Значительное сокращение площади морского льда в Арктике как фактор обильных апрельских снегопадов на территории Европы

Фролов Д.М.

Московский Государственный Университет имени М.В. Ломоносова, Географический факультет, Москва, Россия

E-mail: denisfrolovm@mail.ru

Волна холода в Европейских странах, сопровождавшаяся интенсивными снегопадами 14-15 апреля 2021 после потепления в конце марта – начале апреля до 20°C объясняется интенсивным испарением с поверхности Баренцева моря вызванными сокращением площади морских льдов в Арктике. Подобная ситуация в марте 2018 года, когда в марте Европу пришла волна холода со снегопадами названная "Beast from the East" подробно описана в статье Bailey, H., Hubbard, A., Klein, E.S. et al. Arctic sea-ice loss fuels extreme European snowfall. Nat. Geosci. (2021) https://doi.org/10.1038/s41561-021-00719-y. Сравнение описанной ситуации 2018 года с ситуацией 2021 года произведено также в очерке Snow chaos in Europe caused by melting sea-ice in the Arctic https://www.sciencedaily.com/releases/2021/04/210413110628.htm

В нём, в частности, говорится, что апрельский снегопад в 2021 году, который выпадал во время цветения фруктовых деревьев в Европе, может быть напрямую связан с уменьшением площади морского льда в Баренцевом море в Арктике и что аналогичная ситуация была в 2018 году.

В Европейской части России также после двадцатиградусного тепла в начале апреля 2021 года 21 апреля снова выпал снег на уже начавшую свою вегетацию растительность.

■ Исследование проведено в рамках госбюджетной темы «Опасность и риск природных процессов и явлений».

Considerable Arctic Sea ice loss as a factor of heavy April snowfalls in Europe

Frolov D.M.

Lomonosov Moscow State University, Geographical Faculty, Moscow, Russia

E-mail: denisfrolovm@mail.ru

According to the going climate warming on the Earth and in particularly in Arctic (fig. 1):

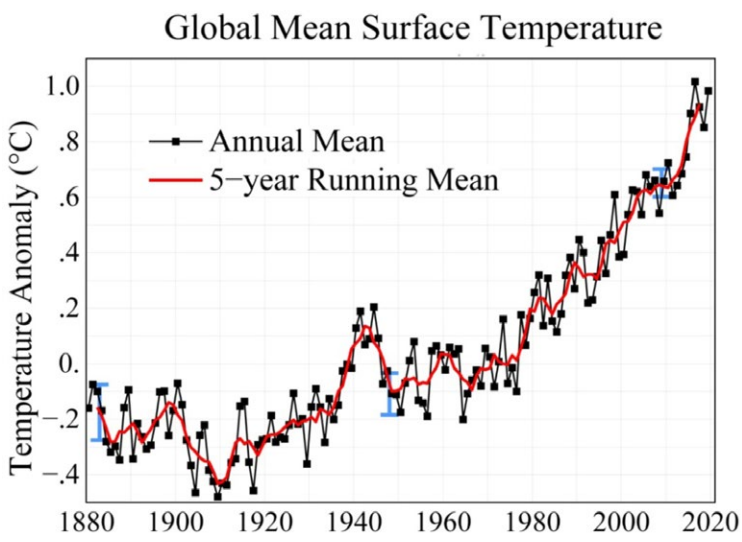


Figure 1 The anomaly of the Earth global surface mean temperature (https://data.giss.nasa.gov/gistemp/).

Earth's global average surface temperature in 2020 tied with 2016 as the warmest year on record, according to an analysis by NASA (https://www.nasa.gov/press-release/2020-tied-for-warmest-year-on-record-nasa-analysis-shows, https://climate.copernicus.eu/new-decade-brings-reference-period-change-climate-data). And also for the territory of Russian Federation 2020 it was the warmest year as well (figure 2):

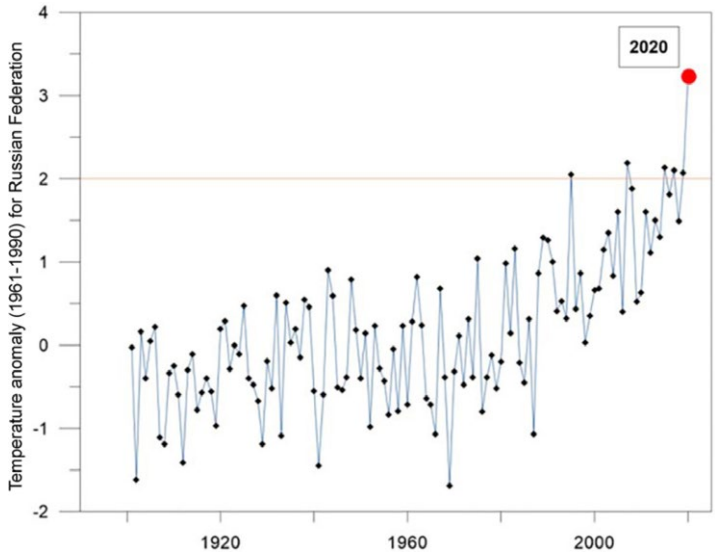


Figure 2. Air temperature anomaly relatively 1961-1990 for the territory of Russia (https://meteoinfo.ru/novosti/17710-2020-god-samyj-teplyj-v-meteorologicheskoj-letopisi-rossii).

Especially intensively warming goes for the territory of Siberia (https://meteoinfo.ru/novosti/17710-2020-god-samyj-teplyj-v-meteorologicheskoj-letopisi-rossii)

And also according to the NSIDC posts (https://nsidc.org/arcticseaicenews/2021/01/ho-ho-ho-hum-december/, https://nsidc.org/arcticseaicenews/2020/12/persistently-peculiar/, https://nsidc.org/arcticseaicenews/2020/11/blue-waves-in-november-in-the-arctic/) the sea ice extent in the Arctic Seas was also at the record low, especially for Russian Arctic (figure 3 and 4).

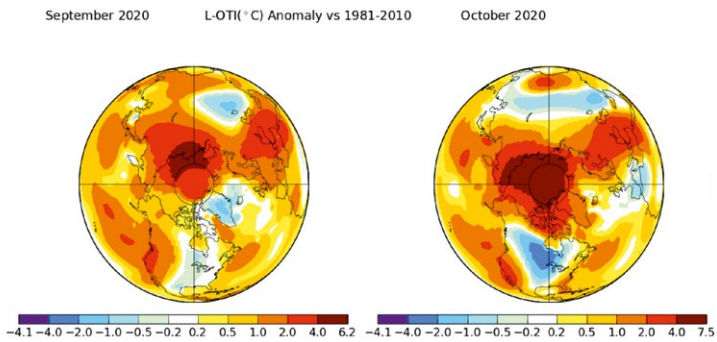


Figure 3. Air temperature anomalies in Northern Hemisphere in months 2020 (https://data.giss.nasa.gov/gistemp/).

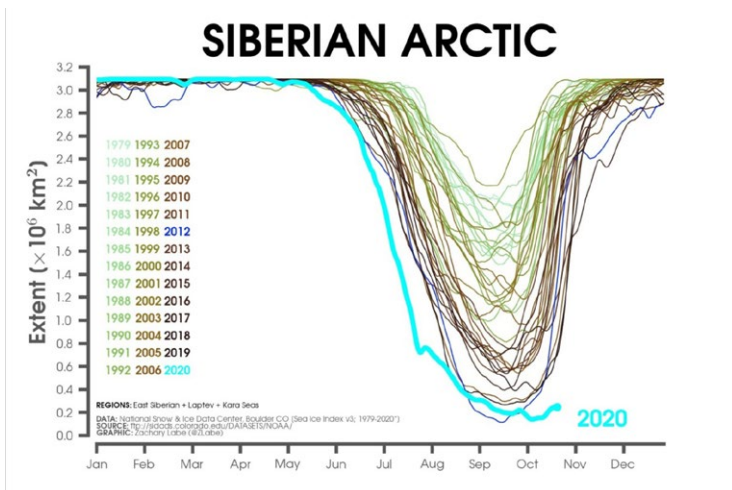


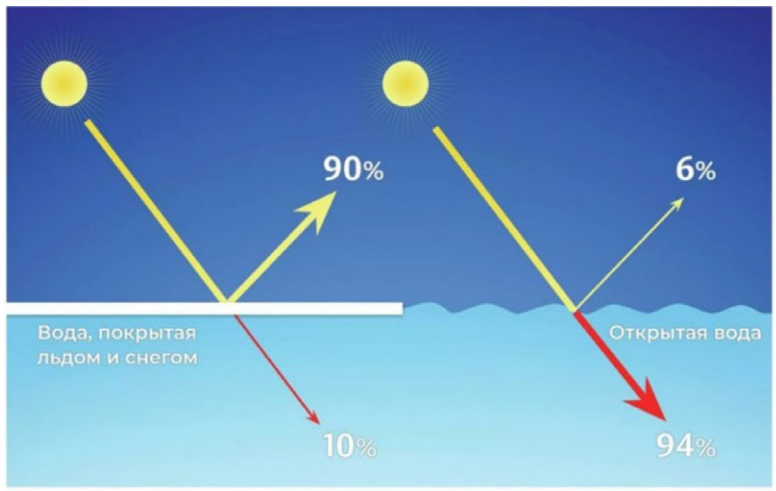
Figure 4. A minimum of sea ice extent in the Russian Arctic seas in 2020 (https://nsidc.org/).

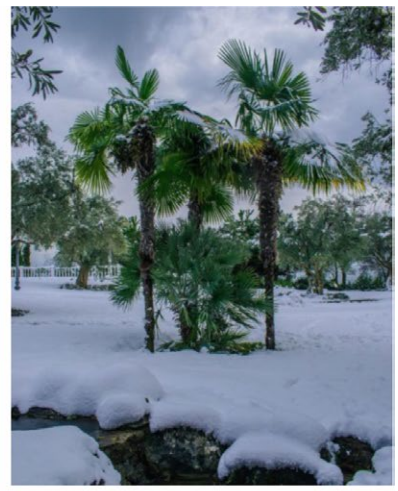
This can lead to some extra evaporation and water vapor atmosphere saturation and due to atmosphere circulation extreme temperature anomalies and heavy snowfalls in the following winter season in the higher latitudes according to for example:

Wegmann M., et al Arctic moisture source for Eurasian snow cover variations in autumn // Environ. Res. Lett. – 2015 – Vol. 10, N 054015

Bailey, H., Hubbard, A., Klein, E.S. et al. Arctic sea-ice loss fuels extreme European snowfall. Nat. Geosci. (2021). https://doi.org/10.1038/s41561-021-00719-y.

This was observed in the winter season 2020/21 in Northern Eurasia. These low temperature anomalies and heavy snowfalls brought difficult consequences for economics and for living there people.





Especially it has appeared as a cold wave in European countries, accompanied by intense snowfalls on April 14-15, 2021 after warming in late March - early April to 20 ° C, is explained by intense evaporation from the surface of the Barents Sea caused by a reduction in the area of sea ice in the Arctic. A similar situation in March 2018, when in March a cold wave with snowfalls called "Beast from the East" came to Europe, is described in detail in the article by Bailey, H., Hubbard, A., Klein, E.S. et al. Arctic sea-ice loss fuels extreme European snowfall. Nat. Geosci. (2021) https://doi.org/10.1038/s41561-021-00719-y. A comparison of the described situation in 2018 with the situation in 2021 was also made in the essay Snow chaos in Europe caused by melting sea-ice in the Arctic https://www.sciencedaily.com/releases/2021/04/210413110628.htm

It says, in particular, that the April snowfall in 2021, which fell during the flowering of fruit trees in Europe, may be directly related to the decrease in the area of sea ice in the Barents Sea in the Arctic and that a similar situation was in 2018.

In the European part of Russia, after a twenty-degree heat at the beginning of April 2021, on April 21, snow fell again on the vegetation that had already begun its growing season.

■ The study was carried out in a frame of state topic « Danger and risk of natural processes and phenomena».