



REPUBLIC OF TÜRKİYE
MINISTRY OF ENVIRONMENT,
URBANIZATION AND CLIMATE CHANGE
Turkish State Meteorological Service



THE STATE OF THE TÜRKİYE'S CLIMATE IN 2022

TURKISH STATE METEOROLOGICAL SERVICE

Ankara, 2023

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1. Summary

In 2022, Türkiye's mean temperature was 14.5°C, this is 0.6°C above the 1991-2020 mean value (13.9°C). There are positive temperature anomalies in Türkiye's mean temperatures since 2007 (except in 2011). The hottest year was 2010 with 15.5°C. The year 2022 was the seventh warmest year with 14.5°C.

In 2022, while the mean temperatures in Türkiye are below the long-term mean in 19 centers; at 201 stations, it was above the long-term mean.

In 2022, monthly mean temperatures were above normal except in January, March, and May.

Seasonal temperatures were above normal, except in spring. The mean temperatures of 2022 were above the seasonal normal (1991-2020) in all geographic regions.

In 2022, the lowest temperature was -34.4°C in Özalp/ Van in January, and the highest temperature was 47.9°C in Silopi/ Şırnak in August.

Türkiye's mean areal precipitation was recorded as 503.8 mm in 2022. The amount is approximately 12.1%, below from the period of 1991-2020's normal (573.4 mm).

Monthly precipitation was above normal in January, February, March, June, and August while they were below in the other months.

Some regions and cities in Türkiye received 40% less precipitation in 2022, compared to their normals. These areas are: the northern part of İzmir; Bursa, Şanlıurfa, Mardin and its surroundings, the eastern parts of Van and Ağrı. However, 40% to 60% more precipitation was observed in Sinop, Samsun, Ordu, Giresun, and the eastern side of Mersin compared to their normals.

Additionally, the precipitation in coastline of the western black sea and eastern black sea was above 1000mm. In Artvin, Rize and its surroundings the amount of precipitation exceeded 1600mm, whereas the in eastern part of Iğdır it was less than 200 mm.

The year 2022 has been the year with the highest number of extreme events, with 1030 extreme events reported through TSMS's Kardelen Database. There is an increasing trend in the number of extreme events, especially in the last two decades. Percentage of extreme events recorded in 2022 were as follow; heavy rain, floods (33.6%), wind storms (21.4%), hail (18.5%), snow (11.7%), lightning (4.1%), forest fire (0.9%), frost (2.5%), landslide (2.7%), avalanche (2.1%), dust storm (0.2%) and fog (0.3%).

Examples of some important events are:

- According to the records of the Municipality of Ordu, 336 landslides occurred in 11 districts of Ordu due to heavy rain on 18 July 2022.
- 38 out of the 200 animals in the sheep barn died due to the lightning occurred in the village of Bahçe, Osmaniye on 24.09.2022.
- On 17 October 2022, 78 animals were killed by lightning in the village of Uzunkuyu, Adıyaman-Besni.

2. Temperature

In 2022, Türkiye's mean temperature was 14.5°C, which was 0.6°C above the 1991-2020 mean value (13.9°C) (Fig.2.1).

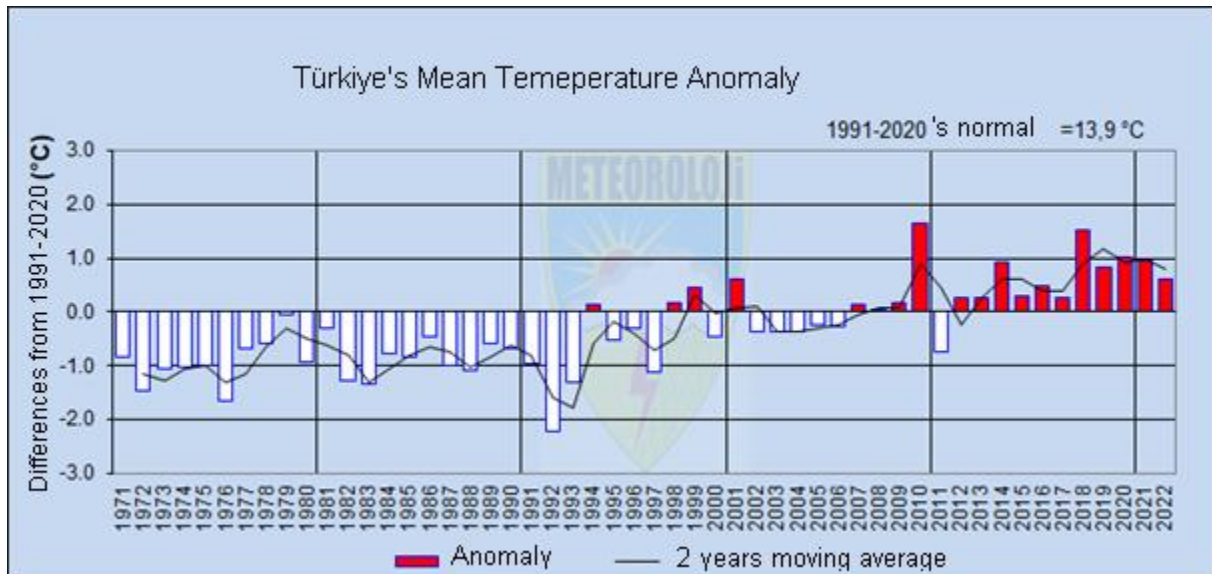


Figure 2.1. Annual mean temperature anomaly (URL 1).

There are positive anomalies in Türkiye's mean temperatures since 2007 (except in 2011). The hottest year was 2010 with 15.5°C. The year 2022 was the seventh warmest year with 14.5°C (Fig. 2.2).

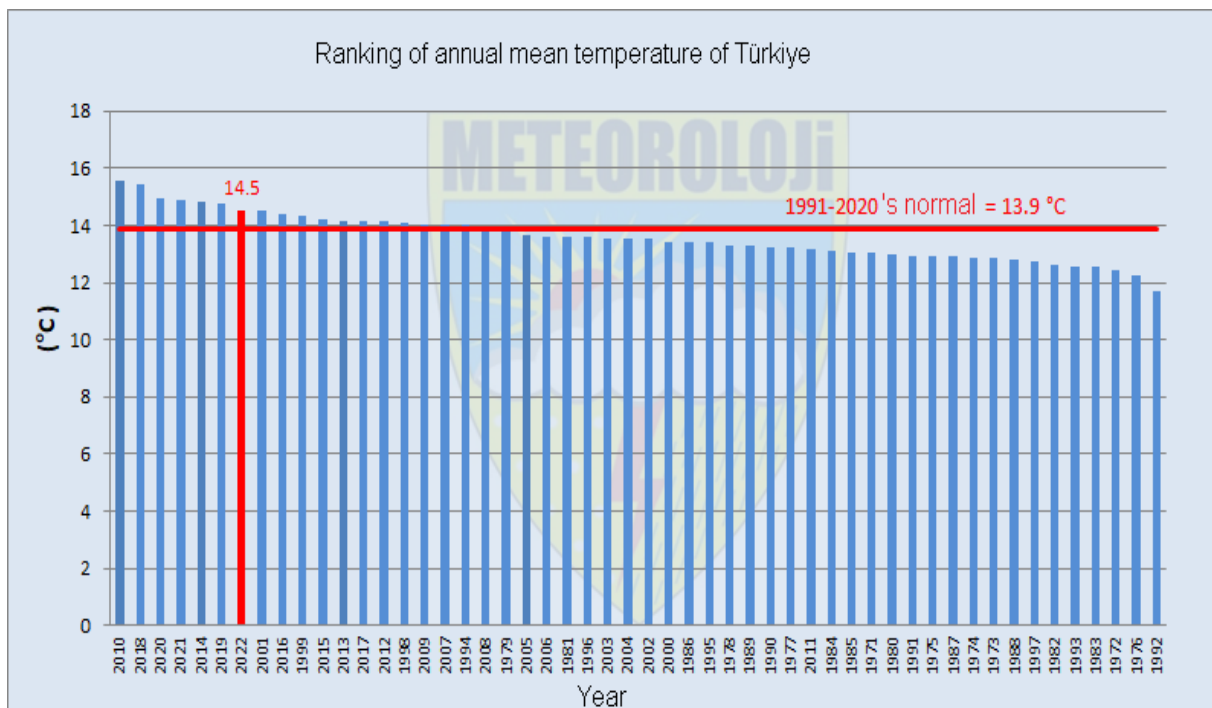


Figure 2.2. Ranking of annual mean temperature (URL 1).

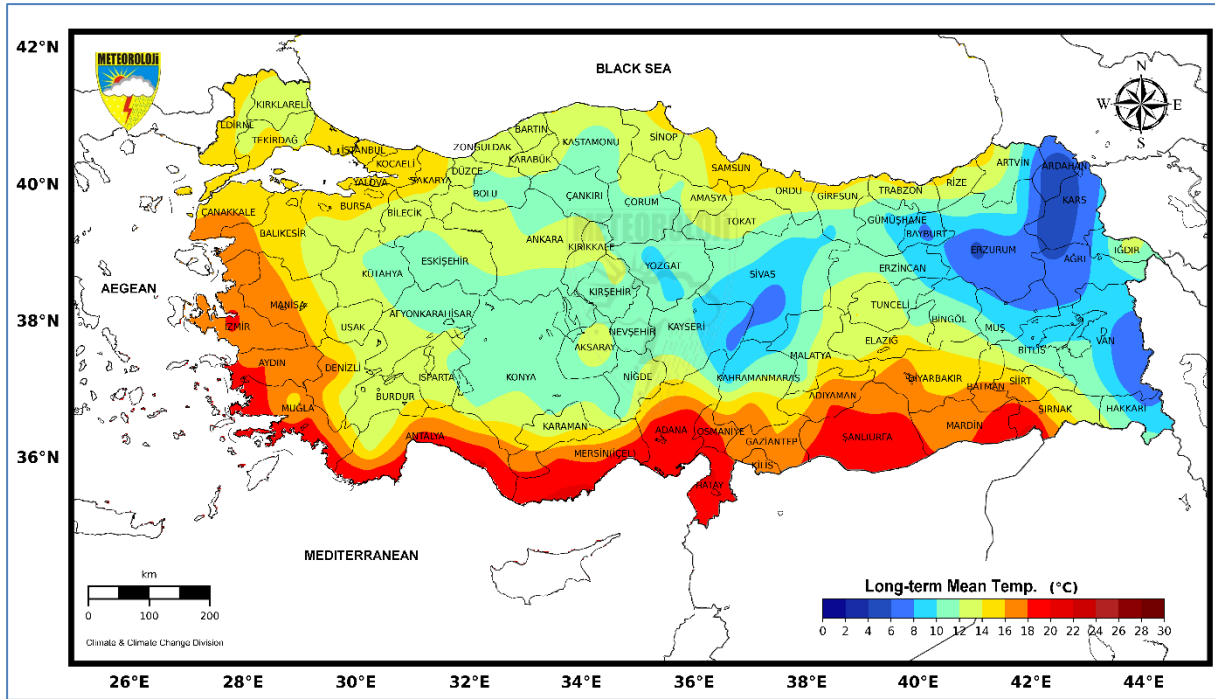


Figure 2.3. Türkiye’s Long-Term (1991-2020) Mean Temperature Map

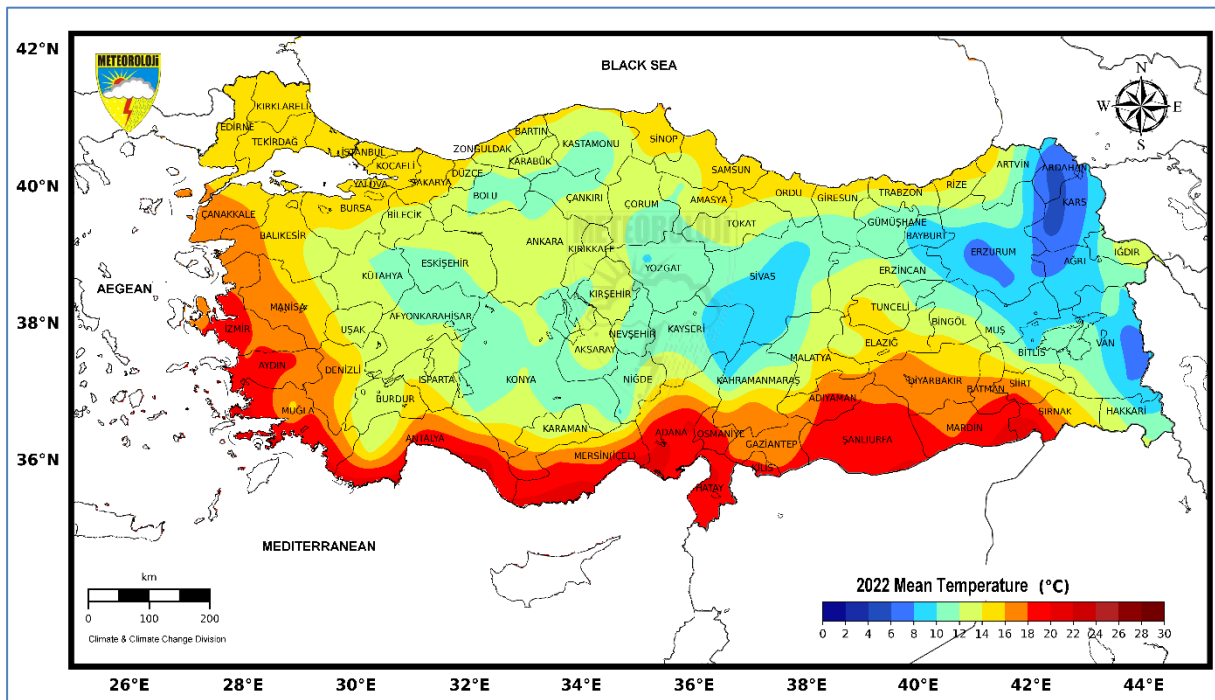


Figure 2.4. Türkiye’s Mean Temperature Map for 2022

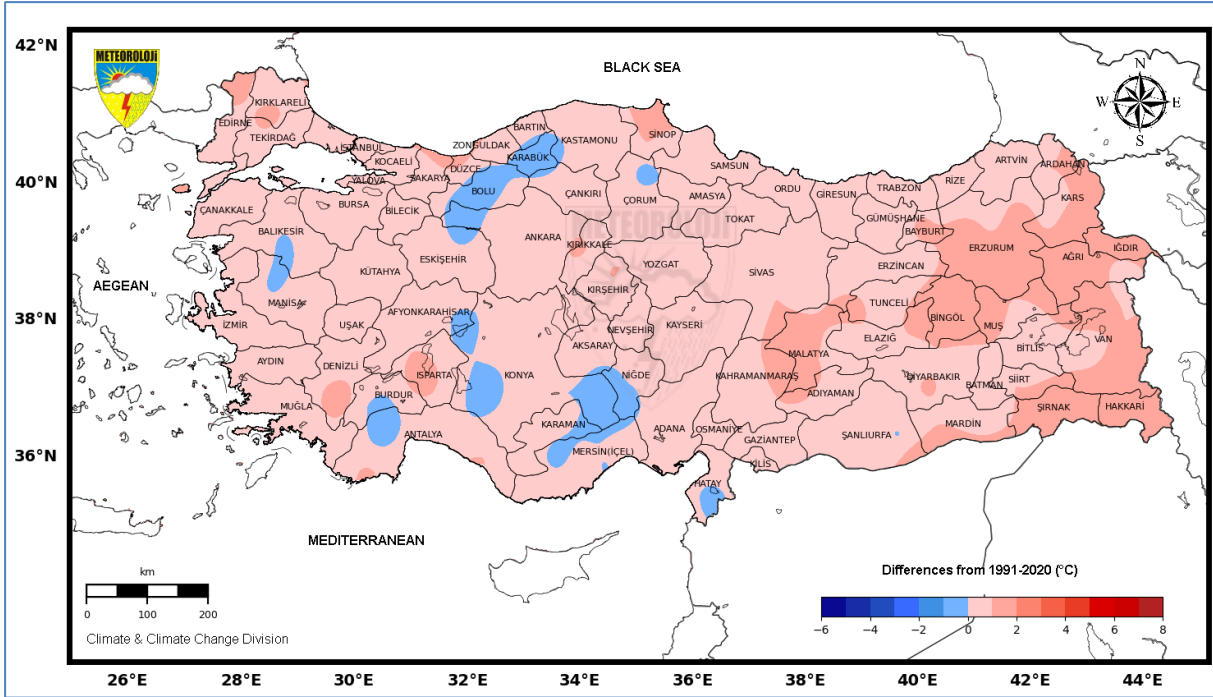


Figure 2.5. Türkiye’s mean temperature differences from 1991-2020 normal.

In 2022, while the mean temperatures in Türkiye are below the long-term mean in 19 centers; at 201 stations, it was above the long-term mean (Fig 2.5).

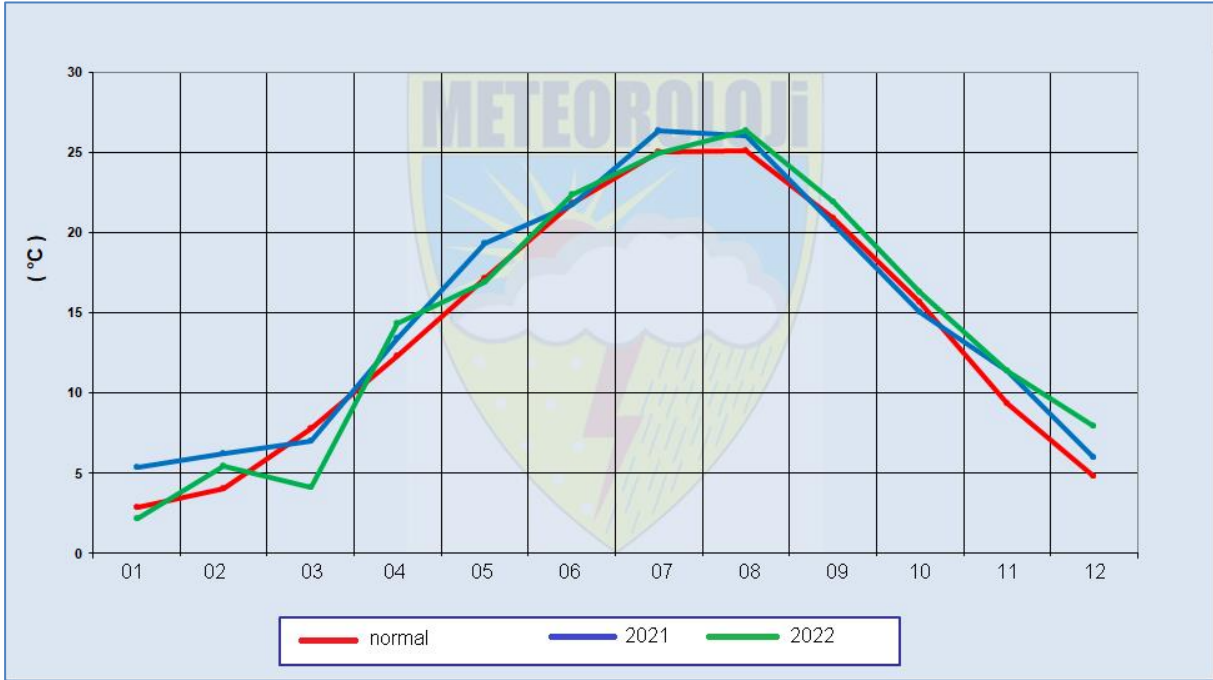


Figure 2.6. Comparison of monthly mean temperatures between normal and last year (URL 1).

In 2022, monthly mean temperatures were above normal except in January, March, and May (Fig. 2.6).

2.1. Seasonal Temperature Assessment

2.1.1. Winter temperature

The winter mean temperature of the years 2021-2022 was 4.5°C, which was 0.6°C above the seasonal normal (3.9°C), (Fig. 2.7).

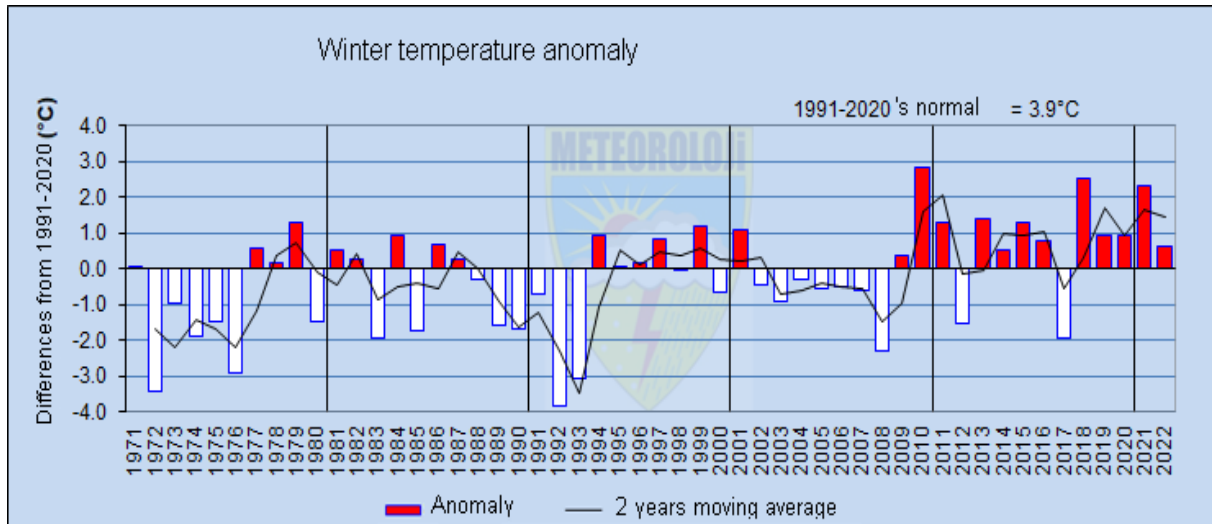


Figure 2.7. Türkiye's winter mean temperature anomaly

2.1.2. Spring temperature

The spring mean temperature in 2022 was 11.8°C, which was 0.6 °C below the seasonal normal (12.4°C), (Figure 2.8).

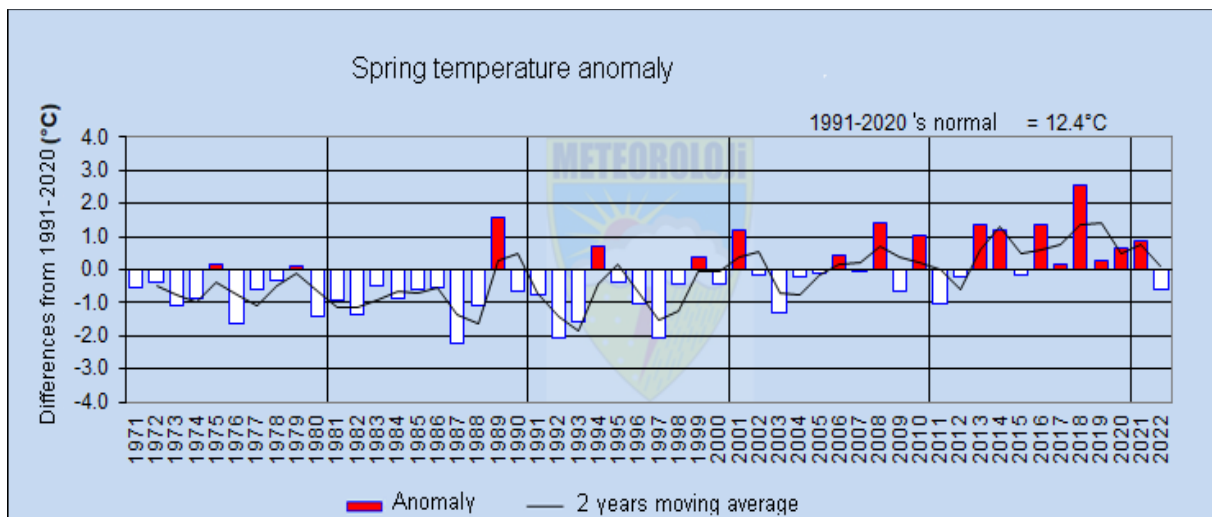


Figure 2.8. Türkiye's spring mean temperature anomaly

2.1.3. Summer temperature

The summer mean temperature of 2022 was 24.6°C, which was 0.6°C above the seasonal normal (24°C). The summer season of 2022 was the 8th warmest season of the past 52 years (Fig. 2.9).

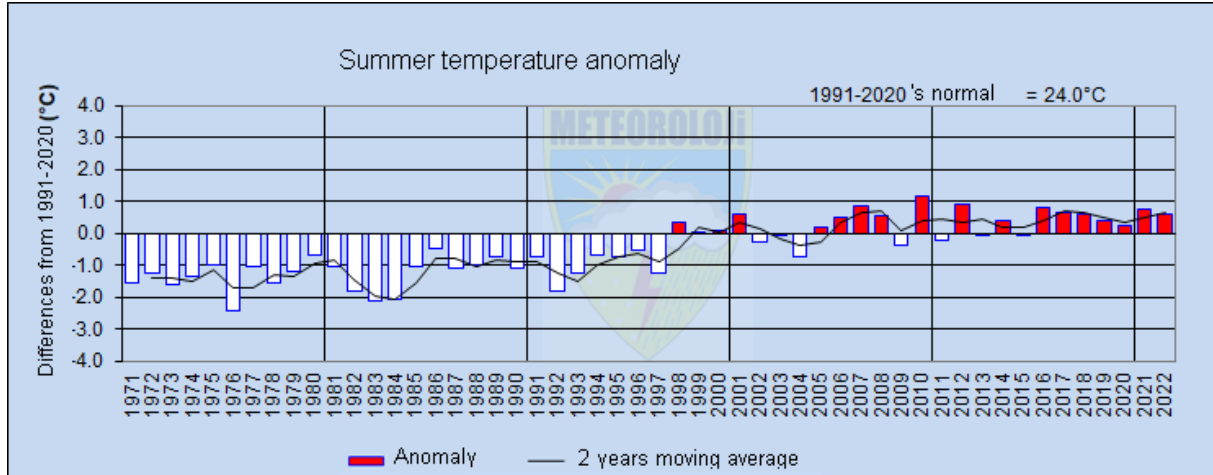


Figure 2.9. Türkiye's summer mean temperature anomaly

2.1.4. Autumn temperature

The mean temperature of the autumn season in 2022 was 16.5°C, which was 1.2°C above the seasonal normal (15.3°C). The autumn season of 2022 was the 6th warmest season of the past 52 years (Fig. 2.10).

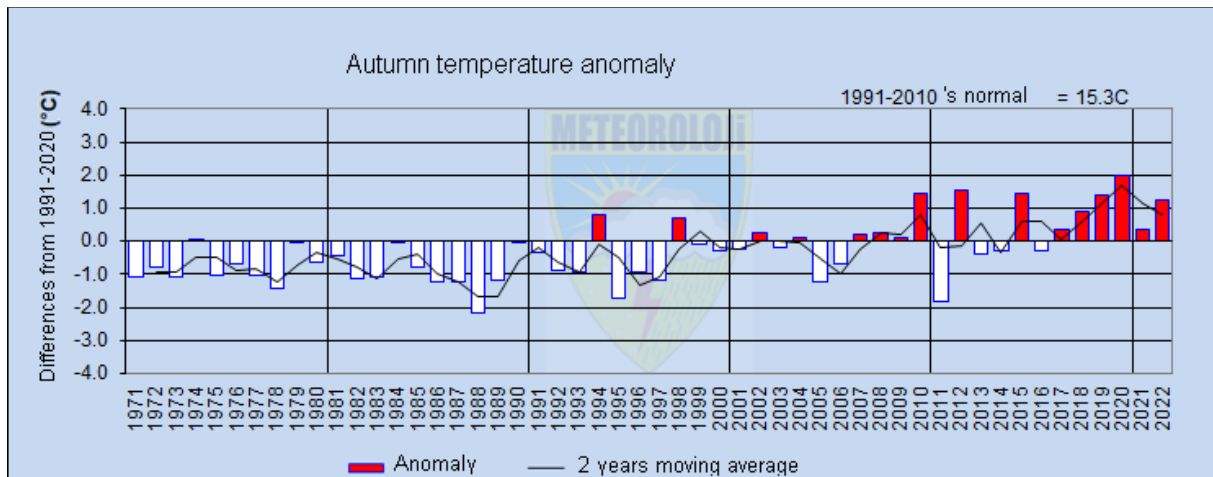


Figure 2.10. Türkiye's autumn mean temperature anomaly

2.2. Regional Temperature Assessment

The mean temperatures of 2022 were above their seasonal normal (1991-2020) in all regions (Fig. 2.11).

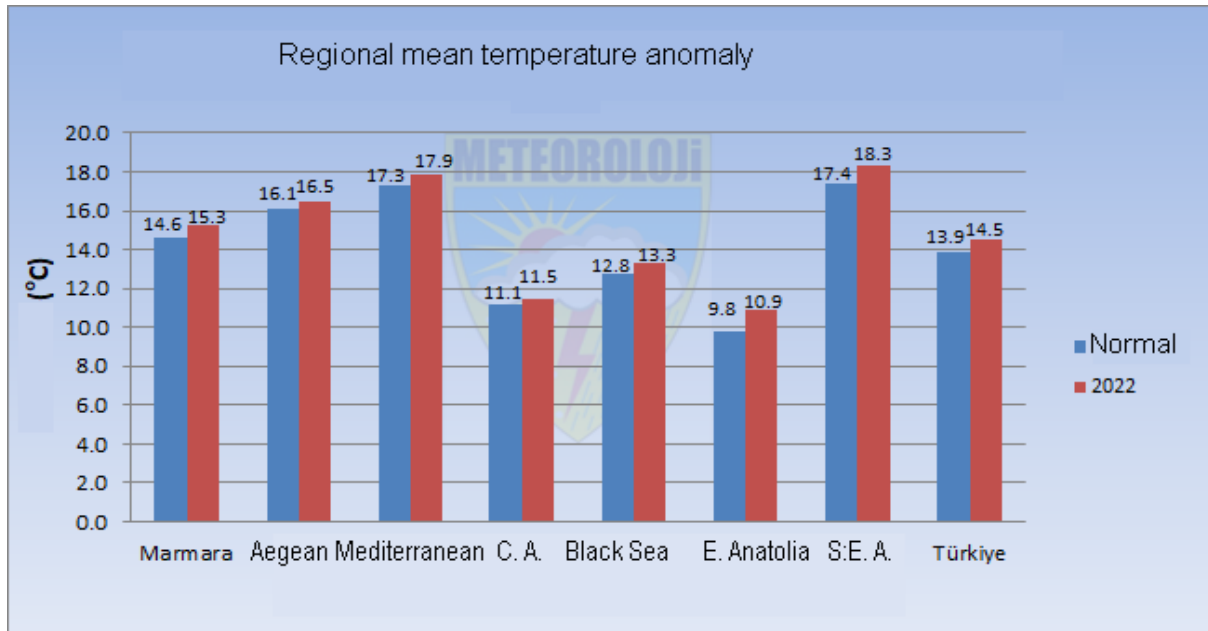


Figure 2.11. Comparisons of the 2022 mean temperatures with the normal temperatures according to the regions (URL 1).

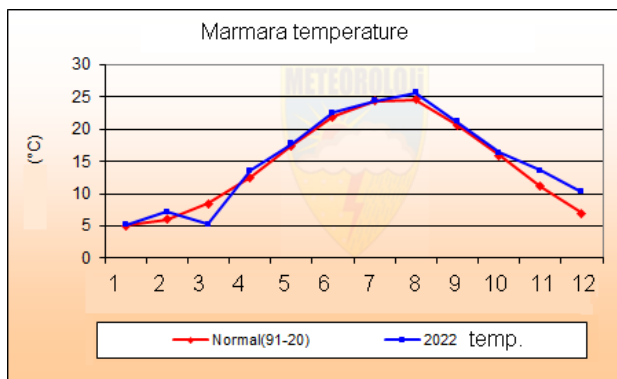


Figure 2.12. Mean Temperature in Marmara

2.2.1. Marmara Region

In 2022, the monthly mean temperatures of the region were below normal in March, near normal in July, and above normal in other months (Fig. 2.12).

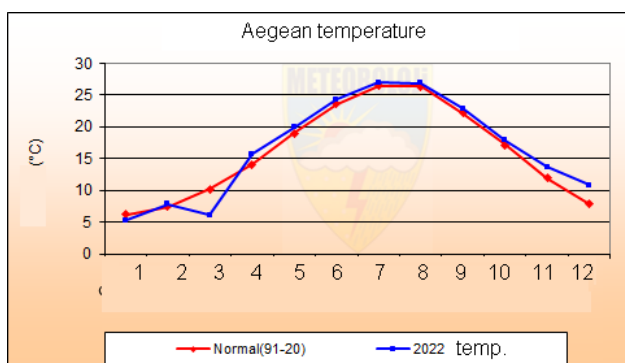


Figure 2.13. Mean Temperature in Aegean

2.2.2. Aegean Region

In 2022, the mean monthly temperatures of the region were below normal in January and March, and above normal in other months (Fig. 2.13).

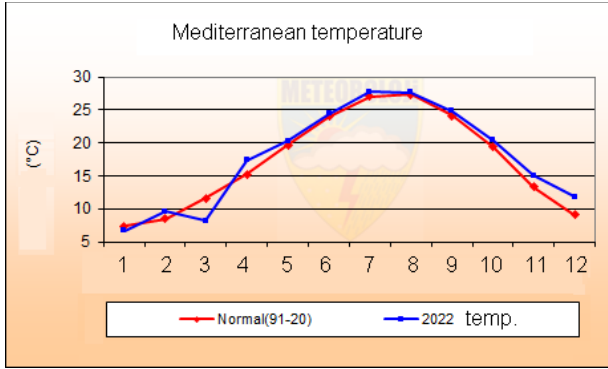


Figure 2.14. Mean Temperature in the Mediterranean

2.2.3 Mediterranean Region

In 2022, the mean monthly temperatures of the region were below normal in January and March and above normal in other months. (Fig. 2.14).

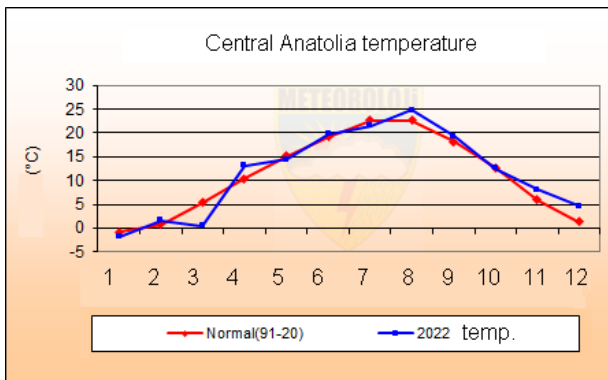


Figure 2.15. Mean Temperature in Central Anatolia

2.2.4. Central Anatolia Region

In 2022, the monthly mean temperatures of the region were below normal in January, March, May, July, and October, and above normal in other months. (Fig. 2.15).

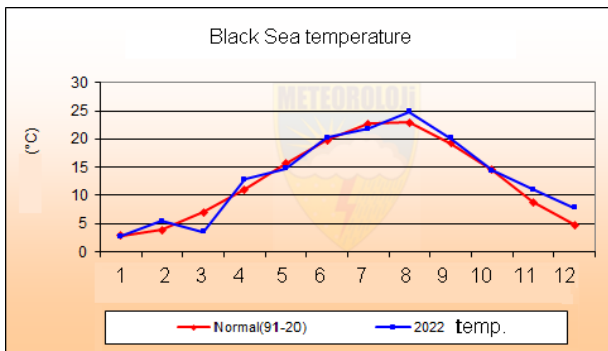


Figure 2.16. Mean Temperature in the Black Sea

2.2.5. Black Sea Region

In 2022, the monthly mean temperatures of the region were below normal in January, March, May, July and October, and above normal in other months (Fig. 2.16).

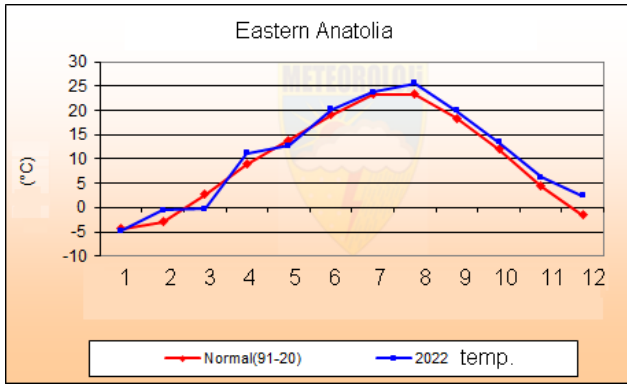


Figure 2.17. Mean Temperature in Eastern Anatolia

2.2.6. Eastern Anatolia Region

In 2022, the mean monthly temperatures of the region were below normal in January, March, and May, and above normal in other months (Fig. 2.17).

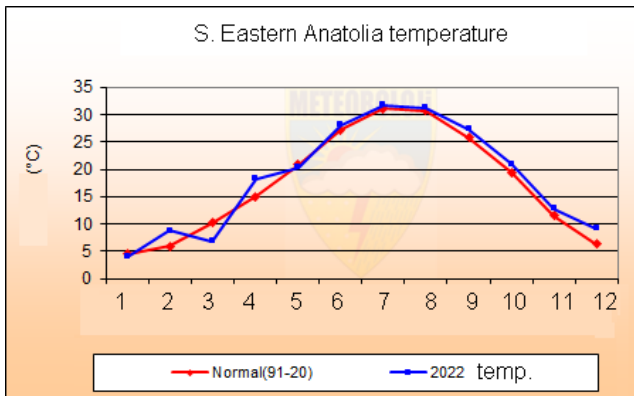


Figure 2.18. Mean Temperature in Southeastern Anatolia

2.2.7. Southeastern Anatolia Region

In 2022, the mean monthly temperatures of the region were below normal in January, March, and May, and above normal in other months (Fig. 2.18).

2.3. Extreme Temperature

In 2022, the lowest temperature was $-34.4\text{ }^{\circ}\text{C}$ in Özalp/ Van in January, and the highest temperature was $47.9\text{ }^{\circ}\text{C}$ in Silopi/ Şırnak in August (Fig. 2.19-2.20).

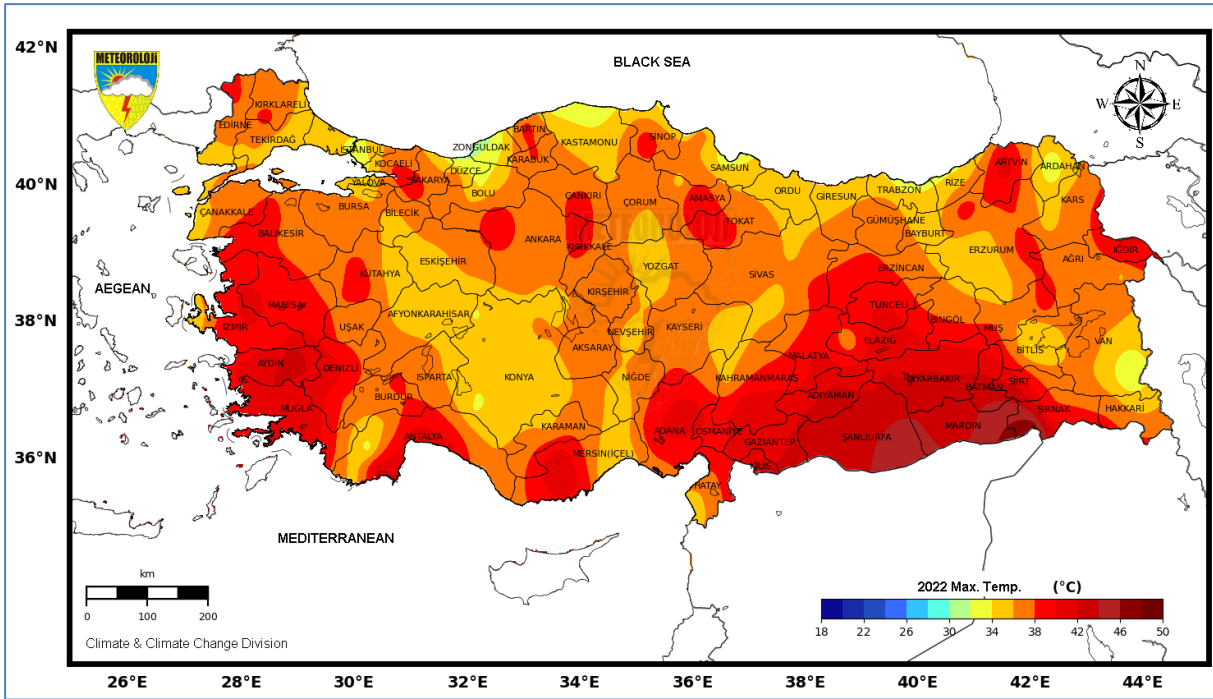


Figure 2.19. Maximum Temperature Map of 2022

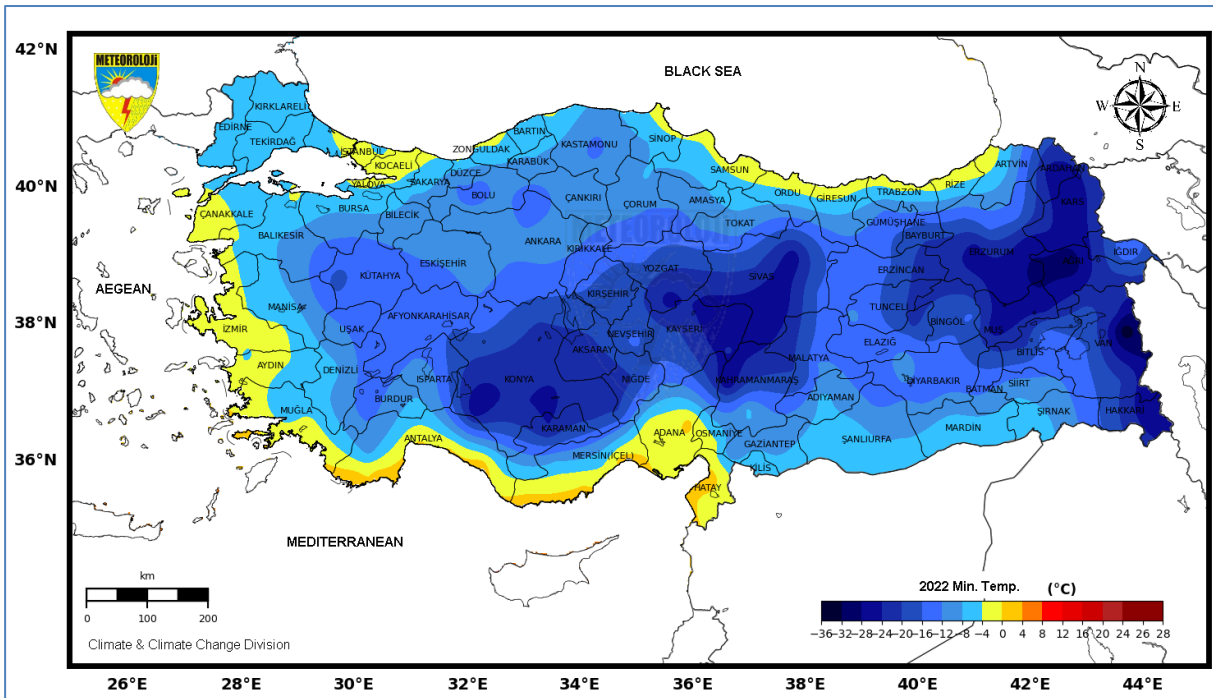


Figure 2.20. Minimum Temperature Map of 2022

In 2022, 63 centers broke their own records for the highest temperatures for the dates given in the Table 1, 6 centers broke their own records for the lowest temperatures for the dates given in the Table 2, and new values were recorded.

Table 1. The highest temperatures recorded in 2022

Day	Month	Station	2022 Max. temp	Long term Max. temp
1	January	KALE-DEMRE	22.4	22.0
6	January	BARTIN	25.0	23.2
24	February	ŞIRNAK	17.5	17.3
18	April	ÜNYE	34.8	34.5
29	May	FLORYA	34.2	33.5
29	May	DİKİLİ	36.9	36.3
30	May	ÇANKIRI	35.5	35.2
3	June	YOZGAT	33.4	33.1
19	June	ŞIRNAK	38.2	37.5
19	June	CİZRE	45.8	45.7
24	August	KARS	37.1	35.4
18	August	HORASAN	39.3	38.0
15	August	SARIKAMIŞ	35.2	34.2
1	September	SİVAS	37.0	36.6
1	September	ZARA	35.7	34.8
3	September	ARTVİN	41.5	39.5
1	September	GÜMÜŞHANE	37.7	37.1
3	September	BAYBURT	34.4	34.0
3	September	İSPİR	38.8	37.4
2	September	OLTU	37.0	35.8
3	September	ŞEBİNKARAHİSAR	36.0	35.6
1	September	ARDAHAN	32.1	31.3
3	September	KARS	33.0	32.6
1	September	MALATYA	39.6	39.5
1	September	ELAZIĞ	39.7	39.0
3	September	BİNGÖL	38.1	37.8
5	September	HORASAN	35.9	35.0
3	September	TERCAN	35.3	35.2
4	September	HINIS	33.2	32.2
3	September	ARAPGİR	37.0	36.6
3	September	ÇEMİŞGEZEK	39.4	38.4
3	September	KARAKOÇAN	38.4	37.1
1	September	PALU	40.2	40.0
3	September	BASKİL	36.2	36.0
3	September	SİİRT	41.3	40.0
3	September	MARDİN	40.5	39.3
4	September	DİYARBAKIR	42.2	42.0
3	September	ŞIRNAK	38.6	37.1
3	September	KAHTA	42.8	41.1
2	September	SİVEREK	41.8	41.1
1	September	VİRANŞEHİR	43.7	42.3

Day	Month	Station	2022 Max. temp	Long term Max. temp
2	September	CİZRE	46.7	44.6
3	September	BİRECİK	43.5	43.4
2	October	EMİRDAĞ	32.7	32.6
2	October	BURDUR	33.6	32.7
2	October	ISPARTA	33.5	33.1
2	October	BEYŞEHİR	31.4	31.2
1	October	ANTALYA	41.2	38.7
2	October	FİNİKE	39.3	38.6
2	October	KAŞ	35.1	34.6
2	October	EĞİRDİR	32.2	30.0
2	October	AKŞEHİR	32.6	31.9
2	October	KONYA	32.3	31.6
2	October	KARAMAN	34.0	33.2
2	October	SEYDİŞEHİR	32.3	31.3
2	October	ÇUMRA	34.0	32.1
2	October	KARAPINAR	33.3	33.2
5	October	ELAZIĞ	32.4	32.1
5	October	DOĞUBEYAZIT	28.9	28.7
7	October	ŞIRNAK	32.1	31.3
1	October	CİZRE	40.2	39.9
5	November	KOCAELİ	29.3	29.1
10	December	AHLAT	16.0	15.1

Table 2. The lowest temperatures recorded in 2022

Day	Month	Station	2022 Min. temp	Long term Min. temp
28	January	BEYŞEHİR	-23.7	-21.4
28	January	SEYDİŞEHİR	-27.3	-24.8
28	January	ÇUMRA	-24.0	-23.7
20	January	İNEBOLU	-8.9	-8.5
21	January	KAHTA	-10.0	-8.2
25	September	BALIKESİR	3.2	4.0

3. Precipitation

Türkiye’s mean areal precipitation was recorded as 503.8 mm in 2022. The amount is approximately 12.1% below from the period of 1991-2020’s normal (573.4 mm). Besides, the value is 4.0% less than last year’s amount of mean areal precipitation. (Figure 3.1)

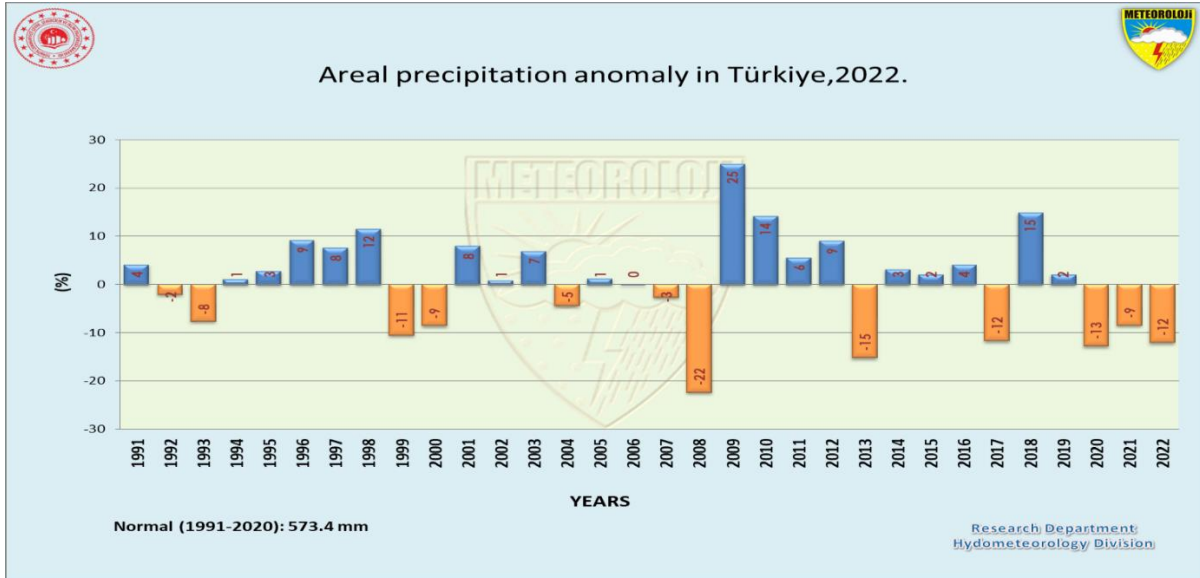


Figure 3.1. Areal precipitation anomaly in Türkiye, 2022 (URL 2).

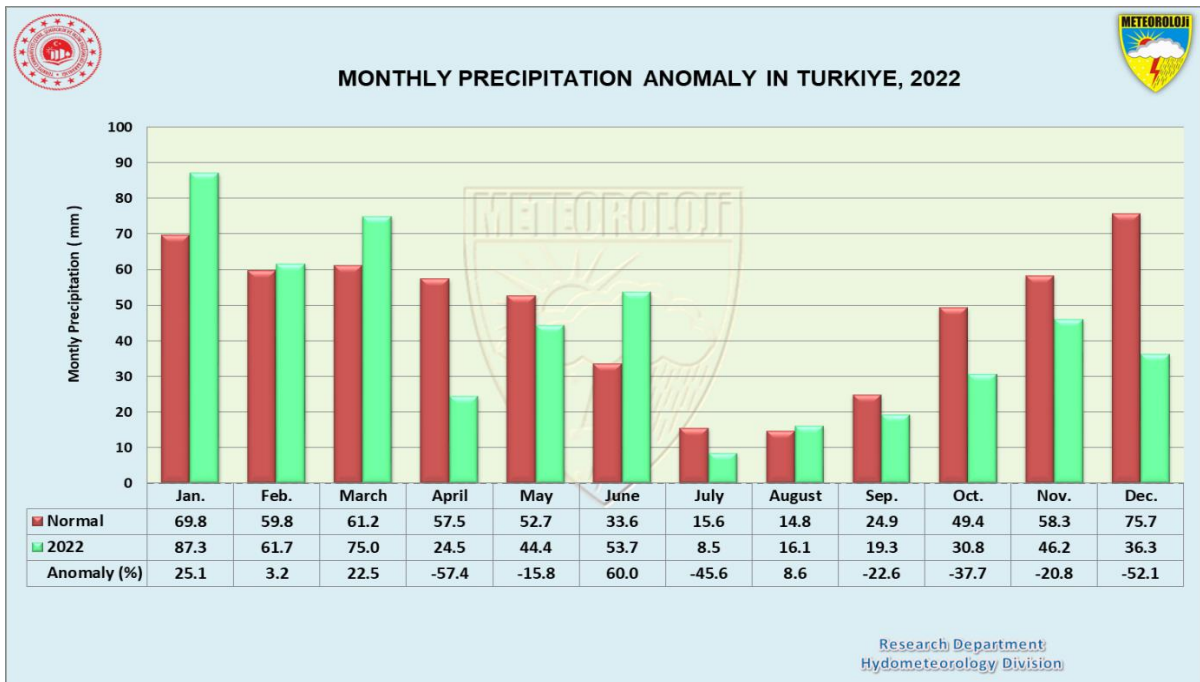


Figure 3.2. Monthly Precipitation Anomaly in Türkiye, 2022 (URL 2).

In general monthly regional precipitation in Türkiye decreased compared to their normal in April, May, July, September, October, November and December. In 2022, the highest precipitation measured in January with 87.3 mm, while the highest proportional increase was realized in June with an increase of 60%. April and December precipitations decreased by more than 50% compared to the normal ones (Figure 2.2).

Some regions and cities in Türkiye received 40% less precipitation in 2022, compared to their normals. These areas are: the northern part of İzmir; Bursa, Şanlıurfa, Mardin and its surroundings, the eastern parts of Van and Ağrı. However, 40% to 60% more precipitation was observed in Sinop, Samsun, Ordu, Giresun, and the eastern side of Mersin compared to their normals (Figure 2.3).

Additionally, the precipitation in the coastline of the west black sea and the east black sea regions are above 1000mm. Artvin, Rize, and its surroundings exceed 1600mm, whereas the precipitation in the eastern part of Iğdır received less than 200 mm. (Fig 3.3).

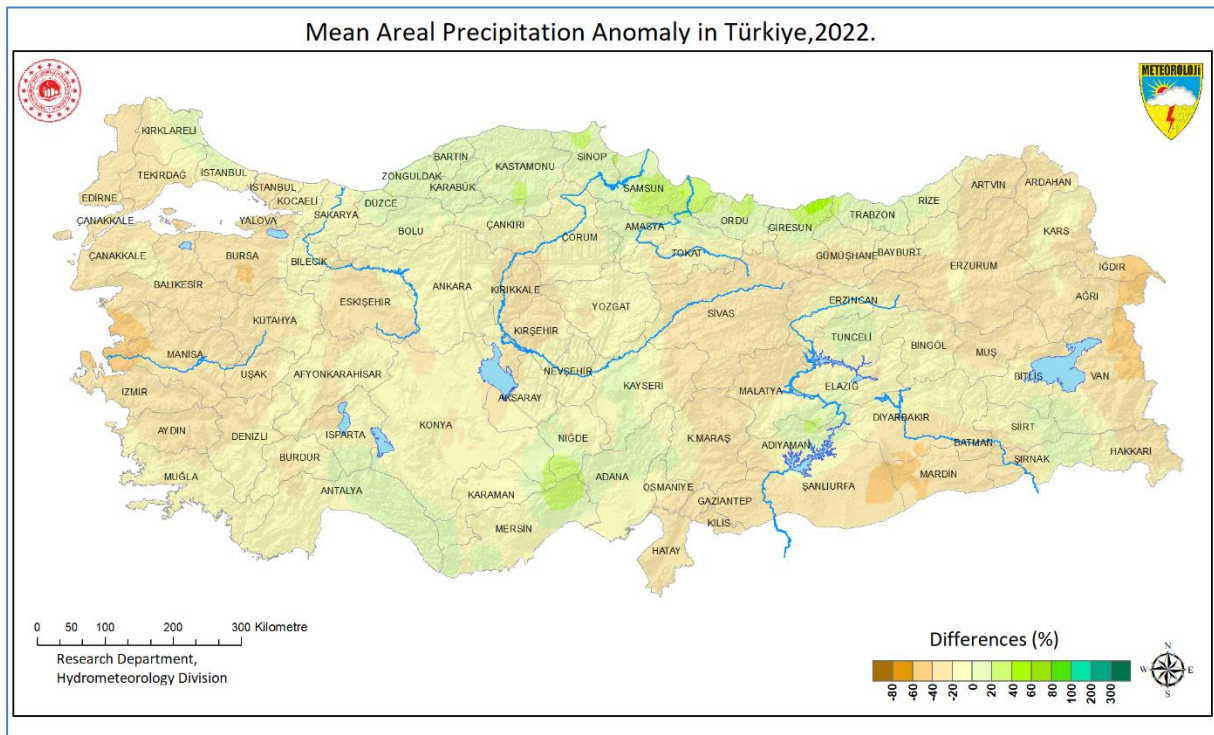


Figure 3.3. Mean Areal Precipitation Anomaly in Türkiye, 2022 (URL 2).

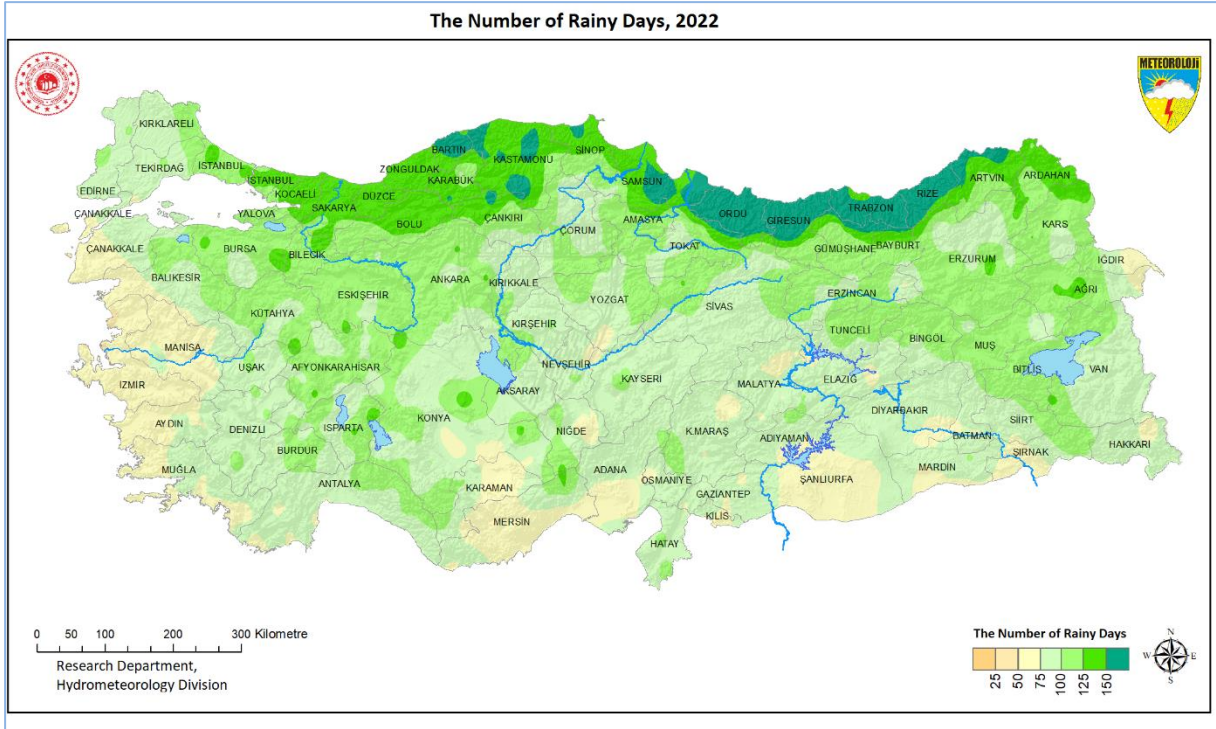


Figure 3.4. The number of rainy days in Türkiye, 2022, (URL 2).

The number of rainy days has altered in all parts of the Türkiye. Especially, the number of rainy days in the eastern part of the Marmara region and in the whole part of the Black Sea Region was over 125 days. In addition to this, this number has increased to 150 days in the East part of the Black Sea, Samsun, Kastamonu, Bartın, and surroundings. On the other hand, the number of rainy days decreased to less than 75 days in the western part of the Aegean Region and Çanakkale, Mersin, Adana, Karaman, Niğde, Şanlıurfa, Mardin, Şırnak, Hakkari, and Iğdır and surroundings (Fig 3.4).

4. Meteorological Disasters

The year 2022 has been the year with the highest number of extreme events, with 1030 extreme events reported through TSMS's Kardelen Database. There is an increasing trend in the number of extreme events, especially in the last two decades (Fig. 4.1).

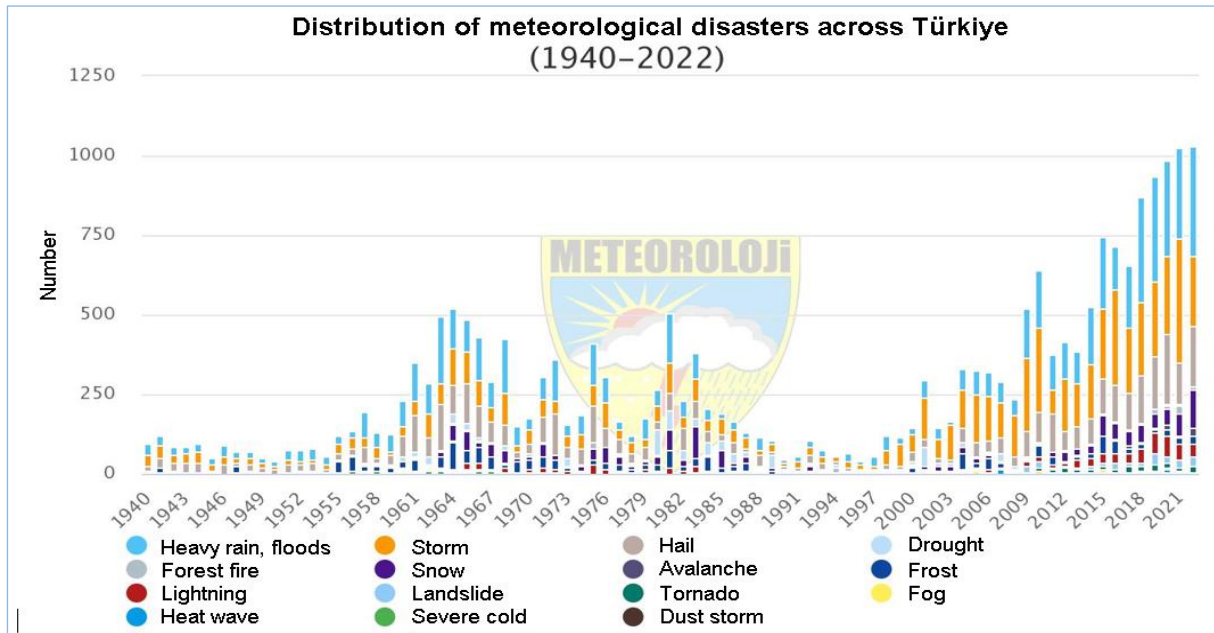


Figure 4.1. Distribution of meteorological disaster across Türkiye (URL 3).

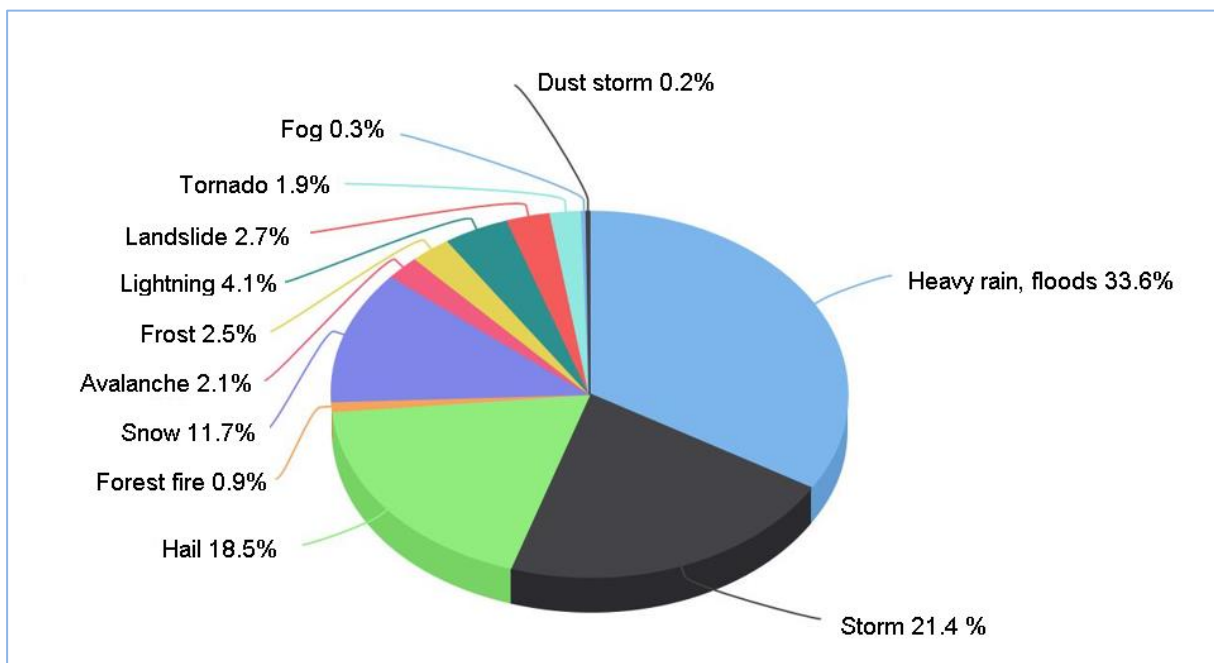


Figure 4.2. Percentage of extreme events in 2022 (URL 3)

The percentage of extreme events recorded in 2022 were heavy rain-floods (33.6%), wind storms (21.4%), hail (18.5%), snow (11.7%), lightning (4.1%), forest fire (0.9%), frost (2.5%), landslide (2.7%), avalanche (2.1%), dust storm (0.2%) and fog (0.3%), (Fig. 4.2).

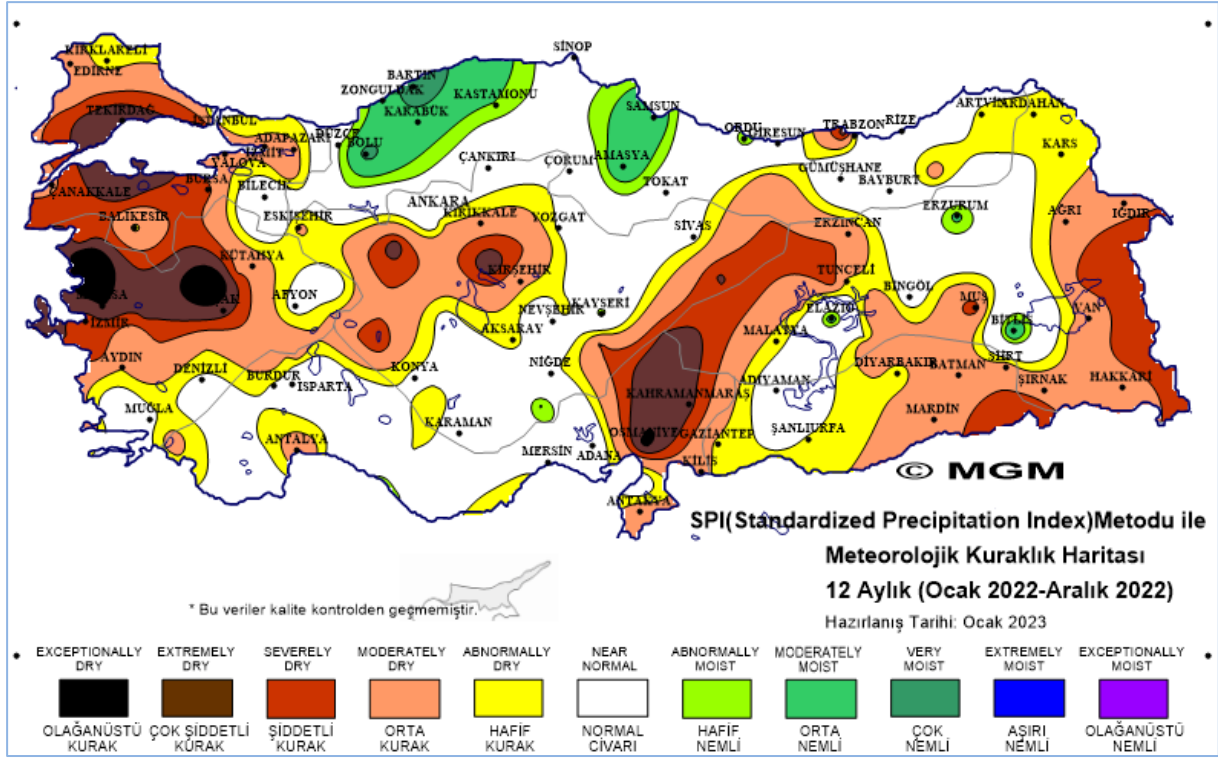


Figure 4.3. 12 Months SPI analysis of Türkiye in 2022, (URL 4)

According to the 12-month (January-December) SPI drought map of 2022; meteorological drought of varying intensities is effective in below regions, (Fig 4.3).

:

- In the Marmara Region, except for Bilecik and its surroundings,
- In the Aegean Region, except for Afyonkarahisar, Denizli, Muğla and its surroundings,
- In the Mediterranean Region, Antalya, Osmaniye, Kahramanmaraş, Antakya, Kilis and its surroundings,
- In the Central Anatolia Region, Eskişehir, Kırıkkale, Kırşehir, Aksaray and their surroundings,
- In the Black Sea Region, Artvin, Trabzon and its environs,
- In the Eastern Anatolia Region, except for Elazığ, Erzurum, Bitlis and its surroundings,
- In the Southeastern Anatolia Region, except for Adıyaman and its surroundings,



Figure 4.4. Landslides in Ordu due to heavy rain on 18 July 2022.

According to the Municipality of Ordu, 336 landslides occurred in 11 districts of Ordu due to heavy rain on 18 July 2022 (Fig 4.4).



Figure 4.5. İnebolu, 27.06.2022, heavy precipitation and flood

On 27.06.2022, heavy rain and floods occurred in the Central Black Sea Region. In İnebolu, the overflowing stream destroyed two bridges (Fig 4.5).

Ağıla yıldırım düştü 38 hayvan telef oldu

Osmaniye’de geçtiğimiz günlerde etkili olan gökgürültülü sağanak yağış sırasında küçükbaş ağılına düşen yıldırım 38 küçükbaş hayvanın telef olmasına neden oldu. Küçükbaş yetiştiricisi Alparslan Delibıçak, 60 bin liralık zararının olduğunu söyledi.

Edinilen bilgilere göre; Osmaniye’nin Merkez köylerinden Bahçe’de bir küçükbaş ağılına yıldırım düşmesi sonucu 38 küçükbaş hayvan telef oldu. Geçtiğimiz günlerde Osmaniye’de etkili olan gökgürültülü sağanak yağış bir çok zarara neden oldu. Bahçe köyünde küçükbaş hayvanların yakınına düşen yıldırım nedeniyle onlarca hayvan yere yığıldı. Ağılda 200 kadar küçükbaş olduğunu söyleyen Delibıçak, 38 hayvanın telef olduğunu söyledi. Delibıçak; “Yağışın kuvvetini yitirmesiyle birlikte yıldırımlar çakmaya başladı. O sırada hayvanların altında yattığı ağaca yıldırım düştü. Koşup ağıla geldiğimde



bir sürü hayvanın yerde yattığını gördüm. Sayım yaptığımda ağılda bulunan 200 küçükbaş hayvanımdan 38 tanesinin telef olduğunu belirledim. Sabah saatlerinde de Tarım ve Orman İl Müdürlüğü’nden gelen yetkililer hasar tespit çalışması yaptı. Yaklaşık 60 bin lira zararım var” dedi.

Telef olan küçükbaş hayvanlar, yerleşim yerinden uzağa iş makinesi ile açılan çukurlara gömüldü.

Haber Merkezi

Figure 4.6. Lightning hazard in Osmaniye on 24.09.2022

38 out of the 200 animals in the sheep barn died due to the lightning occurred in the Bahçe village of Osmaniye on 24.09.2022, (Fig 4.6).



Figure 4.7. Lightning damage in Besni/ Adıyaman on 17 October 2022

On 17 October, 78 animals were killed by lightning in the Uzunkuyu village of Adıyaman-Besni.

References

1. URL 1, Turkish State Meteorological Service, temperature analysis
<https://www.mgm.gov.tr/eng/monthly-climate.aspx>,
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<http://www.mgm.gov.tr/veridegerlendirme/yagis-raporu.aspx>
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<http://kardelen.mgm.gov.tr/BultenGenel/Klima/fevkGlnYeni.aspx> ,
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