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TROPICAL
CYCLONE PROGRAMME

Report No. TCP-30

Regional Association IV (North America, Central America and the Caribbean) Hurricane Operational Plan

2012 Edition

SECRETARIAT OF THE WORLD METEOROLOGICAL ORGANIZATION - GENEVA
SWITZERLAND

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INTRODUCTION

The regional activities under the WMO Tropical Cyclone Programme consist mainly of the programmes pursued by groups of countries acting in concert to improve their warning systems. In Region IV (North America, Central America and the Caribbean) there is a long history of collective action specifically designed to protect people and property from the severe tropical cyclones which are called hurricanes in the Region. A working group, known as the RA IV Hurricane Committee, was established by the seventh session of Regional Association IV (Mexico City, April - May 1977) to promote such activities within the framework of the Tropical Cyclone Programme (Tropical Cyclone Project until Eighth Congress, 1979).

At its first session (San Juan, May 1978), the RA IV Hurricane Committee took a novel approach to its problems by drawing up an RA IV Hurricane Operational Plan with a view to ensuring the most effective co-operation and co-ordination between the countries in preparing and issuing meteorological forecasts and warnings of all tropical cyclones affecting the area. The plan was shortly thereafter adopted by Regional Association IV. It defines the observing, forecasting and warning responsibilities of all cooperating Members and deals with other related items such as terminology and communications. The Committee repeatedly reviews the operational plan and has concluded that it contributes in a very real sense to the improvement of warning systems in the hurricane areas of Region IV. It also serves as a valuable information source for the operational services. Other regional tropical cyclone bodies of the WMO Tropical Cyclone Programme family, the RA I Tropical Cyclone Committee for the South-West Indian Ocean, the WMO/ESCAP Panel on Tropical Cyclones for the Bay of Bengal and the Arabian Sea, the ESCAP/WMO Typhoon Committee and the RA V Tropical Cyclone Committee for the South Pacific and the South-East Indian Ocean have followed this initiative.

As requested by the Hurricane Committee, the RA IV Hurricane Operational Plan has been made available to all concerned through this document. New editions and supplements will be issued from time to time in the years ahead to reflect further development, updating and other changes to the plan.

RESOLUTION 14 (IX-RA IV) - RA IV HURRICANE OPERATIONAL PLAN

REGIONAL ASSOCIATION IV (NORTH AMERICA CENTRAL AMERICA AND THE CARIBBEAN)

NOTING:

(1) Resolution 2914 (XXVI) of the General Assembly of the United Nations - International action for the mitigation of the harmful effects of storms,

(2) Resolution 13 (IX-RA IV) - RA IV Hurricane Committee,

CONSIDERING:

(1) The need to enhance the co-operative efforts of countries within Region IV in carrying out effectively their roles in preparing for and issuing meteorological forecast and warnings of all tropical cyclones affecting the area,

(2) That to achieve this aim it is essential to have an agreed "Hurricane Operational Plan" defining the observing, forecasting and warning responsibilities of all co-operating countries,

DECIDES to adopt the "RA IV Hurricane Operational Plan"*;

AUTHORIZES the president of RA IV to approve on behalf of the Association amendments to this Hurricane Operational Plan, as recommended by the RA IV Hurricane Committee;

REQUESTS the Secretary-General:

(1) To maintain the WMO publication on the RA IV Hurricane Operational Plan in print and to keep it up to date;

(2) To inform all Members concerned of any amendments and updating of the publication.

* Published as WMO/TD-No. 494 Report No. TCP-30

CHAPTER 1

GENERAL

1.1 Introduction

The purpose of this plan is to enhance the co-operative efforts of Members within WMO Region IV in the carrying out of their roles of preparing for and issuing forecasts and warnings of all tropical cyclones affecting the area. Responsibilities of Members are defined. Tropical cyclone releases issued by the Regional/Specialized Meteorological Centre with activity specialization in tropical cyclone analysis, tracking and forecasting, in Miami (RSMC Miami - Hurricane Center) are explained and examples provided. Observational platforms, including land-based radar, satellites and aircraft reconnaissance are discussed. Where differences exist between the USA's National Hurricane Operational Plan (NHOP) and this plan, aircraft radar and upper-air observations made by the US Department of Defence will comply with USA's NHOP. Communication procedures are outlined with special emphasis on headings required to assure proper computer-processing and distribution of messages. The lists of hurricane names for the Caribbean Sea, Gulf of Mexico, the North Atlantic Ocean and the eastern North Pacific are included.

1.2 Terminology used in RA IV

1.2.1 Standard terminology in RA IV

I. Tropical Cyclone A warm-core, non-frontal synoptic-scale cyclone, originating over tropical or subtropical waters, with organized deep convection and closed surface wind circulation about a well defined centre.

A.	Hurricane	A warm core tropical cyclone in which maximum average surface wind (one-minute mean*) is 118 km/h (74 mph) (64 knots) or greater.
B.	Tropical storm	A well organized warm-core tropical cyclone in which the maximum average surface wind (one-minute mean) is in the range 63-117 km/h (39-73 mph) (34-63 knots) inclusive.
C.	Tropical depression	A tropical cyclone in which the maximum average surface wind (one minute mean) is 62 km/h (38 mph) (33 knots) or less.

** For converting the wind speeds of different averaging periods such as 1-min, 2-min, 3-min and 10-min, WMO Tropical Cyclone Programme recommends to follow the guidelines as shown in the ATTACHMENT 1-B.*

II. Subtropical Cyclone. A non-frontal low-pressure system that has characteristics of both tropical and extratropical cyclones. Like tropical cyclones, they are non-frontal, synoptic-scale cyclones that originate over tropical or subtropical waters, and have a closed surface wind circulation about a well-defined center. In addition, they have organized moderate to deep convection, but lack a central dense overcast. Unlike tropical cyclones, subtropical cyclones derive a significant proportion of their energy from baroclinic sources, and are generally cold-core in the upper troposphere, often being associated with an upper-level low or trough. In comparison to tropical cyclones, these systems generally have a radius of maximum winds occurring relatively far from the center (usually greater than 60 n mi), and generally have a less symmetric wind field and distribution of convection.

A.	Subtropical Storm	A subtropical cyclone in which the maximum sustained surface wind is 63 km/h (39 mph) (34 knots) or greater.

B. Subtropical depression — A subtropical cyclone in which the maximum sustained surface wind is less than 63 km/h (39 mph) (34 knots).

III. Tropical wave — A trough or cyclonic curvature maximum in the trade wind easterlies or equatorial westerlies. The wave may reach maximum amplitude in the lower middle troposphere, or may be the reflection of an upper-troposphere cold low or equatorial extension of a mid-latitude trough.

IV. Tropical disturbance — A discrete system of apparently organized convection originating in the tropics or sub-tropics, having a non-frontal migratory character and having maintained its identity for at least 24 hours.

V. Advisory — (English messages) A formal message from a Hurricane Warning Office giving warning information together with details on tropical cyclone location, intensity and movement, and precautions that should be taken. Where possible, the RSMC Miami-Hurricane Center advisory will contain a résumé of all warnings in effect.

A. Hurricane warning — A warning that one or both of the following dangerous effects of a hurricane are expected in a specified area: (a) average winds 118 km/h (74 mph) (64 knots) or higher; (b) dangerously high water or a combination of dangerously high water and exceptionally high waves, even though winds expected may be less than hurricane force. The warning is issued 36 hours in advance of the anticipated onset of tropical-storm-force winds.

B. Hurricane watch — An announcement that hurricane conditions are possible for a within the specified area. The watch is issued 48 hours in advance of the anticipated onset of tropical-storm-force winds.

C. Gale and tropical storm warning — A warning that tropical storm conditions, sustained winds within the range 63-117 km/h (39-73 mph) (34-63 knots) are expected in the specified area within 36 hours or less.

D. Tropical storm watch* — An announcement that tropical storm conditions are possible within the specified area within 48 hours or less.

* The terms "Tropical Storm Warning" and "Tropical Storm Watch" or their equivalent in Spanish are used in coastal or land area warnings by the RSMC Miami-Hurricane Center and an increasing number of Members.

VI. Bulletin (Spanish messages) — A formal message from a Hurricane Warning Office giving warning information, together with details on tropical cyclone location, intensity and movement, and precautions that should be taken.

A. Hurricane Warning — (same as English)

B. Hurricane Watch — (same as English)

C. Gale or Tropical Storm Warning — (same as English)

D. Tropical Storm Watch — (same as English)

E. Advisory — Information on tropical cyclone not requiring watches or warnings at this time.

VII. Bulletin (English) A public release from a weather office issued in the event of the occurrence or forecast occurrence of severe weather, including the developing stage of a tropical cyclone or after formal advisories on a hurricane or tropical cyclone have been discontinued. Bulletins emphasize features which are significant for the safety of the public and summarize all warnings in effect.

1.2.2 Meaning of other terms used

I. Local action statements A public release prepared by a Weather Service Office in or near a threatened area giving specific details for its area of responsibility: (a) weather conditions (b) sections that should be evacuated and (c) other precautions necessary to protect life and property.

II. Hurricane season The portion of the year having a relatively high incidence of hurricanes. In the Atlantic, Caribbean and the Gulf of Mexico, it is the period from 01 June to 30 November, and in the East Pacific, from 15 May to 30 November.

III. Storm surge The difference between the actual water level under influence of a meteorological disturbance (storm tide) and the level which would have been attained in the absence of the meteorological disturbance (i.e. astronomical tide).

IV. Storm tide The actual sea level as influenced by a weather disturbance. The storm tide consists of the normal astronomical tide and the storm surge.

V. "Eye" The relatively clear and calm area inside the circular wall of convective clouds, the geometric centre of which is the centre of the tropical cyclone (hurricane).

VI. Reconnaissance aircraft centre fix of the tropical cyclone, vortex fix. The location of the centre of a tropical cyclone obtained by reconnaissance aircraft penetration.

VII. Centre fix of the tropical cyclone The estimated location of the centre of a tropical cyclone.

1.2.3 Equivalent terms

English	French	Spanish
Advisory	Bulletin spécial	Boletín
Hurricane season	Saison cylonique	Temporada de huracanes
Hurricane warning	Alerte ouragan Pour les iles françaises: Vigilance orange, rouge ou violet (selon le délai)	Alerta de huracán
Hurricane watch	Pré-alerte ouragan Pour les iles françaises: Vigilance jaune ou orange (selon le délai)	Aviso de huracán

1.3 The Saffir/Simpson Hurricane Wind Scale

The Saffir/Simpson Hurricane Scale from one to five based on the hurricane's present intensity, used operationally within RA IV is as follows:

One: Winds 119-153 km h^{-1} (74-95 m.p.h)

Two: Winds 154-177 km h^{-1} (96-110 m.p.h).

Three: Winds 178-208 km h^{-1} (111-129 m.p.h)

Four: Winds 209-251 km h^{-1} (130-156 m.p.h)

Five: Winds 252 km h^{-1} (157 m.p.h) or greater

ATTACHMENT 1 A

RA IV HURRICANE COMMITTEE GLOSSARY OF STORM-RELATED TERMS

(other than those in Chapter 1)

ENGLISH	SPANISH	DESCRIPTION
Analogue method	Método analógico	Forecasting method based on the assumption that a current synoptic situation will develop in the same way as a similar synoptic situation in the past.
Anticyclone	Anticiclón	An area of high pressure, with the highest pressure at the centre. Commonly referred to as "High".
Anticyclogenesis	Anticiclogénesis	Formation of a new anticyclone or intensification of an existing one.
Average one-minute wind speed	Velocidad promedia del viento en un minuto	Determined by averaging observed values from a direct-reading instrument or a recorder over a 1 minute period. The standard height of the wind measuring instrument is 10 meters.
Baroclinic	Baroclínico	An atmospheric state in which the pressure depends upon other variables in addition to density. The isobaric surfaces do not, therefore, coincide with the surfaces of constant specific volume. In a baroclinic atmosphere the variations of the wind with elevation may be quite large.
Barotropic	Barotrópico	A state of the atmosphere in which isobaric surfaces coincide with surfaces of equal density. In a Barotropic atmosphere the variations of the wind with elevation is slight.
Blocking	Bloqueo	Interruption of normal eastward motion due to the stagnancy of an anticyclone (or, less frequently, a cyclone) in their paths.
Circulation	Circulación	General or primary patterns of wind-flow in the atmosphere. Cyclonic circulation is considered positive and Anticyclonic circulation negative.
Climatological forecast	Pronóstico Climatológico	Forecast based on the climate of a region rather than upon the dynamic implications of current weather.
Cold low	Baja fría	Depression or low pressure zone which is cold with respect to its surroundings at the same level of the atmosphere.
Convergence	Convergencia	Increase of mass into an atmospheric layer when the winds are so that there is a net horizontal flow toward inside the layer. Is the opposite to "divergence".
Cyclogenesis	Ciclogénesis	The process that creates a new cyclone or intensifies an existing one.
Cyclone	Ciclón	An area of low pressure, with the lowest pressure at the centre. Commonly referred to as "Low".

ENGLISH	SPANISH	DESCRIPTION
Deepening	Profundización	The process by which the central pressure of a system (i.e. cyclone) decreases with time. Deepening is related to cyclogenesis and results in an increase of the wind speed around a low pressure area.
Divergence	Divergencia	Net outward mass flow from a layer of the atmosphere. Is the opposite to "convergence".
Dropwindsonde	Dropwindsonda	A small radio transmitter, that is dropped from an aircraft with a parachute and transmits to the plane data on temperature, pressure, relative humidity and wind.
Extra-Tropical Cyclone	Ciclón extratropical	A cyclone which attributes the majority of its energy from baroclinic processes. An extra-tropical cyclone has significant vertical wind shears, and a distinctive asymmetric temperature and moisture field. It may develop a cold core in its later stages.
Fetch	Fetch	Length of the section over sea water along which wind blows with almost uniform direction and speed. Height of wind waves is function of the fetch.
Filling	Llenado	Process by which the central pressure of cyclones increases. It is the opposite of "deepening".
Flash flood	Crecida repentina	A flood that rises quite rapidly with little or no advance warning; usually as a result of an intense rainfall over a small area, or, possibly a dam failure etc.
Frontogenesis	Frontogénesis	Process of formation or intensification of a front or frontal zone by means of physical (e.g. radiation) or kinematical (e.g. air motion) influences.
Frontolysis	Frontólisis	Process of weakness or dissipation of a front or frontal zone by means of physical (e.g. radiation) or kinematical (e.g. air motion) influences.
Gale	Viento duro	Sustained winds within the range 63 to 117 km/h (39 to 73 miles per hour) (34 to 63 knots).
Gradient	Gradiente	Change rate of any element value with distance in any given direction.
Gust	Racha	Fluctuation in a short time of wind speed with a variation of 10 knots or more between peaks and lowest speeds.
Hurricane centre or eye	Centro u ojo del huracán	The relatively calm area in the centre of the storm. In this area winds are light and the sky often is only partly covered by clouds.
Hurricane Committee	Comité de Huracanes	Regional Association IV (North America, Central America and the Caribbean) Working Group established in 1977 to promote collective action specifically designed to minimize loss of life and damage to property from tropical cyclones in the Region.

ENGLISH	SPANISH	DESCRIPTION
Inter-tropical Convergence Zone	Zona de Convergencia Inter-Tropical	Narrow zone where the trade winds of the two hemispheres meet. (It is also known as the Equatorial Convergence Zone).
Inversion	Inversión	Condition of the atmosphere when temperature of an air layer increases with height rather than diminish.
Isobar	Isobara	Line connecting points of equal atmospheric pressure on a given surface.
Isochrone	Isocrona	Line connecting all points where a phenomena occurs at the same time.
Isohyet	Isoyeta	Line connecting points where quantity of precipitation collected during a given period has the same value.
Isotach	Isotaca	Line connecting points of equal wind speed.
Isallobar	Isalobara	Line connecting points with the same barometric change during a given period.
Knot	Nudo	Wind speed unit equal to one nautical mile (6.080 feet) (1.8 km) per hour.
Long wave	Onda Larga	Atmospheric waves with wavelength varying from 50° to 120°.
Meridional flow	Flujo meridional	A predominantly north-south wind circulation.
Modelling	Modelización	Use of a theoretical scheme, usually in a mathematical form, of a system or a complex reality that is developed to facilitate its understanding and the study of its behaviour.
Near gale	Viento fuerte	Wind within the speed range 50 to 62 km/h (32 to 38 miles per hour) (28 to 33 knots) (Number 7 of Beaufort Scale).
Numerical Weather Prediction (NWP)	Predicción Numérica del Tiempo (PNT)	Forecast of a pressure field by means of numerical solution of motion equations in a simplified form, usually with the support of electronic computers.
Persistence forecast	Pronóstico de persistencia	Forecast entirely based on tendency to weather persistence.
Polar trough	Vaguada polar	A low pressure trough embedded in the westerly winds prevailing at medium latitudes. They generally move from west to east accompanied by abundant clouds at all levels. Occasionally a well developed polar trough extends until tropical regions. Western Caribbean hurricanes of June and October are frequently formed on polar trough.
Post-Tropical Cyclone	Ciclón Post-Tropical	A cyclone that no longer possesses sufficient tropical characteristics to be considered a tropical cyclone. Post-tropical cyclones can continue carrying intense rainfalls and high winds. [Note that former tropical

ENGLISH	SPANISH	DESCRIPTION
		cyclones that have become fully extra-tropical, as well as remnant lows, are two classes of post-tropical cyclones. The term "post-tropical" is predominantly a convenient communications-term to permit the ongoing use of the storm name.]
Reconnaissance flight	Vuelo de reconocimiento	Flight realized by an aircraft penetrating a tropical storm or hurricane or investigating an area of disturbed weather, with the purpose of carrying out observations.
Recurvature	Recurvatura	Change in the track direction of a tropical cyclone from an initial westward movement until its later normal movement poleward and eastward.
Ridge of high pressure	Cuña de alta presión	Elongated area of high pressure displacing between two depressions or troughs.
Spiral band	Banda espiral	A long and narrow spiral band found inserted into wind circulation around a hurricane. Convergence and rainfall reach maximum values into spiral bands.
Squall	Turbonada	Atmospheric phenomenon characterized by a very large variation of wind speed: it begins suddenly, has a duration of the order of minutes, and decreases its speed quickly. It is often accompanied by showers or storms.
Squall line	Línea de turbonada	Fictitious moving line, sometimes of considerable extension, along which squall phenomena occurs. They frequently precede cold fronts, but occasionally they are present within the external area of the hurricane cloud cover.
Statistical forecast	Pronóstico estadístico	Objective forecast based on a statistical study of the past behaviour of the atmosphere, expressed in the form of regression formulae, probabilities, etc.
Subsidence	Subsidencia	Slow downfall of an air mass over an extended region. It is usually accompanied by horizontal divergence at lower layers.
Swell	Mar de leva	Any water waves system which has not been generated locally.
Thunderstorm	Tormenta	One or more sudden electrical discharges manifested by a luminous flash (lighting) and a sharp or noisy sound (thunder).
Tornado	Tornado	A severe rotating windstorm of small diameter and great destructive power. It is the most violent natural meteorological phenomenon. With certain frequency they can occur within hurricanes circulation. Although tornadoes associated with several weather situations occur over land areas in many parts of the world, they are relatively frequent in the forward portion of the hurricane periphery.

ENGLISH	SPANISH	DESCRIPTION
Tropical weather outlook	Perspectivas del tiempo en los trópicos	A report containing information on possible evolution of tropical weather prepared by RSMC Miami - Hurricane Center from 1 June through 30 November, and transmitted at 0600, 1200, 1800, and 0000 UTC. The outlook discusses which areas are expected to remain stable, which disturbed or suspicious areas are becoming favourable for tropical development during the next day or two.
Trough of low pressure	Vaguada de baja presión	An elongated area of low pressure with U-shaped or V-shaped isobars which concavities are addressed toward low pressure.
Typhoon	Tifón	Name given to "hurricanes" in the China Sea and, more commonly, in the north-west Pacific Ocean.
Vortex	Vórtice	Any rotating wind system.
Vorticity	Vorticidad	Tendency of a fluid to turn or rotate around an arbitrarily oriented axis.
Waterspouts	Tromba marina	Small, revolving storm over oceans or inland waters. They occasionally move towards inland and cause some damage, but winds are less severe than those in tornadoes, which they resemble in appearance.
Wind	Viento	The horizontal movement of the air with respect to earth surface.
Wind shear	Cizalladura del viento	Space variation of wind speed in a given direction (horizontal or vertical).
Wind stress	Fuerza del viento	The drag or tangential force per unit area exerted on the surface of the earth by the adjacent layer of moving air.

ACRONYMS:	SIGLAS:	
GOES	GOES	Geo-stationary Operational Environmental Satellite
HOMS	HOMS	Hydrology Operational Multipurpose System
IOC	COI	Intergovernmental Oceanographic Commission
RSMC	CMRE	Regional Specialized Meteorological Centre
TCP	PCT	Tropical Cyclone Programme
WWW	VMM	World Weather Watch Programme. Consists of the following elements: - GOS (SMO) - Global Observing System; - GTS (SMT) - Global Telecommunication System; - GDPS (SMPD) - Global Data Processing System.

ATACHMENT 1 B

GUIDELINES FOR CONVERTING BETWEEN VARIOUS WIND AVERAGING PERIODS IN TROPICAL CYCLONE CONDITIONS

This note is based on recommendations from Harper et al. (2010) and extracts from Knaff and Harper (2010), providing advice on why, when and how "wind averaging conversions" can be made.

a) Why Convert Wind Speeds?

From the observational perspective, the aim is to process measurements of the wind so as to extract an estimate of the **mean** wind at any time and its **turbulence** properties. From the forecasting viewpoint, the aim is, given a specific wind speed metric derived from a process or product, to usefully predict other metrics of the wind. Typically these needs revolve around the concept of the mean wind speed and an associated peak gust wind speed; such that the statistical properties of the expected level of wind turbulence under **different exposures** can be used to permit useful conversions **between peak gust wind speed** estimates.

b) When to Convert Wind Speeds?

Wind speed conversions to account for varying averaging periods only apply in the context of a maximum (peak gust) wind speed of a given duration observed within some longer interval. Simply measuring the wind for a shorter period of time at random will not ensure that it is always higher than the mean wind (given that there are both lulls and gusts). It is important that all wind speed values be correctly identified as an estimate of the **mean wind** or an estimate of a **peak gust**.

Once the mean wind is reliably estimated, the random effects of turbulence in producing higher but shorter-acting wind gusts, typically of greater significance for causing damage, can be estimated using a "gust factor". In order for a gust factor to be representative, certain conditions must be met, many of which may not be exactly satisfied during a specific weather event or at a specific location:

- Wind flow is turbulent with a steady mean wind speed (**statistically stationary**);
- Constant surface features exist within the period of measurement, such that the boundary layer is in equilibrium with the underlying surface roughness (**exposure**);
- The conversion assumes the mean wind speed and the peak gust wind speed are at the same **height** (e.g. the WMO standard observation height +10 m) above the surface.

c) How to Convert Individual Point-Specific Wind Speeds

Firstly, the mean wind speed estimate V should be explicitly identified by its averaging period T_o in seconds, described here as V_{To} , e.g.

V_{600} is a 10-min averaged mean wind estimate;
V_{60} is a 1-min averaged mean wind estimate;
V_3 is a 3-sec averaged mean wind estimate.

Next, a peak gust wind speed should be additionally prefixed by the gust averaging period τ , and the time period over which it is observed (also termed the **reference period**), described here as $V_{\tau,To}$, e.g.

$V_{60,600}$ is the highest 1-min mean (peak 1-min gust) within a 10-min observation period;
$V_{3,60}$ is the highest 3-sec mean (peak 3-sec gust) within a 1-min observation period.

The "gust factor" $G_{\tau,To}$ then relates as follows to the mean and the peak gust:

$$V_{\tau,To} = G_{\tau,To} V ,$$

where the (true) mean wind V is estimated on the basis of a suitable sample, e.g. V_{600} or V_{3600}.

On this basis, Table 1 provides the recommended near-surface (+10 m) conversion factors $G_{\tau,To}$ between typical peak gust wind averaging periods, which are a strong function of the exposure class because the turbulence level varies depending on the surface roughness. Table 1 only provides a range of indicative exposures for typical forecasting environments and Harper et al. (2010) or WMO (2008) should be consulted for more specific advice regarding particular types of exposures - especially if it is intended to calibrate specific measurement sites to "standard exposure".

Table 1 Wind speed conversion factors for tropical cyclone conditions (after Harper et al. 2010).

Exposure at +10 m		Reference Period	Gust Factor $G_{\tau,To}$				
Class	Description		*Gust Duration* τ (s)				
		T_o (s)	*3*	*60*	*120*	*180*	*600*
In-Land	Roughly open terrain	3600	1.75	1.28	1.19	1.15	1.08
		600	1.66	1.21	1.12	1.09	1.00
		180	1.58	1.15	1.07	1.00	
		120	1.55	1.13	1.00		
		60	1.49	1.00			
Off-Land	Offshore winds at a coastline	3600	1.60	1.22	1.15	1.12	1.06
		600	1.52	1.16	1.09	1.06	1.00
		180	1.44	1.10	1.04	1.00	
		120	1.42	1.08	1.00		
		60	1.36	1.00			
Off-Sea	Onshore winds at a coastline	3600	1.45	1.17	1.11	1.09	1.05
		600	1.38	1.11	1.05	1.03	1.00
		180	1.31	1.05	1.00	1.00	
		120	1.28	1.03	1.00		
		60	1.23	1.00			
At-Sea	> 20 km offshore	3600	1.30	1.11	1.07	1.06	1.03
		600	1.23	1.05	1.02	1.00	1.00
		180	1.17	1.00	1.00	1.00	
		120	1.15	1.00	1.00		
		60	1.11	1.00			

Some example applications of the above recommendations are:

- To estimate the expected "off-land" 3-sec peak gust in a 1-min period, multiply the estimated "off-land" mean wind speed by 1.36
- To estimate the expected "off-sea" 3-sec peak gust in a 10-min period, multiply the estimated "off-sea" mean wind speed by 1.38
- To estimate an "at-sea" 1-min peak gust in a 10-min period, multiply the estimated "at-sea" mean wind speed by 1.05

Note that it is not possible to convert from a peak gust wind speed back to a **specific** time-averaged mean wind – only to the **estimated true mean** speed. Hence to estimate the "off-sea" mean wind speed given only a peak observed gust of 1-min duration (τ = 60 s) measured in a 10-min period (T_o = 600 s), multiply the observed 1-min peak gust by (1/1.11) = 0.90. This does not guarantee that the estimated mean wind will be the same as the 10-min averaged wind at that time but, because the 10-min average is normally a reliable estimate of the true mean wind, it will likely be similar. In all cases, measurement systems should aim to reliably measure the mean wind speed and the standard deviation using a

sample duration of not less than 10-min (WMO 2008), i.e. V_{600}. Additional shorter averaging periods and the retaining of peak information should then be targeted at operational needs.

d) Converting Between Agency Estimates of Storm Maximum Wind Speed *Vmax*

This is a slightly different situation from converting a point specific wind estimate because the concept of a storm-wide maximum wind speed *Vmax* is a metric with an associated spatial context (i.e. anywhere within or associated with the storm) as well as a temporal fix context (at this moment in time or during a specific period of time). While it may be expressed in terms of any wind averaging period it remains important that it be unambiguous in terms of representing a mean wind or a peak gust. Agencies that apply the WMO standard 10-min averaged *Vmax* wind have always applied a wind-averaging conversion to reduce the maximum "sustained" 1-min wind value (a 1-min peak gust) that has been traditionally associated with the Dvorak method (Dvorak 1984, Atkinson and Holliday 1977)[1]. As noted in the previous section, it is technically not possible to convert from a peak gust back to a specific time-averaged mean wind – only to the estimated true mean wind speed. However, in Harper et al. (2010) a practical argument is made for nominal conversion between $Vmax_{60}$ and $Vmax_{600}$ values via an hourly mean wind speed reference, and the recommendations are summarised in Table 2.

It can be noted that the recommended conversion for at-sea exposure is about 5% higher than the "traditional" value of 0.88 (WMO 1993), which is more appropriate to an off-land exposure. This has special implications for the Dvorak method because "at sea" is the typical exposure of interest where such conversions have been traditionally applied.

Table 2 Conversion factors between agency estimates of maximum 1-min and maximum 10-min averaged tropical cyclone wind speed *Vmax*. (after Harper et al. 2010).

$Vmax_{600}=K\ Vmax_{60}$	At-Sea	Off-Sea	Off-land	In-Land
K	0.93	0.90	0.87	0.84

e) References

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[1] As detailed in Harper et al. (2010), this traditional assumption is without a firm basis.

C H A P T E R 2

RESPONSIBILITIES OF MEMBERS

2.1 Forecasts and warnings for the general population

The area of responsibility of RSMC Miami for issuing tropical and subtropical cyclone advisories is the North Atlantic Ocean, the Caribbean Sea, Gulf of Mexico, North Pacific Ocean eastward from 140ºW.

2.1.1 In Region IV the responsibility for preparing and issuing warnings is as follows:

Antigua & Barbuda	The islands and coastal waters of Antigua, Anguilla, Barbuda, British Virgin Islands, Montserrat, Nevis and St. Kitts;
Bahamas	The islands and coastal waters of the Bahamas and the Turks and Caicos Islands;
Barbados	The islands and coastal waters of Barbados, Dominica, St. Vincent and the Grenadines;
Belize	The islands, coastal waters and inland areas of Belize;
Bermuda	The islands and coastal waters of Bermuda;
Canada	The islands, coastal waters and inland areas of Canada;
Cayman Islands	The islands, and coastal waters of Cayman Islands;
Colombia	The islands, coastal waters and inland areas of Colombia;
Costa Rica	The islands, coastal waters and inland areas of Costa Rica;
Cuba	The islands, coastal waters and inland areas of Cuba;
Curacao and Sint Maarten	The islands and coastal waters of Curacao, St Maarten, Bonaire, Saba and St. Eustatius
Dominican Republic	The islands, coastal waters and inland areas of the Dominican Republic;
El Salvador	The islands, coastal waters and inland areas of El Salvador;
France	The coastal waters and islands of Martinique; Guadeloupe (Grande Terre and Basse Terre); Marie-Galante, Desirade and Les Saintes; St Barthelemy; St Martin;
Guatemala	The coastal waters and inland areas of Guatemala;
Honduras	The islands, coastal waters and inland areas of Honduras;
Jamaica	The coastal waters and islands of Jamaica;
Mexico	The islands, coastal waters and inland areas of Mexico;
Netherlands	The island and coastal waters of Aruba;
Nicaragua	The islands, coastal waters and inland areas of Nicaragua;
Panama	The islands, coastal waters and inland areas of Panama;

Saint Lucia	The island and coastal waters of Saint Lucia;
Trinidad and Tobago	The islands and coastal waters of Trinidad, Tobago, and Grenada and its dependencies;
United States of America	The islands, coastal waters and inland areas of the United States of America, including Puerto Rico and the US Virgin Islands. In addition, the USA has agreed to issue warnings for Haiti, and its coastal waters. Forecasts issued by the USA are discussed in Chapter III;
Venezuela	The islands, coastal waters and inland areas of Venezuela.

The dissemination of these warnings within each country or territory is the responsibility of that country or territory.

2.1.2 Some countries have established the following backups for Watches, Warnings and agreed-upon essential products which should include terminal forecasts for main airports. Details of these products are arranged bilaterally.

(a) Barbados will take over the responsibility of Antigua & Barbuda and/or Saint Lucia;

(b) Antigua & Barbuda will take over the responsibility of Barbados with respect to the islands and coastal waters of Dominica.

(c) Trinidad and Tobago will take over the responsibility of Barbados with respect to the islands and coastal waters of Barbados and St. Vincent and the Grenadines. Trinidad and Tobago will serve as a secondary backup to Barbados with respect to Saint Lucia;

(d) USA will take over the responsibility of Bahamas and Jamaica;

(e) USA will take over the responsibility of Curacao and Sint Maarten

(f) Barbados will take over the responsibility of Trinidad and Tobago.

(g) The Cayman Islands will take over responsibility for Belize, with Jamaica serving as a secondary backup to the Cayman Islands with respect to Belize.

(h) Jamaica will take over the responsibility of the Cayman Islands;

(i) USA, the backup to RSMC Miami is the HPC, Washington

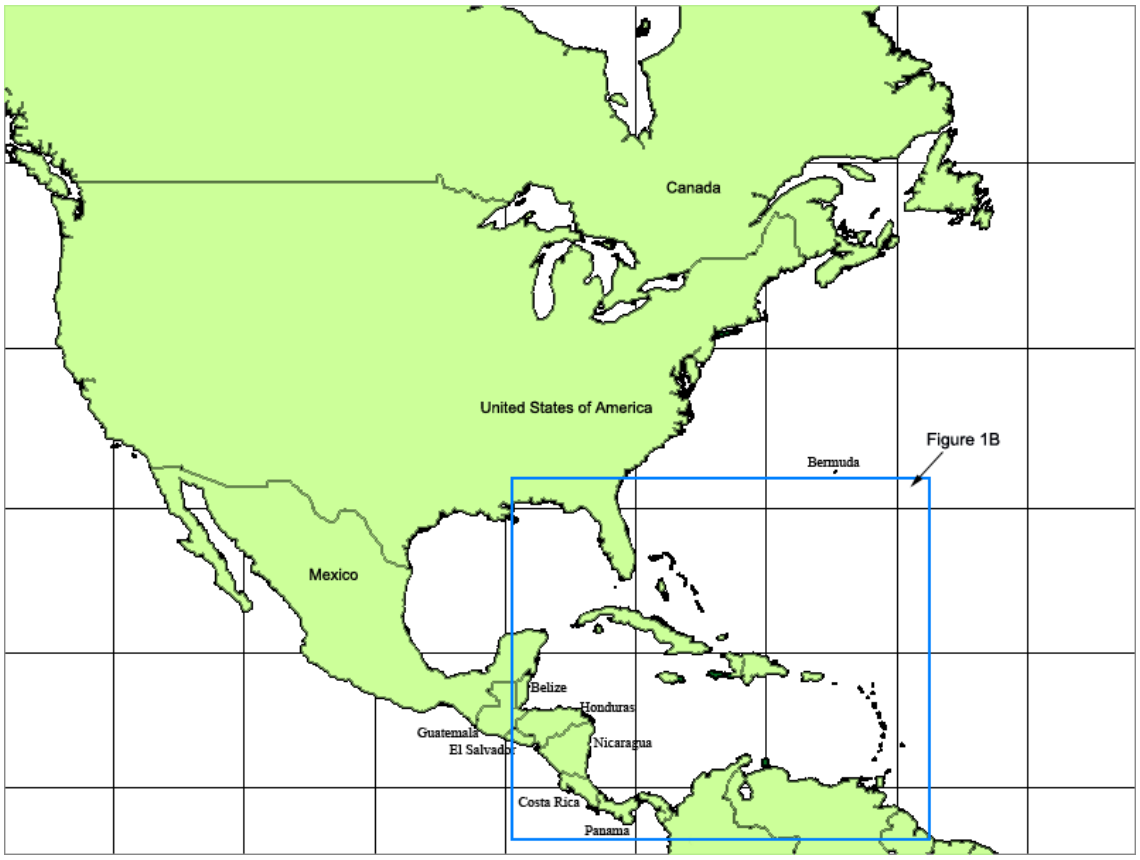

Figure 1-A:Tropical cyclone warning responsibility of RA IV countries described in paragraph 2.1

Figure 1-B: Tropical cyclone warning responsibility of RA IV
countries described in paragraph 2.1

2.2 Forecasts and warnings for the open sea and civil aviation

2.2.1 In accordance with the WMO Manual on Marine Meteorological Services, the USA is responsible for preparing marine tropical cyclone forecasts and warnings for the Caribbean Sea, Gulf of Mexico and the North Atlantic Ocean. These forecasts and warnings are available as part of a tropical cyclone forecast/advisory bulletin (reference chapter 3, section 3.2.4).

2.2.2 In accordance with the International Civil Aviation Organization (ICAO) Air Navigation Plans (ANPs) for the Caribbean (CAR), North Atlantic (NAT) and South American (SAM) Regions, warnings of tropical cyclones for international air navigation are issued as SIGMET messages by designated meteorological watch offices (MWOs), each of which provides information for one or more specified flight information regions (FIRs) or upper information regions (UIRs). The boundaries of the FIRs/UIRs are defined in ICAO ANPs for the CAR, NAT and SAM Regions.

2.2.3 SIGMET information is provided in accordance with WMO-No. 49 - Technical Regulations, Volume II (Meteorological Services for International Air Navigation). SIGMETs for tropical cyclones are issued for those tropical cyclones having a 10-minute mean surface wind speed of 63 km/h (34 kt) or more, **except in Regional Association IV where the mean surface wind will be averaged over a one-minute period.** While ICAO wished to standardize the practice of averaging globally, it recognized that the RA IV practice does not constitute a safety problem for aviation; it simply implies that some additional SIGMET messages would be issued for those tropical cyclones in which the ten-minute average would remain below the specified 63 km/h (34 kt) threshold.

2.2.4 The RSMC Miami – Hurricane Center disseminates advisory information on positions of the centre of the tropical cyclones to MWOs as appropriate for use in the preparation of SIGMETs for tropical cyclones. To facilitate automated pre-flight planning services, the responsible MWO in RA IV, located in the USA, will issue tropical cyclone advisory messages in accordance with amendment 72 to Annex 3.

2.3 Satellite rainfall estimates

The USA will provide satellite rainfall estimates when a tropical system is within 36 hours of making landfall within the region.

2.4 Observations

(a) Radar: All nations in RA IV with radars will ensure the distribution of radar data and/or imagery whenever a tropical disturbance is within radar range. Content of the data and/or imagery will be in accordance with chapter 4 of this document.

(b) Reconnaissance: The USA will make available all operational weather reconnaissance observations obtained in connection with tropical disturbances;

(c) Satellite: Near-polar-orbiting and geostationary satellite products will be made available to countries having the necessary receiving equipment (see WMO-No. 411);

(d) Surface: In addition to routine observations, additional observations will be taken by Members when requested by RSMC Miami - Hurricane Center;

(e) Upper-air: Besides routine observations, additional rawinsonde observations will be taken by Members when requested by RSMC Miami - Hurricane Center.

2.5 Communications

Members will disseminate forecasts, warnings and observations in accordance with established communications headings presented in the Manual on the Global Telecommunication System (WMO-No. 386).

2.6 Information

RSMC Miami - Hurricane Center will serve as a regional information centre on tropical meteorology including tropical cyclones. This function is performed both during active tropical cyclone periods and as a source of information on past tropical cyclone activity.

CHAPTER 3

TROPICAL CYCLONE PRODUCTS OF THE RSMC MIAMI

NOTE: ALL REFERENCES TO TROPICAL CYCLONES APPLY TO SUBTROPICAL CYCLONES

3.1 Tropical Cyclone Forecast and Advisory Products

3.1.1 Tropical Cyclone Public Advisories (TCP) are the primary tropical cyclone information products issued to the public. The RSMC Miami will issue these products on the criteria set in section 3.1.1.1.

3.1.1.1 Issuance Criteria. In the Atlantic, RSMC Miami will issue TCPs for all tropical cyclones. The initial advisory will be issued when data confirm a tropical cyclone has developed. The title of the advisory will depend upon the intensity of the tropical cyclone as listed below.

a. A tropical depression advisory refers to a tropical cyclone with 1-minute sustained winds up to 62 km/h or 38 mph.

b. A tropical storm advisory will refer to tropical cyclones with 1-minute sustained surface winds 63- 117 km/h or 39 to 73 mph.

c. A hurricane advisory will refer to tropical cyclones with winds 118 km/h or 74 mph or greater.

Public advisories will discontinue when either:

a. The tropical cyclone becomes post-tropical

b. The tropical cyclone drops below depression stage (dissipates or becomes a remnant low)

c. Moves inland and watches and warnings are no longer required.

When RSMC Miami writes the last advisory on a system because it has dissipated or become post-tropical, the cyclone type that appears in the product type line will reflect the current status of the system (i.e., Post-Tropical Cyclone or Remnants of).

3.1.1.2 Issuance Times. RSMC Miami will issue public advisories at 0300, 0900, 1500, and 2100 Universal Time Coordinated (UTC) with valid position times corresponding to the advisory time.

3.1.1.3 Format and Content. The TCP is comprised of five sections: Summary, Watches and Warnings, Discussion and 48-hour Outlook, Hazards, and Next Advisory. Each section of the TCP begins with a specific header text string. Advisories can begin with a lead statement or headline to emphasize significant aspects of the tropical cyclone. The Summary section contains the cyclone position in latitude and longitude coordinates, its distance from a well-known reference point, the maximum sustained winds, the cyclone's current direction and speed of motion, and the estimated or measured minimum central pressure. Advisories will list watches and warnings for hurricane and tropical storm conditions with recent changes highlighted at the top of the section. The Discussion and 48-h Outlook section will discussion the cyclone's current characteristics, including location, motion, intensity, and pressure and a general description of the predicted track and intensity of the cyclone over the next 24 to 48 hours. Any pertinent weather observations will also be included in this section. The Hazards section includes information on hazards to land such as storm surge/tide, wind, rainfall, tornadoes, and rip currents associated with the cyclone. The Next Advisory section indicates the time and office responsible for the next advisory will be provided along with new message headers if the tropical cyclone is passed to another Center. The forecaster's name will be included at the end of the message.

3.1.1.3.1 Units. Times in advisories should be local time of the affected area; however, local time and UTC should be used when noting the storm's location. The notation "Z" will not be used. All advisories will use statute miles and statute miles per hour, followed by the metric units of kilometers and kilometers per hour.

3.1.1.3.2 Tropical Storm/Hurricane Watches and Warnings. RSMC Miami will assist in coordination of tropical storm/hurricane watches and warnings if tropical storm/hurricane conditions are possible over land areas.

RSMC Miami will make every effort to list all tropical cyclone watches and warnings in effect. The first advisory in which watches or warnings are mentioned should give the effective time of the watch or warning, except when it is being issued by other countries and the time is not known.

Except for tropical storms and hurricanes forming close to land, it is recommended that a watch should precede a warning. Once a watch is in effect, it should either be replaced by a warning or remain in effect until the threat of the tropical cyclone conditions has passed. A hurricane watch and a tropical storm warning can be in effect for the same section of coast at the same time. It is not advantageous to step down warnings for tropical cyclones. This approach would cause confusion for the media and public, and this is especially true for tropical cyclones whose tracks parallel the coast.

3.1.1.3.3 Location and Movement. All advisories will include the location of the centre of the tropical cyclone by its latitude and longitude, and distance and direction from a well known point, preferably downstream from the tropical cyclone. If the forecaster is unsure of the exact location of a depression, the position may be given as within 50, 75, etc., miles/km of a map coordinate. When the centre of the tropical cyclone is over land, give its position referencing the state or country in which it is located and in respect to some well known city, if appropriate.

In order to avoid confusion for the media and public or the interests of the nation involved, it is recommended that RSMC Miami coordinates and acts in agreement with any NMHS in RAIV, before the issuance of any new advisory, in cases when changes in the classification of the tropical cyclone is intended to occur near or into the territorial waters, or into the territory of the Country itself, of any RAIV Member.

Movement forecasts apply to the tropical cyclone's centre. The present movement is given to 16 points of the compass if possible. A 24-hour forecast of movement is included in terms of a continuance or departure from the present movement and speed. This may be reduced to a 12-hour forecast. Uncertainties in either the tropical cyclone's location or movement should be explained in the advisory. An outlook beyond 24 hours (out to 120 hours when appropriate) may be included in the text of the advisory.

Landfall forecasts of the centre will be made with caution to avoid giving the public any false sense of security. Other forecast parameters can be used to describe the centre's landfall. When a threat to land exists, It is important to stress the tropical cyclone's effects extend well beyond the small area near the tropical cyclone's centre.

3.1.1.3.4 Wind and Intensity. Maximum observed 1-minute sustained surface wind speed will be given. During landfall threats, specific gust values and phrases like "briefly higher in squalls" may be used. Also included is the area (or radius) of both tropical and hurricane force winds. When warnings are in effect, the expected times of onset of tropical storm and hurricane force winds along the coast in general terms will be given, such as "this afternoon" or "tonight." Intensity forecasts for 12 hours only will be stated as an "increase," "decrease," or "no change" from the present intensity. The storm may also be compared to some memorable hurricane or referred to by relative intensity. Where appropriate, use the Saffir/Simpson Hurricane Wind Scale in public releases.

3.1.1.3.5 Pressure. Central pressure values in millibars and inches as determined by available data will be provided.

3.1.1.3.6 Storm Surge. Storm surge forecasts should highlight areas along the coast and within bays that are likely to experience dangerous flooding from storm surge. When possible, timing should be estimated or should be referenced to storm position, e.g. "as the hurricane is making landfall", or "as strong winds turn to the southwest". Wave information should be included for the outer coastline when possible. Storm surge heights should be indicated as values above the normal, predicted astronomical tide level. Note should be made of abnormally high or low astronomical tides, and their times of occurrence.

3.1.1.3.7 Inland Impacts. The inland impacts of tropical cyclones in advisories will be highlighted. This includes the threat of strong winds, heavy rainfall, flooding, and tornadoes. The extent and magnitude of inland winds as well as anticipated rainfall amounts and potential for flooding and tornadoes will be included. Tornado and flood watches will be mentioned as appropriate and actual occurrences of tornadoes, floods, and high winds with a note of urgency and supporting warnings and statements from local weather offices

To further publicize local products, when a tropical cyclone threatens a land area, the following statement in the TCP will be included: "For storm information specific to your area in the United States...please monitor products issued by your local National Weather Service Forecast Office. For storm information specific to your area outside of the United States...please monitor products issued by your National Meteorological Service."

3.1.1.4 Intermediate Public Advisories. These products are issued on a 2- to 3-hourly interval between scheduled advisories (see times of issuance below). 3-hourly intermediate advisories are issued whenever a tropical storm or hurricane watch/warning is in effect. 2-hourly intermediates are issued whenever tropical storm or hurricane warnings are in effect and coastal radars are able to provide RSMC Miami with a reliable hourly centre position. For clarity, when issuing intermediate public advisories, a statement at the end of the scheduled public advisory will be included informing customers when an intermediate advisory will be issued, i.e., "AN INTERMEDIATE ADVISORY WILL BE ISSUED BY THE NATIONAL HURRICANE CENTER AT 2 PM EDT FOLLOWED BY THE NEXT COMPLETE ADVISORY ISSUANCE AT 5 PM EDT."

Intermediate advisories can be used to clear all, or parts of, a watch or warning area. Content should be similar to the scheduled advisory.

a. Three hourly issuances...Scheduled advisories at 0300, 0900, 1500, and 2100 UTC. Intermediates at 0000, 0600, 1200, and 1800 UTC.

b. Two hourly issuances...Scheduled advisories at 0300, 0900, 1500, and 2100 UTC. Intermediates at 2300, 0100, 0500, 0700, 1100, 1300, 1700, and 1900 UTC.

3.1.1.5 Special Public Advisories. Special public advisories are unscheduled products issued whenever an unexpected change has occurred requiring a revised forecast or a tropical storm/hurricane watch or warning.

3.1.2 Tropical Cyclone Forecasts/Advisories (TCM). RSMC Miami will prepare these products for all tropical cyclones within their area of responsibility. They will be issued and cease under the criteria given in section 3.1.1.1.

3.1.2.1 Issuance Times. Issue advisories at 0300, 0900, 1500, and 2100 UTC.

3.1.2.2 Format and Content. Tropical cyclone forecasts/advisories will contain appropriate information as shown in Attachment A in a standard consistent format. All forecast advisories will contain 12-, 24-, 36-, 48-, 72-, 96-, and 120-hour forecast positions, and 1-minute surface wind speeds (intensity). The 34- and 50-knot (four-quadrant) wind speed radii will be defined for 12-, 24-, 36-, 48-, and 72-hours. It will also contain forecast 64-knot wind speed radii at 12-, 24-, and 36-hours. No position or wind speed will accompany the forecast of "dissipated." A standard statement indicating the uncertainty associated with the 96- and 120-hour forecast positions will precede those two forecasts.

NOTE: As part of the header, append a code string at the end of the line "NWS NATIONAL HURRICANE CENTER MIAMI FL."

Format: NWS NATIONAL HURRICANE CENTER MIAMI FL BSNOYR
where: (BS) is the basin (AL, EP or CP)
where: (NO) is the tropical cyclone number (01, 02, 03,...99)
where: (YR) is the last two digits of the year.

A special tropical cyclone forecast/advisory updates a scheduled advisory if unexpected changes have occurred in a tropical cyclone. Content of the special advisory will reflect significant changes requiring the special advisory to be issued. Issue special tropical cyclone forecast/advisories in conjunction with the issuance of a special public advisory.

3.1.3 Tropical Cyclone Discussion (TCD). RMSC Miami issues this product to explain forecasters' reasoning behind analysis and forecast of the tropical cyclone. The issuance time zone for the TCD will be consistent with the companion Public Advisory, so that they will be issued and cease under the criteria given in section 3.1.1.1.

3.1.3.1 Issuance Times. RSMC Miami will issue tropical cyclone discussions at 0300, 0900, 1500, and 2100 UTC and with all special advisories.

3.1.3.2 Format and Content. Discussions include prognostic reasoning; objective techniques employed; guidance used; coordinated 12-, 24-, 36-, 48-, 72-, 96-, and 120-hour tropical cyclone forecast points; maximum sustained wind speed forecasts for each forecast point; other meteorological decisions; and plans for watches and warnings. No position or wind speed will accompany the forecast of "dissipated".

3.1.4 Tropical Cyclone Updates (TCU). These products, brief statements issued by RSMC Miami are in lieu of or preceding special advisories, form of unexpected changes in a tropical cyclone or post or cancel watches and warnings.

3.1.5 Tropical Cyclone Position Estimate (TCE). RSMC Miami will issue a position estimate between 2-hourly intermediate public advisories whenever sufficient reliable radar centre fix information is available. Position estimates provide location in map coordinates, distance, and direction from a well known point. Position estimates are transmitted near the beginning of the hour.

3.1.6 Tropical Cyclone Surface Wind Speed Probabilities. This product will be issued for all tropical and subtropical cyclones in the Atlantic, East Pacific and Central Pacific basins and will be available no earlier than 15 minutes following the issuance deadlines for routine advisories (03, 09, 15, and 21 UTC) and after special advisories. Probabilities are statistically based on track, intensity, and wind structure uncertainties during recent years in the official tropical cyclone forecasts. They are computed for coastal and inland cities as well as some offshore locations (e.g., buoys). The product provides probabilities for sustained wind speeds equal to or exceeding three wind speed thresholds: 34, 50 and 64 knots. Two types of probability values are produced: individual period and cumulative. Individual period probabilities are provided for each of the following time intervals: 0-12 hours, 12-24 hours, 24-36 hours, 36-48 hours, 48-72 hours, 72-96 hours, and 96-120 hours. These individual period probabilities indicate the chance the particular wind speed will start during each interval at each location. Cumulative probabilities are also produced for the following time periods: 0-12 hours, 0-24 hours, 0-36 hours, 0-48 hours, 0-72 hours, 0-96 hours, and 0-120 hours. These cumulative probabilities indicate the overall chance the particular wind speed will occur at each location during the period between hour 0 and the forecast hour. The tropical cyclone wind speed probability text products are found under header FONT1 (01-05) for the Atlantic basin and FOPZ1 (01-05) for the eastern North Pacific basin.

3.2 Subtropical Cyclone Forecast and Advisory Products

3.2.1 Subtropical Cyclone Public Advisories (TCP). RSMC Miami will issue subtropical cyclone advisories. However, due to the lack of well-defined criteria for distinguishing subtropical from non-tropical lows, marginally-subtropical systems may be handled as non-tropical gale or storm centres in High Seas forecast products. Format and content of these products are similar to the public tropical cyclone advisory. (See Attachment 3A for an example). The advisories are titled "SUBTROPICAL DEPRESSION ##" and in the message body is referred to as "SUBTROPICAL

DEPRESSION ##." If winds reach subtropical storm strength, the storm receives the next available name. The advisories are titled "SUBTROPICAL STORM (name)" and in the body of the message the storm is referred to as "SUBTROPICAL STORM (name)." Information is listed in order of importance with a lead statement, when appropriate, followed by a summary of all coastal warnings. Latitude and longitude coordinates are used to identify the centre of the storm. These advisories are issued at the same scheduled times as public tropical cyclone advisories.

Special Subtropical Public Cyclone Advisories will be issued to (1) update previously scheduled advisories whenever an unexpected significant change has occurred in the cyclone or (2) to issue warnings.

3.2.2 Subtropical Cyclone Forecast/Advisory (TCM). These advisories are issued for all subtropical cyclones within RSMC Miami area of responsibility. The advisory is written in the same format and content as the tropical cyclone forecast/advisories. The advisories are titled "SUBTROPICAL DEPRESSION ##" and in the body of the message the depression is referred to as "SUBTROPICAL DEPRESSION ##." If winds reach subtropical storm strength, the storm receives the next available name. Advisories will be titled "SUBTROPICAL STORM (name)" and refer to in the body of the message as "SUBTROPICAL STORM (name)." These are issued at the same times as scheduled tropical cyclone forecast/advisories.

Special Subtropical Cyclone Forecast/Advisories are issued to update any unexpected change which occurred with the subtropical cyclone. Format remains the same as the scheduled advisory being replaced. These will be issued with every special subtropical cyclone public advisory.

3.3 Numbering and Naming Tropical Cyclones

3.3.1 Numbering and Naming Tropical Cyclones. RSMC Miami will number tropical depressions in their areas of responsibility. Tropical depressions will be numbered consecutively beginning each season with the spelled out number "ONE." In the Pacific, for ease in differentiation, tropical depression numbers, assigned by RSMC Miami or RSMC Honolulu, will include the suffix "E" (for eastern) or "C," (for central) respectively, after the number. In both the Atlantic and Pacific, once the depression reaches tropical storm intensity, it will be given a name and the depression number dropped. The depression number will not be used again until the following year. Tropical cyclones will be given a name in the first advisory after intensifying to 34 knots (63 km/h, 39 mph) or greater.

The following rules apply for tropical cyclones passing from basin to another: the name will be retained if a tropical cyclone passes from one basin into another basin as a tropical cyclone, i.e. advisories are continuous. An unnamed tropical depression will also retain its number (e.g. Tropical Depression Six-E remains Tropical Depression Six-E) if it crosses into another basin.

Within a basin, if the remnant of a tropical cyclone redevelops into a tropical cyclone, it is assigned its original number or name. If the remnants of a former tropical cyclone regenerate in a new basin, the regenerated tropical cyclone will be given a new designation.

3.4 Numbering Advisories and Tropical Discussions

Scheduled and special advisories will be numbered consecutively beginning with the number 1 (not spelled out) for each new tropical or subtropical cyclone, and continue through the duration of the cyclone. In both the Atlantic and the Pacific, intermediate advisories and TCDs will retain the advisory number of the scheduled or special advisory they update and append an alphabetic designator (i.e., "HURRICANE ALLISON INTERMEDIATE ADVISORY NUMBER 20A").

3.5 Other Products

3.5.1 Tropical Weather Discussion (TWD). RSMC Miami will issue these discussions to describe major synoptic weather features and significant areas of disturbed weather in the tropics. One discussion will cover the Gulf of Mexico, the Caribbean, and the Atlantic between the equator and 32° north latitude and be transmitted at 0605, 1205, 1805, 0005 UTC. A second message for the

eastern Pacific between the equator and 32° north and east of 140° west will be transmitted at 0405, 1005, 1605, and 2205 UTC.

3.5.2 Tropical Weather Outlook (TWO). RSMC Miami will prepare the TWO during the tropical cyclone seasons. The outlook covers tropical and subtropical waters and discusses areas of disturbed weather and the potential for tropical cyclone development during the next 48 hours. The outlook will include a probability genesis forecast, to the nearest 10 percent, for the probability of tropical cyclone formation within the next 48 hours. The outlook will mention tropical and subtropical cyclones, including the system's location (in either general terms or map coordinates), status, and change in status. For the first 24 hours of a tropical cyclone, the outlook will include a statement identifying WMO headers for the advisory. In the Atlantic, transmission times are 0600, 1200, 1800, and 0000 UTC. In the eastern Pacific, transmission times are 0600, 1200, 1800, and 0000 UTC.

3.5.3 Special Tropical Weather Outlook (Special TWO). RSMC Miami will issue a Special TWO for situations when important changes with areas of disturbed weather over tropical or subtropical waters need to be conveyed before the next scheduled release of the TWO, and when needed outside of the hurricane season. The Special TWO will greatly facilitate incorporation of the most up to date information on the Graphical TWO (GTWO) and new NHC “status map” (home page clickable map).

3.5.4 Tropical Weather Summary (TWS). RSMC Miami will prepare this product each month summarizing the previous month's tropical cyclone activity. The TWS content will consist only of a table of basic statistics for each cyclone and a short narrative of records of interest, if any. The RSMC will update the web page product description accordingly. The last TWS of the season will summarize November's activity plus the activity for the whole tropical cyclone season. Summaries for each month are due the first day of the next month.

3.5.5 Tropical Cyclone Reports. RSMC Miami will prepare a final track chart and summary of each tropical cyclone occurring in its area of responsibility. Reports will be posted on the Internet at www.nhc.noaa.gov.

3.6 Correction Procedures

If a correction needs to be issued for any tropical cyclone product, the reason for the correction will be indicated immediately after the header of the corrected product.

EXAMPLES OF TROPICAL WEATHER PRODUCTS

Example: Tropical Weather Outlook

ABNT20 KNHC 081755
TWOAT **

(Any references to specific product headers in the NHC Tropical Weather Outlook will occur at the bottom of the product, not within the paragraph(s) describing a disturbance or its forecast hazards.)

TROPICAL WEATHER OUTLOOK
NWS NATIONAL HURRICANE CENTER MIAMI FL
200 PM EDT SAT OCT 8 2011

FOR THE NORTH ATLANTIC...CARIBBEAN SEA AND THE GULF OF MEXICO...

THE NATIONAL HURRICANE CENTER IS ISSUING ADVISORIES ON TROPICAL STORM PHILIPPE...LOCATED ABOUT 1215 MILES WEST OF THE AZORES.

A SURFACE TROUGH LOCATED FROM THE EXTREME NORTHWESTERN CARIBBEAN SEA ACROSS CENTRAL CUBA AND INTO THE CENTRAL BAHAMAS IS PRODUCING WIDESPREAD CLOUDINESS AND THUNDERSTORMS OVER MUCH OF CENTRAL AND EASTERN CUBA...ALL OF THE BAHAMAS...AND ADJACENT ATLANTIC WATERS. THE TROUGH HAS BECOME A LITTLE BETTER DEFINED AND SURFACE PRESSURES ARE SLOWLY FALLING. GRADUAL DEVELOPMENT OF THIS LARGE AREA OF DISTURBED WEATHER IS POSSIBLE OVER THE NEXT FEW DAYS AS IT MOVES WESTWARD OR NORTHWESTWARD AT 5 TO 10 MPH. THIS SYSTEM HAS A MEDIUM CHANCE...30 PERCENT...OF BECOMING A TROPICAL OR SUBTROPICAL CYCLONE DURINGTHE NEXT 48 HOURS. ADDITIONAL INFORMATION ON THIS DEVELOPING GALE AREA CAN BE FOUND IN HIGH SEAS FORECASTS ISSUED BY THE NATIONAL WEATHER SERVICE.

A NON-TROPICAL LOW PRESSURE SYSTEM LOCATED ABOUT 425 MILES SOUTHWEST OF AZORES ISLANDS CONTINUES TO PRODUCE GALE FORCE WINDS OVER AN AREA EXTENDING SEVERAL HUNDRED MILES TO THE NORTH OF THE CENTER. THE ASSOCIATED SHOWERS AND THUNDERSTORMS CONTINUE TO SHOW SIGNS OF ORGANIZATION...AND THE LOW COULD ACQUIRE SUBTROPICAL CHARACTERISTICS TONIGHT OR ON TUESDAY. THIS SYSTEM HAS A HIGH CHANCE...60 PERCENT...OF BECOMING A SUBTROPICAL CYCLONE DURING THE NEXT 48 HOURS AS IT MOVES SLOWLY WESTWARD TODAY AND NORTHWESTWARD ON TUESDAY. ADDITIONAL INFORMATION ON THIS LOW PRESSURE AREA CAN BE FOUND IN HIGH SEAS FORECASTS ISSUED BY THE METEO FRANCE MET OFFICE.

ELSEWHERE...TROPICAL CYCLONE FORMATION IS NOT EXPECTED DURING THE NEXT 48 HOURS.

&&
PUBLIC ADVISORIES ON PHILIPPE ARE ISSUED UNDER WMO HEADER WTNT32 KNHC AND UNDER AWIPS HEADER MIATCPAT2. FORECAST/ADVISORIES ARE ISSUED UNDER WMO HEADER WTNT22 KNHC AND UNDER AWIPS HEADER MIATCMAT2.

HIGH SEAS FORECASTS ISSUED BY THE NATIONAL WEATHER SERVICE CAN BE FOUND UNDER AWIPS HEADER NFDHSFAT1 AND WMO HEADER FZNT01 KWBC.

HIGH SEAS FORECASTS ISSUED BY THE METEO FRANCE MET OFFICE CAN BE FOUND UNDER WMO HEADER FQNT50 LFPW.

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FORECASTER STEWART

Example: Special Tropical Weather Outlook

ABNT20 KNHC 161145
TWOAT

SPECIAL TROPICAL WEATHER OUTLOOK
NWS NATIONAL HURRICANE CENTER MIAMI FL
1245 PM EDT WED JUL 1 2009

FOR THE NORTH ATLANTIC...CARIBBEAN SEA AND THE GULF OF MEXICO...

SPECIAL OUTLOOK ISSUED TO UPDATE DISCUSSION OF LOW PRESSURE AREA EAST OF THE WINDWARD ISLANDS.

THE NATIONAL HURRICANE CENTER IS ISSUING ADVISORIES ON TROPICAL STORM BERTHA...LOCATED ABOUT 335 MILES NORTHEAST OF BERMUDA.

UPDATED...SATELLITE IMAGES AND SURFACE OBSERVATIONS INDICATE THAT THE AREA OF LOW PRESSURE LOCATED ABOUT 225 MILES EAST OF THE WINDWARD ISLANDS HAS BECOME BETTER ORGANIZED AND A TROPICAL DEPRESSION COULD BE FORMING. AN AIR FORCE RESERVE HURRICANE HUNTER AIRCRAFT WILL BE INVESTIGATING THE SYSTEM THIS AFTERNOON TO DETERMINE IF A TROPICAL CYCLONE HAS FORMED. LOCALIZED HEAVY RAINS AND GUSTY WINDS ARE POSSIBLE IN THE WINDWARD ISLANDS TODAY AND TONIGHT. ALL INTERESTS IN THE WINDWARD ISLANDS SHOULD MONITOR THE PROGRESS OF THIS SYSTEM...AND FOR INFORMATION SPECIFIC TO YOUR AREA...PLEASE CONSULT STATEMENTS FROM YOUR LOCAL WEATHER OFFICE. THERE IS A HIGH CHANCE...NEAR 100 PERCENT...OF THIS SYSTEM BECOMING A TROPICAL CYCLONE DURING THE NEXT 48 HOURS.

DISORGANIZED THUNDERSTORM ACTIVITY OFF THE SOUTHWEST FLORIDA COAST IS ASSOCIATED WITH AN AREA OF LOW PRESSURE. THIS SYSTEM IS EXPECTED TO PRODUCE LOCALLY HEAVY RAINS OVER PORTIONS OF THE FLORIDA PENINSULA AS IT MOVES EASTWARD OR NORTHEASTWARD DURING THE NEXT DAY OR SO. SIGNIFICANT DEVELOPMENT IS NOT EXPECTED DUE TO PROXIMITY TO LAND. THERE IS A LOW CHANCE...10 PERCENT...OF THIS SYSTEM BECOMING A TROPICAL CYCLONE DURING THE NEXT 48 HOURS.

ELSEWHERE...TROPICAL CYCLONE FORMATION IS NOT EXPECTED DURING THE NEXT 48 HOURS.

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FORECASTER NAME

Examples: Mass News Disseminator Headers

TROPICAL DEPRESSION ONE-E ADVISORY NUMBER 1
TROPICAL STORM ALEX ADVISORY NUMBER 3
HURRICANE ALEX ADVISORY NUMBER 4

SUBTROPICAL DEPRESSION ONE ADVISORY NUMBER 1
POST-TROPICAL CYCLONE IGOR ADVISORY NUMBER 52
REMNANTS OF GASTON ADVISORY NUMBER 9

Example: Hurricane Public Advisory

ZCZC MIATCPAT4 ALL
TTAA00 KNHC DDHHMM

BULLETIN
HURRICANE IKE ADVISORY NUMBER 42
NWS NATIONAL HURRICANE CENTER MIAMI FL AL092008
1000 PM CDT THU SEP 11 2008

...IKE CONTINUES TO GROW IN SIZE BUT HAS NOT STRENGTHENED YET...
...HURRICANE WARNING ISSUED FOR NORTHWESTERN GULF COAST...

SUMMARY OF 1000 PM CDT...0300 UTC...INFORMATION

LOCATION...25.5N 88.4W
ABOUT 580 MI...930 KM ESE OF CORPUS CHRISTI TEXAS
ABOUT 470 MI...760 KM ESE OF GALVESTON TEXAS
MAXIMUM SUSTAINED WINDS...100 MPH...160 KM/H
PRESENT MOVEMENT...W OR 275 DEGREES AT 10 MPH...17 KM/H
MINIMUM CENTRAL PRESSURE...945 MB...27.91 INCHES

WATCHES AND WARNINGS

CHANGES WITH THIS ADVISORY...

A HURRICANE WARNING HAS BEEN ISSUED FROM MORGAN CITY LOUISIANA TO BAFFIN BAY TEXAS.

A TROPICAL STORM WARNING HAS BEEN ISSUED FROM SOUTH OF BAFFIN BAY TO PORT MANSFIELD TEXAS.

SUMMARY OF WATCHES AND WARNINGS IN EFFECT...

A HURRICANE WARNING IS IN EFFECT FOR...
* MORGAN CITY LOUISIANA TO BAFFIN BAY TEXAS

A TROPICAL STORM WARNING IS IN EFFECT FOR...
* EAST OF MORGAN CITY TO THE MISSISSIPPI-ALABAMA BORDER...INCLUDING THE CITY OF NEW ORLEANS AND LAKE PONTCHARTRAIN

* SOUTH OF BAFFIN BAY TO PORT MANSFIELD

A HURRICANE WARNING MEANS THAT HURRICANE CONDITIONS ARE EXPECTED SOMEWHERE WITHIN THE WARNING AREA. A WARNING IS TYPICALLY ISSUED 36 HOURS BEFORE THE ANTICIPATED FIRST OCCURRENCE OF TROPICAL-STORM-FORCE
WINDS...CONDITIONS THAT MAKE OUTSIDE PREPARATIONS DIFFICULT OR DANGEROUS. PREPARATIONS TO PROTECT LIFEAND PROPERTY SHOULD BE RUSHED TO COMPLETION.

A TROPICAL STORM WARNING MEANS THAT TROPICAL STORM CONDITIONS ARE EXPECTED SOMEWHERE WITHIN THE WARNING AREA WITHIN THE NEXT 36 HOURS.

FOR STORM INFORMATION SPECIFIC TO YOUR AREA...INCLUDING POSSIBLE INLAND WATCHES AND WARNINGS...PLEASE MONITOR PRODUCTS ISSUED BY YOUR LOCAL WEATHER OFFICE.

DISCUSSION AND 48-HOUR OUTLOOK

AT 1000 PM CDT...0300Z...THE CENTER OF HURRICANE IKE WAS LOCATED NEAR LATITUDE 25.5 NORTH...LONGITUDE 88.4 WEST. IKE IS MOVING TOWARD THE WESt NEAR 10 MPH...17 KM/H. A GENERAL WEST-NORTHWESTWARD MOTION IS EXPECTED OVER THE NEXT DAY OR SO...AND THE CENTER OF IKE SHOULD BE VERY NEAR THE COAST BY LATE FRIDAY.

MAXIMUM SUSTAINED WINDS ARE NEAR 100 MPH...160 KM/H...WITH HIGHER GUSTS. IKE IS A CATEGORY TWO HURRICANE ON THE SAFFIR-SIMPSON SCALE. IKE IS FORECAST TO BECOME A MAJOR HURRICANE PRIOR TO REACHING THE COASTLINE.

IKE REMAINS A VERY LARGE TROPICAL CYCLONE. HURRICANE FORCE WINDS EXTEND OUTWARD UP TO 115 MILES...185 KM...FROM THE CENTER...AND TROPICAL STORM FORCE WINDS EXTEND OUTWARD UP TO 275 MILES...445 KM.

THE LATEST MINIMUM CENTRAL PRESSURE REPORTED BY A NOAA HURRICANE HUNTER AIRCRAFT WAS 945 MB...27.91 INCHES.

HAZARDS AFFECTING LAND

STORM SURGE...STORM SURGE WILL RAISE WATER LEVELS AS MUCH AS 10 TO 15 FT ABOVE GROUND LEVEL ALONG THE COAST WITHIN THE HURRICANE WARNING AREA...WITH LARGE AND DANGEROUS BATTERING WAVES...NEAR AND TO THE
EAST OF WHERE THE CENTER OF IKE MAKES LANDFALL. STORM SURGE WILL RAISE WATER LEVELS AS MUCH AS 5 TO 7 FEET ABOVE GROUND LEVEL ALONG THE COAST WITHIN THE TROPICAL STORM WARNING AREA ALONG THE NORTHERN GULF COAST. THE SURGE COULD PENETRATE AS FAR INLAND AS ABOUT 10
MILES FROM THE SHORE WITH DEPTH GRADUALLY DECREASING AS THE WATER MOVES INLAND.

WIND...BECAUSE IKE IS A VERY LARGE TROPICAL CYCLONE...WEATHER WILL DETERIORATE ALONG THE COASTLINE LONG BEFORE THE CENTER REACHES THE COAST. HURRICANE CONDITIONS ARE EXPECTED TO REACH NORTHWESTERN GULF
COAST WITHIN THE WARNING AREA FRIDAY AFTERNOON. WINDS ARE EXPECTED TO FIRST REACH TROPICAL STORM STRENGTH FRIDAY MORNING...MAKING OUTSIDE PREPARATIONS DIFFICULT OR DANGEROUS. PREPARATIONS TO PROTEC LIFE AND PROPERTY SHOULD BE RUSHED TO COMPLETION.

RAINFALL...IKE IS EXPECTED TO PRODUCE RAINFALL AMOUNTS OF 5 TO 10 INCHES ALONG THE CENTRAL AND UPPER TEXAS COAST AND OVER PORTIONS OF SOUTHWESTERN LOUISIANA...WITH ISOLATED MAXIMUM AMOUNTS OF 15 INCHES POSSIBLE. RAINFALL AMOUNTS OF 1 TO 2 INCHES ARE POSSIBLE OVER PORTIONS OF THE YUCATAN PENINSULA.

NEXT ADVISORY

NEXT INTERMEDIATE ADVISORY...100 AM CDT.
NEXT COMPLETE ADVISORY...400 AM CDT.

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FORECASTER FRANKLIN

NNNN

Example: Intermediate Public Advisory

WTNT33 KNHC 221858
TCPAT3

BULLETIN
HURRICANE RITA INTERMEDIATE ADVISORY NUMBER 20A
NWS NATIONAL HURRICANE CENTER MIAMI FL
1 PM CDT THU SEP 22 2005

...RITA WEAKENS A LITTLE FURTHER...REMAINS AN EXTREMELY DANGEROUS HURRICANE...

SUMMARY OF 1000 PM CDT...0300 UTC...INFORMATION

LOCATION...25.5N 89.2W
ABOUT 435 MI...700 KM...SE OF GALVESTON TEXAS
ABOUT 430 MI...695 KM...SE OF PORT ARTHUR TEXAS
MAXIMUM SUSTAINED WINDS...150 MPH...240 KM/H
PRESENT MOVEMENT...W OR 275 DEGREES AT 9 MPH...15 KM/H
MINIMUM CENTRAL PRESSURE...915 MB...27.06 INCHES

WATCHES AND WARNINGS

CHANGES WITH THIS ADVISORY...

NONE.

SUMMARY OF WATCHES AND WARNINGS IN EFFECT...

A HURRICANE WARNING IS IN EFFECT FOR...
* PORT O'CONNOR TEXAS TO MORGAN CITY LOUISIANA

A TROPICAL STORM WARNING IS IN EFFECT FOR...
* FROM SOUTH OF PORT O'CONNOR TO PORT MANSFIELD TEXAS
* SOUTHEASTERN COAST OF LOUISIANA EAST OF MORGAN CITY TO THE MOUTH OF THE MISSISSIPPI RIVER

A TROPICAL STORM WATCH IS IN EFFECT FOR...
* FROM NORTH OF THE MOUTH OF THE MISSISSIPPI RIVER TO THE MOUTH OF THE PEARL RIVER INCLUDING METROPOLITAN NEW ORLEANS AND LAKE PONTCHARTRAIN
* FROM SOUTH OF PORT MANSFIELD TO BROWNSVILLE TEXAS

* FOR THE NORTHEASTERN COAST OF MEXICO FROM RIO SAN FERNANDO NORTHWARD TO THE RIO GRANDE

A HURRICANE WARNING MEANS THAT HURRICANE CONDITIONS ARE EXPECTED SOMEWHERE WITHIN THE WARNING AREA. A WARNING IS TYPICALLY ISSUED 36 HOURS BEFORE THE ANTICIPATED FIRST OCCURRENCE OF TROPICAL-STORM-FORCE WINDS...CONDITIONS THAT MAKE OUTSIDE PREPARATIONS DIFFICULT OR DANGEROUS. PREPARATIONS TO PROTECT LIFE AND PROPERTY SHOULD BE RUSHED TO COMPLETION.

A TROPICAL STORM WARNING MEANS THAT TROPICAL STORM CONDITIONS ARE EXPECTED SOMEWHERE WITHIN THE WARNING AREA WITHIN THE NEXT 36 HOURS.

A TROPICAL STORM WATCH MEANS THAT TROPICAL STORM CONDITIONS ARE POSSIBLE SOMEWHERE WITHIN THE WATCH AREA WITHIN THE NEXT 48 HOURS.

FOR STORM INFORMATION SPECIFIC TO YOUR AREA...INCLUDING POSSIBLE INLAND WATCHES AND WARNINGS...PLEASE MONITOR PRODUCTS ISSUED BY YOUR LOCAL WEATHER OFFICE.

DISCUSSION AND 48-HOUR OUTLOOK

AT 1 PM CDT...1800 UTC...THE CENTER OF HURRICANE RITA WAS LOCATED NEAR LATITUDE 25.5 NORTH...LONGITUDE 89.2 WEST. RITA IS MOVING TOWARD THE WEST-NORTHWEST NEAR 9 MPH...15 KM/H. A GRADUAL TURN TO THE NORTHWEST IS EXPECTED DURING THE NEXT 24 TO 36 HOURS.

DATA FROM A NOAA RECONNAISSANCE AIRCRAFT INDICATE THAT MAXIMUM SUSTAINED WINDS HAVE DECREASED TO NEAR 150 MPH...240 KM/H...WITH HIGHER GUSTS. RITA IS NOW A STRONG CATEGORY FOUR HURRICANE ON THE SAFFIR-SIMPSON SCALE. SOME SLIGHT WEAKENING IS FORECAST DURING THE NEXT 24 HOURS BUT RITA IS EXPECTED TO REMAIN AN EXTREMELY DANGEROUS HURRICANE.

HURRICANE FORCE WINDS EXTEND OUTWARD UP TO 85 MILES...140 KM...FROM THE CENTER...AND TROPICAL STORM FORCE WINDS EXTEND OUTWARD UP TO 185 MILES...295 KM.

LATEST MINIMUM CENTRAL PRESSURE REPORTED BY A NOAA HURRICANE HUNTER PLANE WAS 915 MB...27.01 INCHES.

HAZARDS AFFECTING LAND

WIND...HURRICANE CONDITIONS ARE EXPECTED TO REACH THE NORTHWESTERN GULF COAST WITHIN THE WARNING AREA FRIDAY NIGHT. WINDS ARE EXPECTED TO FIRST REACH TROPICAL STORM STRENGTH FRIDAY AFTERNOON...MAKING OUTSIDE PREPARATIONS DIFFICULT OR DANGEROUS. PREPARATIONS TO PROTECT LIFE AND PROPERTY SHOULD BE RUSHED TO COMPLETION.

STORM SURGE...STORM SURGE WILL RAISE WATER LEVELS BY AS MUCH AS 4 FEET ABOVE GROUND LEVEL ALONG THE WEST COAST OF FLORIDA IN AREAS OF ONSHORE FLOW SOUTH OF VENICE AND IN FLORIDA BAY...WITH LARGE AND DANGEROUS BATTERING WAVES...THE SURGE COULD PENETRATE AS FAR INLAND AS ABOUT 30 MILES FROM THE SHORE WITH DEPTH GENERALLY

DECREASING AS THE WATER MOVES INLAND. STORM SURGE SHOULD BEGIN TO DECREASE ALONG THE EAST COAST OF FLORIDA.

RAINFALL...ACCUMULATIONS OF 8 TO 12 INCHES WITH ISOLATED MAXIMUM AMOUNTSS OF 15 INCHES POSSIBLE ALONG THE PATH OF RITA PARTICULARLY OVER SOUTHEAST TEXAS AND WESTERN LOUISIANA. IN ADDITION...RAINFALL AMOUNTS OF 3 TO 5 INCHES ARE POSSIBLE OVER SOUTHEASTERN LOUISIANA INCLUDING NEW ORLEANS. RAINFALL TOTALS IN EXCESS OF 25 INCHES ARE POSSIBLE FARTHER INLAND AFTER RITA MOVES INLAND.

NEXT ADVISORY

NEXT COMPLETE ADVISORY...400 PM CDT.

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FORECASTER FRANKLIN

Example: Special Public Advisory

ZCZC MIATCPAT4 ALL
TTAA00 KNHC DDHHMM

BULLETIN
HURRICANE HUMBERTO SPECIAL ADVISORY NUMBER 4
NWS NATIONAL HURRICANE CENTER MIAMI FL AL092007
1215 AM CDT THU SEP 13 2007

...HUMBERTO BECOMES A HURRICANE JUST BEFORE LANDFALL...
...HURRICANE FORCE WINDS COVER SMALL AREA NORTHEAST OF CENTER...

SUMMARY OF 1215 AM CDT...0515 UTC...INFORMATION

LOCATION...29.4N 94.4W
ABOUT 20 MI...30 KM...E OF GALVESTON TEXAS
ABOUT 15 MI...20 KM...S OF HIGH ISLAND TEXAS
MAXIMUM SUSTAINED WINDS...80 MPH...130 KM/H
PRESENT MOVEMENT...NNE OR 25 DEGREES AT 8 MPH...13 KM/H
MINIMUM CENTRAL PRESSURE...992 MB...29.29 INCHES

WATCHES AND WARNINGS

CHANGES WITH THIS ADVISORY...

A HURRICANE WARNING HAS BEEN ISSUED FROM EAST OF HIGH ISLAND TEXAS TO CAMERON LOUISIANA.

SUMMARY OF WATCHES AND WARNINGS IN EFFECT...

A HURRICANE WARNING IS IN EFFECT FOR...
* EAST OF HIGH ISLAND TEXAS TO CAMERON LOUISIANA

A TROPICAL STORM WARNING IS IN EFFECT FOR...
* EAST OF SARGENT TEXAS TO HIGH ISLAND
* EAST OF CAMERON TO INTRACOASTAL CITY LOUISIANA

THE HURRICANE WARNING FOR HUMBERTO MEANS THAT HURRICANE CONDITIONS ARE EXPECTED WITHIN THE WARNING AREA WITHIN THE NEXT FEW HOURS.

FOR STORM INFORMATION SPECIFIC TO YOUR AREA...INCLUDING POSSIBLE INLAND WATCHES AND WARNINGS...PLEASE MONITOR PRODUCTS ISSUED BY YOUR LOCAL WEATHER OFFICE.

DISCUSSION AND 48-HOUR OUTLOOK

AT 1215 AM CDT...0515 UTC...THE CENTER OF HURRICANE HUMBERTO WAS LOCATED NEAR LATITUDE 29.4 NORTH...LONGITUDE 94.4 WEST. HUMBERTO IS MOVING TOWARD THE NORTH-NORTHEAST NEAR 8 MPH...13 KM/H. THIS GENERAL DIRECTION OF MOTION WITH SOME INCREASE IN FORWARD SPEED IS EXPECTED OVER THE NEXT 24 HOURS. ON THE FORECAST TRACK THE CENTER WILL BE CROSSING THE UPPER TEXAS COAST WITHIN THE NEXT FEW HOURS.

DATA FROM AN AIR FORCE RECONNAISSANCE AIRCRAFT AND DOPPLER RADAR INDICATE THAT THE MAXIMUM SUSTAINED WINDS HAVE INCREASED TO NEAR 80 MPH...130 KM/H...WITH HIGHER GUSTS...CONFINED TO A SMALL AREA NORTHEAST OF THE CENTER. HUMBERTO IS NOW A CATEGORY ONE HURRICANE ON THE SAFFIR-SIMPSON SCALE. LITTLE ADDITIONAL STRENGTHENING IS EXPECTED PRIOR TO LANDFALL.

HURRICANE FORCE WINDS EXTEND OUTWARD UP TO 15 MILES...30 KM... NORTHEAST OF THE CENTER...AND TROPICAL STORM FORCE WINDS EXTEND OUTWARD UP TO 60 MILES...95 KM.

MINIMUM CENTRAL PRESSURE RECENTLY REPORTED BY THE AIRCRAFT WAS 992 MB...29.29 INCHES.

HAZARDS AFFECTING LAND

WIND...TROPICAL-STORM-FORCE WINDS ARE ALREADY AFFECTING PORTIONS OF THE UPPER TEXAS COAST. HURRICANE-FORCE WINDS WILL BE SPREADING ONSHORE WITHIN THE WARNING AREA WITHIN THE NEXT COUPLE OF HOURS.

RAINFALL...RAINFALL AMOUNTS OF 5 TO 10 INCHES ARE EXPECTED ALONG THE TRACK OF HUMBERTO THROUGH EASTERN TEXAS AS WELL AS WESTERN AND CENTRAL LOUISIANA...WITH ISOLATED MAXIMUM ACCUMULATIONS OF 15 INCHES POSSIBLE.

STORM SURGE...STORM SURGE WILL RAISE WATER LEVELS BY AS MUCH AS 4 FEET ABOVE GROUND LEVEL ALONG THE COAST...NEAR AND TO THE EAST OF WHERE THE CENTER MAKES LANDFALL. THE SURGE COULD PENETRATE AS FAR INLAND AS ABOUT TWO MILES FROM THE SHORE WITH DEPTH GENERALLY DECREASING AS THE WATER MOVES INLAND.

TORNADOES...ISOLATED TORNADOES ARE POSSIBLE IN SOUTHEASTERN TEXAS AND SOUTHWESTERN LOUISIANA THROUGH EARLY THURSDAY.

NEXT ADVISORY

NEXT COMPLETE ADVISORY...400 AM CDT.

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FORECASTER MAINELLI/AVILA

Example: Public Advisory Correction

ZCZC MIATCPEP5 ALL
TTAA00 KNHC DDHHMM CCA

BULLETIN
HURRICANE LINDA ADVISORY NUMBER 12...CORRECTED
NWS NATIONAL HURRICANE CENTER MIAMI FL EP152009
800 PM PDT WED SEP 09 2009

CORRECTED MINIMUM PRESSURE

...LINDA BECOMES A HURRICANE...THE SIXTH HURRICANE OF THE EASTERN PACIFIC SEASON...

SUMMARY OF 800 PM PDT INFORMATION

LOCATION...17.1N 129.4W
ABOUT 1325 MI...2135 KM WSW OF THE SOUTHERN TIP OF BAJA CALIFORNIA
MAXIMUM SUSTAINED WINDS...80 MPH...130 KM/H
PRESENT MOVEMENT...NW OR 320 DEGREES AT 6 MPH...9 KM/H
MINIMUM CENTRAL PRESSURE...984 MB...29.06 INCHES

WATCHES AND WARNINGS

THERE ARE NO COASTAL WATCHES OR WARNINGS IN EFFECT.

DISCUSSION AND 48-HOUR OUTLOOK

AT 800 PM PDT...0300 UTC...THE CENTER OF HURRICANE LINDA WAS LOCATED NEAR LATITUDE 17.1 NORTH...LONGITUDE 129.4 WEST. LINDA IS MOVING TOWARD THE NORTHWEST NEAR 6 MPH...9 KM/H...AND THIS GENERAL MOTION IS EXPECTED TO CONTINUE FOR THE NEXT COUPLE OF DAYS.

MAXIMUM SUSTAINED WINDS ARE NEAR 80 MPH...130 KM/H...WITH HIGHER GUSTS. LITTLE CHANGE IN STRENGTH IS EXPECTED TONIGHT AND THURSDAY...WITH LINDA FORECAST TO WEAKEN THURSDAY NIGHT AND FRIDAY.

HURRICANE FORCE WINDS EXTEND OUTWARD UP TO 25 MILES...35 KM...FROM THE CENTER...AND TROPICAL STORM FORCE WINDS EXTEND OUTWARD UP TO 125 MILES...205 KM.

ESTIMATED MINIMUM CENTRAL PRESSURE IS 984 MB...29.06 INCHES.

HAZARDS AFFECTING LAND

NONE.

NEXT ADVISORY

NEXT COMPLETE ADVISORY...200 AM PDT.

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FORECASTER BEVEN

Example: Hurricane Forecast/Advisory

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ZCZC MIATCMAT2 ALL
TTAA00 KNHC DDHHMM

TROPICAL STORM EARL FORECAST/ADVISORY NUMBER  16
NWS NATIONAL HURRICANE CENTER MIAMI FL   AL072010
0900 UTC SUN AUG 29 2010

CHANGES IN WATCHES AND WARNINGS WITH THIS ADVISORY...

THE GOVERNMENT OF THE NETHERLANDS ANTILLES HAS ISSUED A HURRICANE
WARNING FOR THE ISLANDS OF ST. MAARTEN...SABA AND ST. EUSTATIUS.

SUMMARY OF WATCHES AND WARNINGS IN EFFECT...

A HURRICANE WARNING IS IN EFFECT FOR...
* ANTIGUA...BARBUDA...MONTSERRAT...ST. KITTS...NEVIS...AND ANGUILLA
* SAINT MARTIN AND SAINT BARTHELEMY
* ST. MAARTEN...SABA AND ST. EUSTATIUS

A HURRICANE WATCH IS IN EFFECT FOR...
* BRITISH VIRGIN ISLANDS
* U.S. VIRGIN ISLANDS
* PUERTO RICO INCLUDING THE ISLANDS OF CULEBRA AND VIEQUES

HURRICANE CONDITIONS ARE EXPECTED WITHIN THE WARNING AREA BEGINNING
WITHIN 24 HOURS.  PREPARATIONS TO PROTECT LIFE AND PROPERTY SHOULD
BE RUSHED TO COMPLETION.

HURRICANE CONDITIONS ARE POSSIBLE WITHIN THE WATCH AREA WITHIN THE
NEXT 36 HOURS.

TROPICAL STORM CENTER LOCATED NEAR 16.9N  56.9W AT 29/0900Z
POSITION ACCURATE WITHIN  30 NM

PRESENT MOVEMENT TOWARD THE WEST OR 280 DEGREES AT  16 KT

ESTIMATED MINIMUM CENTRAL PRESSURE  989 MB
MAX SUSTAINED WINDS  55 KT WITH GUSTS TO  65 KT.
50 KT..... 35NE   0SE   0SW  30NW.
34 KT.....140NE  80SE  15SW  90NW.
12 FT SEAS..170NE  80SE  30SW  90NW.
WINDS AND SEAS VARY GREATLY IN EACH QUADRANT.  RADII IN NAUTICAL
MILES ARE THE LARGEST RADII EXPECTED ANYWHERE IN THAT QUADRANT.

REPEAT...CENTER LOCATED NEAR 16.9N  56.9W AT 29/0900Z
AT 29/0600Z CENTER WAS LOCATED NEAR 16.7N  56.2W

FORECAST VALID 29/1800Z 17.3N  59.1W
MAX WIND  65 KT...GUSTS  80 KT.
64 KT... 15NE   0SE   0SW  15NW.
50 KT... 40NE  25SE  15SW  35NW.
34 KT...140NE  90SE  30SW  90NW.

FORECAST VALID 30/0600Z 17.9N  61.4W
MAX WIND  70 KT...GUSTS  85 KT.
64 KT... 25NE  15SE   0SW  25NW.
50 KT... 50NE  30SE  30SW  40NW.
34 KT...140NE  90SE  50SW 100NW.
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FORECAST VALID 30/1800Z 18.7N  63.6W
MAX WIND  80 KT...GUSTS 100 KT.
64 KT... 35NE  25SE  20SW  35NW.
50 KT... 60NE  40SE  40SW  50NW.
34 KT...140NE 100SE  60SW 110NW.

FORECAST VALID 31/0600Z 19.9N  65.4W
MAX WIND  90 KT...GUSTS 110 KT.
50 KT... 75NE  50SE  50SW  75NW.
34 KT...150NE 110SE  75SW 120NW.

FORECAST VALID 01/0600Z 23.5N  69.0W
MAX WIND 100 KT...GUSTS 120 KT.
50 KT... 90NE  60SE  50SW  80NW.
34 KT...160NE 120SE  90SW 130NW.

EXTENDED OUTLOOK. NOTE...ERRORS FOR TRACK HAVE AVERAGED NEAR 200 NM
ON DAY 4 AND 250 NM ON DAY 5...AND FOR INTENSITY NEAR 20 KT EACH DAY

OUTLOOK VALID 02/0600Z 29.0N  72.0W
MAX WIND 105 KT...GUSTS 130 KT.

OUTLOOK VALID 03/0600Z 34.5N  72.0W
MAX WIND 105 KT...GUSTS 130 KT.

REQUEST FOR 3 HOURLY SHIP REPORTS WITHIN 300 MILES OF 16.9N  56.9W

NEXT ADVISORY AT 29/1500Z

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FORECASTER BRENNAN


NNNN
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Example: Tropical Cyclone Discussion (TCD)

HURRICANE ISIDORE DISCUSSION NUMBER 28
NWS NATIONAL HURRICANE CENTER MIAMI FL
11 PM EDT SUN SEP 22 2002

SATELLITE IMAGES INDICATE STRENGTHENING…AND THIS IS CORROBORATED BY RECON DATA WHICH SHOW FLIGHT LEVEL WINDS NEAR 100 KT AND FALLING CENTRAL PRESSURE. FURTHER INTENSIFICATION IS LIKELY.

THE 4 AND 5 DAY FORECAST POINTS IMPLY A POTENTIAL THREAT TO EITHER THE NORTHWEST OR NORTHERN GULF OF MEXICO COAST...BUT TRACK ERRORS CAN BE RATHER LARGE AT THESE LONGER RANGES.

FORECASTER PASCH

FORECAST POSITIONS AND MAX WINDS

INIT	13/0900Z	20.5N	86.0W	80 KT 90 MPH
12H	13/1800Z	21.2N	85.9W	90 KT 105 MPH
24H	14/0600Z	22.0N	85.7W	95 KT 110 MPH
36H	14/1800Z	22.8N	85.6W	100 KT 115 MPH
48H	15/0600Z	23.7N	85.5W	105 KT 120 MPH
72H	16/0600Z	25.4N	85.2W	115 KT 135 MPH
96H	17/0600Z	27.1N	85.0W	120 KT 140 MPH
120H	18/0600Z	28.8N	84.7W	105 KT 120 MPH

Example: Tropical Cyclone Update from - NHC

Example 1 - TCU to convey changes in storm information (with summary section)

ZCZC MIATCUAT4 ALL
TTAA00 KNHC DDHHMM

TROPICAL STORM CLAUDETTE TROPICAL CYCLONE UPDATE
NWS NATIONAL HURRICANE CENTER MIAMI FL AL042009
1215 PM EDT SUN AUG 16 2009

...DEPRESSION BECOMES TROPICAL STORM CLAUDETTE...

DATA FROM THE NOAA DOPPLER RADAR IN TALLAHASSEE FLORIDA INDICATE THAT SURFACE WINDS ASSOCIATED WITH THE DEPRESSION HAVE INCREASED TO 40 MPH...65 KM/H... INDICATING THAT THE DEPRESSION HAS BECOME A TROPICAL STORM.

...SUMMARY OF 1215 PM EDT INFORMATION...
LOCATION...28.7N 84.6W
MAXIMUM SUSTAINED WINDS...40 MPH
PRESENT MOVEMENT...NORTHWEST OR 320 DEGREES AT 14 MPH
MINIMUM CENTRAL PRESSURE...1011 MB

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FORECASTER ROBERTS/BRENNAN

NNNN

Example 2 - TCU to notify users that change in status is forthcoming (no summary section)

ZCZC MIATCUAT2 ALL
TTAA00 KNHC DDHHMM

TROPICAL DEPRESSION SEVEN TROPICAL CYCLONE UPDATE
NWS NATIONAL HURRICANE CENTER MIAMI FL AL072008
200 PM EDT MON AUG 25 2008

PRELIMINARY REPORTS FROM AN AIR FORCE HURRICANE HUNTER AIRCRAFT INDICATE THAT TROPICAL DEPRESSION SEVEN HAS STRENGTHENED. A SPECIAL ADVISORY WILL BE ISSUED WITHIN THE NEXT 30 MINUTES TO UPGRADE THE DEPRESSION TO A TROPICAL STORM...TO UPDATE THE INTENSITY FORECAST...AND TO ISSUE NEW WATCHES AND WARNINGS FOR HISPANIOLA.

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FORECASTER PASCH

NNNN

Example 3 - TCU to update watches or warnings (no change in storm summary information)

ZCZC MIATCUAT4 ALL
TTAA00 KNHC DDHHMM

HURRICANE IKE TROPICAL CYCLONE UPDATE
NWS NATIONAL HURRICANE CENTER MIAMI FL AL092008
600 PM AST FRI SEP 05 2008

AT 6 PM AST...2200 UTC...THE GOVERNMENT OF THE BAHAMAS HAS ISSUED A HURRICANE WATCH FOR THE SOUTHEASTERN BAHAMAS...INCLUDING THE ACKLINS...CROOKED ISLAND...THE INAGUAS...MAYAGUANA...AND THE RAGGED ISLANDS...AS WELL AS FOR THE TURKS AND CAICOS ISLANDS.

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FORECASTER BLAKE/BEVEN

Example: Tropical Cyclone Position Estimate

WTNT51 KNHC 190755
TCEAT1

HURRICANE HUGO...POSITION ESTIMATE
NWS NATIONAL HURRICANE CENTER MIAMI FL
300 AM AST TUE SEP 19 1989

AT 3 AM AST THE CENTER OF HURRICANE HUGO WAS ESTIMATED NEAR LATITUDE 20.7 NORTH AND LONGITUDE 67.3 WEST. THIS IS APPROXIMATELY 155 MILES NORTH NORTHWEST OF SAN JUAN PUERTO RICO AND 220 MILES EAST SOUTHEAST OF GRAND TURK ISLAND OF THE BAHAMAS.

LAWRENCE

Example: Wind Speed Probabilities

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ZCZC MIAPWSAT1 ALL
TTAA00 KNHC DDHHMM

TROPICAL STORM TEST WIND SPEED PROBABILITIES NUMBER   1
NWS NATIONAL HURRICANE CENTER MIAMI FL   AL812008
2100 UTC WED APR 16 2008

AT 2100Z THE CENTER OF TROPICAL STORM TEST WAS LOCATED NEAR LATITUDE
25.3 NORTH...LONGITUDE 87.9 WEST WITH MAXIMUM SUSTAINED WINDS NEAR
50 KTS...60 MPH...95 KM/H.

Z INDICATES COORDINATED UNIVERSAL TIME (GREENWICH)
   ATLANTIC STANDARD TIME (AST)...SUBTRACT 4 HOURS FROM Z TIME
   EASTERN  DAYLIGHT TIME (EDT)...SUBTRACT 4 HOURS FROM Z TIME
   CENTRAL  DAYLIGHT TIME (CDT)...SUBTRACT 5 HOURS FROM Z TIME


I.  MAXIMUM WIND SPEED (INTENSITY) PROBABILITY TABLE

CHANCES THAT THE MAXIMUM SUSTAINED (1-MINUTE AVERAGE) WIND SPEED OF
THE TROPICAL CYCLONE WILL BE WITHIN ANY OF THE FOLLOWING CATEGORIES
AT EACH OFFICIAL FORECAST TIME DURING THE NEXT 5 DAYS.
PROBABILITIES ARE GIVEN IN PERCENT.  X INDICATES PROBABILITIES LESS
THAN 1 PERCENT.


      - - - MAXIMUM WIND SPEED (INTENSITY) PROBABILITIES - - -
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VALID TIME	06Z THU	18Z THU	06Z FRI	18Z FRI	18Z SAT	18Z SUN	18Z MON
FORECAST HOUR	12	24	36	48	72	96	120
DISSIPATED	X	X	1	3	25	54	58
TROP DEPRESSION	1	2	9	12	33	26	18
TROPICAL STORM	86	49	53	59	34	15	15
HURRICANE	13	50	37	27	8	5	10
HUR CAT 1	12	44	31	21	6	3	7
HUR CAT 2	1	5	3	4	1	1	2
HUR CAT 3	X	1	2	2	X	X	1
HUR CAT 4	X	X	X	X	X	X	X
HUR CAT 5	X	X	X	X	X	X	X
FCST MAX WIND	55KT	65KT	65KT	55KT	35KT	15KT	5KT

II. WIND SPEED PROBABILITY TABLE FOR SPECIFIC LOCATIONS

CHANCES OF SUSTAINED (1-MINUTE AVERAGE) WIND SPEEDS OF AT LEAST
...34 KT (39 MPH... 63 KPH)...
...50 KT (58 MPH... 93 KPH)...
...64 KT (74 MPH...119 KPH)...
FOR LOCATIONS AND TIME PERIODS DURING THE NEXT 5 DAYS

PROBABILITIES FOR LOCATIONS ARE GIVEN AS IP(CP) WHERE
IP IS THE PROBABILITY OF THE EVENT BEGINNING DURING AN INDIVIDUAL TIME PERIOD (INDIVIDUAL PROBABILITY)
(CP) IS THE PROBABILITY OF THE EVENT OCCURRING BETWEEN 18Z WED AND THE FORECAST HOUR (CUMULATIVE PROBABILITY)

PROBABILITIES ARE GIVEN IN PERCENT
X INDICATES PROBABILITIES LESS THAN 1 PERCENT
PROBABILITIES FOR 34 KT AND 50 KT ARE SHOWN AT A GIVEN LOCATION WHEN THE 5-DAY CUMULATIVE PROBABILITY IS AT LEAST 3 PERCENT.
PROBABILITIES FOR 64 KT ARE SHOWN WHEN THE 5-DAY CUMULATIVE PROBABILITY IS AT LEAST 1 PERCENT.

- - - - WIND SPEED PROBABILITIES FOR SELECTED LOCATIONS - - - -

TIME PERIODS		FROM 18Z WED TO 06Z THU	FROM 06Z THU TO 18Z THU	FROM 18Z THU TO 06Z FRI	FROM 06Z FRI TO 18Z FRI	FROM 18Z FRI TO 18Z SAT	FROM 18Z SAT TO 18Z SUN	FROM 18Z SUN TO 18Z MON
FORECAST HOUR		(12)	(24)	(36)	(48)	(72)	(96)	(120)
LOCATION	KT							
ATLANTIC CITY	34	X	X(X)	X(X)	X(X)	X(X)	1(1)	2(3)
BALTIMORE MD	34	X	X(X)	X(X)	X(X)	X(X)	1(1)	2(3)
DOVER DE	34	X	X(X)	X(X)	X(X)	X(X)	1(1)	2(3)
OCEAN CITY MD	34	X	X(X)	X(X)	X(X)	X(X)	1(1)	2(3)
RICHMOND VA	34	X	X(X)	X(X)	X(X)	X(X)	2(2)	2(4)
NORFOLK VA	34	X	X(X)	X(X)	X(X)	X(X)	2(2)	2(4)
GREENSBORO NC	34	X	X(X)	X(X)	X(X)	1(1)	1(2)	2(4)
RALEIGH NC	34	X	X(X)	X(X)	X(X)	1(1)	1(2)	1(3)

CAPE HATTERAS	34	X	X(X)	X(X)	X(X)	X(X)	1(1)	3(4)
CHARLOTTE NC	34	X	X(X)	X(X)	X(X)	3(3)	2(5)	1(6)
MOREHEAD CITY	34	X	X(X)	X(X)	X(X)	X(X)	2(2)	2(4)
WILMINGTON NC	34	X	X(X)	X(X)	X(X)	X(X)	2(2)	2(4)
COLUMBIA SC	34	X	X(X)	X(X)	1(1)	2(3)	2(5)	1(6)
MYRTLE BEACH	34	X	X(X)	X(X)	X(X)	1(1)	2(3)	2(5)
CHARLESTON SC	34	X	X(X)	X(X)	X(X)	2(2)	2(4)	2(6)
ATLANTA GA	34	X	X(X)	1(1)	5(6)	9(15)	1(16)	X(16)
ATLANTA GA	50	X	X(X)	X(X)	X(X)	2(2)	1(3)	X(3)
AUGUSTA GA	34	X	X(X)	X(X)	1(1)	5(6)	1(7)	1(8)
SAVANNAH GA	34	X	X(X)	X(X)	1(1)	2(3)	2(5)	1(6)
JACKSONVILLE	34	X	X(X)	X(X)	1(1)	2(3)	1(4)	1(5)
DAYTONA BEACH	34	X	X(X)	X(X)	1(1)	1(2)	X(2)	1(3)
VENICE FL	34	X	2(2)	X(2)	1(3)	X(3)	X(3)	1(4)
TAMPA FL	34	X	1(1)	1(2)	1(3)	X(3)	1(4)	X(4)
CEDAR KEY FL	34	X	2(2)	2(4)	1(5)	1(6)	1(7)	1(8)
TALLAHASSEE FL	34	X	3(3)	4(7)	5(12)	3(15)	1(16)	X(16)
ST MARKS FL	34	X	3(3)	5(8)	4(12)	2(14)	2(16)	X(16)
APALACHICOLA	34	2	7(9)	7(16)	4(20)	2(22)	1(23)	X(23)
APALACHICOLA	50	X	X(X)	1(1)	X(1)	1(2)	X(2)	1(3)
GFMX 290N 850W	34	4	9(13)	6(19)	3(22)	1(23)	1(24)	X(24)
PANAMA CITY FL	34	2	9(11)	10(21)	5(26)	2(28)	1(29)	X(29)
PANAMA CITY FL	50	X	X(X)	2(2)	1(3)	1(4)	1(5)	X(5)
PANAMA CITY FL	64	X	X(X)	X(X)	1(1)	X(1)	X(1)	X(1)
COLUMBUS GA	34	X	1(1)	3(4)	8(12)	8(20)	1(21)	X(21)
COLUMBUS GA	50	X	X(X)	X(X)	1(1)	2(3)	X(3)	X(3)
MONTGOMERY AL	34	X	1(1)	8(9)	17(26)	7(33)	1(34)	X(34)
MONTGOMERY AL	50	X	X(X)	X(X)	3(3)	4(7)	X(7)	X(7)
MONTGOMERY AL	64	X	X(X)	X(X)	1(1)	X(1)	1(2)	X(2)
PENSACOLA FL	34	2	12(14)	19(33)	14(47)	2(49)	X(49)	X(49)
PENSACOLA FL	50	X	X(X)	4(4)	6(10)	2(12)	X(12)	X(12)
PENSACOLA FL	64	X	X(X)	1(1)	2(3)	X(3)	1(4)	X(4)
GFMX 290N 870W	34	7	28(35)	15(50)	4(54)	1(55)	X(55)	X(55)
GFMX 290N 870W	50	X	3(3)	7(10)	3(13)	X(13)	X(13)	1(14)
GFMX 290N 870W	64	X	X(X)	2(2)	X(2)	1(3)	X(3)	X(3)
MOBILE AL	34	1	13(14)	25(39)	20(59)	3(62)	X(62)	X(62)
MOBILE AL	50	X	X(X)	7(7)	14(21)	1(22)	X(22)	1(23)
MOBILE AL	64	X	X(X)	1(1)	4(5)	1(6)	X(6)	X(6)
GULFPORT MS	34	2	15(17)	32(49)	17(66)	3(69)	1(70)	X(70)
GULFPORT MS	50	X	1(1)	11(12)	15(27)	2(29)	X(29)	1(30)

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GULFPORT MS    64  X   X( X)   2( 2)   5( 7)   1( 8)   X( 8)   1( 9)

BURAS LA       34  3  30(33)  31(64)  10(74)   2(76)   1(77)   X(77)
BURAS LA       50  X   5( 5)  24(29)   8(37)   1(38)   1(39)   X(39)
BURAS LA       64  X   X( X)   6( 6)   5(11)   X(11)   1(12)   X(12)

GFMX 280N 890W 34 29  46(75)  11(86)   3(89)   1(90)   X(90)   X(90)
GFMX 280N 890W 50  1  34(35)  18(53)   2(55)   X(55)   X(55)   X(55)
GFMX 280N 890W 64  X   7( 7)  10(17)   2(19)   X(19)   X(19)   X(19)

JACKSON MS     34  X   2( 2)   9(11)  23(34)   6(40)   1(41)   1(42)
JACKSON MS     50  X   X( X)   X( X)   9( 9)   4(13)   X(13)   X(13)
JACKSON MS     64  X   X( X)   X( X)   2( 2)   1( 3)   X( 3)   X( 3)

NEW ORLEANS LA 34  1  15(16)  31(47)  14(61)   3(64)   1(65)   X(65)
NEW ORLEANS LA 50  X   2( 2)  10(12)  11(23)   2(25)   X(25)   X(25)
NEW ORLEANS LA 64  X   X( X)   2( 2)   4( 6)   X( 6)   1( 7)   X( 7)

GFMX 280N 910W 34  5  26(31)  17(48)   3(51)   2(53)   X(53)   X(53)
GFMX 280N 910W 50  X   4( 4)   9(13)   3(16)   X(16)   1(17)   X(17)
GFMX 280N 910W 64  X   X( X)   3( 3)   1( 4)   X( 4)   X( 4)   X( 4)

BATON ROUGE LA 34  1   6( 7)  20(27)  14(41)   3(44)   1(45)   X(45)
BATON ROUGE LA 50  X   X( X)   4( 4)   7(11)   2(13)   X(13)   X(13)
BATON ROUGE LA 64  X   X( X)   X( X)   2( 2)   1( 3)   X( 3)   X( 3)

NEW IBERIA LA  34  1   5( 6)  14(20)   9(29)   3(32)   1(33)   X(33)
NEW IBERIA LA  50  X   X( X)   2( 2)   4( 6)   1( 7)   X( 7)   X( 7)
NEW IBERIA LA  64  X   X( X)   X( X)   2( 2)   X( 2)   X( 2)   X( 2)

GFMX 280N 930W 34  1   4( 5)   7(12)   2(14)   2(16)   X(16)   1(17)

SHREVEPORT LA  34  X   X( X)   2( 2)   3( 5)   3( 8)   1( 9)   X( 9)

PORT ARTHUR TX 34  X   1( 1)   4( 5)   3( 8)   1( 9)   1(10)   X(10)

GALVESTON TX   34  X   1( 1)   2( 3)   1( 4)   2( 6)   X( 6)   1( 7)

HOUSTON TX     34  X   X( X)   2( 2)   1( 3)   X( 3)   1( 4)   X( 4)

FREEPORT TX    34  X   X( X)   2( 2)   X( 2)   1( 3)   1( 4)   X( 4)

GFMX 280N 950W 34  X   1( 1)   1( 2)   1( 3)   1( 4)   X( 4)   1( 5)
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NOTE: Above probability table is provided as an example depicting the format. The probabilities included do not necessarily agree with the predicted forecast positions.

Example: Subtropical Cyclone Public Advisory

WTNT31 KNHC 040255
BULLETIN

SUBTROPICAL STORM ANDREA ADVISORY NUMBER 3
NWS NATIONAL HURRICANE CENTER MIAMI FL AL012007
1100 PM EDT WED MAY 09 2007

...ANDREA NEARLY STATIONARY...FORECAST TO WEAKEN...

SUMMARY OF 1100 PM EDT...0300 UTC...INFORMATION

LOCATION...30.5N 79.8W
ABOUT 135 MI...215 KM...SE OF SAVANNAH GEORGIA
ABOUT 115 MI...185 KM...NE OF DAYTONA BEACH FLORIDA
MAXIMUM SUSTAINED WINDS...45 MPH...75 KM/H
PRESENT MOVEMENT...STATIONARY
MINIMUM CENTRAL PRESSURE...1003 MB...29.62 INCHES

WATCHES AND WARNINGS

CHANGES WITH THIS ADVISORY...

NONE.

SUMMARY OF WATCHES AND WARNINGS IN EFFECT...

A TROPICAL STORM WATCH IS IN EFFECT FOR...
* ALTAMAHA SOUND GEORGIA SOUTHWARD TO FLAGLER BEACH FLORIDA

A TROPICAL STORM WATCH MEANS THAT TROPICAL STORM CONDITIONS ARE POSSIBLE SOMEWHERE WITHIN THE WATCH AREA WITHIN THE NEXT 48 HOURS.

FOR STORM INFORMATION SPECIFIC TO YOUR AREA...INCLUDING POSSIBLE INLAND WATCHES AND WARNINGS...PLEASE MONITOR PRODUCTS ISSUED BY YOUR LOCAL WEATHER OFFICE.

DISCUSSION AND 48-HOUR OUTLOOK

AT 1100 PM EDT...0300 UTC...THE CENTER OF SUBTROPICAL STORM ANDREA WAS LOCATED NEAR LATITUDE 30.5 NORTH...LONGITUDE 79.8 WEST. THE STORM IS NEARLY STATIONARY AND NO SIGNIFICANT MOTION
IS EXPECTED DURING THE NEXT 24 HOURS.

MAXIMUM SUSTAINED WINDS ARE NEAR 45 MPH...75 KM/H...WITH HIGHER GUSTS. SOME WEAKENING IS POSSIBLE DURING THE NEXT DAY OR SO.

WINDS OF TROPICAL STORM FORCE EXTEND OUTWARD UP TO 105 MILES... 165 KM TO THE EAST OF THE CENTER.

ESTIMATED MINIMUM CENTRAL PRESSURE IS 1003 MB...29.62 INCHES.

HAZARDS AFFECTING LAND

RAINFALL...ANDREA IS EXPECTED TO PRODUCE TOTAL RAINFALL ACCUMULATIONS OF 1 TO 2 INCHES ALONG COASTAL AREAS OF THE SOUTHEASTERN UNITED STATES. ISOLATED MAXIMUM AMOUNTS OF ABOUT 3 INCHES ARE POSSIBLE IN SOME RAINBANDS.

NEXT ADVISORY

NEXT INTERMEDIATE ADVISORY...200 AM EDT.
NEXT COMPLETE ADVISORY...500 AM EDT.

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FORECASTER AVILA

CHAPTER 4

GROUND RADAR OBSERVATIONS

4.1 General

Weather radars are used to locate precipitation, calculate its motion, estimate its type (rain, hail, etc) and amount and to forecast future positions and intensity. Most modern weather radars are Doppler radars, capable of detecting the motion of rain droplets in addition to intensity of the precipitation. Both types of data can be analyzed to determine the structure of approaching storms and hurricanes.

Since radar data is mostly digital and available through meteorological circuits and the Internet, individual and network mosaic radar images from all available sources should be distributed to all warning offices and the RSMC-Miami via meteorological circuits and FTP servers. Provision of meteorological data to other users and the general public via the Internet should be separated, if possible, from data intended for operational use.

4.1.1 Observations

Radar imagery during tropical cyclones are among the most important and useful observations available to the hurricane forecaster and to those whose responsibility it is to issue warnings. It is essential that continuous radar observations be available whenever a tropical cyclone is under surveillance by a particular radar, and that all responsible officials co-operate to ensure that the observations are distributed to the RSMC-Miami and other concerned meteorological offices.

While it might be a practice to provide only base reflectivity radar data (data from at a single elevation scan of the radar) outside of the hurricane season or when no weather systems are present, it is recommended that full volume scans (composite reflectivity) of each radar, showing the strongest reflected energy at all elevation scans, be made available as a routine on any weather system during the hurricane season.

Radar data which is intended to be included in the Caribbean radar mosaic should be transmitted to Météo-France Martinique, which has responsibility for the generation of the composite product.

4.1.2 Special Observations

(a) ***Information on the hurricane or storm eye or centre***

Any radar image containing an eye or centre position is considered as a special observation. Observance of the eye of tropical storms and hurricanes is vital. The eye position is best determined from a continuous set of observations. Ideally, the radar-observed eye is readily apparent as a circular echo-free area surrounded by the wall cloud. Once an eye is located within a radar's range, it is recommended that as many detailed images as possible be made available to the RSMC and the Warning Offices under threat. Information should be available on the imagery to enable the latitude and longitude of the eye or centre to be determined.

(b) ***Doppler observations***

Availability of Doppler information on the wind field of the storm or hurricane should also be increased. It is recommended that a Doppler scan with radial velocity measurements up to 100-120 km should be made available every 15 minutes.

(c) ***Rainfall observations***

Radar observations are necessary to provide quantitative estimate of precipitation during a storm or hurricane. Imagery in rainfall rates (in addition to intensities – dBZ) should be provided at intervals, as well as imagery to indicate precipitation intensities in the major rain bands.

4.1.3 Radar availability

It is highly recommended that interruptions of radar operations for preventive maintenance should be minimized during periods of inclement weather. In particular, interruptions of an individual radar's operations should not be carried out when a tropical cyclone is within at least forty-eight (48) hours of surveillance by that radar. Where possible, radar outages should be made known to RSMC Miami, along with the estimated time to their return to service.

4.2 USA coastal radars

These are operated by the US National Weather Service at the following sites:

Location	Radar type	Latitude	Longitude	Id.	Max range (Nau/St mi/km)
Boston, MA	WSR-88D	41°57' N	71°08' W	BOX	248/ - /460
Brownsville, TX	WSR-88D	25°55' N	97°29' W	BRO	"
Caribou, ME	WSR-88D	46°02' N	67°48' W	CBW	"
Charleston, SC	WSR-88D	32°39' N	80°03' W	CLX	"
Corpus Christi, TX	WSR-88D	27°46' N	97°30' W	CRP	"
Houston, TX	WSR-88D	29°28' N	95°05' W	HGX	"
Jacksonville, FL	WSR-88D	30°29' N	81°42' W	JAX	"
Key West, FL	WSR-88D	24°36' N	81°42' W	BYX	"
Lake Charles, LA	WSR-88D	30°07' N	93°13' W	LCH	"
Miami, FL	WSR-88D	25°37' N	80°25' W	AMX	"
Melbourne, FL	WSR-88D	28°07' N	80°39' W	MLB	"
Mobile, AL	WSR-88D	30°41' N	88°14' W	MOB	"
Morehead City, NC	WSR-88D	34°47' N	76°53' W	MHX	"
New York City, NY	WSR-88D	40°52' N	72°52' W	OKX	"
Norfolk, VA	WSR-88D	36°59' N	77°00' W	AKQ	"
Philadelphia, PA	WSR-88D	39°57' N	74°27' W	DIX	"
Portland, ME	WSR-88D	43°53' N	70°15' W	GYX	"
San Juan, PR	WSR-88D	18°07' N	66°05' W	TJUA	"
Slidell, LA	WSR-88D	30°20' N	89°49' W	LIX	"
State College, PA	WSR-88D	40°55' N	78°00' W	CCX	"
Sterling, VA	WSR-88D	38°58' N	77°29' W	LWX	"
Tampa, FL	WSR-88D	27°42' N	82°24' W	TBW	"
Tallahassee, FL	WSR-88D	30°24' N	84°20' W	TLH	"
Wilmington, NC	WSR-88D	33°59' N	78°26' W	LTX	"
Coastal Department of Defence sites, NHC access:					
Dover AFB, DE	WSR-88D	38°50' N	75°26' W	DOX	248/ - /460
Eglin AFB, FL	WSR-88D	30°34' N	85°55' W	EVX	"
Fort Hood, TX	WSR-88D	30°43' N	97°23' W	GRK	"
Fort Rucker, AL	WSR-88D	31°28' N	85°28' W	EOX	"
Maxwell AFB, AL	WSR-88D	32°32' N	85°47' W	MXX	"
Robins AFB, GA	WSR-88D	32°40' N	83°21' W	JGX	"

4.3 Panama radar

Engineering Hill	DWSR-8501S	08 58' N	79 33' W		260/300/480

4.4 Bahamian radar

Nassau	EEC	25°03'N	77°28'W	MYNN	- /300/480

4.5 Canadian radars

Halifax – Gore, NS	45°5'N	63°42'W	XGO	- /155/250
Holyrood, NL	47°19'N	53°10'W	WTP	"
Marion Bridge, NS	45°56'N	60°12'W	XMB	"
Chipman, NB	46°13'N	65°41'W	XNC	"
Marble Mtn., NL	48°55'N	57°50'W	XME	"
Val d'Irène, QC	48°28'N	67°36'W	XAM	"
Lac Castor, QC	48°34'N	70°39'W	WMB	"

4.6 Caribbean Meteorological Organization network of Doppler radars

Location	**Radar type**	**Latitude**	**Longitude**	**Id.**	**Max range (Nau/St mi/km)**
Barbados	Gematronik 10cm	13°11'N	59°33'W	TBPB	- /250/400
Belize	Gematronik 10cm	17°32'N	88°18'W	MZBZ	- /250/400
Kingston, Jamaica	EEC 10cm	18°04'N	76°51'W	MKJP	- /300/480
Trinidad	Gematronik 10cm	10°25'N	61°17'W	TTPP	- /250/400
Guyana (RAIII)	Gematronik 10cm	06°29'N	58°15'W	SYCJ	- /250/400

4.7 Cuban radars

Casablanca	MRL-5(M)	23˚09´N	82˚21´W	CSB	- /280/450
Camaguey	MRL-5(M)	21˚23´N	77˚51´W	CMW	-./280/450
La Bajada	RC-32B(M)	21˚51´N	84˚29´W	LBJ	-./280/450
Punta del Este	RC-32B(M)	21˚33´N	82˚32´W	PDE	- /280/450
Gran Piedra	RC-32B(M)	20˚01´N	75˚38´W	GPD	- /310/500
Pico San Juan	MRL-5(M)	21˚59´N	80˚09´W	PSJ	- /310/500
Pilón	MRL-5(M)	19˚56´N	77˚24´W	PLN	- /280/450
Holguín	Meteor 1500 S	20˚56´N	76˚12´W	HLG	- /280/450

4.8 Dominican Republic radar

Punta Cana	TDR-4350 Doppler	18°31'N	68°24'W	MDPC 78479	- /217/350

4.9 El Salvador radars

Santa Ana	FURUNO BANDA X 3 cm	13°58'42.83"N	89°33'52.76"W	-/-/60
San Salvador	FURUNO BANDA X 3 cm	13°41'15.39"N	89°13'43.38"W	-/-/60
San Miguel	FURUNO BANDA X 3 cm	13°29'55.40"N	88° 9'45.50"W	-/-/60
Sonsonate	FURUNO BANDA X 3 cm	13°42'32.92"N	89°43'52.62"W	-/-/60
Chalatenango	FURUNO BANDA X 3 cm	14° 9'45.74"N	88°56'40.51"W	-/-/60
Zacatecoluca	FURUNO BANDA X 3 cm	13°30'18.81"N	88°52'32.57"W	-/-/60

4.10 French radars

Le Moule, Guadeloupe	Gematronik 10cm	16°19'N	61°20'W	TFFR	- /250/400
Diamant, Martinique	Gematronik 10cm Doppler	14°30'N	61°01'W	TFFF	- /250/400
Kourou, French Guiana	EEC 5.6 cm Doppler	04°50'N	52°22'W	SOCA	- /250/400

4.11 Mexican radars

Location	Radar type	Latitude	Longitude	Id.	Max range (Nau/St mi/km)
Tampico, Tamaulipas	EEC	22°23'N	97°56'W	TAM	-/-/480
Guasave, Sinaloa	EEC	25°34'N	108°28'W	SIN	-/-/480
Los Cabos, Baja California Sur	EEC	22°53'N	109°56'W	BCS	-/-/480
El Palmito, Durango[1]	EEC	25°46'N	104°54'W	DGO	-/-/480
Acapulco, Guerrero	EEC	16°46'N	99°45'W	GRO	-/-/480
Sabancuy, Campeche	EEC*	18º57'N	91°10'W	CMP	-/-/480
Cancún, Quintana Roo	EEC*	21°01'N	86°51'W	QRO	-/-/480
Cerro de la Catedral, Estado de México	Ericsson	19°33'N	99°31'W	MEX	-/-/500
Cuyutlán, Colima	Ericsson	18°57'N	104°08'W	COL	-/-/500
Puerto Angel, Oaxaca	Ericsson	15°39'N	96°30'W	OAX	-/-/500
Alvarado, Veracruz	Ericsson	18°43'N	95°37'W	VER	-/-/480
Obregón, Sonora	Ericsson	27°28'N	109°55'W		-/-/500
Mozotal, Chiapas	Gematronik	15°26'N	92°21'W		-/-/480

* Equipo de computo y controlador Enterprise; Antena y Pedestal Ericsson (The equipment of calculation and controller are manufactured by Enterprise; the antenna and the pedestal are manufactured by Ericsson).

4.12 Curacao and Sint Maarten radars

Hato Airport, Curaçao	WSR-74S 10 cm	12°l0'N	68°56'W	TNCC	- /250/400
Juliana Airport St. Maarten	WSR-74S 10 cm	18°03'N	63°04'W	TNCM	- /250/400

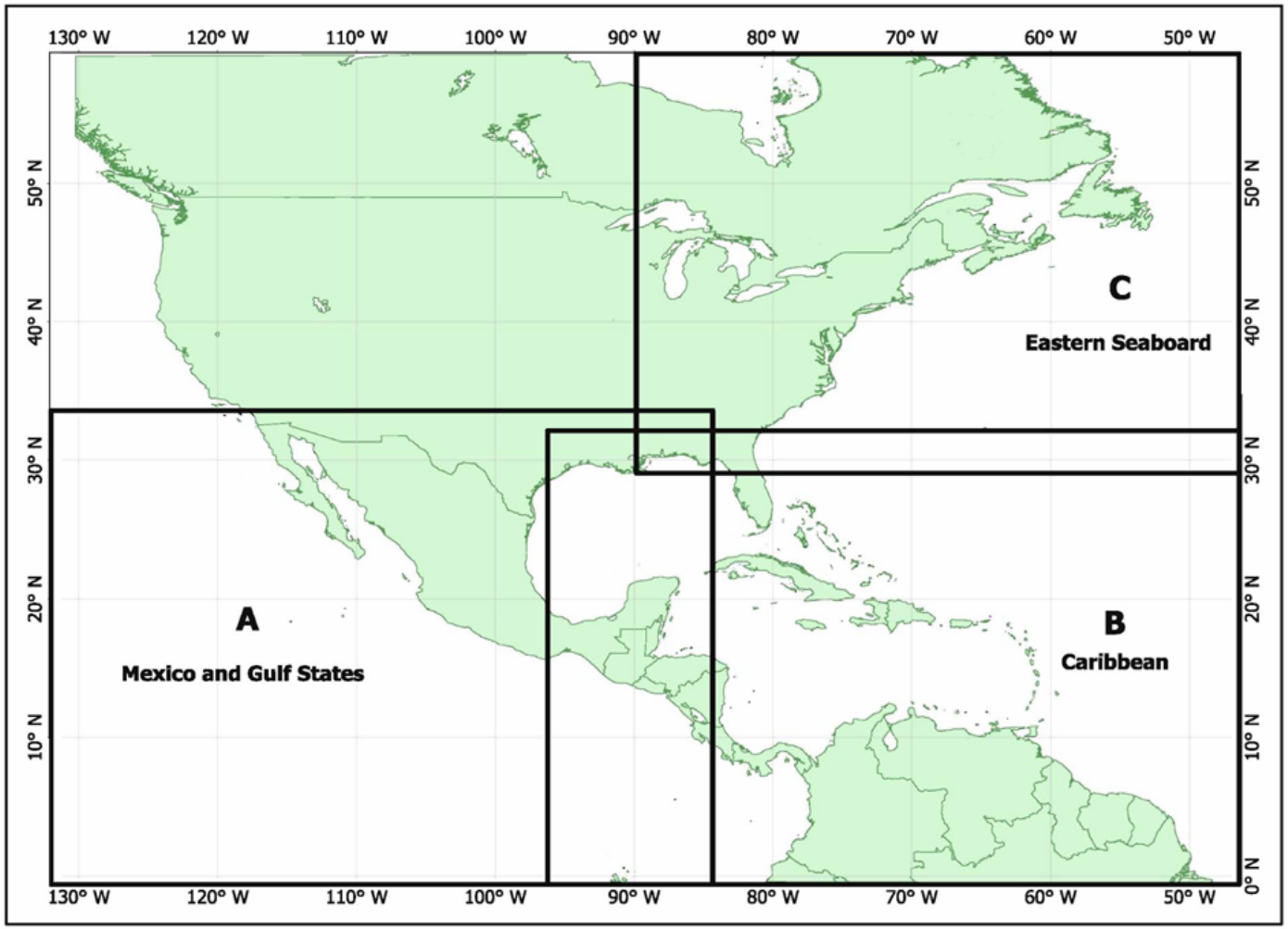
4.13 Bermuda Radar

LF Wade Intl. Airport	Gematronik 10cm	32º18´N	64º42´W	TXKF	- /310/500

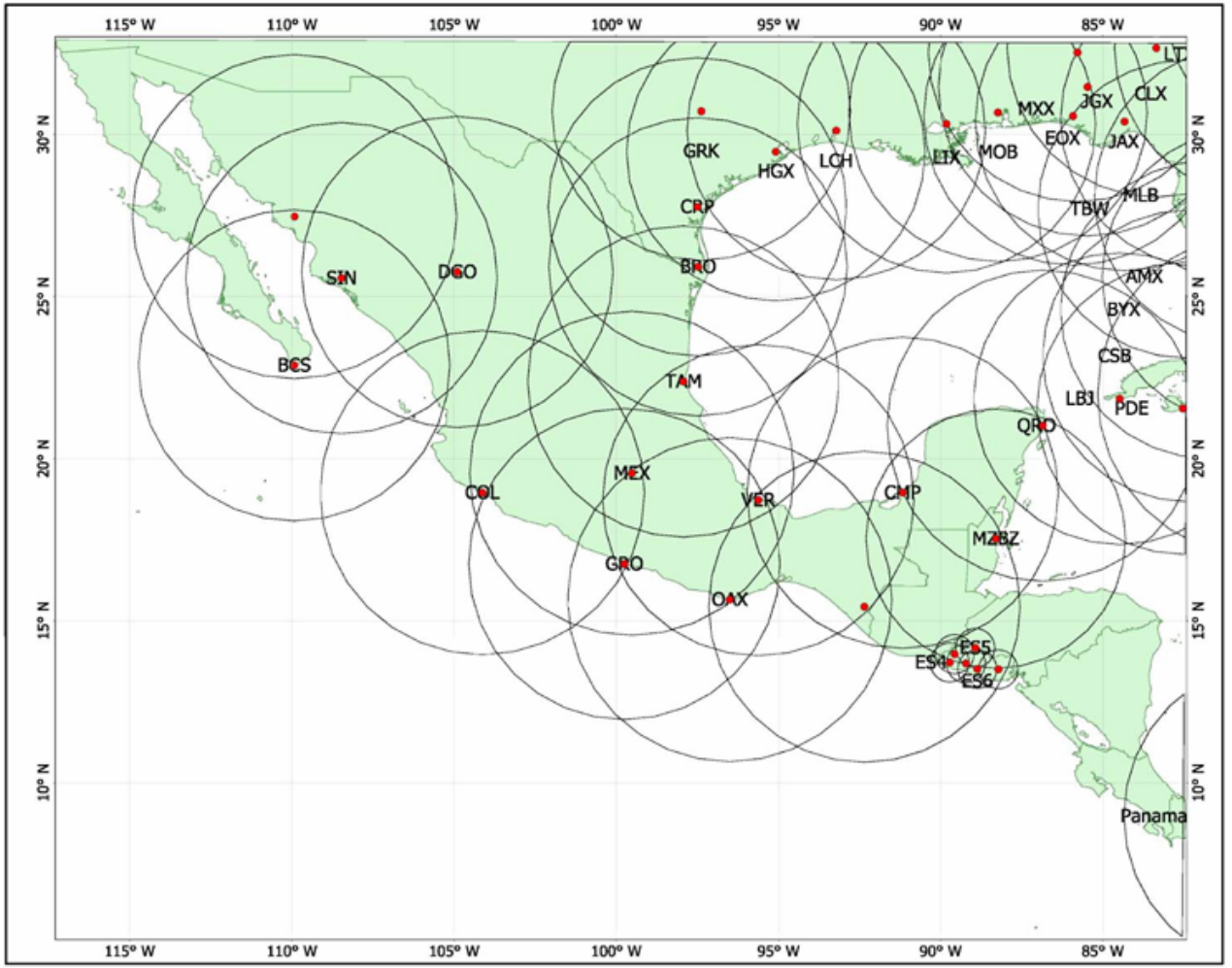
4.14 Venezuela – Coastal Radars

Maracaibo	Gematronik 10cm	10º25´N	67º13´W		-/-/400
Jeremba	Gematronik 10cm	10º34´N	71º43´W		-/-/400
Capuchino	Gematronik 10cm	10º33´N	63º21´W		-/-/400

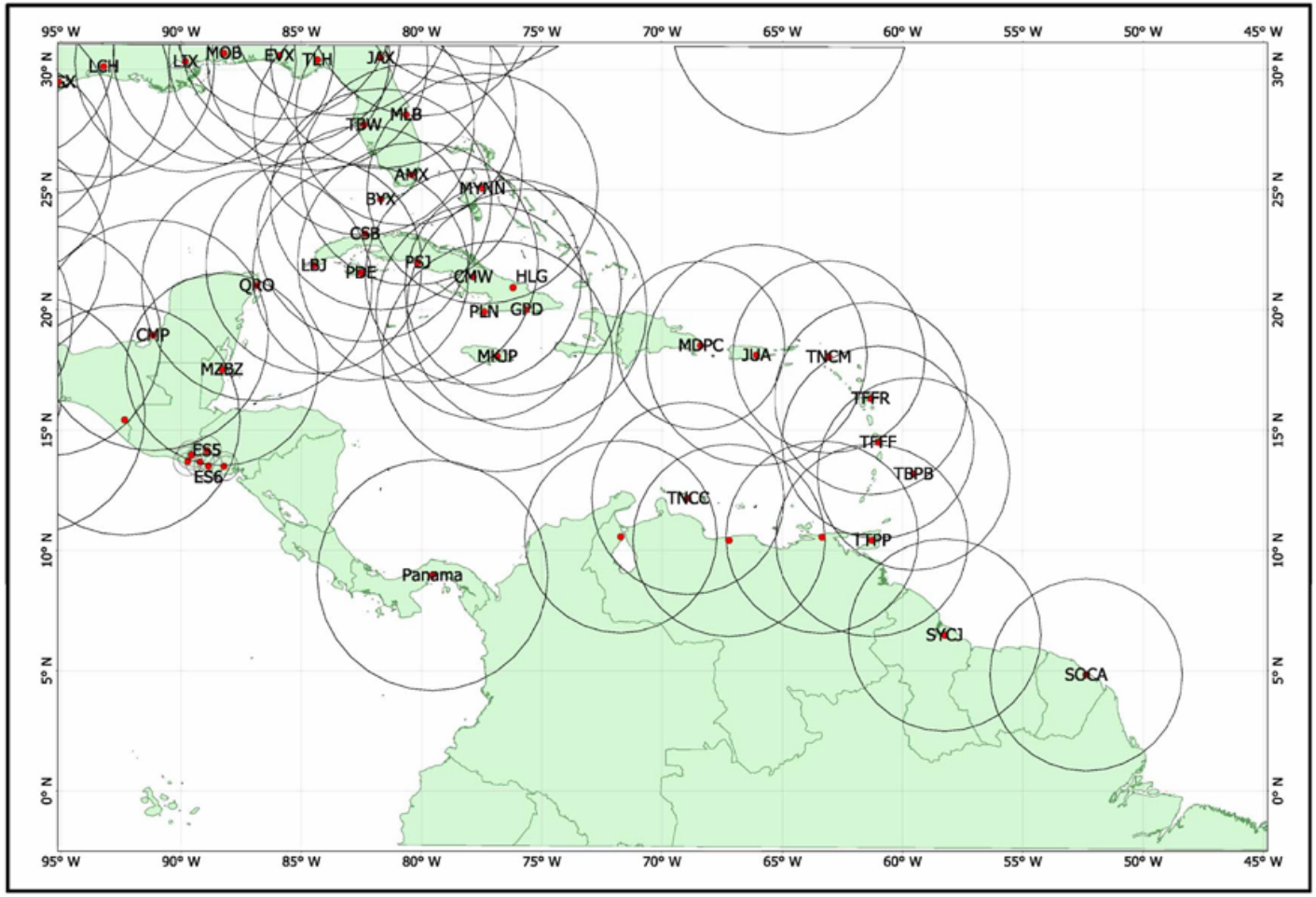
4.15 **Section map for the coastal radar coverage in RA IV**



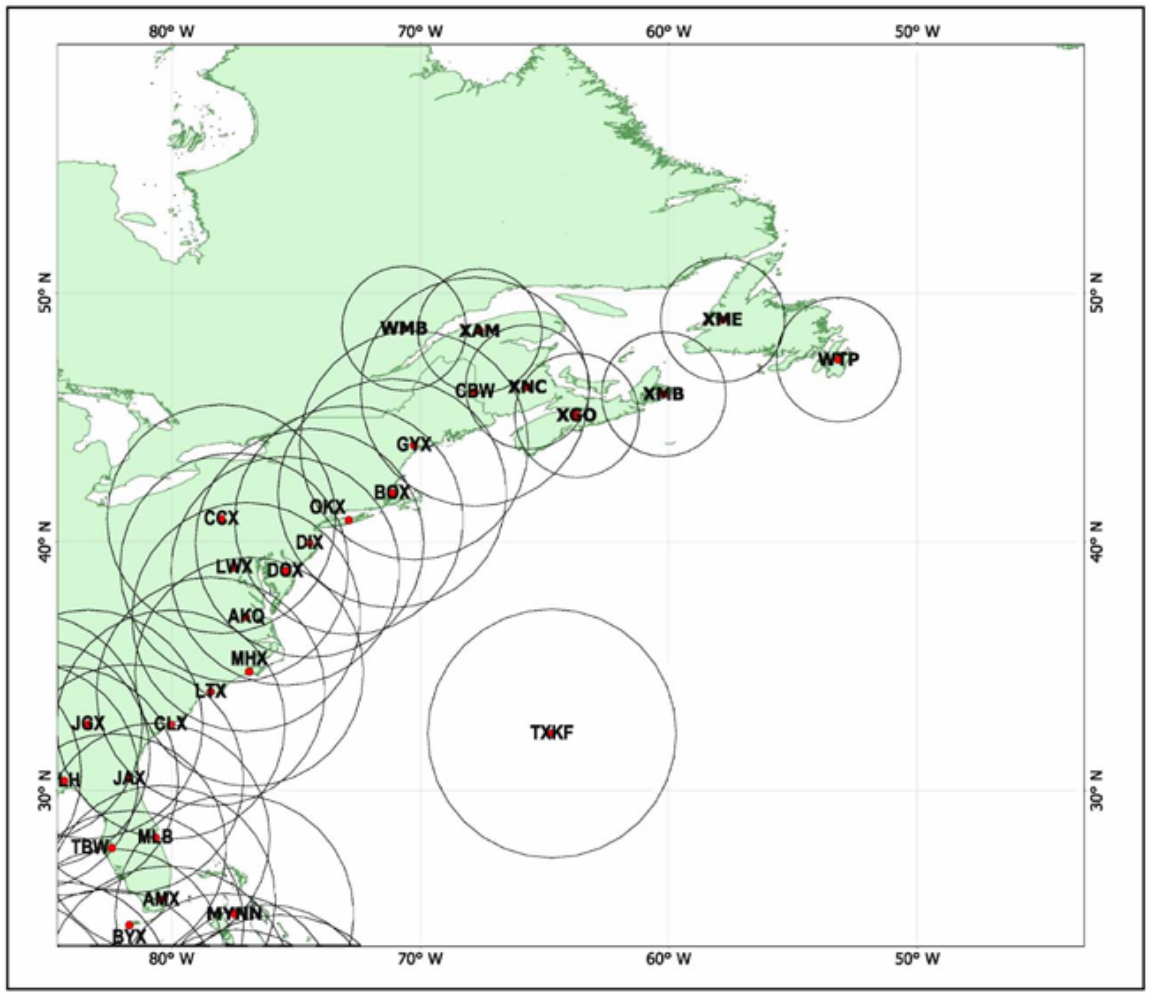
4.15.1 **Coastal radar coverage (Doppler) - map A**



4.15.2 **Coastal radar coverage - map B**



4.15.3 **Coastal radar coverage - map C**



CHAPTER 5

SATELLITE SURVEILLANCE

5.1 Operational Meteorological Satellites

Latest detailed information on the status of operational meteorological satellites is available from **http://www.wmo.int/pages/prog/sat/satellitestatus.php**

5.2 Tropical Analysis and Forecast Branch Products

(a) Support concept

GOES imagery in support of the hurricane warning services provided by direct downlink to RSMC Miami is distributed by the Central Data Distribution Facility at Marlow Heights, Maryland, to Honolulu and Washington.

(b) Station contact

NHC satellite meteorologists can be contacted as follows:
(i) Miami - 24 hours a day at (305) 229-4425.

(c) Satellite Products: Issuance Times and Geographic Areas

Tropical Weather Discussion

Heading	Issuance times	Oceanic area
AXNT20 KNHC	0005Z, 0605Z, 1205Z, 1805Z	Gulf of Mexico, Caribbean Sea, and Atlantic South of 32°N to equator
AXPZ20 KNHC	0405Z, 1005Z, 1605Z, 2205Z	Pacific South of 32°N to equator and east of 140°W

Tropical Disturbance Rainfall Estimate

Heading	Issuance times	Oceanic area
TCCA21 KNHC	6 Hourly as needed	Caribbean East of 67°W
TCCA22 KNHC	6 Hourly as needed	Caribbean between 67°W and a 22°N 81°W - 9°N 77°W line
TCCA23 KNHC	6 Hourly as needed	Caribbean West of 22°N 81°W – 9°N 77°W line and Mexico (Atlantic and Pacific Coasts)

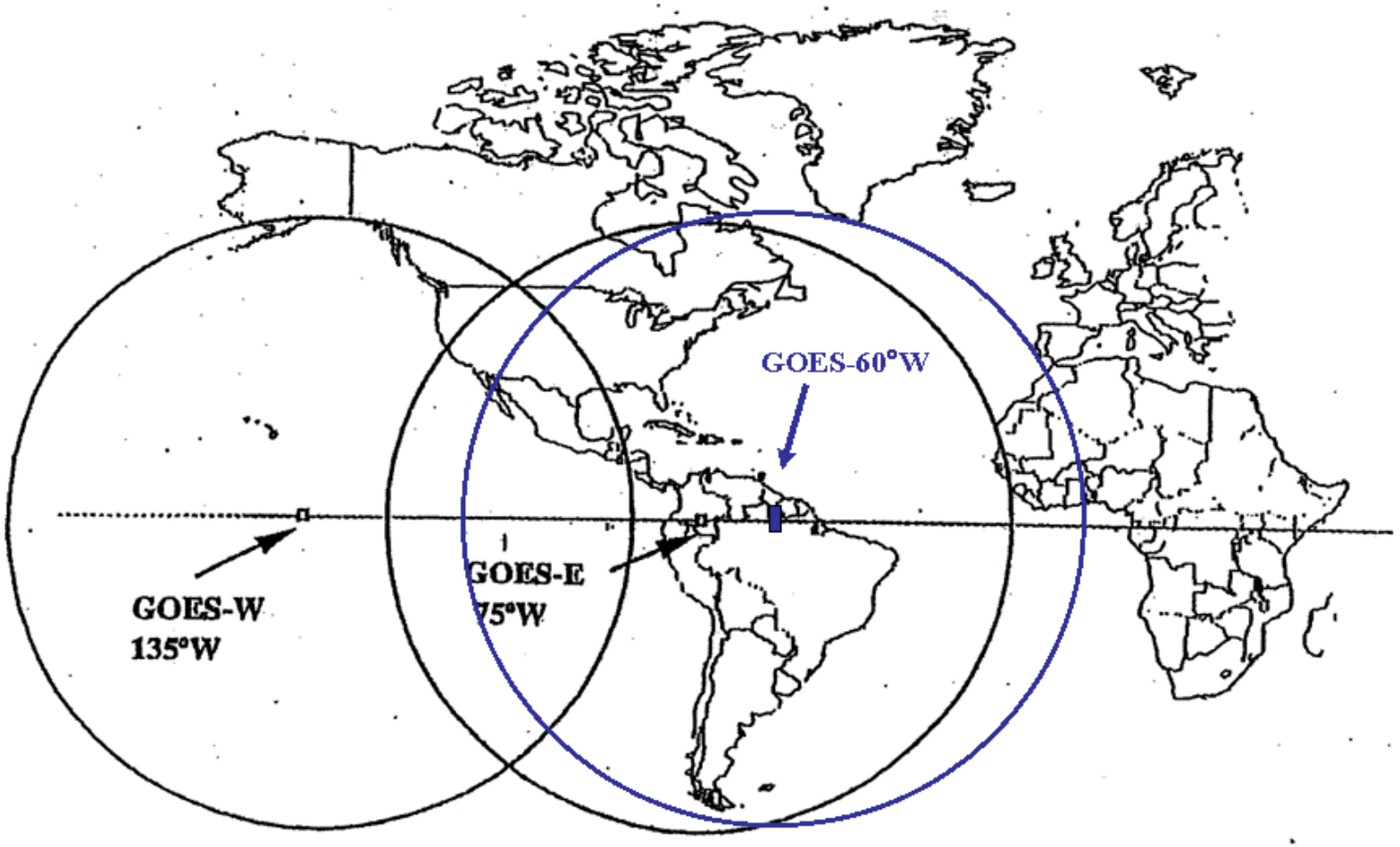
5.3 Tropical Numerical Guidance Interpretation Message

The National Centers for Environmental Prediction Tropical Desk (NCEP) in Washington issues a Tropical Numerical Guidance Interpretation Message once a day about 1900 UTC under the header FXCA20 KWBC. The message includes a description of the initial model analysis, model comparison and a prognostic discussion.

5.4 NESDIS Satellite Analysis Branch

The SAB operates 24 hours a day to provide GOES and NOAA satellite data support to the National Weather Service forecast offices and the National Centers for Environmental Prediction.

GOES-East and GOES-West COVERAGE



A T T A C H M E N T 5 A

OPERATIONAL METEOROLOGICAL SATELLITE INFORMATION FOR REGION IV

1. The space-based component of the GOS is comprised of operational meteorological satellites in polar-orbit and in geostationary orbit, oceanographic satellites in low-Earth orbit, and other environmental satellite missions often provided by Members in the context of scientific research or demonstration programmes.

2. With regard to operational meteorological satellites, primary geostationary coverage is provided over Region IV by GOES-13 in GOES East position (75° West) and GOES-15 in GOES West position (135°W), operated by the United States. In addition, the GOES-12 satellite is operated by the USA at 60° W to specifically provide coverage of South America. GOES coverage is complemented in the West by MTSAT-1R (140° W) and MTSAT-2 (145°), operated by Japan, and in the East by Meteosat-9 operated by EUMETSAT. The following polar-orbiting satellites are operational: Metop-A (primary satellite in morning orbit) operated by EUMETSAT; NOAA-19 (primary spacecraft in afternoon orbit) operated by the United States; FY-3A and FY-3B operated by China on a morning and afternoon orbit respectively. Additional observations are provided by older polar-orbiting satellites that are maintained in orbit for back-up purposes. Meteor-M1 is operated by the Russian Federation on a morning orbit. The new generation afternoon satellite Suomi-NPP is in commissioning.

3. The JASON-2 spacecraft, a joint ocean mission of CNES, EUMETSAT, NASA, and NOAA, is providing precision ocean surface topography measurements.

4. With regard to R&D satellites, the present constellation includes a number of satellites of potential interest to tropical cyclone monitoring, such as: NASA's Aqua, Terra, TRMM (in cooperation with Japan), and CloudSat (in cooperation with Canada), the joint NASA-CNES JASON-1 mission, ESA's ENVISAT and ERS-2, CNSA's HY-1B and ISRO's Oceansat-2.

Details for the status of operational space segment available in RA IV are given below. Updated status information and links to the websites of the satellite operators are provided on the following web pages maintained by the WMO Space Programme: **http://www.wmo.int/pages/prog/sat/satellitestatus.php.**

Polar-orbiting satellites

FY-3A and FY-3B

5. The FY-3A and FY-3B polar orbiting satellites were launched respectively on 27 May 2008 on a morning orbit and on 4 November 2010 on an afternoon orbit. They carry a comprehensive payload with visible, infrared and microwave imagery and infrared and microwave sounding. Direct Broadcast is available..

NOAA-19 and NPP

6. NOAA-19 was launched on 6 February 2009. It serves as the primary spacecraft on an afternoon orbit with a descending node at approx. 2 p.m.. Its payload includes the heritage imager (AVHRR/3) and ATOVS sounding instruments (HIRS, AMSU-A, MHS). Continuity of the NOAA-19 mission will be provided by the Suomi National Polar-orbiting Partnership (NPP) launched on 27 October 2011, currently in commissioning. The Suomi-NPP spacecraft carries a new generation, advanced payload including a Visible Infrared Imaging Radiometer (VIIRS), Advanced Technology Microwave Sounder (ATMS) and a Cross-track Infrared Sounder (CrIS).

MetOp-A

7. MetOp-A, launched in October 2006, is operated on a morning orbit with a 09:30 descending node. It is the primary spacecraft in a morning orbit. Its instruments include namely an Infrared Atmospheric Sounding Interferometer (IASI), an MHS, an advanced scatterometer (ASCAT) as well as NOAA provided instruments for VIS/IR imaging and sounding. While the instruments on-board are

performing quite satisfactory, the High Resolution Picture Transmission (HRPT) direct broadcast service was interrupted by a transponder failure on 4 July 2007. In order to limit the exposure to space environment effects, the HRPT service can only be activated over a limited area which excludes South America and the South Atlantic.

Geostationary satellites

GOES-12 and 13 and 15

8. The current Geostationary Operational Environmental Satellites (GOES) are three-axis stabilized spacecraft in geosynchronous orbits. The current primary satellites, GOES-15 and GOES-13, are stationed over the west and east coasts of the United States at 135°W and 75°W respectively. These satellites are used to provide simultaneous images and soundings of the Western Hemisphere.

9. The GOES-15 spacecraft, launched on 4 March 2010, is the primary spacecraft in GOES-West position over the Pacific. GOES-12, launched in July 2001 has been relocated in June 2010 at 60 degrees W in order to provide coverage for South America. GOES-13, launched in May 2006, is the operational East Coast satellite at 75°W .

MTSAT

10. Since July 2010, the MTSAT mission is performed by MTSAT-2, stationed at 145°E, however data dissemination continues to be performed via MTSAT-1R at 140°E. In addition to the direct broadcast in High and Low Rate Information Transmission (HRIT/LRIT), high and low resolution data are made available in near-real time by JMA via Internet.

Meteosat-9

11. Meteosat-9, launched in December 2005, is the operational spacecraft located at 0°. Its visible and infrared imager data are disseminated by EUMETSAT over Regions III and IV via the DVB-S System in C-band EUMETCast-America.

Ocean surface topography missions

12. The Jason-2 altimetry satellite, launched in June 2008 on a 1336 km orbit with an inclination of 66°, is an operational follow-on to the Jason-1 mission. It provides high-precision, reference measurements of the ocean surface topography. It is complemented by the altimetry measurements of the ESA's ENVISAT satellite.

CHAPTER 6

AIRCRAFT RECONNAISSANCE

6.1 General

The tropical cyclone reconnaissance system of the USA will normally be prepared to generate up to five reconnaissance aircraft sorties per day in the Atlantic when a storm is within 500 nm of landfall and west of 52.5°W. Notification of requirements must generally be levied by RSMC Miami early enough to allow 16 hours plus en route flying time to ensure that the aircraft will reach the area on time. In the Eastern Pacific, reconnaissance missions may be tasked when necessary to carry out warning responsibilities.

The USA has a Gulfstream jet aircraft for determining the environmental conditions on the periphery of tropical cyclones that threaten landfall. The environmental conditions will be determined with GPS dropwinsondes. The flight pattern will be tailored to the storm situation on a case-by-case basis.

To assure the uninterrupted flow of operational reconnaissance data, all Member countries hosting or conducting research or operational flights into tropical cyclones in the RA IV Region will coordinate such activities. The RSMC Miami will serve as the focus for this coordination. Whenever possible, this co-ordination will be accomplished in advance by telephone. All other means of contact will be utilized, including in-flight aircraft to aircraft radio/voice contacts, to assure proper co-ordination.

6.2 Aircraft reconnaissance data

6.2.1 Parameter requirements

Data needs in order of priority are:

(a) Geographical position of vortex centre (surface centre, if known);

(b) Central sea-level pressure (by dropsonde or extrapolation from within 1,500 ft. of sea surface);

(c) Minimum 700 hPa height (if available);

(d) Wind-profile data (surface and flight level);

(e) Temperature (flight level);

(f) Sea-surface temperature;

(g) Dewpoint temperature (flight level);

(h) Height of eye wall.

6.2.2 Meteorological instrument capabilities

Required aircraft reconnaissance data instrument capabilities are as follows:

(a) Data positions - within 18.5 km (10 naut. mls.);

(b) Sea-level pressure - $\pm$ 2 hPa;

(c) Pressure heights - $\pm$ 10 m;

(d) Temperatures (including dewpoint and sea-surface temperatures (SST)) - $\pm$ 0.5^{o};

(e) Winds - speed $\pm$ 9 km h^{-1} ($\pm$ 5 kt); direction $\pm$ 10^{o}.

6.3 Mission identifier

Each reconnaissance report will include the mission identifier as the opening text of the message. Regular weather and hurricane reconnaissance messages will include the five digit agency/aircraft indicator followed by the 5 digit assigned mission-system indicator. Elements of the mission identifier are:

Agency - aircraft indicator - mission indicator

Agency - aircraft number	# of missions this system (two digits)	TD # or XX if not at least a TD (two digits)	Alpha letter showing area A-Atlantic E-East Pacific C-Central Pacific	Storm name or words CYCLONE or DISTURB

AF plus last three digits of tail #

NOAA plus last digit of registration #

Examples:

AF985 01XXA DISTURB (lst mission on a disturbance in the Atlantic) AF987 0503E CYCLONE (5th mission, depression #3, in the Eastern Pacific) NOAA2 0701C Agnes (7^{th} mission on TD #1 which was named Agnes, Central Pacific)

6.4 Observation numbering and content

(a) The first weather observation will have appended as remarks the ICAO four-letter departure station identifier, time of departure and estimated time of arrival (ETA) at the co-ordinates or storm. It will be transmitted as soon as possible after take-off.

AF966 0308 EMMY OB I
97779 TEXT...DPTD KBIX AT 102100Z ETA
31.5N 75.0W AT 110015Z;

(b) All observations on tropical cyclone missions requested by Hurricane Centres will be numbered sequentially from the first to the last.

6.5 Aerial reconnaissance weather encoding and reporting

6.5.1 Horizontal and vertical observations

Horizontal meteorological observations and vertical observations will be coded and transmitted in RECCO code and TEMP DROP code, respectively. En route RECCO observations will be taken and transmitted at least hourly until the aircraft is within 370 km (200 naut. mls.) of the centre of the storm at which time observation frequency will become at least every 30 minutes.

6.5.2 Vortex data

All observed vortex fix information will be included in the detailed vortex data message (see Attachment 6A) prepared and transmitted for all scheduled fixes and in all detailed vortex data messages prepared and transmitted on an "as required" basis for intermediate non-scheduled fixes. An abbreviated vortex data message (Attachment 6A, items A-H) may be sent in lieu of the detailed message for intermediate fixes. These messages should be transmitted as soon as possible.

6.5.3 Coded reports

Other than vortex data and supplementary vortex data messages, teletype aerial reconnaissance observation messages will have the following format:

9xxx9 GGggi$_d$ YQL$_a$L$_a$L$_a$ L$_o$L$_o$L$_o$Bf$_c$ h$_a$h$_a$h$_a$d$_t$d$_a$ ddfff TTT$_d$T$_d$w m$_w$jHHH

4ddff and 9V$_i$T$_w$T$_w$T$_w$ 95559 GGggi$_d$ YQL$_a$L$_a$L$_a$ L$_o$L$_o$L$_o$Bf$_c$ ddfff TTT$_d$T$_d$w

m$_w$jHHH 4ddff plus 9V$_i$T$_w$T$_w$T$_w$

Symbol identification

9xxx9 - RECCO indicator group specifying type of observation

xxx = 222 - Basic observation without radar data

555 - Intermediate observation

777 - Basic observation with radar data

GGgg - Time of observation (hours and minutes -UTC)

i_d - Humidity indicator (0-no humidity; 4-°C dewpoint)

Y - Day of week (Sun-1)

Q - Octant of the globe (0- 0° - 90°W N.H.)
(1-90° - 180°W N.H.)

L$_a$L$_a$L$_a$ - Latitude degrees and tenths
L$_o$L$_o$L$_o$ - Longitude degrees and tenths

B - Turbulence (range 0 (none) to 9 (frequent, severe))

fc - Cloud amount (range 0 (less than 1/8) to 9 (in clouds all the time))

h$_a$h$_a$h$_a$ - Absolute altitude of aircraft (decametres)

d_t - Type of wind (range 0 (spot wind) to 9 (averaged over more than 740 km (400 naut. mls.))

d_a - Reliability of wind (range 0 (90 % to 100 % reliable) to 7 (no reliability) and 8 (no wind))

dd - Wind direction at flight level (tens of degrees true)

fff - Wind speed at flight level (knots)

TT - Temperature (whole degrees C; 50 added to temperature for negative temperatures)

T$_d$T$_d$ - Dewpoint temperature (whole degrees C), (when // with i_d;=;4 indicates relative humidity less than 10 %)

w - Present weather (0 (clear), 4 (thick dust or haze), 5 (drizzle), 6 (rain), 8 (showers), 9 (thunderstorms))

m_w - Remarks on weather (range 0 (light intermittent) to 5 (heavy continuous) and 6 (with rain))

j - Index to level ((0 (sea-level pressure in whole hectopascals (hPa), thousands omitted: 1 - 1,000 hPa surface height in geopotential metres, 500 added to HHH if negative; 2 - 850 hPa and 3 - 700 hPa height in gpm, thousands omitted; 4 - 500 hPa, 5 - 400 hPa and 6 - 300 hPa height in geopotential decametres; 7 - 250 hPa height in geopotential decametres, tens of thousands omitted; 8 - D - value in geopotential decametres, 500 added to HHH if negative; 9 - no absolute altitude available)

4 - Group indicator for surface wind direction and speed

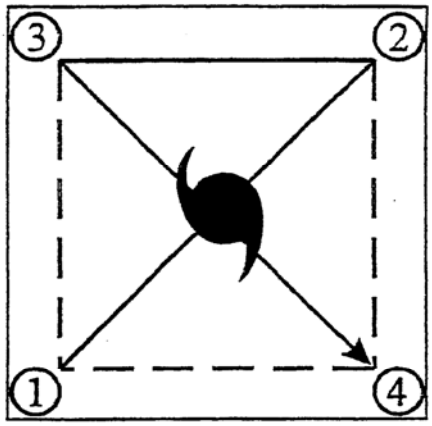
V_i - In-flight visibility (1 (0 to 1.8 km) (0 to 1 naut. ml.); 2 (greater than 1.8 km) (1 naut. ml.), but not exceeding 5.5 km (3 naut. mls.); 3 (greater than 5.5 km (3 naut. mls.))

$T_wT_wT_w$ - Sea-surface temperature (degrees and tenths ^oC)

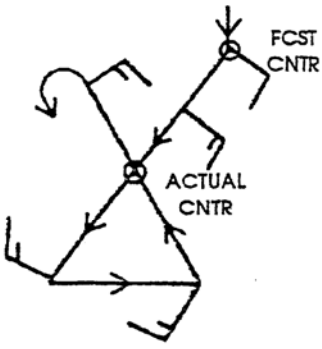
ABBREVIATED/DETAILED VORTEX DATA MESSAGE

DATE		SCHEDULED FIX TIME	AIRCRAFT NUMBER	ARWO
WX MISSION IDENTIFICATION		STORM NUMBER IDENTIFIER		OB
VORTEX DATA MESSAGE				
A		DATE AND TIME OF FIX		
B	DEG MIN N S	LATITUDE OF VORTEX FIX		
	DEG MIN E W	LONGITUDE OF VORTEX FIX		
C		MINIMUM HEIGHT AT STANDARD LEVEL		
D		ESTIMATE OF MAXIMUM SURFACE WIND OBSERVED		
E		BEARING AND RANGE FROM CENTER OF MAXIMUM SURFACE WIND		
F		MAXIMUM FLIGHT LEVEL WIND NEAR CENTER		
G		BEARING AND RANGE FROM CENTER OF MAXIMUM FLIGHT LEVEL WIND		
H		MINIMUM SEA LEVEL PRESSURE COMPUTED FROM DROPSONDE OR EXTRAPOLATED FROM FLIGHT LEVEL. IF EXTRAPOLATED, CLARIFY IN REMARKS.		
I		MAXIMUM FLIGHT LEVEL TEMP/PRESSURE ALTITUDE OUTSIDE EYE		
J		MAXIMUM FLIGHT LEVEL TEMP/PRESSURE ALTITUDE INSIDE EYE		
K		DEWPOINT TEMP/SEA SURFACE TEMP INSIDE EYE		
L		EYE CHARACTER: Closed wall, poorly defined, open SW, etc.		
M		EYE SHAPE/ORIENTATION/DIAMETER. **CODE EYE SHAPE AS:** C -Circular; CO - Concentric; E- Elliptical. **TRANSMIT ORIENTATION OF MAJOR AXIS IN TENS OF DEGREE** (i.e., 01-010 to 190; 17-170 to 350). **TRANSMIT DIAMETER IN NAUTICAL MILES.** Examples: C8 - Circular eye 8 miles in diameter. EO9/15/5 - Elliptical eye, major axis 090-270, length of major axis 15 NM, length of minor axis 5NM. CO8-14 - Concentric eye, diameter inner eye 8 NM, outer eye 14 NM.		
N		FIX DETERMINED BY/FIX LEVEL**. FIX DETERMINED BY:** 1 - Penetration; 2 - Radar; 3 - Wind; 4 - Pressure; 5 - Temperature. **FIX LEVEL:** Indicate surface center if visible; indicate both surface and flight level centers only when same: 0 - Surface; 1 - 1500ft; 9-925mb; 8 - 850 mb; 7 - 700 mb; 5 - 500 mb; 4 - 400 mb; 3 - 300 mb; 2 - 200 mb; NA - Other.		
O		NAVIGATION FIX ACCURACY/METEOROLOGICAL ACCURACY		
P	REMARKS MAX FL WIND_____KT_____QUAD_____Z MAX OUTBOUND FL WIND_____KT_____QUAD_____Z SLP EXTRAP FROM (Below 1500 FT/ 925 MB/ 850 MB/ DROPSONDE) SFC CNTR_____/_____NM FROM FL CNTR MAX FL TEMP _____C_____/_____NM FROM FL CNTR SURFACE WIND OBSERVED VISUALLY			
INSTRUCTIONS: Items A through G (and H when extrapolated) are transmitted from the aircraft immediately following the fix. The remainder of the message is transmitted as soon as available.				

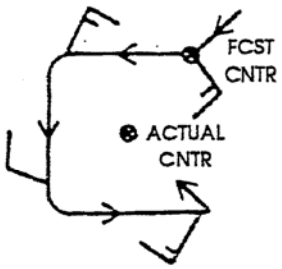
OPERATIONAL HURRICANE RECONNAISSANCE FLIGHT PATTERN



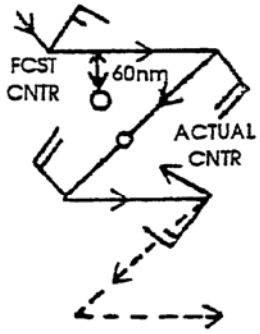
Flight pattern ALPHA



X-PATTERN



BOX PATTERN



DELTA PATTERN

CHAPTER 7

SURFACE AND UPPER-AIR OBSERVATIONS

7.1 General

In addition to regularly scheduled surface and upper-air observations, additional observations are required at key locations when a tropical cyclone is an imminent threat to Members. These requests for additional observations are normally initiated by the RSMC Miami. The frequency of special observations depends on the individual tropical cyclone situation. Additional observations may require 24-hour staffing of a station. Requests will normally be made by telephone to the relevant NMC.

7.2 Surface observations

Additional surface observations at one- three- or six-hourly intervals may be requested from implemented stations in Region IV. A list of key stations is given in Attachment 7 A.

7.3 Upper-air observations

Additional upper-air observations may be requested from implemented stations in Region IV. A list of key stations is given in Attachment 7 B.

7.4 Moored buoys

Information on the operational status of moored buoys may be required. This information is provided for those located in the North Atlantic Ocean, Caribbean Sea and Gulf of Mexico in Attachment 7 C.

7.5 Post-storm country reports

A post-storm country report should be issued by National Meteorological Services in RA IV, based on the format as given in Attachment 7 D and sent to the RSMC Miami (ncep.nhc.hsu@noaa.gov) preferably within 15 days after being affected, directly or indirectly, by any tropical depression, tropical storm or hurricane.

STATIONS FROM WHICH ADDITIONAL SURFACE OBSERVATIONS MAY BE REQUESTED DURING TROPICAL CYCLONES

Country	Station name	Block and station number	Int. location indicators for addressed messages
Antigua & Barbuda	V.C. Bird Airport	78862	TAPA
Bahamas	Freeport, Grand Bahama	78062	MYGF
	Green Turtle Cay, Abaco	78066	
	Alice Town, Bimini	78070	MYBS
	Nassau, New Providence	78073	MYNN
	Dunmore Town, Harbour Island, Eleuthera	78077	MYER
	Kemps Bay, Andros	78086	
	The Bight, Cat Island	78087	
	Cockburn Town, San Salvador	78088	MYSM
	George Town, Exuma	78092	MYEG
	Clarence Town, Long Island	78095	
	Duncan Town, Ragged Island	78101	
	Church Grove, Crooked Island	78104	
	Abraham Bay, Mayaguana	78109	MYMM
	Matthew Town, Inagua	78121	MYIG
Barbados	Grantley Adams	78954	TBPB
Belize	Philip Goldson Int'l Airport	78583	MZBZ
Bermuda	LF Wade International Airport	78016	TXKF
Canada	Halifax International, NS	71395	CYHZ
	Sable Island, NS	71600	CWSA
	Shearwater, NS	71601	CYAW
	Sydney, NS	71707	CYQY
	Yarmouth, NS	71603	CYQI
	Fredericton, NB	71700	CYFC
	Gagetown, NB	71701	CYCX
	Moncton, NB	71705	CYQM
	Saint John, NB	71609	CYSJ

Country	Station name	Block and station number	Int. location indicators for addressed messages
Canada (continued)	Charlottetown, PEI	71706	CYYG
	Mt. Pearl, Nfld	71802	CAYT
	Stephenville, Nfld	71815	CYJT
Cayman Island	Grand Cayman Owen Roberts Intl.	78384	MWCR
Colombia	Aerp. Sesquicentenario/Isla San Andres	80001	SKSP
	Aerp. El Embrujo/Isla Providencia	80002	SKPV
	Aerp. Admirante Padilla/Río Hacha	80035	SKRH
Costa Rica	Aeropuerto Intn. Juan Santamaria/Alajuela	78762	MROC
	Puerto Limon	78767	MRLM
Cuba	Cabo de San Antonio	78310	
	Santa Lucia	78312	
	Isabel Rubio	78313	
	Pinar del Rio	78315	
	Paso Real de San Diego	78317	
	Bahia Honda	78318	
	Güira de Melena	78320	
	La Fé	78321	
	Batabano	78322	
	Punta del Este	78324	
	Casablanca	78325	
	Union de Reyes	78327	
	Varadero	78328	
	Colon	78332	
	Playa Giron	78333	
	Sagua la Grande	78338	
	Cayo Coco	78339	
	Bainoa	78340	
	Yabu	78343	
	Cantarrana	78344	
	Jucaro	78345	
	Ciego de Avila	78346	
	Caibarién	78348	

Country	Station name	Block and station number	Int. location indicators for addressed messages
Cuba (continued)	Sancti Spiritus	78349	
	Sta. Cruz del Sur	78351	
	Nuevitas	78353	
	Camaguey	78355	
	Victoria de Las Tunas	78357	
	Puerto Padre	78358	
	Manzanillo	78359	
	Cabo Cruz	78360	
	Contramaestre	78363	
	Santiago de Cuba	78364	
	Punta Lucrecia	78365	
	Gran Piedra	78366	
	Guantánamo	78368	
	Punta Maisi	78369	
	Santiago de Las Vegas	78373	
Dominica	Melville Hall	78905	TDPD
	Canefield	78906	TDCF
Dominican Republic	Montecristo	78451	MDMC
	Puerto Plata Int'l Airport	78458	MDPP
	Santiago	78460	MDST
	Arroyo Barril	78466	MDAB
	Sabana de la Mar	78467	MDSM
	San Juan de la Maguana	78470	MDSJ
	Bayaguana	78473	
	Punta Cana Int'l Airport	78478	MDPC
	Jimani	78480	
	Maria Montez Airport, Barahona	78482	MDBH
	Aeropuerto Int'l Joaquin Balaguer	78484	MDJB
	Las Americas Int'l Airport	78485	MDLA
	Santo Domingo	78486	MDSD
El Salvador	Puerto de Acajutla	78650	MSAC
	Aeropuerto de Ilopango	78663	MSSS
	Santa Ana UNICO	78655	MSSA
	San Miguel/UES	78670	MSSM
	La Unión/CPI	78672	MSLU
	El Salvador Int Airport	78666	MSLP

Country	Station name	Block and station number	Int. location indicators for addressed messages
France..			
Guadeloupe			
	Le Raizet	78897	TFFR
Martinique			
	Le Lamentin	78925	TFFF
Grenada	Pt. Salines	78958	TGPY
Guatemala	Mundo Maya	78615	MGMM
	Puerto Barrios	78637	MGPB
	Guatemala	78641	MGGT
	San Jose	78647	MGSJ
	Huehuetenango	78627	MGHP
Haiti	Cap Haitien	78409	
	Port-au-Prince	78439	MTPP
	Cayes	78447	MTCH
Honduras			
	Amapala	78700	MHAM
	Guanaja	78701	MHNJ
	Roatan	78703	MHRO
	Trujillo	78704	MHTR
	La Ceiba/Goloson	78705	MHLC
	Tela	78706	MHTE
	Yoro	78707	MHYR
	La Mesa/San Pedro Sula	78708	MHLM
	Puerto Lempira	78711	MHPL
	Catacamas	78714	MHCA
	Santa Rosa de Copan	78717	MHSR
	Nueva Ocotepeque	78718	MHNO
	La Esperanza	78719	MHLE
	Tegucigalpa	78720	MHTG
	Choluteca	78724	MHCH
Jamaica	Montego Bay	78388	MKJS
	Kingston	78397	MKJP

Country	Station name	Block and station number	Int. location indicators for addressed messages
Mexico (on the Pacific)	San Felipe, B.C.	76055	
	Santa Rosalia, B.C.S.	76253	
	Loreto, B.C.S.	76305	
	Empalme, Son.	76256	
	La Paz, B.C.	76405	
	Mazatlan, Sin.	76458	
	Manzanillo, Col.	76654	
	Isla Socorro, Col.	76723	
	Acapulco, Gro.	76805	
	Salina Cruz, Oax.	76833	
	Tapachula. Chis.	76904	
Mexico (on the Gulf of Mexico)	Tampico, Tamps.	76548	
	Tuxpan, Ver.	76640	
	Merida, Yuc.	76644	
	Veracruz, Ver.	76692	
	Campeche, Camp.	76695	
	Coatzacoalcos, Ver.	76741	
Mexico (on the Caribbean)	Cozumel, Q. Roo	76648	
	Chetumal, Q. Roo	76750	
(continental locations)	Monterrey, N.L.	76394	
	Felipe Carrillo Puerto, Q. Roo	76698	
	Mexico, D.F.	76679	
Curacao and Sint Maarten	Hato Airport, Curaçao	78988	TNCC
	Juliana Airport, St. Maarten	78866	TNCM
The Netherlands	Roosevelt Airport, St. Eustatius	78873	TNCE
	Flamingo Airport, Bonaire	78990	TNCB
Aruba	Queen Beatrix Airport, Aruba	78982	TNCA

Country	Station name	Block and station number	Int. location indicators for addressed messages
Nicaragua	Puerto Cabezas	78730	MNPC
	Bluefields	78745	MNBL
	Managua	78741	MNMG
	Rivas	78733	MNRS
	Jinotega	78734	MNJG
	Juigalpa	78735	MNJU
	Chinandega	78739	MNCH
Panama	Tocumen	78792	MPTO
	David	78793	MPDA
	Santiago	78795	MPSA
	Changuinola		MPCH
	Albrook		MPMG
St. Kitts/ Nevis	Robert Bradshaw Airport	78858	TKPK
Saint Lucia	George F. L. Charles	78947	TLPC
	Hewanorra International Airport	78948	TLPL
St Vincent	Arnos Vale	78951	TVSV
Trinidad and Tobago	A.N.R. Robinson International Airport, Scarborough, Tobago	78962	TTCP
	Piarco International Airport, Port-of-Spain, Trinidad	78970	TTPP
Turks and Caicos Islands	Grand Turk	78118	MBGT
	Providenciales	78114	MBPV
USA	Mainland coastal stations*		
Puerto Rico	San Juan	78526	TJSJ
	Ponce		TJPS
	Mayaguez		TJMZ
	Aguadilla		TJBQ
	Ceiba (Rossevelt Road/Navy)	78535	TJNR
Cuba	Guantanamo	78367	
U.S. Virgin Islands	Saint Thomas		TIST
	Saint Croix		TISX
Venezuela	Aves Island	80400	

STATIONS FROM WHICH ADDITIONAL UPPER-AIR OBSERVATIONS MAY BE REQUESTED DURING TROPICAL CYCLONES

Country	Station name	Block and station number	Int. location indicators for addressed messages
Bahamas	Nassau	78073	MYNN
Barbados	Grantley Adams	78954	TBPB
Belize	Philip Goldson Int'l Airport	78583	MZBZ
Bermuda	LF Wade International Airport	78016	TXKF
Canada	Sable Island, NS	71600	CWSA
	Gagetown, NB	71701	CYCX
	Mt. Pearl, Nfld.	71802	CAYT
	Stephenville, Nfld.	71815	CZJT
	Yarmouth, NS	71603	CYQI
Cayman Islands	Georgetown, Grand Cayman	78384	MWCR
Colombia	San Andres (Isla)	80001	SKSP
	Riohacha/Admirante Padilla	80035	SKRH
Costa Rica	San Jose/Juan Santamaria	78762	MROC
Cuba	Camaguey	78355	
	Casa Blanca	78325	
Curacao and Sint Maarten	Hato Airport, Curacao	78988	TNCC
	Juliana Airport, St. Maarten	78866	TNCM
Dominican Republic	Santo Domingo	78486	MDSD
France: Guadeloupe	Le Raizet	78897	TFFR

Country	Station name	Block and station number	Int. location indicators for addressed messages
Haiti	Port-au-Prince**	78439	MTPP
Honduras	Tegucigalpa	78720	MHTG
Jamaica	Kingston	78397	MKJP
Mexico	Acapulco, Gro.*	76805	
	Cancún, Q.R.	76695	
	Chihuahua, Chi.	76225	
	Empalme, Son.*	76256	
	Isla Socorro, Col.*	76723	
	La Paz, B.C.S.*	76405	
	Monterrey, N.L.	76394	
	Mazatlan, Sin.*	76458	
	Guadalajara, Jal.	76612	
	Merida. Yuc.	76644	
	Manzanillo, Col.*	76654	
	Mexico City, D.F.	76679	MMMX
	Villahermosa, Tab.	76743	MMVA
	Veracruz, Ver.	76692	
	* Stations at the Pacific coast		
Nicaragua	Puerto Cabezas**	78730	MNPC
Panama	Corozal	78808	MPCZ
Sint Maarten	Juliana Airport, St. Maarten	78866	TNCM
Trinidad and Tobago	Piarco International Airport, Port of Spain	78970	TTPP
USA	Rawinsonde stations within 300 miles of the coast		
Venezuela	San Antonio	80447	SVSA
	San Fernando	80450	SVSR
	Ciudad Bolivar	80444	SVCB
	Mariscal Sucre	80413	SVBS

* Stations on the Pacific coast
** Out of Service

A T T A C H M E N T 7 C

INFORMATION ON OPERATIONAL STATUS OF AUTOMATIC MARINE STATIONS - MOORED BUOYS

Legend - Observed or technical parameters

Column	Parameters	Column	Parameters
1	Wind direction and speed	5	Sea-surface temperature
2	Air temperature	6	Wave period and height
3	Air pressure	7	Wave spectra
4	Pressure tendency	8	Peak wind gust
		9	Wave direction

1. Canada

The data acquisition for the moored buoys is presently via the NESDIS GOES system. The messages are received by NESDIS and sent to the Canadian Meteorological Centre (CMC) for processing by the Weather Buoy System (WBS) which is installed in Vancouver, British Columbia and Gander, Newfoundland and Labrador. The WBS is the software that generates the FM13 messages and sends the bulletins to the GTS. Meteorological reports from moored buoys using FM 13-IX SHIP code are distributed on the GTS from the Direct Readout Station located in Vancouver, B.C.

North-west Atlantic Ocean:

WMO buoy Identifier	ARGOS Identifier	Position Latitude	Longitude	Observed or technical parameters 1	2	3	4	5	6	7	8	9
44137	05579	42°16'N	62°00'W	X	X	X	X	X	X	X	X	
44138	05577	44°16'N	53°38'W	X	X	X	X	X	X	X	X	
44139	03448	44°16'N	57°05'W	X	X	X	X	X	X	X	X	
44140	05576	43°45'N	51°44'W	X	X	X	X	X	X	X	X	
44141	03449	43°00'N	58°00'W	X	X	X	X	X	X	X	X	
44150		42°30'N	64°01W	X	X	X	X	X	X	X	X	
44251	09234	46°27'N	53°23'W	X	X	X	X	X	X	X	X	
44255	09233	47°16'N	57°21'W	X	X	X	X	X	X	X	X	
44258		44°30'N	63°24'W	X	X	X	X	X	X	X	X	
VEP717*		46°42'N	48°42'W	X	X	X	X	X	X	X	X	
YJUF7*		46°06'N	53°48'W	X	X	X	X	X	X	X	X	

*Indicates Platform-based observations

2. France

Data from the moored buoys are available on the GTS in BUOY code. The wave spectra is not available in the BUOY code, but is available in WAVEOB code. Buoys 41096, 41098 and 41099 are sensitive to Atlantic swells while buoy 41097 on the west coast of Martinique in the bay of Fort de France is not directly sensitive to Atlantic swells but westerly or northerly swells. Note that the waverider information is concentrated by VHF and sent on the GTS right after. As a backup system, some waveriders are still equipped with ARGOS transmitters, others with IRIDIUM but due to a rotation programme, the identifier changes annually for the same location.

WMO buoy	Position:	Observed or technical parameters

Identifier	Location	Latitude	Longitude	1	2	3	4	5	6	7	8	9
41096*	GD – La vigie	16.530 N	61.410 W	.	.	.	.	X	X	X	.	X
41097*	MA - Fort de France	14.550 N	61.095 W	.	.	.	.	X	X	X	.	X
41098*	MA- Basse Pointe	14.895 N	61.115W					X	X	X		X
41099*	Ste-Lucia Chanel	14.175 N	60.940 W					X	X	X		X
41101**		14.600 N	56.200 W	X	X	X	X	X	X	X	X	

* waverider ** moored buoy

3. United States of America

Up-to-date list of U.S.A. Ocean Data Acquisition System (ODAS) is available at the web site of the National Data Buoy Centre of the National Oceanic and Atmospheric Administration (NOAA) **www.ndbc.noaa.gov.** Data from moored buoys and platforms are collected by geostationary meteorological satellites and reports are distributed on the GTS in SHIP code.

WMO buoy Identifier	ARGOS Identifier	Position: Latitude	Longitude	Observed or technical parameters 1	2	3	4	5	6	7	8	9
41001		34.70N	72.73W	X	X	X	X	X	X	X		
41002		32.38N	75.41W	X	X	X	X	X	X	X		
41004		32.50N	79.10W	X	X	X	X	X	X	X		
41008		31.40N	80.87W	X	X	X	X	X	X	X		X
41009		28.52N	80.17W	X	X	X	X	X	X	X		
41010		28.91N	78.47W	X	X	X	X	X	X	X		
41012		30.04N	80.53W	X	X	X	X	X	X	X		X
41013		33.44N	77.74W	X	X	X	X	X	X	X		X
41025		35.01N	75.40W	X	X	X	X	X	X	X		
41035		34.48N	77.28W	X	X	X	X	X	X	X		X
41036		34.21N	76.95W	X	X	X	X	X	X	X		X
41040		14.48N	53.01W	X	X	X	X	X	X	X		
41041		14.36N	46.01W	X	X	X	X	X	X	X		X
41043		20.99N	65.01W	X	X	X	X	X	X	X		
41044		21.65N	58.70W	X	X	X	X	X	X	X		
41046		23.87N	70.87W	X	X	X	X	X	X	X		
41047		27.47N	71.49W	X	X	X	X	X	X	X		
41048		31.98N	69.65W	X	X	X	X	X	X	X		X
41049		27.50N	63.00W	X	X	X	X	X	X	X		
42001		25.90N	89.67W	X	X	X	X	X	X	X		X
42002		25.79N	93.67W	X	X	X	X	X	X	X		X
42003		25.97N	85.59W	X	X	X	X	X	X	X		X
42007		30.09N	88.77W	X	X	X	X	X	X	X		X
42012		30.07N	87.55W	X	X	X	X	X	X	X		X
42019		27.90N	95.39W	X	X	X	X	X	X	X		X
42020		26.97N	96.70W	X	X	X	X	X	X	X		X
42035		29.23N	94.41W	X	X	X	X	X	X	X		X
42036		28.50N	84.52W	X	X	X	X	X	X	X		X
42039		28.79N	86.01W	X	X	X	X	X	X	X		
42040		29.21N	88.21W	X	X	X	X	X	X	X		
42055		22.02N	94.05W	X	X	X	X	X	X	X		X
42056		19.87N	85.06W	X	X	X	X	X	X	X		X
42057		16.83N	81.50W	X	X	X	X	X	X	X		X
42058		15.09N	75.06W	X	X	X	X	X	X	X		X
42059		15.01N	67.50W	X	X	X	X	X	X	X		
42060		16.50N	63.50W	X	X	X	X	X	X	X		
44005		43.19N	69.14W	X	X	X	X	X	X	X		
44007		43.53N	70.14W	X	X	X	X	X	X	X		X
44008		40.50N	69.25W	X	X	X	X	X	X	X		X

44009	38.46N	74.70W	X	X	X	X	X	X	X	
44011	41.11N	66.58W	X	X	X	X	X	X	X	
44013	42.35N	70.65W	X	X	X	X	X	X	X	
44014	36.61N	74.84W	X	X	X	X	X	X	X	X
44017	40.69N	74.70W	X	X	X	X	X	X	X	X
44018	41.26N	69.31W	X	X	X	X	X	X	X	X
44020	41.44N	70.19W	X	X	X	X	X	X	X	X
44025	40.25N	73.17W	X	X	X	X	X	X	X	X
44027	44.27N	67.31W	X	X	X	X	X	X	X	X
44065	40.37N	73.70W	X	X	X	X	X	X	X	
44066	39.58N	72.60W	X	X	X	X	X	X	X	
51000	23.46N	154.00W	X	X	X	X	X	X	X	X
51001	23.45N	162.28W	X	X	X	X	X	X	X	X
51002	17.19N	157.78W	X	X	X	X	X	X	X	
51003	19.09N	160.66W	X	X	X	X	X	X	X	
51004	17.59N	152.46W	X	X	X	X	X	X	X	
51100	23.56N	153.90W	X	X	X	X	X	X	X	X
51101	24.32N	162.06W	X	X	X	X	X	X	X	X

POST STORM COUNTRY REPORTS

A Post-storm Country Report should be issued by National Meteorological Services in RA IV and sent to the RSMC Miami (ncep.nhc.hsu@noaa.gov, lixion.a.avila@noaa.gov), preferably within 15 days after being affected, directly or indirectly, by any Tropical Depression, Tropical Storm or Hurricane. This document will be of utmost importance to gather all relevant data necessary for the Hurricane Season Report.

This Report should have the following format:

a) Document headings:

Post-Storm Country Report.
Country_____
Tropical Cyclone name
Date of data: _____; Date of issuance _____

b) Data for each meteorological station within the affected area:

- Maximum sustained wind reported (10-min wind/ 1-min wind): (direction, velocity, date and time)
- Maximum wind gust reported (direction, velocity, date and Zulu time)
- Duration of Calm (Zulu Time of onset and of end)
- Total rainfall during the event
- Minimum sea level pressure (date and Zulu time)

c) Remarks:

- Data concerning storm surge: height, instrument used, etc.
- Data on type of instrument or observation methodology if different from WMO standards.

Other relevant information.

Example**:**

POST-STORM COUNTRY REPORT
Country: CUBA
Tropical Cyclone: Hurricane MICHELLE
Date of data: November 4, 2001 Date of issuance: November 10, 2001

Station	Maximum Sustained Wind			Maximum Wind Gust			Calm	Total Rainfall	Minimum SL Pressure	
	Direction	Veloc. (km/h) 10 min/1 min	Z Time	Direction	Veloc (km/h)	Z Time	Z Time	(mm)	Pressure (hPa)	Z Time
78325 Casablanca	NNE	112/xxx	21:00-22:00	NNE	134	21:15	-	44.4	993.4	21:10
78373 Stgo Las Vegas	NNE	90	20:00-22:45	NNE	138	20:55	-	57.6	997.8	20:40
78340 Bainoa	NE	90	20:00-21:00	NE	140	22:40	-	83.2	996.1	20:45
78374 Tapaste	NE	70	19:00-04:00 (5^{th})	NNE	120	20:00	-	97.6	995.5	20:50
78323 Güines	NE	82	20:30-02:40 (5^{th})	NNE	118	01:25 (5^{th})	-	23.7	993.4	20:30
78375 Melena del Sur	N	80	20:00 -02:30 (5^{th})	N	135	22:53	-	60.8	994.8	20:00
78320 Güira de Melena	NNE	60	19:00-03:00 (5^{th})	NNE	103	00:50 (5^{th})	-	78.4	997.7	20:55
78376 Bauta	N	90	21:00-01:00 (5^{th})	N	112	20:50	-	40.3	999.1	20:30
78322 Batabanó	NNE	84	21:00-01:00 (5^{th})	NNE	100	23:10	-	64.3	995.3	19:00
78324 Punta del Este	N	128	16:45-17:00	N	160	03:55 (5^{th})	-	304.0	981.4	17:00
78321 La Fe	N	100	18:35-19:00	N	112	19:00	-	118.9	991.6	15:00

Station	Maximum Sustained Wind			Maximum Wind Gust			Calm	Total Rainfall	Minimum SL Pressure	
	Direction	Veloc. (km/h) 10 min/1 min	Z Time	Direction	Veloc (km/h)	Z Time	Z Time	(mm)	Pressure (hPa)	Z Time
78309 Cuba-Francia	N	100	12:15-12:23	N	132	13:32	-	103.8	991.7	16:56
78221 Nueva Gerona	NNE	92	04:15-04:45	NNE	120	18:00	-		994.3	17:30
78331 Jagüey Grande	ENE	135	21:00-00:00 (5th)	-	210	-	-	234.3	992.8	00:00 (5th)
78333 Playa Girón	ESE	101	18:00-21:00	W	194	23:00	16:30-17:30	129.5	960.5	23:00
78328 Varadero	NNE	85	00:00 (5th)-03:00 (5th)	N	151	00:40 (5th)	-	101.1	-	-
78327 Unión de Reyes	N	85	00:30 (5th)-03:00 (5th)	NNE	150	01:15 (5th)	-	116.0	986.6	00:00 (5th)
78332 Colón	ENE	70	19:00-23:00	NE	147	22:45	-	86.2	980.9	23:00
78330 Jovellanos	N	68	23:00-01:00 (5th)	N	101	00:00 (5th)	-	164.8	985.3	00:00 (5th)
78344 Cienfuegos	SE	120	23:00-02:00 (5th)	S	168	00:00 (5th)	-	-	958.9	01:00 (5th)
78335 Aguada de Pasajeros	ESE	120	22:00-23:00	ESE	176	23:00	19:45-20:45	-	958.5	00:30 (5th)
78338 Sagua La Grande	ESE	90	02:20 (5th)-03:30 (5th)	N	150	05:58 (5th)	23:20 – 23:45	57.0	977.0	04:10 (5th)
78326 Santo Domingo	SE	119	02:40 (5th)	N	157	05:44 (5th)	22:50 – 23:00	61.2	962.8	03:00 (5th)
78343 Yabú	SE	112	03:00 (5th)	SW	136	01:58 (5th)	-	46.5	963.7	04:55 (5th)
78349 Sancti Spíritus	S	90	04:25 (5th)-04:55 (5th)	S	120	04:30 (5th)	-	75.4	990.1	06:00 (5th)

Station	Maximum Sustained Wind			Maximum Wind Gust			Calm	Total Rainfall	Minimum SL Pressure	
	Direction	Veloc. (km/h) 10 min/1 min	Z Time	Direction	Veloc (km/h)	Z Time	Z Time	(mm)	Pressure (hPa)	Z Time
78337 Trinidad	WNW	70	04:30 (5^{th})-04:40 (5^{th})	WNW	118	04:45 (5^{th})	-	121.5	991.3	04:00 (5^{th})
78341 Jíbaro	S	68	04:10 (5^{th})-04:20 (5^{th})	ESE	108	04:25 (5^{th})	-	86.0	995.5	04:00 (5^{th})
78342 T. de Collantes	W	100	05:00 (5^{th})-05:10 (5^{th})	W	120	04:50 (5^{th})	-	193.0	-	04:00 (5^{th})

Remarks:

1. A maximum Storm Surge 2.5 - 3 meters high was reported in Cayo Largo del Sur (observational). The coastline retreated up to 500 meters in Batabanó, some people walked through the exposed sea bottom. Large waves battered both coasts of western and central Cuba with waves up to 4 – 5 meters high, causing extensive coastal floodings.

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C H A P T E R 8

COMMUNICATIONS

8.1 General

The RMTN (Regional Meteorological Telecommunication Network) is the component of the WMO Global Telecommunication System primarily responsible for the operational exchange of warnings, forecasts and observations among members. It is mostly implemented through the International Satellite Communications System (ISCS) operated by the National Weather Service of the USA. The RMTN is a multipoint system via satellite utilizing two - way and one-way very small aperture terminal (VSAT) antenna and microcomputer - based systems. The data collection (inbound to RTH Washington) is being transitioned to network connections to the NOAAnet communications system. The ISCS transmission carries GTS data and products along with the world Area Forecast System (WAFS) products WMO and ICAO recognized formats including GRIB (gridded binary), fax, and alpha - numeric data formats. The user terminals include the necessary software application to handle binary information.

Additional communication systems are also in place and are an integral part of the RMTN. These include the Emergency Managers Weather Information Network (EMWIN), the GOES Satellite Data Collection Platform (DCP), and the ICAO Aeronautical Fixed telecommunication Network (AFTN). Several alternate mechanisms for data exchange exist which use the Internet and TCP/IP technologies have been implemented by RTH Washington, including HTTP and FTP servers, E-mail Data Ingest Systems, RTH Web-based Bulletin Input, FTP Input Service and Dial-up Data Input. These alternate mechanisms are available to all Members covered by this Plan.

All data and product providers covered by this plan are encouraged to have at a minimum two methods of transmission and to regularly exercise or test both of them.

A restricted distribution list containing telephone numbers of national Meteorological Service and homes of key officials is given in attachment 8A.

8.2 Procedures to be followed

WMO communications headings, station location identifiers, and international block and station index numbers will be used to send surface and upper-air observations.

8.3 Tropical cyclone warning headings

Tropical cyclone warning headings to be used by Members are listed in Attachment 8B. Headings to be used by the USA for tropical/subtropical cyclone releases are listed in Attachments 8C and 8D.

ATTACHMENT 8 A / ADJUNTO 8 A

LIST OF TELEPHONE NUMBERS OF NATIONAL METEOROLOGICAL SERVICES AND KEY OFFICIALS / LISTA DE LOS NÚMEROS DE TELÉFONO DE LOS SERVICIOS METEOROLÓGICOS NACIONALES Y DE LOS PRINCIPALES FUNCIONARIOS

(RESTRICTED DISTRIBUTION / DISTRIBUCIÓN RESTRICTIVA)

ATTACHMENT 8 B / ADJUNTO 8 B

TROPICAL CYCLONE WARNING HEADINGS/
ENCABEZAMIENTO DE LOS AVISOS DE CICLON

Country/País	Tropical depression heading/ Encabezamiento depresión tropical	Tropical storm or hurricane heading/ Encabezamiento de tormenta tropical o de huracán
Antigua & Barbuda	WOCA31 TAPA	WHCA31 TAPA
Bahamas	WOBA31 MYNN	WHBA31 MYNN
Barbados	WOCA31 TBPB	MHCA31 TBPB
Belize/Belice	WOCA31 MZBZ	WHCA31 MZBZ
Costa Rica	WOCA31 MRSJ	WHCA31 MRSJ
Cuba	WOCA31 MUHV	WHCA31 MUHV
Dominican Republic/ República Dominicana	WOCA31 MDSD	WHCA31 MDSD
France (Martinique)/ Francia (Martinica)	WOMR31 TFFF	WHMR31 TFFF
France (Guadeloupe)/ Francia (Guadalupe)	WOMF31 TFFR	WHMF31 TFFR
Guatemala	WOCA31 MGGT	WHCA31 MGGT
Honduras	WOCA31 MHTG	WHCA31 MHTG
Jamaica	WOCA31 MKJP	WHCA31 MKJP
Mexico/México	WOMX01 MMMX	WHMX01 MMMX
	WOMX02 MMMX	WHMX02 MMMX

Country/País	Tropical depression heading/ Encabezamiento depresión tropical	Tropical storm or hurricane heading/ Encabezamiento de tormenta tropical o de huracán
Nicaragua	WOCA31 MNMG	WHCA31 MNMG
Panama	WOCA31 MPTO	WHCA31 MPTO
Trinidad and Tobago/ Trinidad y Tabago	WOCA31 TTPP	WHCA31 TTPP

CANADA HEADINGS FOR TROPICAL CYCLONE RELEASES

	Public Tropical Cyclone Information Statement	Watch/Warning Tropical Cyclone	Tropical Cyclone Technical Discussion
Canada	WOCN31-33 CWHX (E) WOCN41-43 CWHX (F)	W(W/T)CN31-33 CWHX (E) W(W/T)CN41-43 CWHX (F)	FXCN31-33 CWHX (E) FXCN41-43 CWHX (F)

USA HEADINGS FOR TROPICAL CYCLONE RELEASES

	Public Tropical Cyclone	Forecast/Advisory Tropical Cyclone	Tropical Cyclone Discussion
Miami, FL	WTNT31-35 KNHC	WTNT21-25 KNHC	WTNT41-45 KNHC
	(Atlantic, Caribbean, Gulf of Mexico)		
Miami, FL	WTPZ31-35 KNHC	WTPZ21-25 KNHC	WTPZ41-45 KNHC
	(Eastern North Pacific)		
Honolulu, HI	WTPA31-35 PHFO	WTPA21-25 PHFO	

(removed Strike Probabilities)

Tropical Cyclone Surface Wind Speed Probabilities
World Meteorological Organization (WMO) and AWIPS (in parenthesis) headers:
FONT11-15 KNHC (MIAPWSAT1-5) – Atlantic
FOPZ11-15 KNHC (MIAPWSEP1-5) – Eastern Pacific
FOPA11-15 PHFO (HNLPWSCP1-5) – Central Pacific (issued by CPHC)

NOTE: US advisory headings range from 1 to 5 and are recycled with the sixth, eleventh, and sixteenth tropical cyclone.

USA HEADINGS FOR ADDITIONAL TROPICAL/ SUBTROPICAL METEOROLOGICAL RELEASES

1. SPECIAL DISTURBANCE STATEMENT
   WONT41 KNHC North Atlantic
   WOPZ41 KNHC Eastern North Pacific

2. TROPICAL CYCLONE POSITION ESTIMATE
   WTNT51-55 KNHC (NORTH ATLANTIC)
   WTPZ51-55 KNHC (EASTERN NORTH PACIFIC)

3. TROPICAL CYCLONES UPDATE
   WTNT61-65 KNHC (NORTH ATLANTIC)
   WTPZ61-65 KNHC (EASTERN NORTH PACIFIC)

4. TROPICAL WEATHER OUTLOOK
   ABNT20 KNHC (NORTH ATLANTIC)
   ABPZ20 KNHC (EASTERN NORTH PACIFIC)

5. TROPICAL WEATHER SUMMARY
   ABNT30 KNHC (NORTH ATLANTIC)
   ABPZ30 KNHC (EASTERN NORTH PACIFIC)

6. TROPICAL WEATHER DISCUSSION
   AXNT20 KNHC (NORTH ATLANTIC)
   AXPZ20 KNHC (EASTERN NORTH PACIFIC)

7. SATELLITE - DERIVED RAINFALL
   TCCA21 KNHC (EASTERN CARIBBEAN)
   TCCA22 KNHC (CENTRAL CARIBBEAN)
   TCCA23 KNHC (WESTERN CARIBBEAN)

8. TROPICAL NUMERICAL GUIDANCE MESSAGE
   (TROPICAL NORTH ATLANTIC/CARIBBEAN)
   FACA20 KWBC

ATTACHMENT 8 E / ADJUNTO 8 E

LIST OF WEB SITES OF NATIONAL METEOROLOGICAL SERVICES/
LISTA DE WEB SITES DE LOS SERVICIOS METEOROLOGICOS -

ANTIGUA AND BARBUDA / ANTIGUA Y BARBUDA	
Meteorological Services	www.antiguamet.com
ARUBA	
Departamento Meteorologico Aruba	www.meteo.aw
BAHAMAS/BAHAMAS	
Meteorological Services	www.bahamasweather.org.bs
BARBADOS	
Meteorological Services	www.barbadosweather.org
BELIZE / BELICE	
Meteorological Services	www.hydromet.gov.bz
BERMUDA / BERMUDA	
Bermuda Weather Service	www.weather.bm
BRAZIL/ BRASIL	
Instituto Nacional de Meteorologia (INMET)	http://www.inmet.gov.br/
CANADA / CANADA	
Canadian Hurricane Centre Meteorological Service of Canada	www.weatheroffice.gc.ca/hurricane/ www.hurricanes.ca
CAYMAN ISLANDS/ ISLAS CAIMAN	
National Weather Service	www.gov.ky/weather
COLOMBIA / COLOMBIA	
Institudo de Hidrologia, *Meteorología y Estudios Ambientales*	www.ideam.gov.co
CURACAO AND SINT MAARTEN	
Meteorological Department	www.meteo.an
COSTA RICA / COSTA RICA	
Instituto Meteorológico Nacional	www.imn.ac.cr
CUBA / CUBA	
Instituto de Meteorología	www.insmet.cu
DOMINICA/ DOMINICA	
Dominica Meteorological Service	www.weather.gov.dm

DOMINICAN REPUBLIC/ REPUBLICA DOMINICANA

Oficina Nacional de Meteorología	www.onamet.gov.do

EL SALVADOR /EL SALVADOR

Servicio Meteorológico Nacional Observatorio Ambiental	www.snet.gob.sv

FRANCE / FRANCIA

Météo-France	www.meteo.fr www.meteo.gp

for access by NMSs to radar imagery, please request a password from webmaster

GUATEMALA / GUATEMALA

INSIVUMEH	www.insivumeh.gob.gt

HAITI

Centre National Météorologique	www.meteo-haiti.gouv.ht

HONDURAS / HONDURAS

Servicio Meteorológico Nacional	www.smn.gob.hn

JAMAICA/JAMAICA

Meteorological Service of Jamaica	www.metservice.gov.jm

MEXICO / MEXICO

Servicio Meteorológico Nacional	http://smn.cna.gob.mx/SMN.html

NICARAGUA/NICARAGUA

Meteorological Services	www.ineter.gob.ni

PANAMA / PANAMA

Meteorological Services	www.hidromet.com.pa

SPAIN / ESPAÑA

Agencia Estatal de Meteorologia	www.aemet.es

SAINT LUCIA / SAN LUCIA

Meteorological Services	www.slumet.gov.lc

TRINIDAD AND TOBAGO

Meteorological Service	www.metoffice.gov.tt

UNITED STATES OF AMERICA / ESTADOS UNIDOS DE AMERICA

National Hurricane Centre / Nacional de Huracanes	www.nhc.noaa.gov

PUERTO RICO / PUERTO RICO USA

Weather Service Forecast Office	www.srh.noaa.gov/sju www.upr.clu.edu/nws

VENEZUELA / VENEZUELA

National Institute of Meteorology and Hydrology (INAMEH)	www.inameh.gob.ve

TROPICAL CYCLONE ADVISORY MESSAGE
FOR INTERNATIONAL CIVIL AVIATION

1. TC ADVISORY:	
2. DTG:	Year month date (yyyymmdd)/time (in UTC) (using “Z”) of issue
3. TCAC:	Name of TCAC (location indicator or full name)
4. TC :	Name of tropical cyclone
5. NR:	Advisory number (starting with “01” for each cyclone)
6. PSN:	Position of the centre in degrees and minutes (Nnnnn” or “Snnnn”, “Wnnnnn” or “Ennnnn”)
7. MOV:	Direction and speed of movement respectively to at least eight compass points (“N”, “NE”, “E”, “SE”, “S”, “SW”, “W”, “NW”) and in km/h (or kt)
8. C:	Central pressure (in hPa)
9. MAX WIND:	Maximum surface wind near the centre (mean over 10 minutes, in km/h (or kt))
10. FCST PSN +12 HR:	Forecast of centre position for fixed valid time of … UTC (12 hours after time of issuance of the advisory)
11: FCST MAX WIND +12 HR:	Forecast of maximum surface wind for fixed valid time of …UTC (12 hours after time of issuance of the advisory
12. FCST PNS +18 HR:	Forecast of centre position for fixed valid time of … UTC (18 hours after time of issuance of the advisory)
13. FCST MAX WIND +18HR:	Forecast of maximum surface wind for fixed valid time of ….UTC (18 hours after the issuance of the advisory)
14. FCST PSN +24HR:	Forecast of centre position for fixed valid time of UTC (24 hours after issuance of the advisory)
15. FCST MAX WIND +24HR:	Forecast of maximum surface wind for fixed valid time of….UTC (24 hours after the issuance of the advisory)
16. NXT MSG:	Expected year month date (yyyymmdd)/time (in UTC) (using “Z” of issuance of next advisory (using “BFR”, if applicable) or NO MSG EXP”

Note.— The numbers 1 to 16 are included only for clarity and they are not part of the advisory message shown in the example below.

EXAMPLE

ADVISORY MESSAGE FOR TC

TC ADVISORY	
DTG:	19970925/1600Z
TCAC:	YUFO
TC:	GLORIA
NR:	01
PSN:	N2706 W07306
MOV:	NW 10KT
C:	965HPA
MAX WIND:	45KT
FCST PSN +12HR:	260400 N2830 W07430
FCST MAX WIND +12HR:	45KT
FCST PSN +18HR:	261000 N2852 W07500
FCST MAX WIND +18HR:	40KT
FCST PSN +24HR:	261600 N2912 W07530
FCST MAX WIND +24HR:	45KT
NXT MSG:	19970925/2000Z

C H A P T E R 9

TROPICAL CYCLONE NAMES

The lists in Table I and Table II contain the names to be used during 2012-2017 to identify the named tropical cyclones of the Caribbean Sea, the Gulf of Mexico, the North Atlantic Ocean and the eastern North Pacific, respectively. These lists of names will be rotated forward beyond 2017 so that the 2012 names will be used again in 2018. However, if a tropical cyclone acquires special notoriety because of its strength, deaths, damage or other special reasons, its name may be withdrawn at the request of any Member and the agreement at the session of the RA IV Hurricane Committee. In such a case, the RA IV Hurricane Committee will select a replacement for the withdrawn name. Whenever more storms develop in a given year than the number of names in the relevant list, the Greek alphabet (Alpha, Beta, etc.) will be used to name the subsequent systems.

A tropical cyclone which passes from one basin to another will retain its name.

TABLE I

Names and Pronounciations to be used for named tropical cyclones in the Caribbean Sea, the Gulf of Mexico and the North Atlantic Ocean

2012		2013		2014	
Alberto	al-BAIR-toe	Andrea	AN-dree-uh	Arthur	AR-thur
Beryl	BER-ril	Barry	BAIR-ree	Bertha	BUR-thuh
Chris	kris	Chantal	shahn-TAHL	Cristobal	krees-TOH-bahl
Debby	DEH-bee	Dorian	DOR-ee-an	Dolly	DAH-lee
Ernesto	er-NES-toh	Erin	AIR-rin	Edouard	eh-DWARD
Florence	FLOOR-ence	Fernand	fair-NAHN	Fay	fay
Gordon	GOR-duhn	Gabrielle	ga-bree-ELL	Gonzalo	gohn-SAH-loh
Helene	heh-LEEN	Humberto	oom-BAIR-toh	Hanna	HAN-uh
Isaac	EYE-zik	Ingrid	ING-grid	Isaias	ees-ah-EE-ahs
Joyce	joyss	Jerry	JEHR-ee	Josephine	JOH-seh-feen
Kirk	kurk	Karen	KAIR-ren	Kyle	KY-ull
Leslie	LEHZ-lee	Lorenzo	loh-REN-zoh	Laura	LOOR-ruh
Michael	MY-kuhl	Melissa	meh-LIH-suh	Marco	MAR-koe
Nadine	nay-DEEN	Nestor	NES-tor	Nana	NA-na
Oscar	AHS-kur	Olga	OAL-guh	Omar	OH-mar
Patty	PAT-ee	Pablo	PAHB-lo	Paulette	pawl-LET
Rafael	rah-fah--ELL	Rebekah	reh-BEH-kuh	Rene	re-NAY
Sandy	SAN-dee	Sebastien	suh-BASH-chuhn	Sally	SAL-ee
Tony	TOH-nee	Tanya	TAHN-yuh	Teddy	TEHD-ee
Valerie	VAH-lur-ee	Van	van	Vicky	VIH-kee
William	WILL-yum	Wendy	WEN-dee	Wilfred	WILL-fred

2015		2016		2017	
Ana	AH-nah	Alex	AL-leks	Arlene	ar-LEEN
Bill	bill	Bonnie	BAH-nee	Bret	bret
Claudette	klaw-DET	Colin	KAH-lihn	Cindy	SIN-dee
Danny	DAN-ee	Danielle	dan-YELL	Don	dahn
Erika	eh-RIH-kuh	Earl	URR-ull	Emily	EH-mih-lee
Fred	frehd	Fiona	fee-OH-nuh	Franklin	FRANK-lin
Grace	grayss	Gaston	ga-STAWN	Gert	gert
Henri	ahn-REE	Hermine	her-MEEN	Harvey	HAR-vee
Ida	EYE-duh	Ian	EE-an	Irma	ER-mah
Joaquin	wah-KEEN	Julia	JOO-lee-uh	Jose	ho-ZAY
Kate	kayt	Karl	KAR-ull	Katia	KAH-tyah
Larry	LAIR-ree	Lisa	LEE-suh	Lee	lee
Mindy	MIN-dee	Matthew	MATH-yoo	Maria	muh-REE-uh
Nicholas	NIH-kuh-luss	Nicole	nih-KOHL	Nate	nait
Odette	oh-DEHT	Otto	AHT-toh	Ophelia	o-FEEL-ya
Peter	PEE-tur	Paula	PAHL-luh	Philippe	fee-LEEP
Rose	rohz	Richard	RIH-churd	Rina	REE-nuh
Sam	sam	Shary	SHAHR-ee	Sean	shawn
Teresa	tuh-REE-suh	Tobias	toh-BEE-uss	Tammy	TAM-ee
Victor	VIK-tur	Virginie	vir-JIN-ee	Vince	vinss
Wanda	WAHN-duh	Walter	WALL-tur	Whitney	WHIT-nee

TABLE II
Names and Pronounciations to be used for named tropical cyclones in the eastern North Pacific Ocean

2012		2013		2014	
Aletta	a-LET-ah	Alvin	AL-vin	Amanda	uh-MAN-duh
Bud	buhd	Barbara	BAR-bruh	Boris	bor-EES
Carlotta	kar-LOT-uh	Cosme	COS-may	Cristina	kris-TEE-nuh
Daniel	DAN-yuhl	Dalila	dah-LAY-lah	Douglas	DUG-luss
Emilia	ee-MILL-ya	Erick	EHR-ik	Elida	ELL-ee-dah
Fabio	FAH-bee-o	Flossie	FLOSS-ee	Fausto	FOW-sto
Gilma	GIL-mah	Gil	gill	Genevieve	jeh-nuh-VEEV
Hector	HEHK-tor	Henriette	hen-ree-ETT	Hernan	her-NAHN
Ileana	ill-ay-AH-nah	Ivo	eye-VOH	Iselle	ee-SELL
John	jahn	Juliette	jew-lee-EHT	Julio	HOO-lee-o
Kristy	KRIS-tee	Kiko	KEE-ko	Karina	kuh-REE-nuh
Lane	layne	Lorena	low-RAY-na	Lowell	LO-uhl
Miriam	MEER-yim	Manuel	mahn-WELL	Marie	muh-REE
Norman	NOR-muhn	Narda	NAHR-duh	Norbert	NOR-bert
Olivia	uh-LIV-ee-uh	Octave	AHK-tayv	Odile	oh-DEAL
Paul	pall	Priscilla	prih-SIH-luh	Polo	POH-loh
Rosa	ROH-zuh	Raymond	RAY-mund	Rachel	RAY-chull

Sergio	SIR-gee-oh	Sonia	SOHN-yah	Simon	SY-muhn
Tara	TAIR-uh	Tico	TEE-koh	Trudy	TROO-dee
Vicente	vee-CEN-tay	Velma	VELL-muh	Vance	vanss
Willa	WIH-lah	Wallis	WAHL-lis	Winnie	WIN-ee
Xavier	ZAY-vee-ur	Xina	ZEE-nah	Xavier	ZAY-vee-ur
Yolanda	yo-LAHN-da	York	york	Yolanda	yo-LAHN-da
Zeke	zeek	Zelda	ZEL-dah	Zeke	zeek

2015		2016		2017	
Andres	ahn-DRASE	Agatha	A-guh-thuh	Adrian	AY-dree-uhn
Blanca	BLAHN-kah	Blas	blahs	Beatriz	BEE-a-triz
Carlos	KAR-loess	Celia	SEEL-yuh	Calvin	KAL-vin
Dolores	deh-LOOR-ess	Darby	DAR-bee	Dora	DOR-ruh
Enrique	ahn-REE-kay	Estelle	eh-STELL	Eugene	YOU-jeen
Felicia	fa-LEE-sha	Frank	frank	Fernanda	fer-NAN-dah
Guillermo	gee-YER-mo	Georgette	jor-JET	Greg	greg
Hilda	HILL-duh	Howard	HOW-urd	Hilary	HIH-luh-ree
Ignacio	eeg-NAH-see-oh	Isis	EYE-sis	Irwin	UR-win
Jimena	he-MAY-na	Javier	hahv-YAIR	Jova	HO-vah
Kevin	KEH-vin	Kay	kay	Kenneth	KEH-neth
Linda	LIHN-duh	Lester	LESS-tur	Lidia	LIH-dyah
Marty	MAR-tee	Madeline	MAD-eh-luhn	Max	maks
Nora	NOOR-ruh	Newton	NOO-tuhn	Norma	NOOR-muh
Olaf	OH-lahf	Orlene	or-LEEN	Otis	OH-tis
Patricia	puh-TRIH-shuh	Paine	payne	Pilar	Pee-LAHR
Rick	rik	Roslyn	RAWZ-luhn	Ramon	rah-MOHN
Sandra	SAN-druh	Seymour	SEE-mor	Selma	SELL-mah
Terry	TAIR-ree	Tina	TEE-nuh	Todd	tahd
Vivian	VIH-vee-uhn	Virgil	VUR-jill	Veronica	vur-RAHN-ih-kuh
Waldo	WAHL-doh	Winifred	WIN-ih-fred	Wiley	WY-lee
Xina	ZEE-nah	Xavier	ZAY-vee-ur	Xina	ZEE-nah
York	york	Yolanda	yo-LAHN-da	York	york
Zelda	ZEL-dah	Zeke	zeek	Zelda	ZEL-dah

TABLE III

Names of Atlantic Storms Retired into Hurricane History

Name	Year/Key	Location(s) affected
Agnes	1972 +*	Florida, Northeast USA
Alicia	1983 *	North Texas
Allen	1980 *	Antilles, Mexico, South Texas
Allison	2001 *	Texas
Andrew	1992 *	Bahamas, South Florida and Louisiana
Anita	1977	Mexico
Audrey	1957 +*	Louisiana, North Texas
Betsy	1965 +*	Bahamas, Southeast Florida, Southeast Louisiana
Beulah	1967 *	Antilles, Mexico, South Texas
Bob	1991 *	North Carolina and Northeast U.S.
Camille	1969 +*	Louisiana, Mississippi and Alabama
Carla	1961 +*	Texas
Carmen	1974	Mexico, Central Louisiana
Carol[1]	1954 +*	Northeast U.S.
Celia	1970 *	South Texas
César	1996	Costa Rica, Nicauragua
Charley	2004 +	Cuba, USA
Cleo	1964 *	Lesser Antilles, Haiti, Cuba, Southeast Florida
Connie	1955 +	North Carolina
Dennis	2005	Cuba, Florida
David	1979 *	Lesser Antilles, Hispaniola, Bahamas, Florida and Eastern U.S.
Dean	2007	Mexico, Belize
Diana	1990	Mexico
Diane	1955 +*	Mid-Atlantic U.S. & Northeast U.S.
Donna	1960 +*	Bahamas, Florida and Eastern U.S, Turks and Caicos.
Dora	1964 *	Northeast Florida
Elena	1985 *	Mississippi, Alabama, Western Florida
Eloise	1975 *	Antilles, Northwest Florida, Alabama
Fabian	2003	Bermuda
Félix	2007	Nicaragua, Honduras
Fifi	1974	Belize, Guatemala, Honduras, El Salvador
Flora	1963	Haiti, Cuba, Tobago
Floyd	1999	Bahamas, North Carolina
Fran	1996	North Carolina
Frances	2004 +	Bahamas, Florida
Frederic	1979 *	Alabama and Mississippi
Georges	1998	U.S Virgin Is., Puerto Rico, Dominican Republic, Haiti, Cuba, Florida, Mississippi
Gilbert	1988	Lesser Antilles, Jamaica, Yucatan Peninsula, Mexico, El Salvador
Gloria	1985 *	North Carolina, Northeast U.S.
Greta	1978	Belize
Gustav	2008	Haiti, Jamaica, Cayman Islands, Cuba, Louisiana, USA
Hattie	1961	Belize, Guatemala
Hazel	1954 +*	Antilles, North and South Carolina, Southern Ontario
Hilda	1964 +*	Louisiana
Hortense	1996	Puerto Rico, Dominican Republic, Nova Scotia
Hugo	1989 *	Antilles, Guadeloupe, Virgin Islands, Puerto Rico, South Carolina
Igor	2010	Canada
Ike	2008	Turks & Caicos Islands, Bahamas, Cuba, Texas & other US States
Ione	1955 *	North Carolina
Inez	1966	Lesser Antilles, Hispaniola, Cuba, Florida Keys, Mexico
Isabel	2003 +	North Carolina, District of Colombia, Virginia, Maryland
Isidore	2002	Cuba, Mexico, Louisiana, Mississippi
Iris	2001	Belize, Guatemala
Irene	2011	USA
Ivan	2004 +	Grenada, Jamaica, Cayman Islands, Cuba, Alabama, Florida

Name	Year/Key	Location(s) affected
Janet	1955	Lesser Antilles, Belize, Mexico, Costa Rica
Jeanne	2004 +	Domincan Republic, Haiti, Bahamas, Turks and Caicos, Florida
Joan	1988	Curaçao, Venezuela, Colombia, Costa Rica, Nicaragua < crossed into the Pacific and became Miriam >
Juan	2003	Canada
Katrina	2005	Louisiana, Mississippi
Keith	2000	Belize and Mexico
Klaus	1990	Martinique
Lenny	1999	Lesser Antilles
Lili	2002	Cuba, Louisianna
Luis	1995	Lesser Antilles
Marilyn	1995	Lesser Antilles, Puerto Rico
Michelle	2001	Cuba
Mitch	1998	Cayman Is, Colombia, Honduras, Nicaragua, Guatemala, Belize, Costa Rica, Mexico, Florida
Noel	2007	Dominican Republic, Haiti, Cuba, Jamaica, Bahamas, Canada
Opal	1995	Central America, Mexico, Florida
Paloma	2008	Cayman Islands (Little Cayman & Cayman Brac), Cuba
Rita	2005	Louisiana, Texas
Roxanne	1995	Mexico
Stan	2005	Guatamela, El Savador, Mexico
Tomas	2010	Windward Islands
Wilma	2005	Mexico, Florida

Key: + within the list of top 36 most deadly US tropical cyclones
* within the list of top 31 most costly US tropical cyclones in 1990 US dollars

[1] The name "Carol" was used again to denote a hurricane in the mid-Atlantic Ocean in 1965. However, because the name does not appear after that time, it is assumed that the name was retired retrospectively for the damages caused by the 1954 storm of the same name.

TABLE IV

Names of Eastern North Pacific Ocean Storms Retired into Hurricane History

Eastern Pacific naming began in 1960 apparently with two lists of twenty female names. The scheme began with A (Annette) and continued until mid 1962 without starting over. The year 1961 began with Iva, and 1962 began with Valerie. The years 1963-65 completed the second alphabet and then the second alphabet was unexplainedly started over again in early 1965 after the last two names from the same alphabet had started the season. Interestingly in 1963, two named systems apparently merged, or appeared to merge, so their names were also merged and Jennifer and Katherine became Jen-Kath. In 1966 a scheme using four alphabetical lists of female names was instituted where one of the four, in turn, was started at the beginning of each year. This continued until 1978 when alternating male and female names were used. Prior to 1978, only two names were retired, Hazel and Adele, and it is not clear why either was retired.

In 1978, when alternating male and female names were first used, there were initially four lists, and so a list beginning with Aletta was used in 1978 and again in 1982. At that time two additional lists were added, so in 1983 and 1984, the new lists were used. Thereafter, until today, each list is reused every six years.

Several names have been retired, some for practical reasons such as a pronunciation ambiguity or a “socially unacceptable” meaning in one of the languages and others because they represented a significant human disaster. A name was retired if it appeared in a sequence one or more times, and was subsequently missing when the other names in the sequence were reused.

Name	Year
Adele	1970
Adolph	2001
Alma	2008
Fefa	1991
Fico	1978
Hazel	1965
Ismael	1995
Israel (replaced)	2001
Iva	1988
Kenna	2002
Knut	1987
Pauline	1997

C H A P T E R 10

ARCHIVE OF TROPICAL CYCLONE DATA

In accordance with the directive of the WMO Executive Council (EC-XLV), Geneva, (July 1993) an international format for the archiving of tropical cyclone data is to be used by all RSMCs with activity specialization in tropical cyclones.

In the international format given in Attachment 10A, the Dvorak T-number (Position 35-36) and Dvorak CL-number (position 37-38) will be the ones determined at the centre submitting the data, in the case of the RA IV Hurricane Committee, by RSMC Miami-Hurricane Center.

Complete historic data using this format will be made available for research applications. RSMC Miami will provide such data, to the Director of the National Climatic Data Center (NCDC), USA.

The Tropical Cyclone Programme (TCP) Division of the WMO Secretariat has the responsibility for the maintenance of the format, including assignment of the source codes to appropriate organizations, and authorizing additions and changes.

A T T A C H M E N T 10 A

GLOBAL TROPICAL CYCLONE TRACK AND INTENSITY DATA SET - REPORT FORMAT

Position	Content
1- 9	Cyclone identification code composed by 2 digit numbers in order within the cyclone season, area code and year code. 01SWI2000 shows the 1st system observed in South-West Indian Ocean basin during the 2000/2001 season. Area codes are as follows: ARB = Arabian Sea ATL = Atlantic Ocean AUB = Australian Region (Brisbane) AUD = Australian Region (Darwin) AUP = Australian Region (Perth) BOB = Bay of Bengal CNP = Central North Pacific Ocean ENP = Eastern North Pacific Ocean ZEA = New Zealand Region SWI = South-West Indian Ocean SWP = South-West Pacific Ocean WNP = Western North Pacific Ocean and South China Sea
10-19	Storm Name
20-23	Year
24-25	Month (01-12)
26-27	Day (01-31)
28-29	Hour- universal time (at least every 6 hourly position -00Z,06Z,12Z and 18Z)
30	Latitude indicator: 1=North latitude; 2=South latitude
31-33	Latitude (degrees and tenths)
34-35	Check sum (sum of all digits in the latitude)
36	Longitude indicator: 1=West longitude; 2=East longitude
37-40	Longitude (degrees and tenths)
41-42	Check sum (sum of all digits in the longitude)
43	position confidence* 1 = good (<30nm; <55km) 2 = fair (30-60nm; 55-110 km) 3 = poor (>60nm; >110km) 9 = unknown
Note*	Confidence in the centre position: Degree of confidence in the centre position of a tropical cyclone expressed as the radius of the smallest circle within which the centre may be located by the analysis. **"position good"** implies a radius of less than 30 nm, 55 km; "position fair", a radius of 30 to 60 nm, 55 to 110km; and "position poor", radius of greater than 60 nm, 110km.
44-45	Dvorak T-number (99 for no report)
46-47	Dvorak CI-number (99 for no report)
48-50	Maximum average wind speed (whole values) (999 for no report)
51	Units 1=kt, 2=m/s, 3=km per hour
52-53	Time interval for averaging wind speed (minutes for measured or derived wind speed, 99 if unknown or estimated)
54-56	Maximum Wind Gust (999 for no report)
57	Gust Period (seconds, 9 for unknown)
58	Quality code for wind reports: 1=Aircraft or Dropsonde observation 2=Over water observation (e.g. buoy) 3=Over land observation 4=Dvorak estimate

5=Other

59-62 Central pressure (nearest hectopascal) (9999 if unknown or unavailable)

63 Quality code for pressure report (same code as for winds)

64 Units of length: 1=nm, 2=km

65-67 Radius of maximum winds (999 for no report)

68 Quality code for RMW:
- 1=Aircraft observation
- 2=Radar with well-defined eye
- 3=Satellite with well-defined eye
- 4=Radar or satellite, poorly-defined eye
- 5=Other estimate

69-71 Threshold value for wind speed (gale force preferred, 999 for no report)

72-75 Radius in Sector 1: 315^{o}-45^{o}

76-79 Radius in Sector 2: 45^{o}-135^{o}

80-83 Radius in Sector 3: 135^{o}-225^{o}

84-87 Radius in Sector 4: 225^{o}-315^{o}

88 Quality code for wind threshold
- 1=Aircraft observations
- 2=Surface observations
- 3=Estimate from outer closed isobar
- 4=Other estimate

89-91 Second threshold value for wind speed (999 for no report)

92-95 Radius in Sector 1: 315^{o}-45^{o}

96-99 Radius in Sector 2: 45^{o}-135^{o}

100-103 Radius in Sector 3: 135^{o}-225^{o}

104-107 Radius in Sector 4: 225^{o}-315^{o}

108 Quality code for wind threshold (code as for row 88)

109-110 Cyclone type:
- 01= tropics; disturbance (no closed isobars)
- 02= <34 knot winds, <17m/s winds and at least one closed isobar
- 03= 34-63 knots, 17-32m/s
- 04= >63 knots, >32m/s
- 05= extratropical
- 06= dissipating
- 07= subtropical cyclone (nonfrontal, low pressure system that comprises initially baroclinic circulation developing over subtropical water)
- 08= overland
- 09= unknown

111-112 Source code (2 - digit code to represent the country or organization that provided the data to NCDC USA. WMO Secretariat is authorized to assign number to additional participating centres, organizations)
- 01 RSMC Miami-Hurricane Center
- 02 RSMC Tokyo-Typhoon Centre
- 03 RSMC-tropical cyclones New Delhi
- 04 RSMC La Reunion-Tropical Cyclone Centre
- 05 Australian Bureau of Meteorology
- 06 Meteorological Service of New Zealand Ltd.
- 07 RSMC Nadi-Tropical Cyclone Centre
- 08** Joint Typhoon Warning Center, Honolulu
- 09** Madagascar Meteorological Service
- 10** Mauritius Meteorological Service
- 11** Meteorological Service, New Caledonia
- 12 Central Pacific Hurricane Center, Honolulu

Note** No longer used

Headings
- 1-19 Cyclone identification code and name; 20-29 Date time group;
- 30-43 Best track positions;
- 44-110 Intensity, Size and Type;
- 111-112 Source code.