

ICES involvement in IGY 1957/58 with special emphasis on marine biology

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After 1882/1883 and 1932/1933, a third International Polar Year was envisaged for 1957/1958. During the preparatory phase, the suggestion was made to cover the whole earth and to call this the International Geophysical Year. Ocean physics were included and, based on Sverdrup's proposal, ICES assumed responsibility for coordination in the Northeast Atlantic and the Arctic region. In addition to hydrographic measurements, chemical and biological measurements were also included in the programme. The hydrographic investigations led to a completely new insight into the dynamics in this area, whereas the chemical and biological measurements, at first glance, appeared to have been mainly a required exercise to get ICES involved. However, in the long run, their value lay in the identification of seasonal changes in the composition and distribution of plankton in the open sea.

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Introduction

Arthur E. J. Went, President of the International Council for the Exploration of the Sea (ICES) during 1966–1969, mentioned the International Geophysical Year (IGY) in only two sentences in his book on the history of ICES (Went, 1972). In the collection of 40 important essays on ICES activities compiled by E. M. Thomasson (1981), the IGY was not mentioned at all. This clearly does not adequately reflect the importance of the IGY to ICES activities. Up to 49 research vessels from almost all of the ICES Member Countries participated in this project, and ICES called for a Special IGY Meeting in 1959 to report on the results, and some 29 hydrographical and 14 biological papers were presented (Tait, 1961). Furthermore, on the basis of the IGY data, ICES published the huge 140-page *Atlas of the Hydrography of the Northern North Atlantic Ocean* (Dietrich, 1969a).

Prehistory of IGY

In 1875, at the 48th Assembly of German Naturalists and Physicians held at Graz, Carl Weyprecht (born in Darmstadt, Germany), Arctic explorer in the service of Austria, proposed an international simultaneous observation of Arctic weather and physics (Ihne, 1913). He promoted his plan at the International Meteorological

Congress at Rome in 1879, and after the subject was dealt with at two international polar conferences at Hamburg the same year and at Bern in 1880, 11 nations decided to establish stations around the Arctic from the summer of 1882 to the summer of 1883 to observe the weather, northern lights (*aurora borealis*), and magnetic changes. Later on, it was called the First International Polar Year 1882/1883.

Fifty years later, the next International Polar Year took place in 1932/1933, and 20 nations sent expeditions to the Arctic. Special emphasis was placed on observations of the Arctic ionosphere, which was recognized as very important for the long-distance travel of radio waves.

In 1950, the American pioneer in exploring the ionosphere, Lloyd Berkner, began to argue for a third Polar Year in 1957/1958 in view of an expected high in solar eruption activities (sunspots maximum). Already in the following year, the International Council of Scientific Unions (ICSU), of which Berkner later became president, took up the subject, and the plan was extended so as to cover the physical study of the whole earth instead of only its polar regions. Consequently, it was named the International Geophysical Year (IGY) and a special committee (Comité Spécial de l'Année Géophysique Internationale – CSAGI) was formed to organize and coordinate the programme. The activity of this committee and many of the primary results have been published in 48 volumes (*Annals of the International Geophysical Year, 1958–1970*). Volume 1 (1959) contains the de-

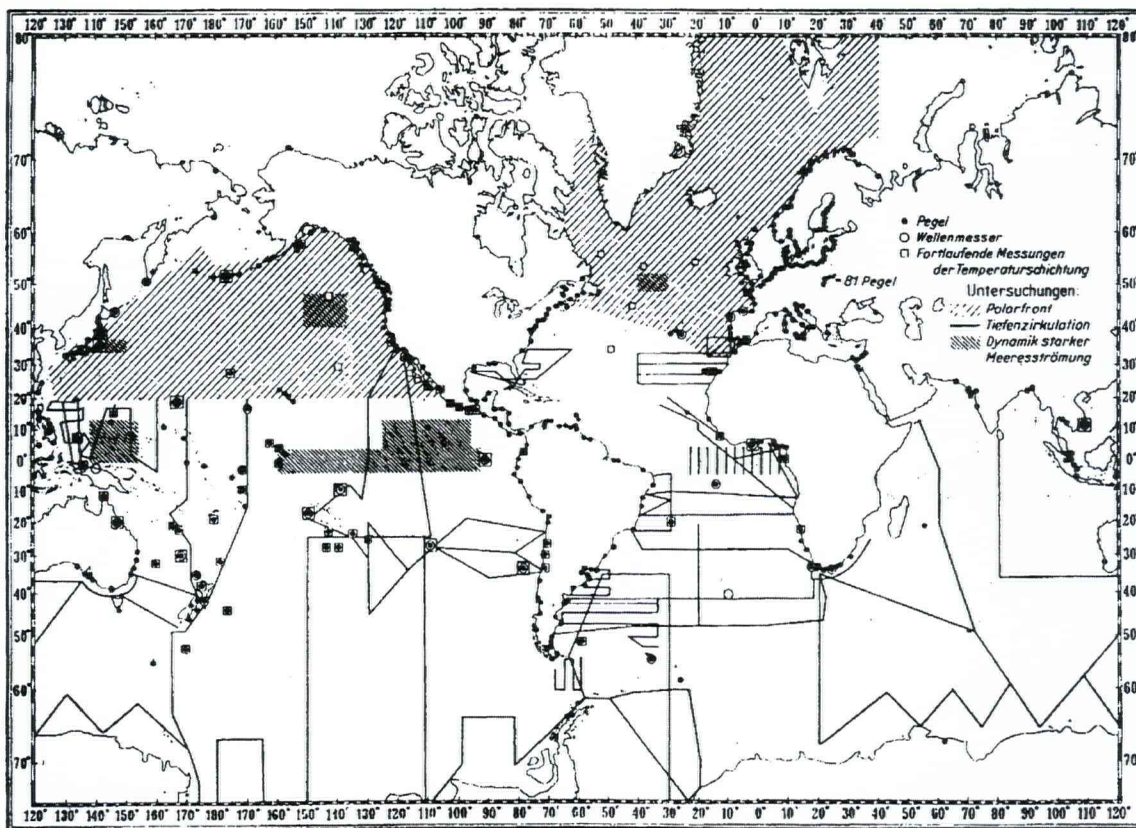


Figure 1. World map of proposed IGY observations (Böhnecke, 1957).

tailed histories of the preceding International Polar Years and the inception and development of the IGY. What was not mentioned, but certainly was evident behind the scenes, was the endeavour by those on both sides of the Iron Curtain to strive for recognized leadership within the international scientific community – a Cold War competition, as Hamblin (2001) put it.

The oceanographic programme of IGY 1957/1958

According to the original plan, the aim of the IGY was the simultaneous observation of rapid changes in the earth's geophysical phenomena. Special emphasis was placed on observations, by satellites (which were in the final stage of being launched), of cosmic and solar radiation at the edge of the atmosphere, of the outer atmosphere, ionosphere, northern lights, and ozone layer, and on the earth's seismic activity, gravity, magnetism, glaciation, and other phenomena.

At the first meeting of CSAGI in 1953 in Brussels, there was discussion of some proposals on oceanographic subjects submitted by Finland, the Federal Republic of Germany (FRG), Sweden, and the United Kingdom (UK), amongst others. As the delegates did not feel competent in oceanography, they suggested contacting the International Association of Physical Oceanography (IAPO), a member of the International Union of Geodesy and Geophysics (IUGG), which itself belongs to ICSU. Leading IAPO scientists were G. E. R. Deacon as well as H. U. Sverdrup, the president. IAPO recommended not only oceanographic investigations on a worldwide scale, but proposed concentrating on the following programmes (Figure 1):

- Mean sea level
- Long waves
- Deepwater circulation
- Multiple ship measurement
- Polar Front surveys.

Some topics were based on actual problems. For example, scientists were asked to search for answers about where to dump nuclear waste on the sea bottom. Or, as it was already recognized that carbon dioxide had increased in the atmosphere and that this would have a long-term influence on world climate, scientists wanted to study the ability of the ocean to dissolve carbonic acid gas (Chapman, 1957).

Table 1. Reports and short summaries presented to the Special ICES/IGY Meeting 1959

(A) Hydrographic Section and (B) Biological Section, covering primary productivity, biochemistry, plankton, benthic fauna, fishes (cod, haddock).

Country	Authors (A)	Data used in report		Authors (B)	Data used in report	
		National	beyond		National	beyond
Canada	Bailey	X				
	Campbell	X				
	Lauzier	X				
Denmark				Steemann-Nielsen <i>et al.</i>	X	
				Hansen	X	
Finland	Hela	X				
	Gripenberg	X				
	Voipo	X	(X)			
France	Peluchon	X				
Federal Republic of Germany	Krauss	X		Schaefer	X	Fish-related
	Dietrich	X		Gillbricht	X	
	Weidemann	X		Krey	X	
				Höhnk	X	
			Ziegelmeier	X		
Norway	Midttun	X		Berge	X	
	Sælen	X		Wiborg	X	
	Sælen	X	"Discovery"	Midttun	X	
				Eggvin	X	
Poland	Filarski	X				
	Glowinska <i>et al.</i>	X	"K. Liebknecht"			
Spain	Menéndez	X	"Winnaretta", "Passeur du Printemps"			
UK	Lee		X	Fraser	X	
	Tait <i>et al.</i>	X	"G. O. Sars"			
	Steele		X			
	Cooper	X	"Dana"			
	Cox	X				
	Corlett	X				
USA	Lumby		X			
	Worthington <i>et al.</i>		X			
USSR	Gorshkova <i>et al.</i>	X		Pavshtiks <i>et al.</i>	X	
	Zaitsev <i>et al.</i>	X	"Aranda", "Anton Dohrn"			
	Alekseev <i>et al.</i>	X				
	Fedosov <i>et al.</i>	X				

Of the 49 participating ships, which all made measurements of physical parameters, 22 ships also conducted chemical observations; 14, biological observations; and two were equipped to catch fish ("Anton Dohrn" from FRG and "Explorer" from Scotland). Only one fourth of the vessels took the opportunity to collect plankton; indeed, that was virtually the only measurement referred to under the category "biological". One reason for this was certainly the very restricted working

and sleeping space aboard the vessels, especially the smaller ones. According to the survey schedules, the hydrographic work continued around the clock, which made it necessary for two or three groups of hydrographers, both scientists and technicians, to be on board. Consequently, there was not much room for scientific personnel of other disciplines, unless they could be integrated into sampling procedures. Samples, in those days, were mainly taken by hydrocasts with Nansen

bottles, which were also used for chemical and biological analyses. If one reflects on the fact that biologists were given the unique chance to relate their results to a three-dimensional picture of the distribution of temperature, salinity, and water masses at a resolution never before achieved, it raises the question of whether the biologists attempted to obtain more space for their interests or whether they accepted the dominance of hydrography without contradiction. The minutes of the biological committees of ICES in those years do not reveal any discussion about problems associated with participation in the IGY.

Evaluation

Unanimous consent within ICES to participate in the IGY was achieved right at the beginning because the idea of taking part was introduced by the famous Norwegian oceanographer Harald U. Sverdrup, who had developed an outstanding broad interdisciplinary view during his scientific career. From 1936 to 1948, he served as Director of the Scripps Institution of Oceanography in La Jolla, California, USA, which, under his leadership, developed into one of the foremost marine science centres. His book *The Oceans* (Sverdrup *et al.*, 1942) brought together, for the first time, the existing knowledge of the marine disciplines of physics, chemistry, and biology and was the guiding handbook for generations of students throughout the world. His role within ICES may be characterized by the following words from a report of the Hydrographic Committee: "he tried to promote the hydrographic activity in the other committees. As the Hydrographic Committee was dealing with the environment of the organisms studied by the other committees of the Council its work was basic to these committees" (Böhnecke, 1955, p. 49). However, it could probably be said that biologists were more excited about the invitation to participate in this worldwide and outstanding geophysical enterprise than in trying to influence the programme in terms of what was needed for their research. Furthermore, the hydrographic programme was accomplished in every detail by the influential Günther Dietrich, who knew exactly what he wanted as a research product – an atlas of quasi-synoptic charts (Dietrich, 1969a). In the report of the IGY Working Group to the Council in 1960, he even defined the number of charts and the costs of printing them (Dietrich, 1960). The biological programme lacked an equally strong person.

A year after the IGY, a Special IGY Meeting (Tait, 1961) was organized immediately before the 1959 ICES annual meeting to summarize preliminary results. Twenty-nine hydrographical and 15 biological contributions were presented by scientists from almost all ICES Member Countries that had been involved in the surveys (Table 1). The great majority of the contributions were restricted to a description of the results obtained by sin-

gle vessels, and only a few of them mentioned measurements from other vessels. This is not surprising as the data exchange, although agreed upon via the ICES Service Hydrographique, was not yet functional given the time-lag of data delivery.

The biological contributions dealt with primary productivity, biochemistry, plankton, benthic fauna, and, in one paper, fish (cod and haddock). The role that the IGY surveys played, in the view of ICES biologists, may be briefly illustrated by the following case. J. H. Fraser from Scotland reported on plankton observations made on board the "Explorer". In his report as Chair of the Plankton and Benthos Committee for the year 1958, he mentioned this cruise, but without saying that it was part of the IGY Polar Front Survey. He may have thought that this report had to deal with the annual routine investigations. Arthur Went, on the contrary, wrote that "The report on the Special IGY Meeting...which incidentally also dealt with associated biological aspects of IGY, indicates just how effectively the Council can work in coordinating investigations...and the report...is an important contribution to our knowledge of the North Atlantic Polar Front and as such an excellent contribution to IGY" (Went, 1972, p. 226).

And how did the ICSU–CSAGI Working Group on Oceanography recognize the activity of ICES? At its 5th meeting in Moscow in 1958, it decided to summarize the oceanographic results in a special volume of the *Annals of IGY*, which was finally published as the third-to-last volume (no. 46, 1969). Fourteen authors were nominated to cover the whole spectrum. Only one presented the results of the contribution by ICES (Dietrich, 1969b).

Almost from its establishment, ICES was in contact with other international organizations as a result of exchanging observers at meetings. The participation in IGY brought ICES to a new level of cooperation. It collaborated with other organizations for the first time in special interdisciplinary scientific investigations. At the 1960 ICES annual meeting in Moscow, a resolution was adopted to cooperate with FAO, UNESCO, WMO, IAPO, ICNAF, IOC, and SCOR. The establishment of both IOC and SCOR was a result of the IGY.

IGY was a milestone in the development of ICES as a partner in international and interdisciplinary investigations. However, on a global scale, ICES acted principally as a supporting body rather than one that led initiatives beyond its central obligations. Its greatest value was and is to overcome national sensitivities, a role which is crucial in conducting international investigations.

References

- Annals of the International Geophysical Year. 1958–1970. Volumes 1–48. Pergamon Press, Oxford.
- Böhnecke, G. 1955. Hydrographical Committee. Rapports et Procès-Verbaux des Réunions du Conseil International pour l'Exploration de la Mer, 142: 35-36.
- Böhnecke, G. 1957. Die ozeanographischen Arbeiten im Internationalen Geophysikalischen Jahr (IGJ) – Übersicht über die Programme und Ziele [Oceanographic operations in the International Geophysical Year (IGY) – An outline of their plans and aims]. *Deutsche Hydrographische Zeitschrift* (German Journal of Hydrography), 10: 33-38. (In German).
- Chapman, S. 1957. The International Geophysical Year. *The Advancement of Science*, XIII, 52: 259-268.
- Dietrich, G. 1960. Report of the IGY Working Group. ICES CM 1960/Hydrographical Committee, 196. 2 pp.
- Dietrich, G. 1969a. Atlas of the Hydrography of the Northern North Atlantic Ocean. Based on the Polar Front Survey of the International Geophysical Year Winter and Summer 1958. Conseil International pour l'Exploration de la Mer, Service Hydrographique, Charlottenlund Slot, Denmark. 140 pp.
- Dietrich, G. 1969b. North Atlantic Polar Front Survey in the IGY 1957/58. *In* *Oceanography*, pp. 63-77. Ed. by Arnold L. Gordon and F. W. G. Baker. Annals of the International Geophysical Year, 46. Pergamon Press, Oxford. 216 pp.
- Hamblin, J. D. 2001. Science and North-South Sentiment: International Oceanography in the Pacific and Indian Oceans, 1950–1966. *Historisch-Meereskundliches Jahrbuch* (History Oceanography Yearbook) 8, 89–102.
- Ihne, J. 1913. *Der Nordpolforscher Carl Weyprecht* (The arctic explorer Carl Weyprecht). Darmstadt, Germany. 182 pp.
- Meincke, J. 2002. 100 years of field work in hydrography: a retrospective of its impacts. *ICES Marine Science Symposia*, 215: 87–99. (This volume).
- Sverdrup, H. U., Johnson, M. W., and Fleming, R. H. 1942. *The Oceans, Their Physics, Chemistry, and General Biology*. Prentice-Hall, Inc., New York. 1087 pp.
- Tait, J. B. 1961. Contributions to Special IGY Meeting 1959. Rapports et Procès-Verbaux des Réunions du Conseil International pour l'Exploration de la Mer, 149. 218 pp.
- Thomasson, E. M. (Ed.). 1981. *Study of the Sea. The Development of Marine Research under the Auspices of the International Council for the Exploration of the Sea*. Fishing News Books Ltd., Farnham, England, UK. 256 pp.
- Went, A. E. J. 1972. *Seventy Years Agrowing: A History of the International Council for the Exploration of the Sea, 1902–1972*. Rapports et Procès-Verbaux des Réunions du Conseil International pour l'Exploration de la Mer, 165. 252 pp.