



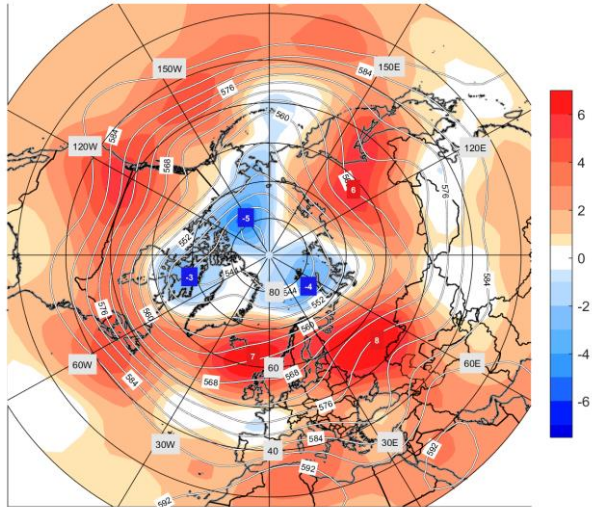
North EurAsia Climate Centre



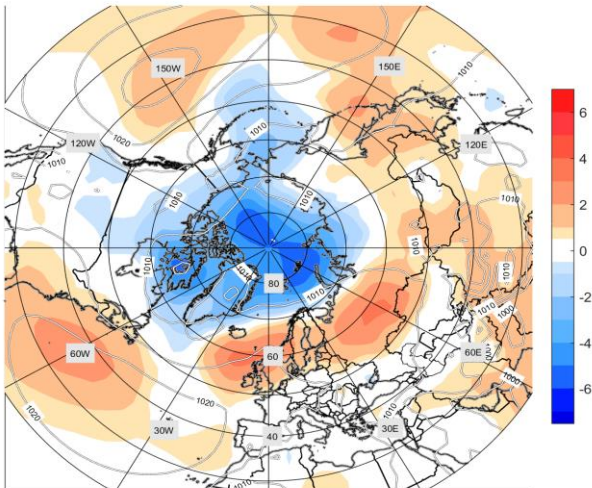
SEASONAL OUTLOOK FOR WINTER 2021-22

Summer 2021

Seasonal the 500 hPa geopotential height and MSLP anomalies (ERA5 reanalysis, based on a 1981-2010 mean)



H500 gpm anomalies (norms 1981-2010). JJA 2021.



MSLP hPa anomalies (norms 1981-2010). ERA5. Summer 2021.

In the troposphere:

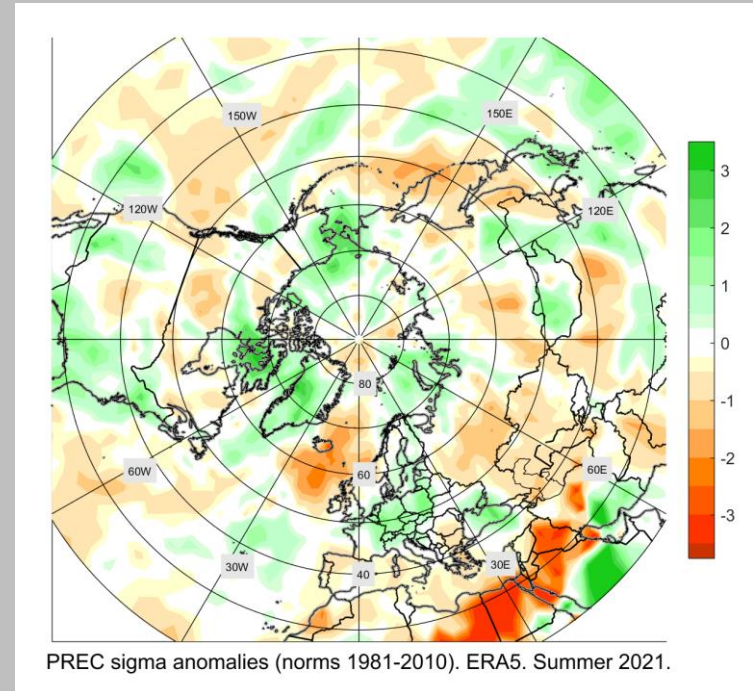
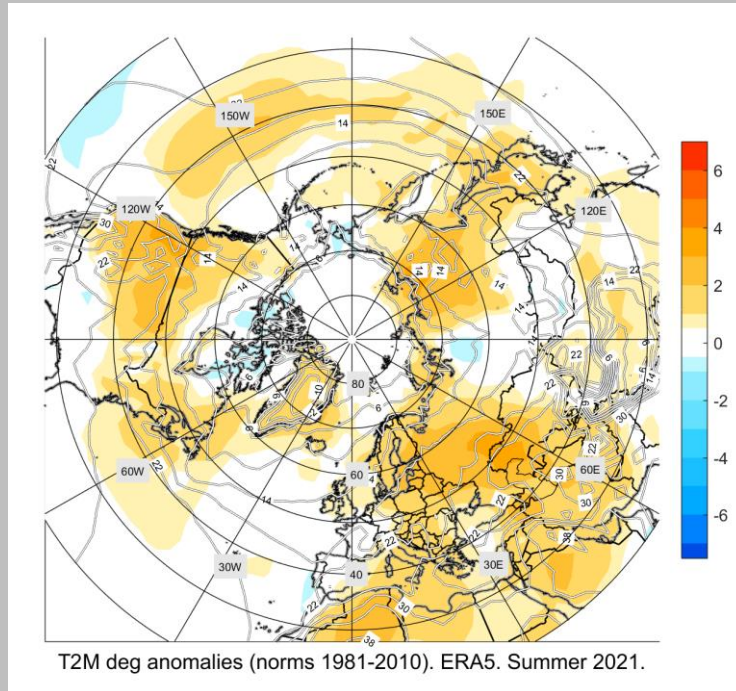
- The circumpolar cyclone was deep, its center was located above the pole;
- The position of the troughs was close to the climate, the intensity was normal and increased only in the northern parts of the troughs;
- Intense anticyclones activity in the middle troposphere has deformed the troughs associated with the cyclone.

At sea level:

- The Azores maximum was extensive, its center was located to the west of the Azores Islands and its western ridges were more intense;
- The position of the Icelandic minimum was unstable during the season;
- As a result of frequent blocking processes at high latitudes of the Northern Hemisphere and disruption of the displacement of cyclones, active cyclonic activity took place above the pole, capturing the northern regions of Siberia;
- Anticyclones prevailed over the European territory of Russia and the southern regions of Siberia;
- In the Pacific Ocean, the leading role in the circulation features belonged to the WPSH, extensive and intense. It occupied the middle and subtropical latitudes of the ocean;
- The Aleutian minimum was deep and its position was close to climate; in the north of the PO there was a zone of negative anomalies spreading to Chukotka.

Temperature and precipitation

Seasonal temperature 2m anomalies and precipitation anomalies (ERA5 reanalysis, based on a 1981-2010 mean)



Temperature

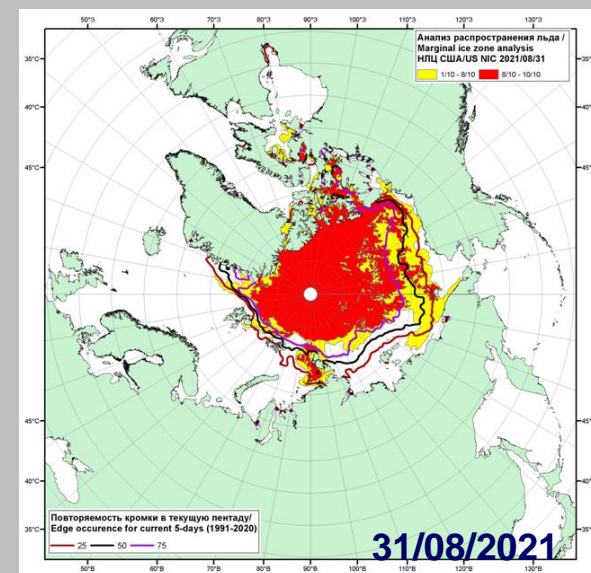
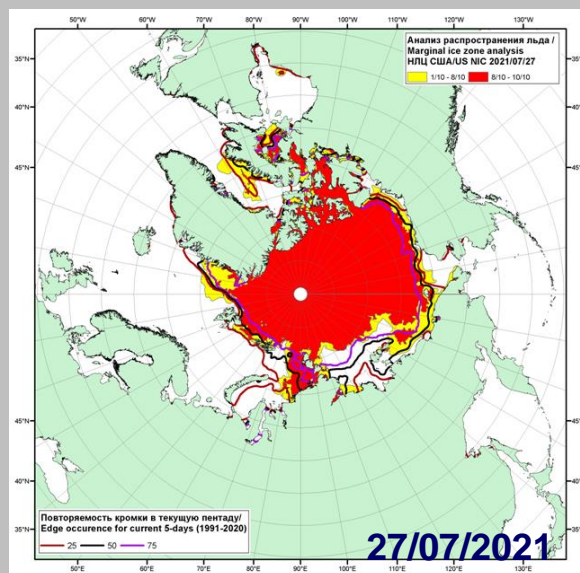
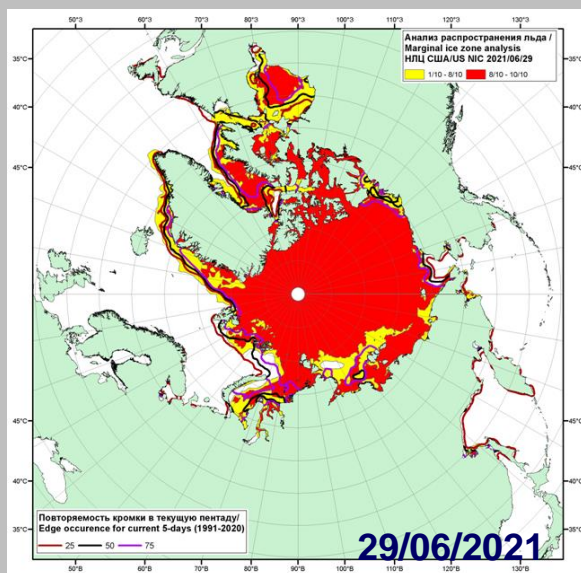
- The temperature over most of Northern Eurasia was higher than normal or near normal;
- The most positive temperature anomalies were observed in the European Russia, the west of Kazakhstan and the Eastern Siberia;
- The temperature was below than normal or near normal the Iberian Peninsula and France, also in the Central Siberia and Mongolia.

•Precipitation:

- A lot of precipitation fell in the Central part of Europe, south-east of Ukraine, Crimea, and in the south of the European Russia, in the southeastern part of Far East;
- Precipitation was around normal and above in the north of Siberia and in the north of Ural;
- Deficit of precipitation was observed in the central of the European Russia, in the southern half of the Urals, in the south of Western Siberia and in the central of Eastern Siberia.

Arctic sea ice extent.

Arctic and Antarctic Research Institute (AARI), Russia



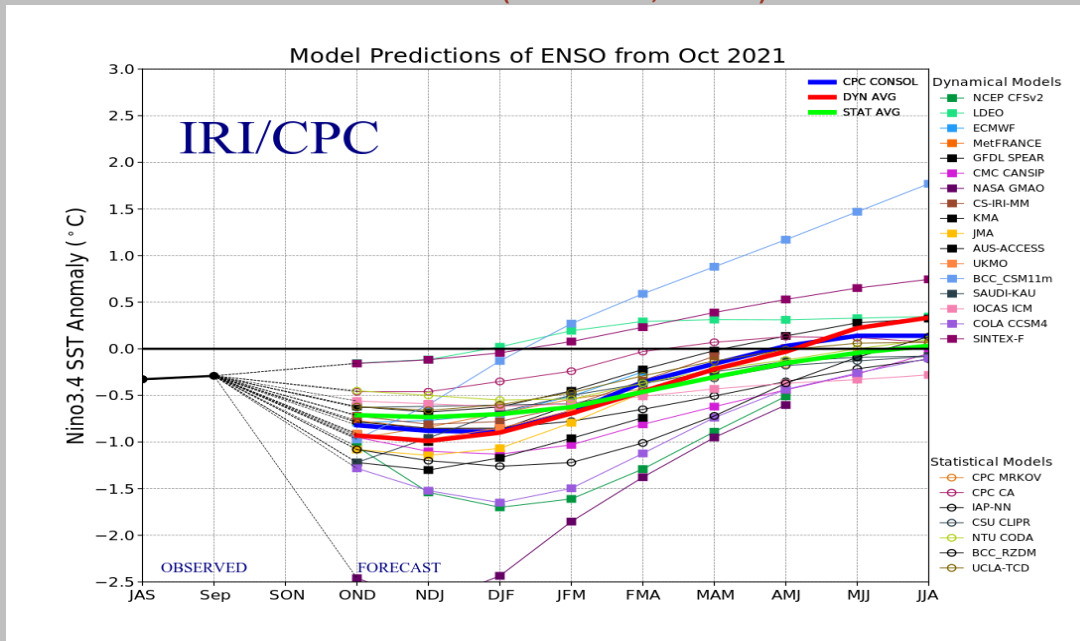
According to the AARI, following features highlighted in the Arctic sea ice extent:

- The seasonal decline of ice loss during the month of June was faster than average. The rate of ice melting was quite high during the first week of July, but slowed down at the end of month. In August, the monthly ice melting rate was much lower than in recent years.

Seasonal forecast for winter 2021-22

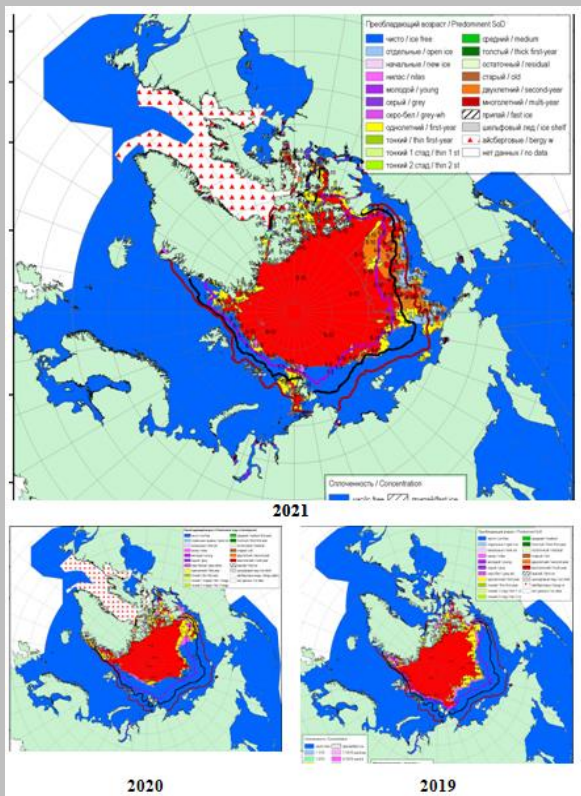
El Nino / Southern Oscillation (SOI).

The IRI/CPC probabilistic ENSO forecast.
Nino 3.4 forecasts (120°-170°W, 5°S-5°N)

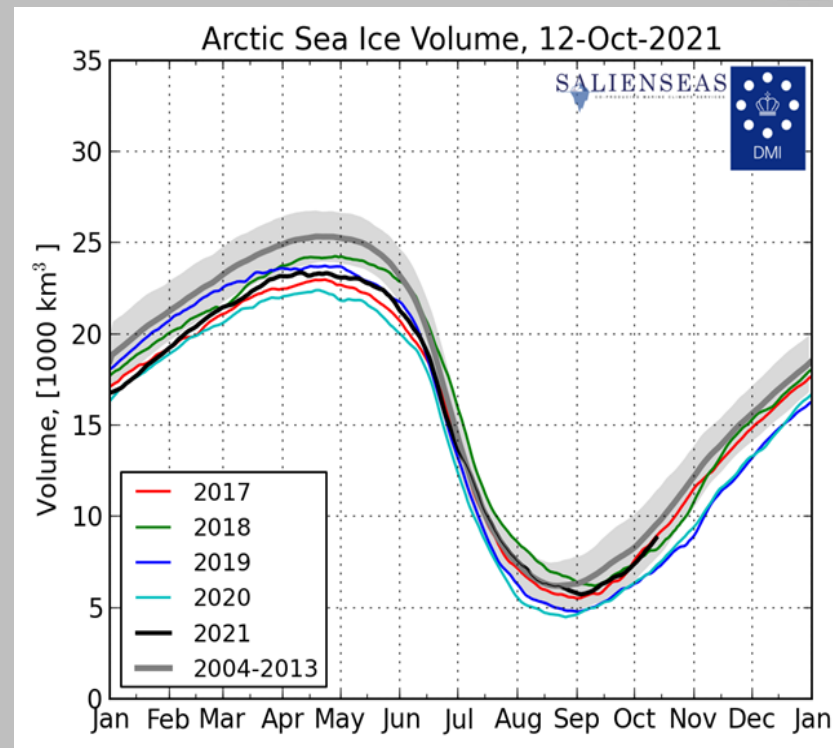


<http://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/>

Most of models predict **La Nina for the winter 2021-22** (December-February). According to the CPC/IRI Consensus Probabilistic Forecast the probabilities for La Nina, neutral and El Nino conditions (using -0.5C and 0.5C thresholds) over the coming DJF 2021-22 season are: 72%, 28% and 0%.



Overview ice map of the Arctic Ocean from 16.09 to 21.09.2021 and similar periods 2019-2020 based on ice analysis of AARI, SRC "Planeta" and Canadian Ice Service and the US National Ice Data Center.

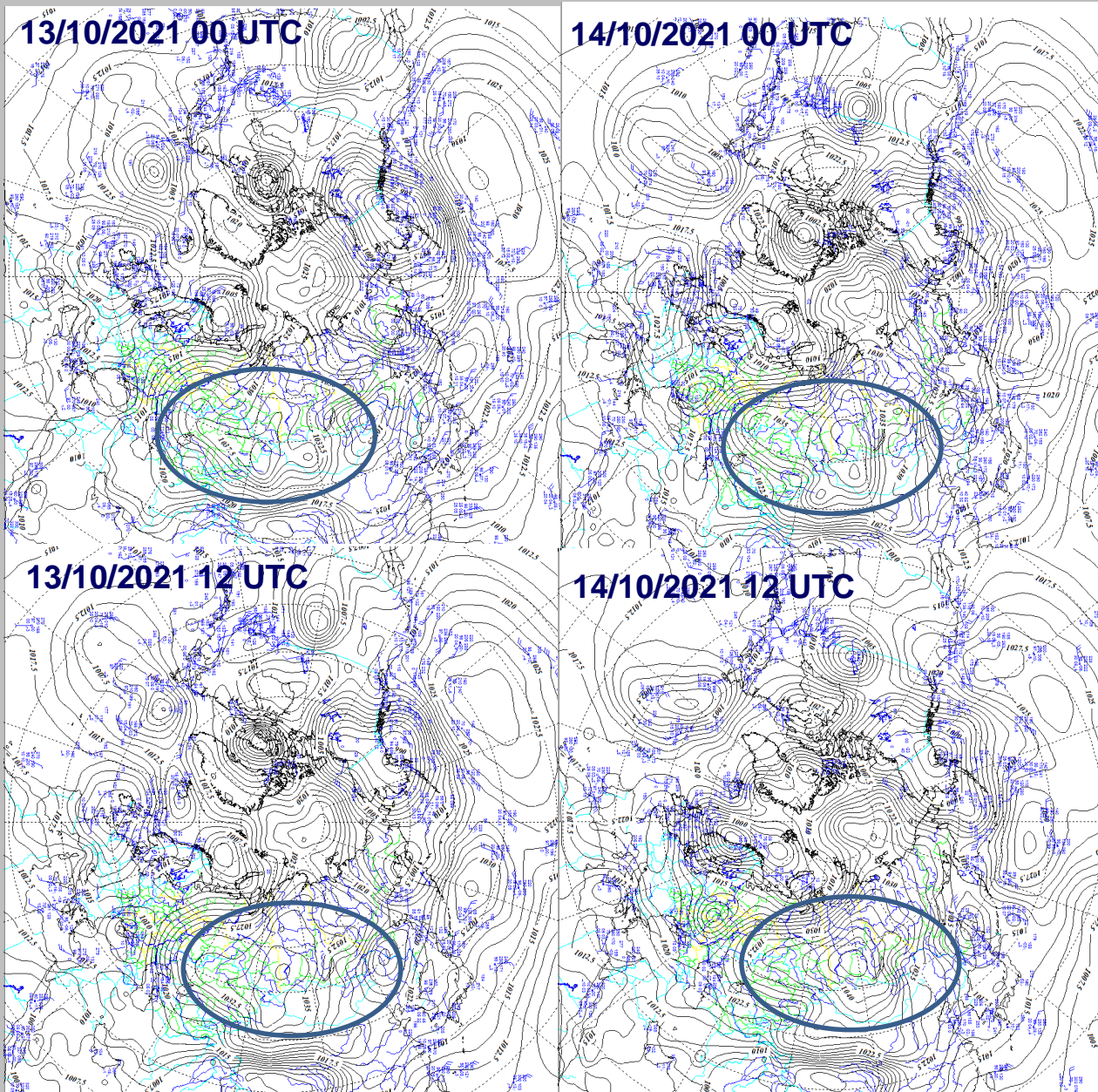


Daily estimates of the seasonal variation of the sea ice volume in the Arctic Ocean from 01.01.2004 to 12.10.2021.
 Data from DMI North Atlantic - Arctic Ocean model HYCOM-CICE - <http://ocean.dmi.dk/models/hycom.uk.php>

According to the AARI, following features highlighted in the Arctic sea ice extent:

- Arctic sea ice reaches its minimum annual extent on September 16, 2021.
- The 2021 minimum is the twelfth lowest record in the nearly 43-year satellite observations. The last 15 years are the lowest fifteen sea ice extents in the satellite record.
- Sea ice extent will now begin its seasonal increase through autumn and winter.

The Siberian High



**The Siberian High formed on
October 13-14.**

The daily maps of MSLP over Northern Hemisphere for 13.10.21 and 14.10.21

Teleconnection indices

Table.2. Indices oscillation forecasts.
Data from Hydrometeorological centre of Russia (SL-AV).

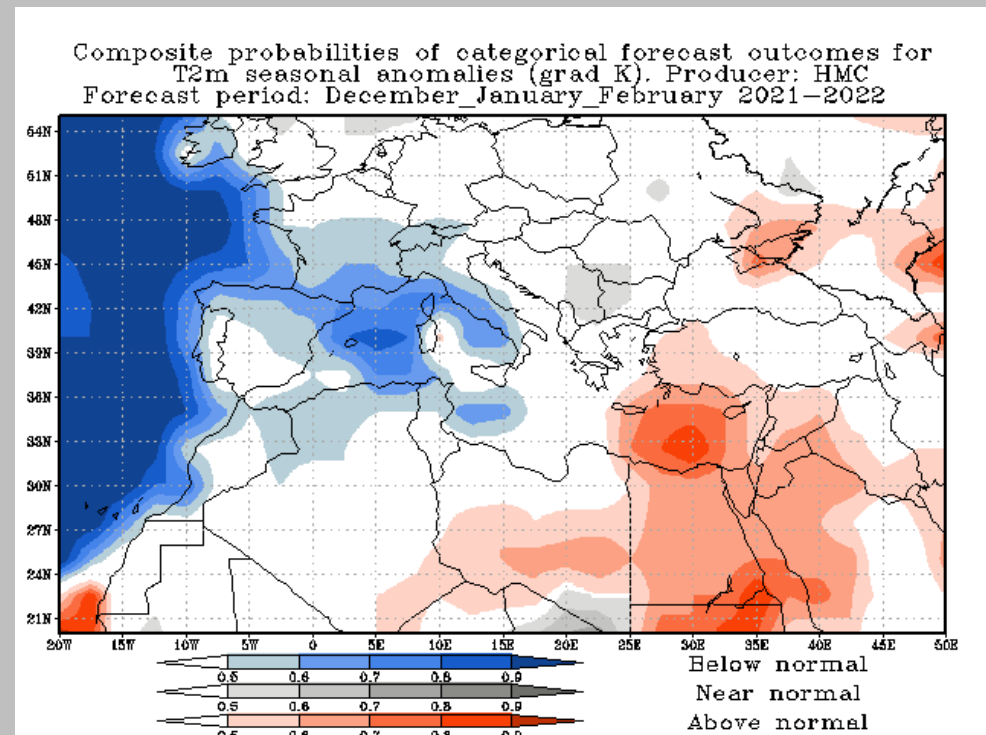
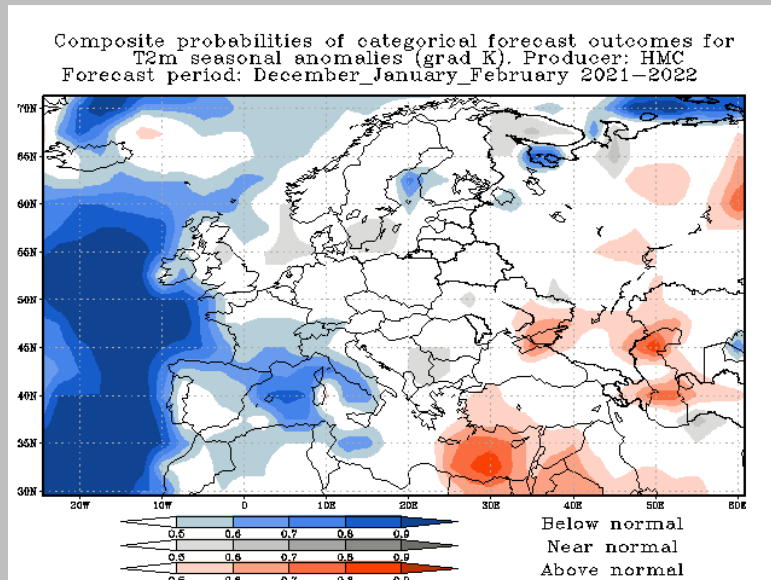
INDEX	DECEMBER-JANUARY 2021-22			
	DECEMBER	JANUARY	FEBRUARY	DECEMBER-FEBRUARY
WA	-0,8	0,78	0,37	0,29
EU	0,29	0,1	1,03	0,66
WP	-0,6	0,13	-0,59	-0,42
PNA	-1,30	-0,22	-0,27	-1,03
NAO	1,22	-0,67	1,19	0,95
POL	-0,28	0,14	0,28	0,14
AOS	0,29	-0,19	0,09	-0,06

- West Atlantic (**WA**), Eurasian (**EU**), West Pacific (**WP**), Pacific-North American (**PNA**) oscillations (Wallace J. M., Gutzler D.S. Teleconnections in the geopotential height field during the Northern Hemisphere winter. – Mon. Wea. Rev., 1981, vol. 109, pp. 784-812).
- North Atlantic (**NAO**), Polar (**POL**) and Arctic (**AO**) oscillations (Climate Prediction Centre of USA).

- **AO** and **POL** is expected insignificant during the winter season 2021-22;
- The strong signal is forecasted for **NAO**, which is in the positive phase for December, February and winter. It means zonal atmospheric processes prevail over the territory of Northern Eurasia. The prevalence of meridional circulation is likely to expect in January, due to the negative phase of **NAO**;
- In the case of a negative phase of **WP** index in December and January, there is a signal for the strengthening of WPSH;
- The significant signal is forecasted for **EU** oscillation, which is in the positive phase for February;
- The positive (negative) phase of the **WA** index is accompanied by a weakening (strengthening) of the jetstream in the west of the North Atlantic, as well as an increasing (weakening) of the Azores maximum and a weakening (strengthening) of the Icelandic minimum;
- The negative phase of **PNA** oscillation is forecasted during winter. The impact of **PNA** is only seen in temperature field over Chukotka during winter seasons. In the case of negative **PNA**, that is accompanies by weakening of Aleutian minimum and Subtropical high, the positive temperature anomaly is noted in Chukotka.

Temperature forecast

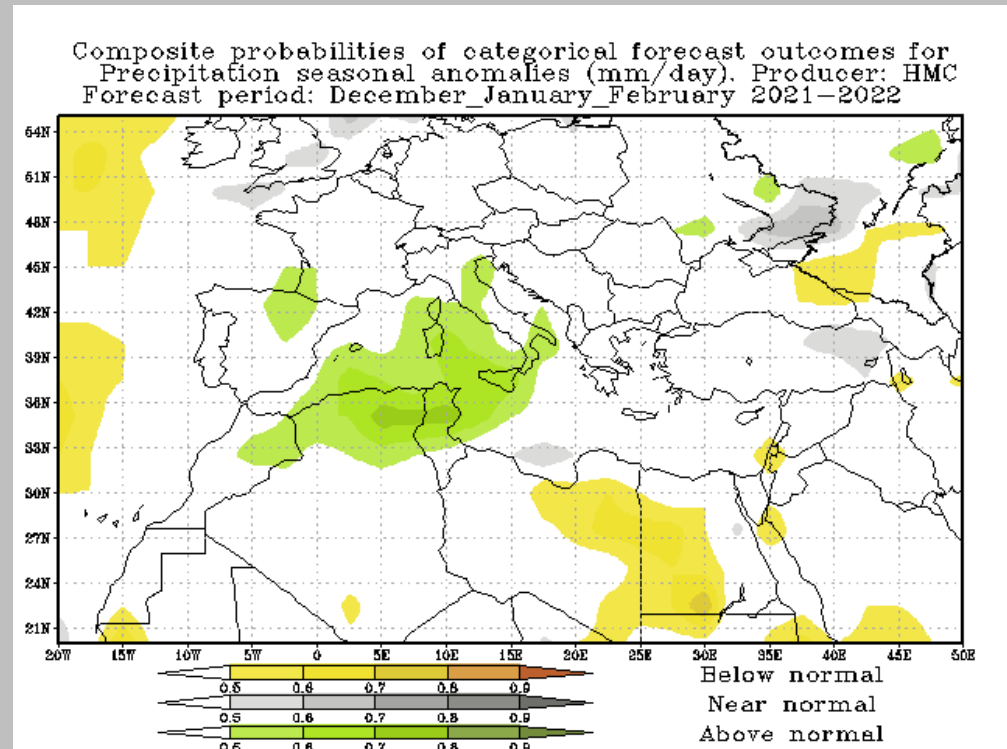
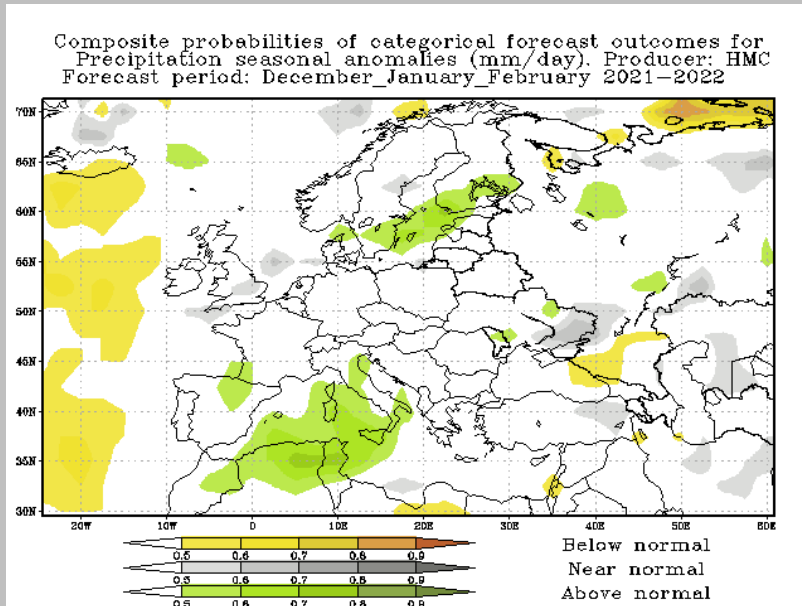
Composite probabilities of categorical forecast outcomes for T2m seasonal anomalies. Producer: HMC (SL-AV)



According to the forecasts of the HMC the negative temperature anomalies are expected over southwestern part of Europe, the probabilities are 55-70%. A weak signal associated with positive temperature anomalies are expected in western part of Turkey and the southeast of Ukraine.

Precipitation forecast

Composite probabilities of categorical forecast outcomes for precipitation seasonal anomalies. Producer: HMC (SL-AV)



From HMC model forecasts. As for precipitation there are many uncertainties in the forecasts. Precipitation above normal is seen locally in Italy and near the border of Spain and France, with probabilities 60%.

Summary

- Most of models predict **La Nina for the winter 2021-22** (December-February). According to the CPC/IRI Consensus Probabilistic Forecast the probabilities for La Nina, neutral and El Nino conditions (using -0.5C and 0.5C thresholds) over the coming DJF 2021-22 season are: 72%, 28% and 0%.
- According to the forecasts of the Hydrometeorological Center of Russia, the prevalence of circulation regimes associated with the positive phases of NAO and EU oscillations is expected in the coming winter. Due to the positive phase of **NAO** during winter, the zonal atmospheric processes is likely to prevail over the territory of Northern Eurasia. In the case of the positive phase of **EU** index, the strengthening of Siberian high and the negative temperature anomalies over the northern part of Europe are expected .
- According to the forecasts of the HMC, the negative temperature anomalies are expected over southwestern part of Europe, the probabilities are 55-70%. A weak signal associated with positive temperature anomalies are expected in the western part of Turkey and the southeast of Ukraine.
- As for precipitation there are many uncertainties in the forecasts. Precipitation above normal is seen locally in Italy and near the border of Spain and France, with probabilities 60%.