

Climate of Turkey

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Although Turkey is situated in large Mediterranean geographical location where climatic conditions are quite temperate, diverse nature of the landscape, and the existence in particular of the mountains that run parallel to the coasts, result in significant differences in climatic conditions from one region to the other. While the coastal areas enjoy milder climates, the inland Anatolian plateau experiences extremes of hot summers and cold winters with limited rainfall.

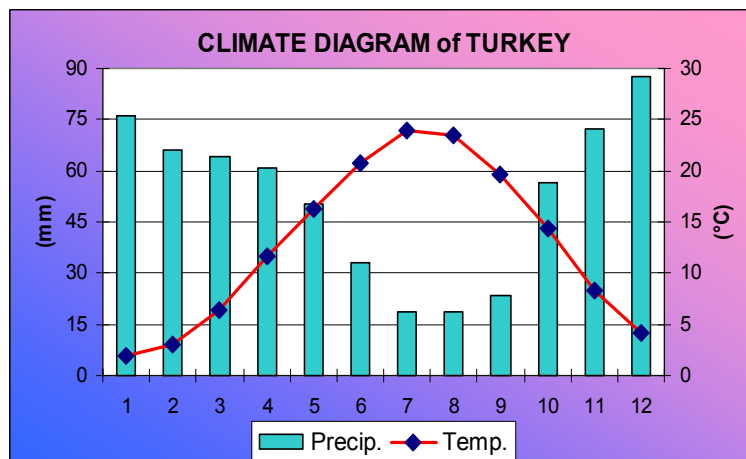


Figure 1. Climate diagram of Turkey (Sensoy, S. et al, 2008)

Turkey receives most of the rainfall in the winter season. In this season, mean temperature usually is below 5°C and there is not too much evaporation. But summer rainfall is very limited and could not be enough to remove water deficit resulted from increased temperature and evaporation.

The Aegean and Mediterranean coasts have cool, rainy winters and hot, moderately dry summers. Annual precipitation in those areas varies from 580 to 1,300 millimeters, depending on location. The Black Sea coast receives the greatest amount of rainfall. The eastern part of that receives 2,200 millimeters annually and is the only region of Turkey that receives rainfall throughout the year.

Turkey's diverse regions have different climates because of irregular topography. Taurus Mountains are close to the coast and rain clouds cannot penetrate to the interior part of the country. Rain clouds drop most of their water on the coastal area. As rain clouds pass over the mountains and reach central Anatolia they have no significant capability to produce rain. In the Eastern region of Anatolia, the elevation of mountains exceeds 2500-3000 m. Northern Black Sea Mountains and Caucasian Mountain hold the rain clouds, and therefore the area is affected by the continental climate with long and very cold winter. Minimum temperatures of -30°C to -38°C are observed in the mountainous areas in the east, and snow may lie on the ground 120 days of the year. Winters are bitterly cold with frequent, heavy snowfall. Villages in the region remain isolated for several days during winter storms.

Key words: Climate of Turkey, climate classification of Turkey

Annual Average Precipitation of Turkey

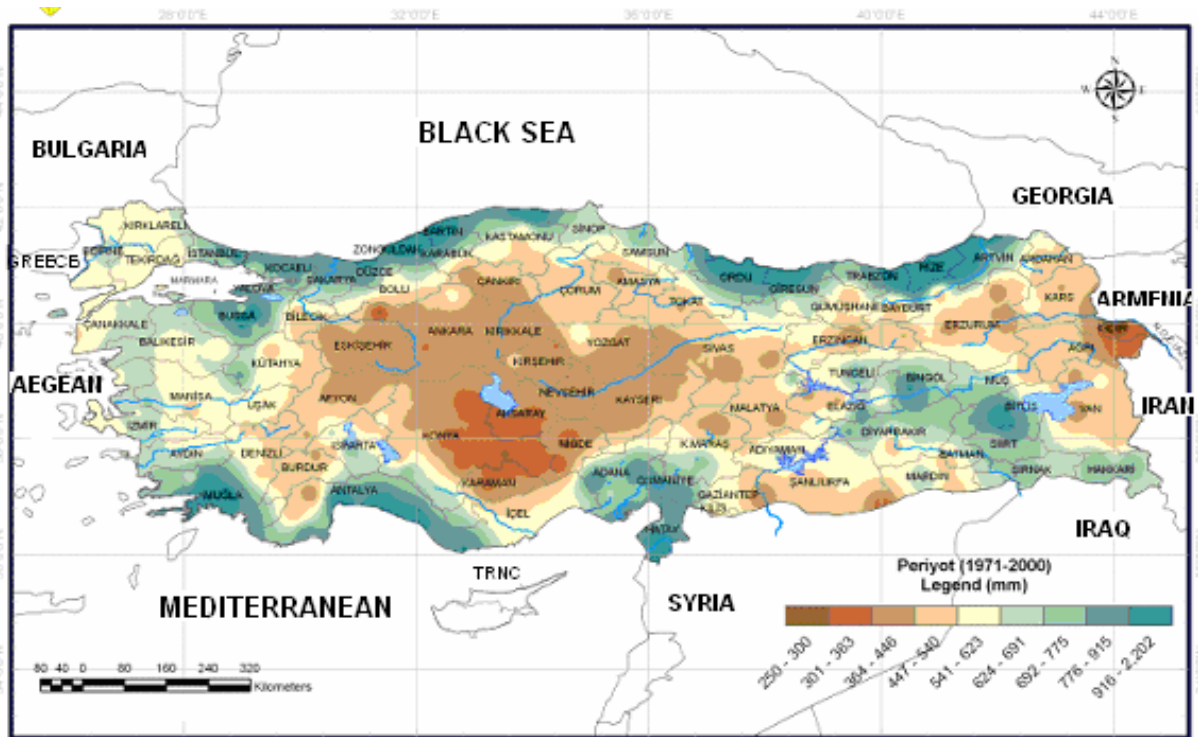


Figure 2. Geographical distribution of mean annual precipitation (Sensoy, S. et al, 2008)

A big difference is observed when the total rainfall between coastal and inland stations, are compared. The Black Sea coasts (Rize, Hopa) receive 2,200 mm rainfall while Konya and Iğdır 250-300mm. Annual precipitation amount of Turkey is mainly determined by elevation. The Aegean and Mediterranean coasts have rainy conditions in winters but dry in summers. Annual precipitation in those areas varies from 580 to 1,300 mm. The Black Sea coast receives the greatest amount of rainfall and is the only region of Turkey that receives rainfall throughout the year.

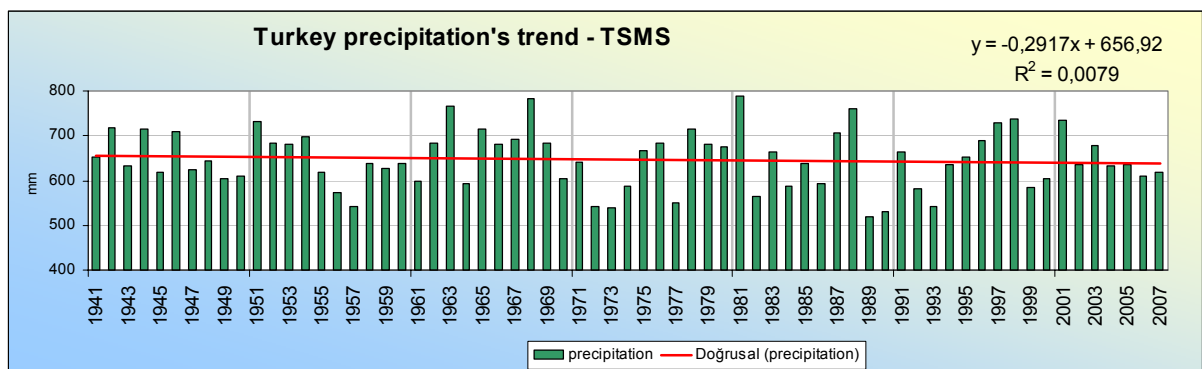


Figure 3. Turkey annual precipitation and its trend (Sensoy, S. et al, 2008)

Annual average precipitation of Turkey for the 1971-2000 climatic periods is about 640mm and has 29mm/100 years decreasing trend.

Large mountains influence regional climates. For example Turkey's diverse regions have different climates because of irregular topography. Taurus Mountains are close to the coast and rain clouds cannot penetrate to the interior part of the country. Rain clouds drop most of their water on the coastal area. As rain clouds pass over the mountains and reach central Anatolia they have no significant capability to produce of rain.

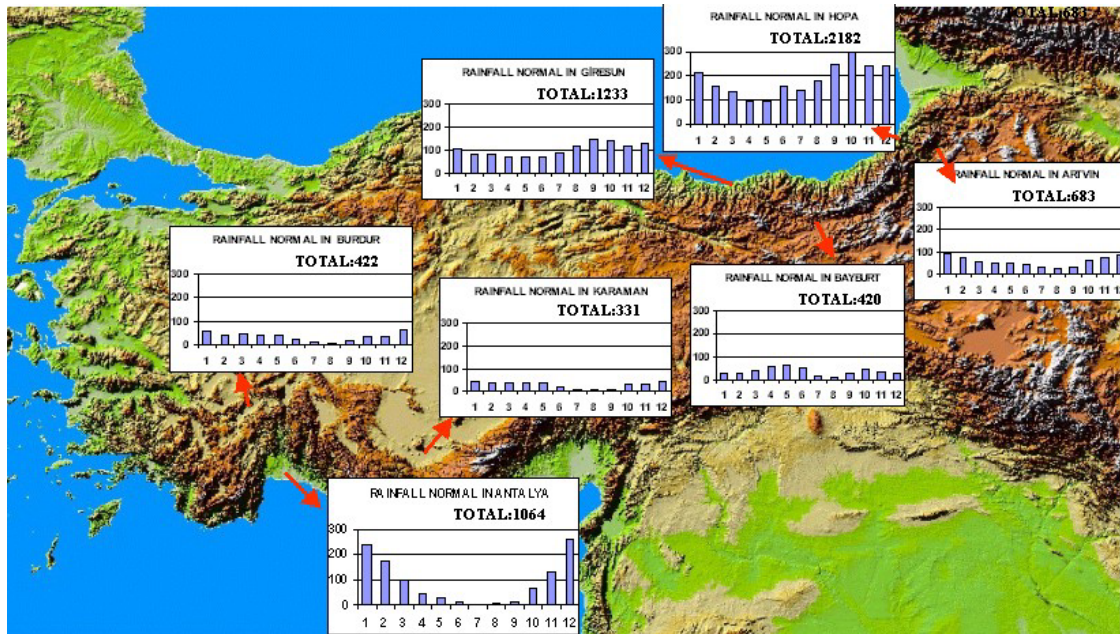


Figure 4. The Mountain influence on Turkey precipitation (Sensoy, S., 2004)

A big difference is observed when the total rainfall between coastal stations and inland stations, are compared.

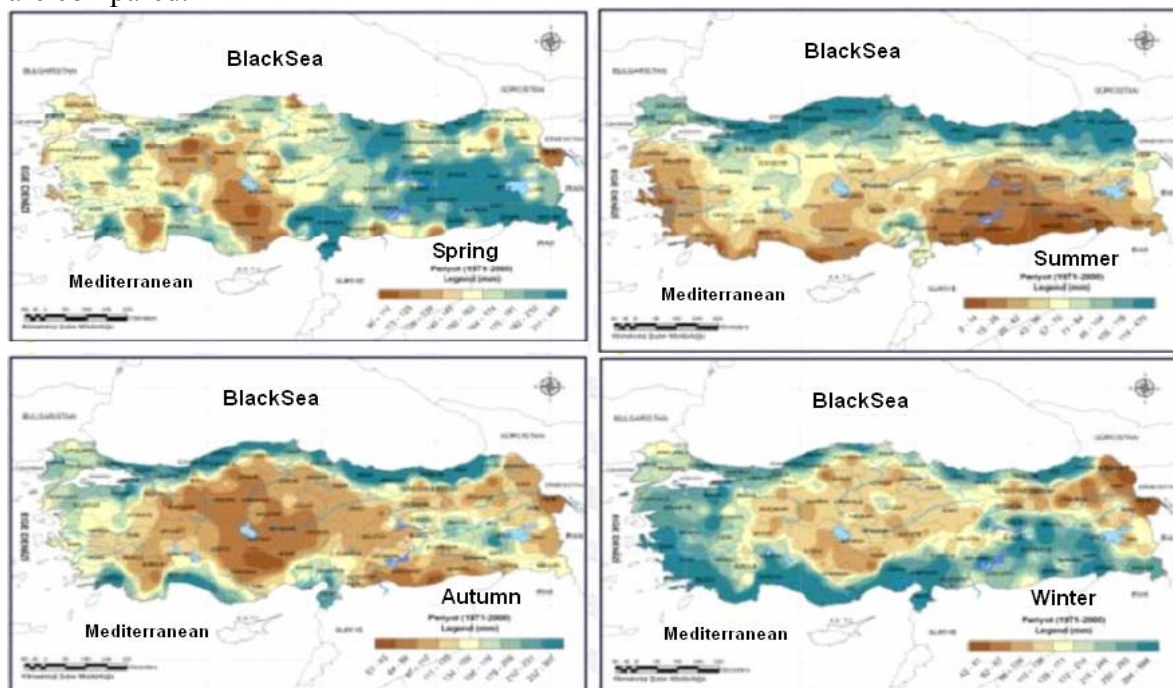


Figure 5. Seasonal rainfall distribution of Turkey (Sensoy, S. et al, 2008)

A big difference is observed also between seasonal rainfalls. The Aegean and Mediterranean coasts have rainy in winters but dry in summers. Black sea coast has rainy in all season.

Long Term Mean Temperature of Turkey



Figure 6. Geographical distribution of mean annual temperature (Sensoy, S. et al, 2008)

In Istanbul and around the Sea of Marmara the climate is moderate (winter 4°C and summer 27°C); in winter however the temperatures can drop below zero. In Western Anatolia, there is a mild Mediterranean climate with average temperatures of 9°C in winter and 29°C in summer. On the southern coast of Anatolia the similar climatic condition are observed. The climate of the Anatolian Plateau is a steppe climate. There is a great temperature difference between day and night. Rainfall is low but it usually in form of snow. The average temperature is 23°C in summer and -2°C in winter. The climate in the Black Sea area is wet, and humid (summer 23°C, winter 7°C). In the Eastern Anatolia region there is a long winter, and snow remains on the ground from November until the end of April (the average temperature in winter is -13 °C and in summer 17 °C). In the South-Eastern Anatolia region, summers are hot and dry, with temperatures above 30°C. Spring and autumn are generally mild, but during both seasons sudden hot and cold spells frequently occur in the region.

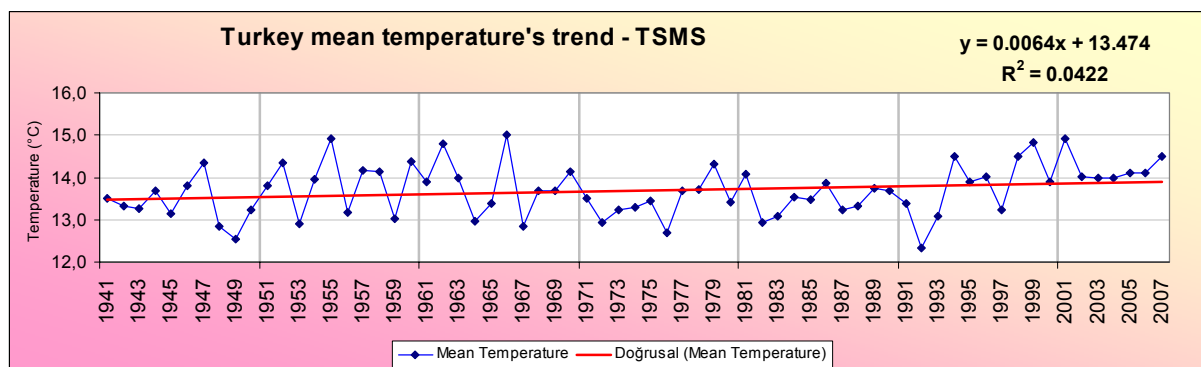


Figure 7. Turkey mean temperature and its trend (Sensoy, S. et al, 2008)

Turkey mean temperature for the 1971-2000 climatic periods is about 13°C and has 0.64°C/100 years increasing trend.

Renewable energy sources

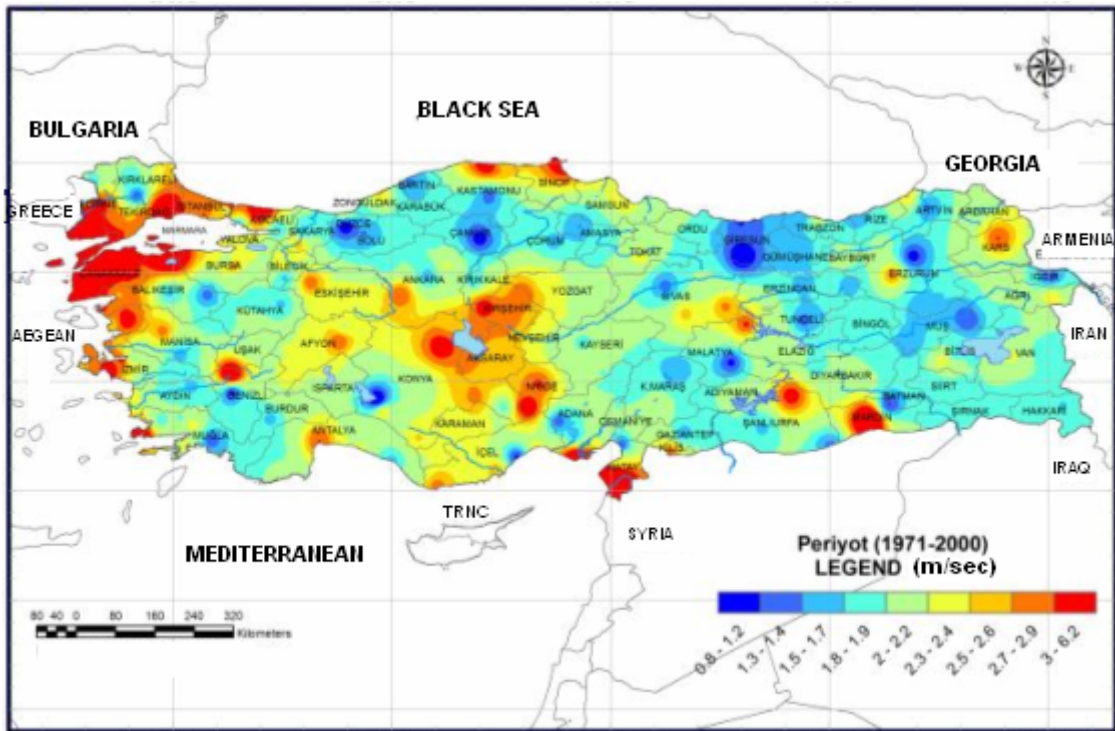


Figure 8. Average wind speed distribution over Turkey (Sensoy, S. et al, 2008)

Average wind speed distribution over Turkey shows that there is great wind energy potential in Canakkale, Istanbul, Sinop, Aksaray, Kırşehir, Hatay and Mardin.

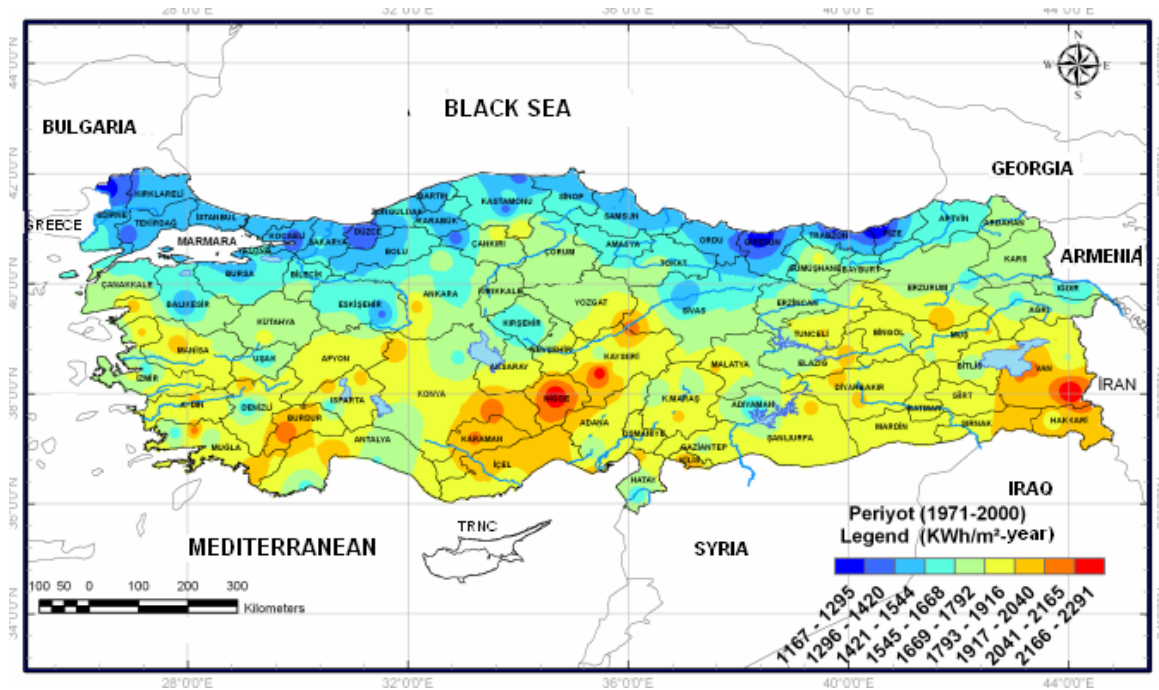


Figure 9. Average total radiation distribution over Turkey (Sensoy, S. et al, 2008)

Average total radiation distribution over Turkey shows that there is great solar energy potential in the Aegean and Mediterranean region and also around Niğde, Van and Karaman.

Climate classification of Turkey via Thornthwaite method

Thornthwaite climate classification depends on precipitation - evaporation and temperature - evaporation relations. According to Thornthwaite, if precipitation more than evaporation there soil is wet. On the other hand, if precipitation is less than evaporation there is water deficit there. Soil couldn't be given enough water to plant. So this area is dry.

Rainfall effectiveness indice

$$I_m = \frac{100 S - 60 d}{ETP} \quad \text{where;}$$

S = annual water surplus,

d = annual water deficit

ETP = annual evapotranspiration

Calculation for Şanlıurfa:

$$I_m = \frac{(100 \times 193) - (60 \times 761.8)}{1030} = -26$$

Şanlıurfa 1st. letter is **D**

Table 1. Thornthwaite index and climate types

Im	Letter	Climate types
>100	A	Very humid
100-80	B4	Humid
80-60	B3	Humid
60-40	B2	Humid
40-20	B1	Humid
20-0	C2	Semi humid
0-(-20)	C1	S. dry-less humid
-20-(-40)	D	Semi dry
-40-(-60)	E	Dry

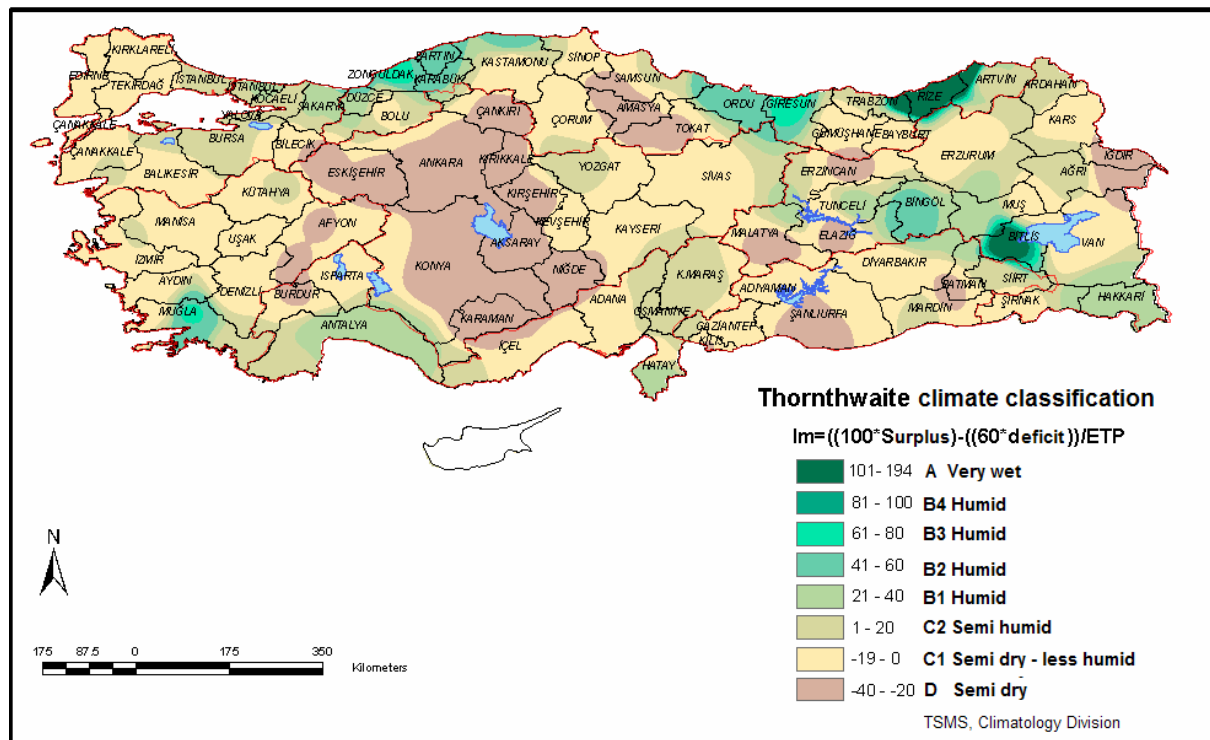


Figure 10. Climate classification of Turkey via Thornthwaite method (Sensoy, S. et al, 2008)

According to Thornthwaite method; semi dry areas are the inland Anatolia, Iğdır and Şanlıurfa; very wet region is the Eastern Black Sea; humid regions are Black sea and the around of Bitlis and Muğla and the other large areas of Turkey are semi dry and less humid climatic regions.

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