



# Arctic sea ice extent and water vapor transport to Eurasian continent

Alexandra Urazgildeeva  
St. Petersburg State University

# Climate change in Arctic

## Arctic Sea Ice



---

# Purpose of the research

To test a hypothesis which claim that a record minimum arctic sea ice extent in summertime may cause new ice age in Europe.

Reason: amplification of amount of solid precipitation during winter directed from ocean to the Eurasia → growth of continental glaciers

---

---

# Objectives:

- To determine quantitative parameter which will show changes in horizontal water vapor transport;
  - To select stations of meteorological network in Russian Arctic whose data will be enough to make needed calculations;
  - To calculate zonal and meridional components of horizontal water vapor flux;
  - To examine changes of water vapor flux in meridional direction depending on sea ice extent
-

# Calculations

Zonal and meridional component of horizontal water vapor flux

$$F_x = \int_0^z u \, dz$$

$$F_y = \int_0^z v \, dz$$

# Calculations

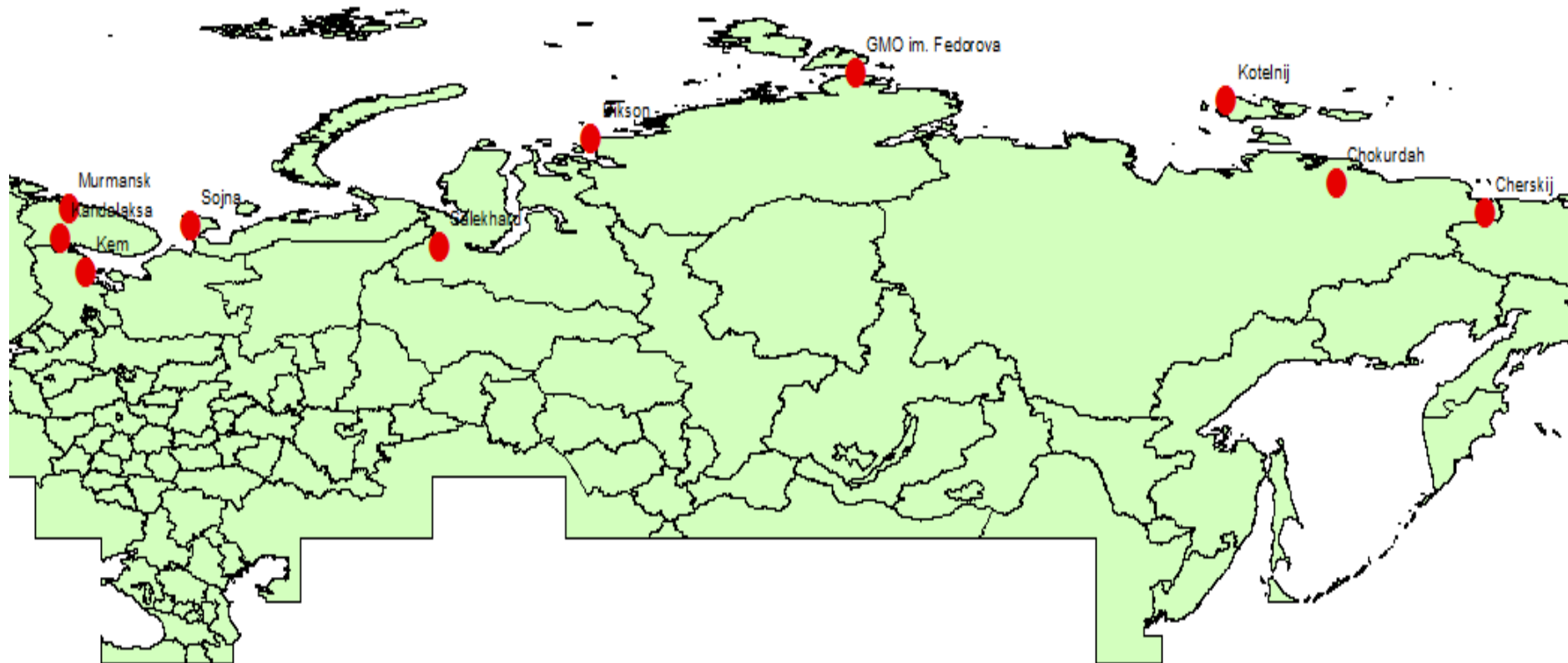
- Amount of resultant water vapor flux, kg/m\*s

$$F_{res} = \sqrt{F_x^2 + F_y^2}$$

- Direction of resultant water vapor flux

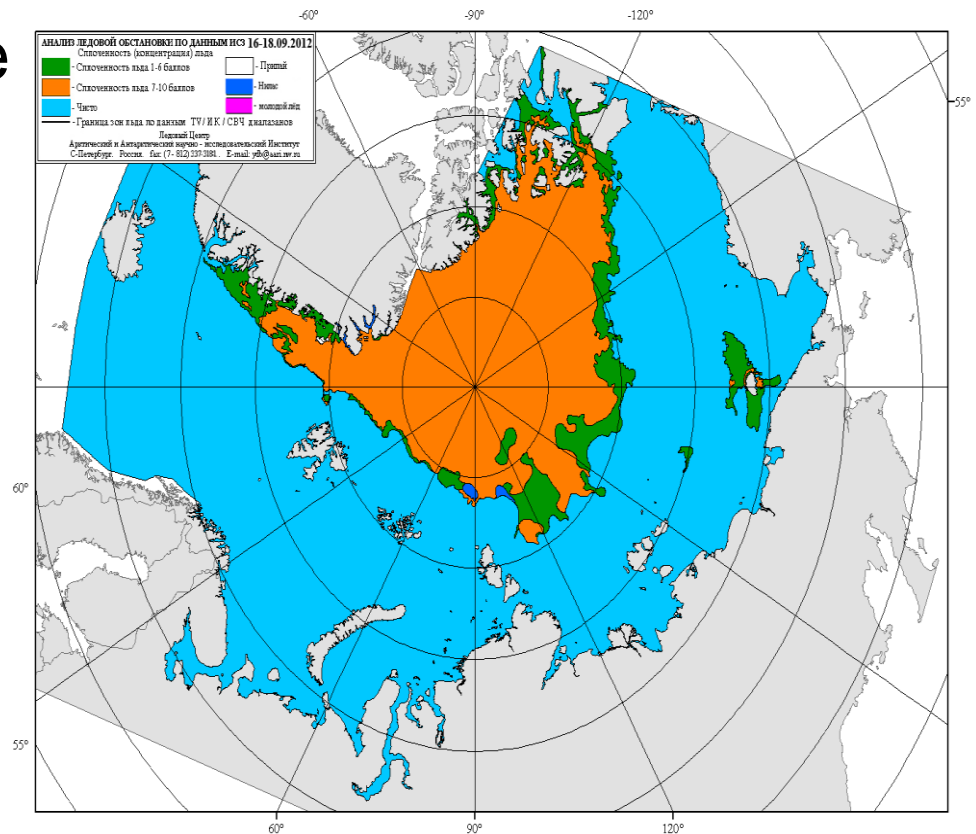
$$\Theta = \arctg \frac{F_x}{F_y}$$

# Stations of upper-air network



# Period

- Maximum arctic sea ice extent: 1977 and 1982
- Minimum arctic sea ice extent: 2007 и 2012
- Total amount of soundings  $\approx$  22,000



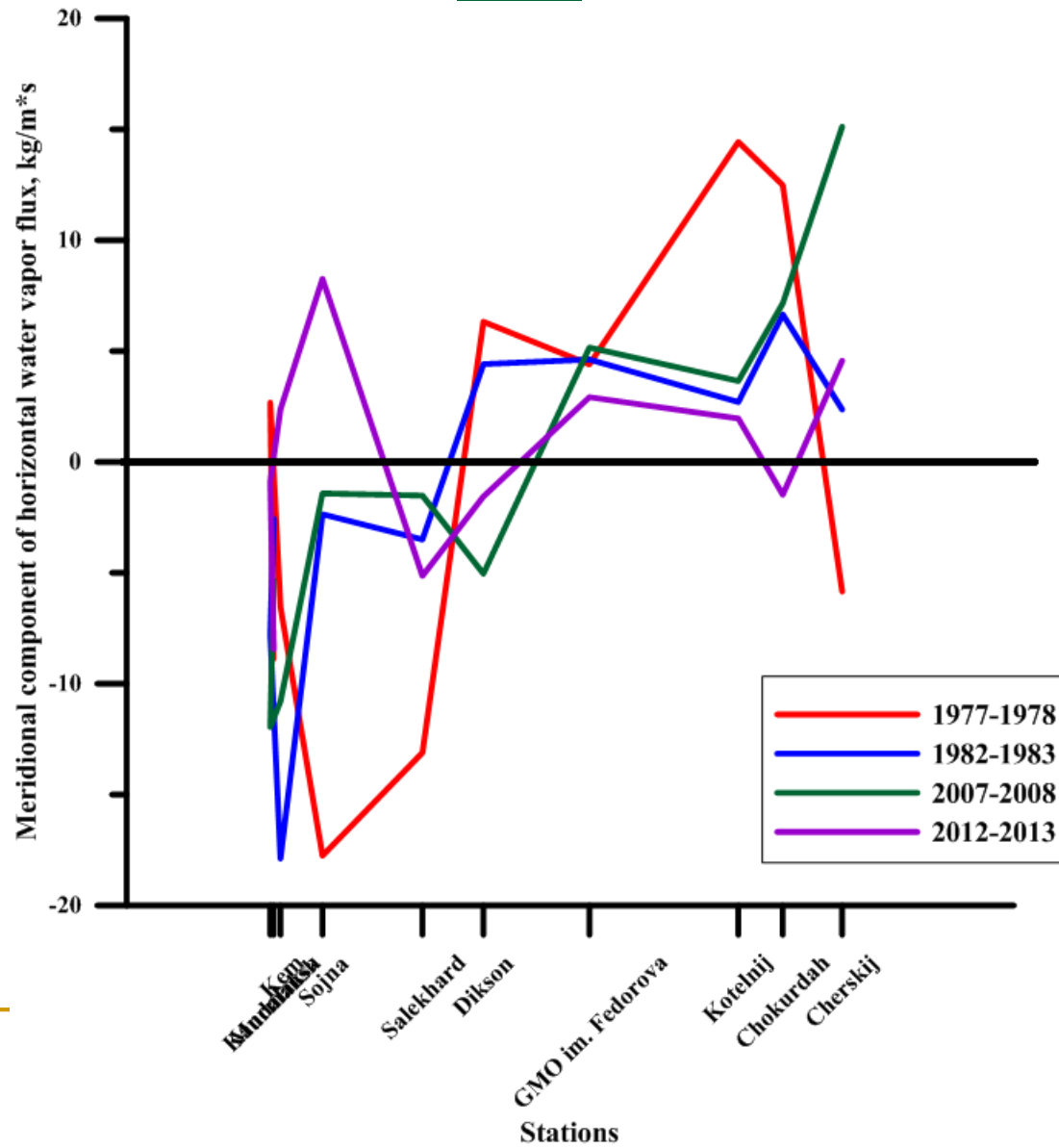


---

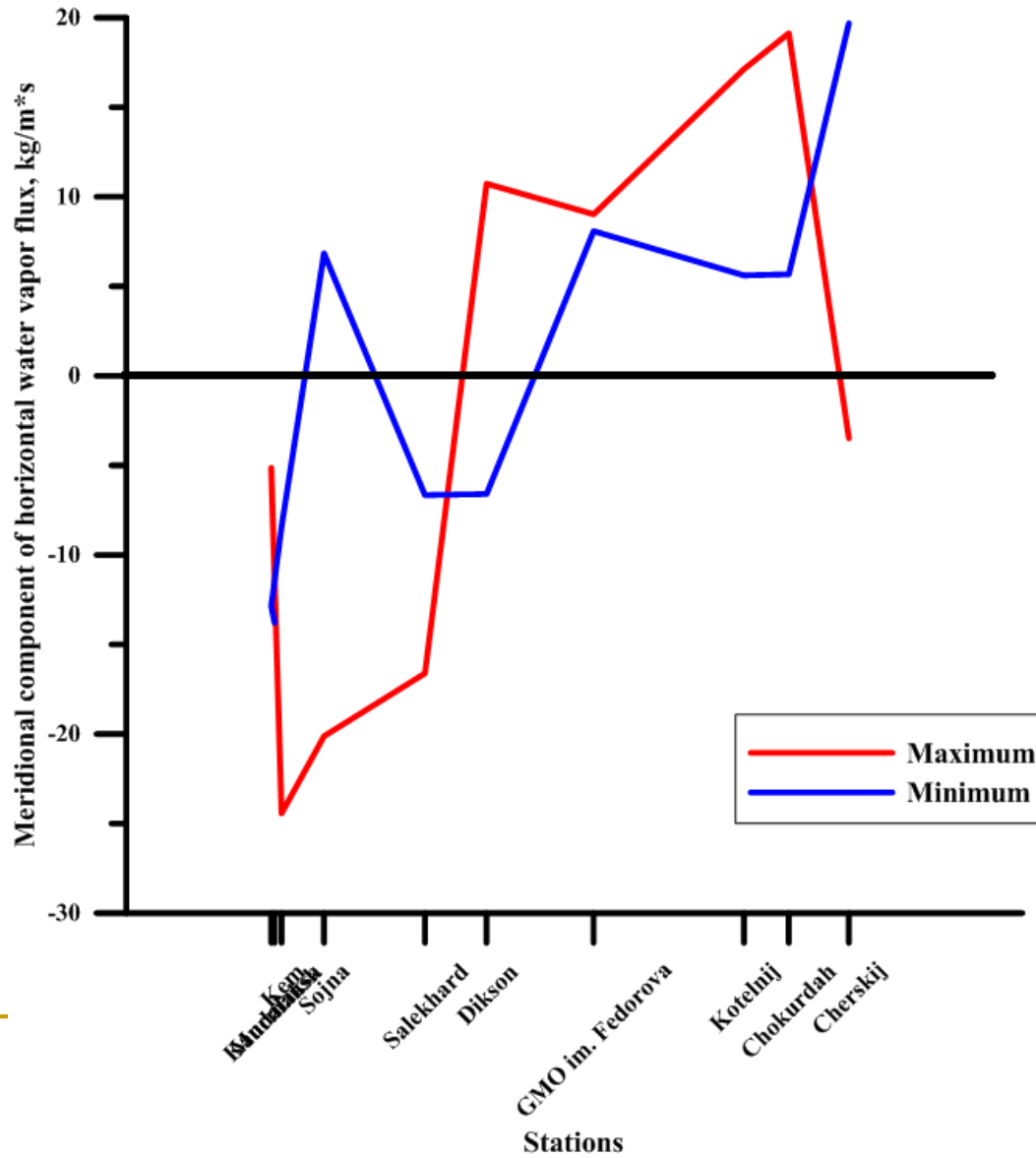
# Results



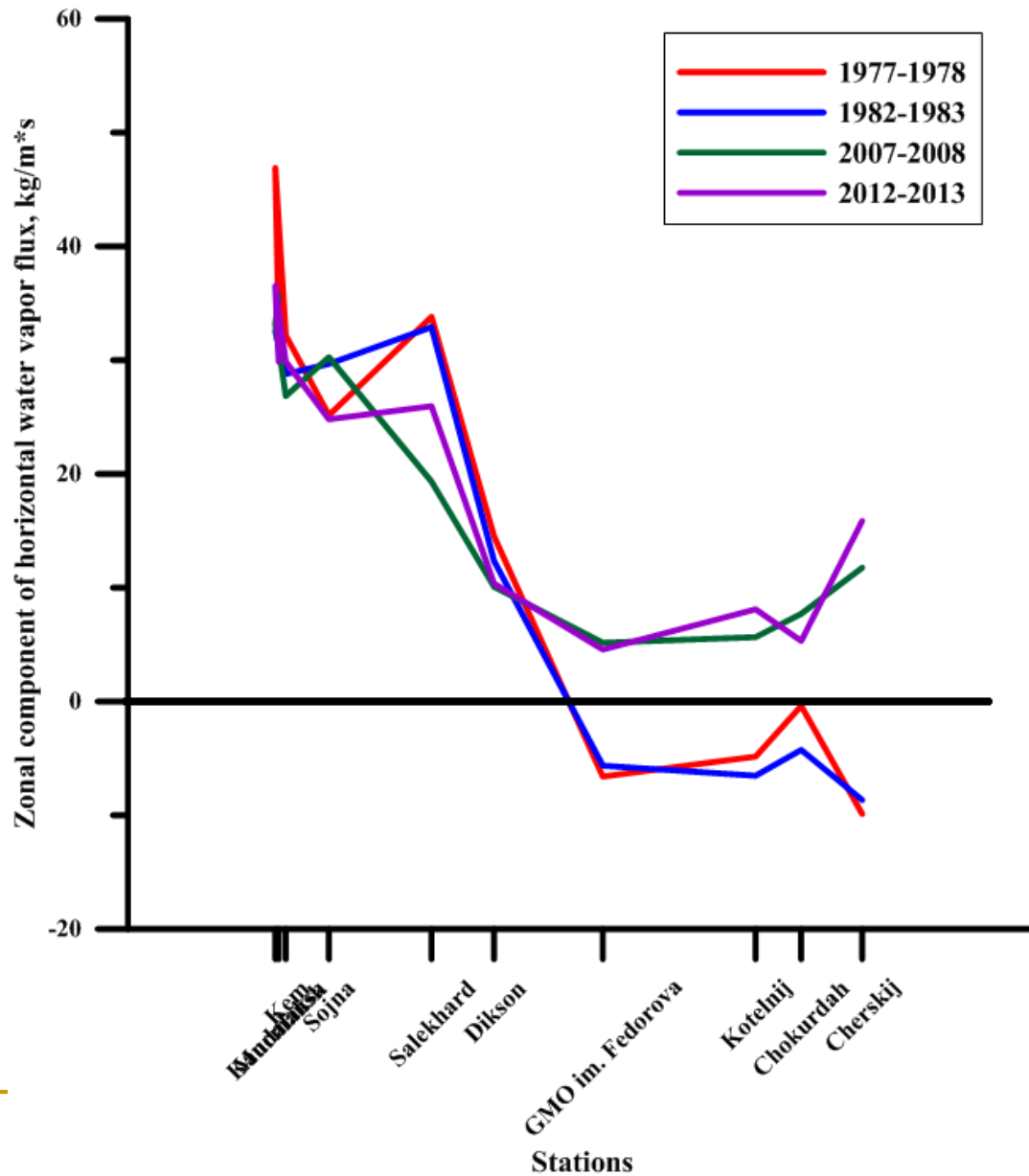
# Meridional component of horizontal water vapor flux



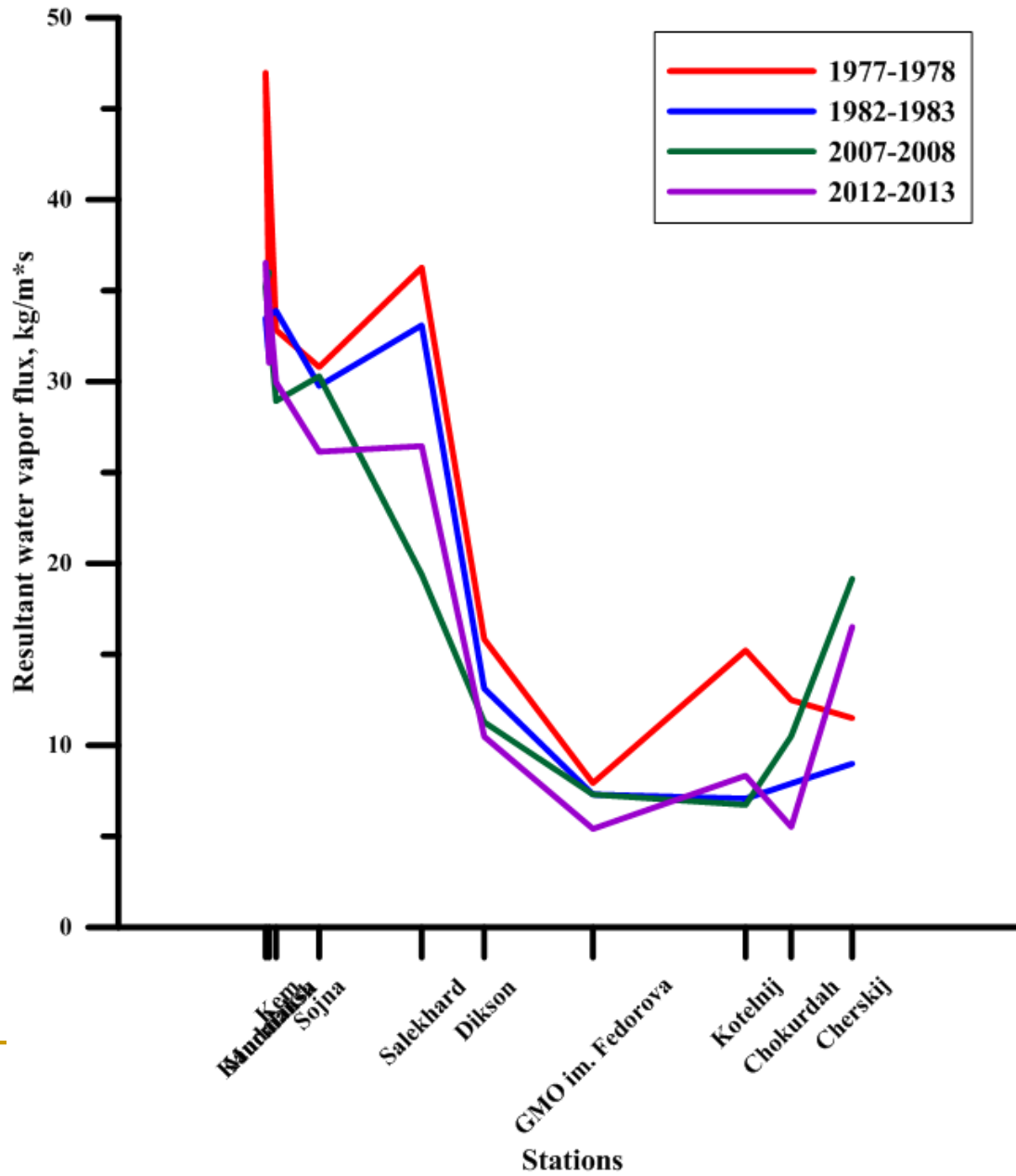
# Meridional component of horizontal water vapor flux



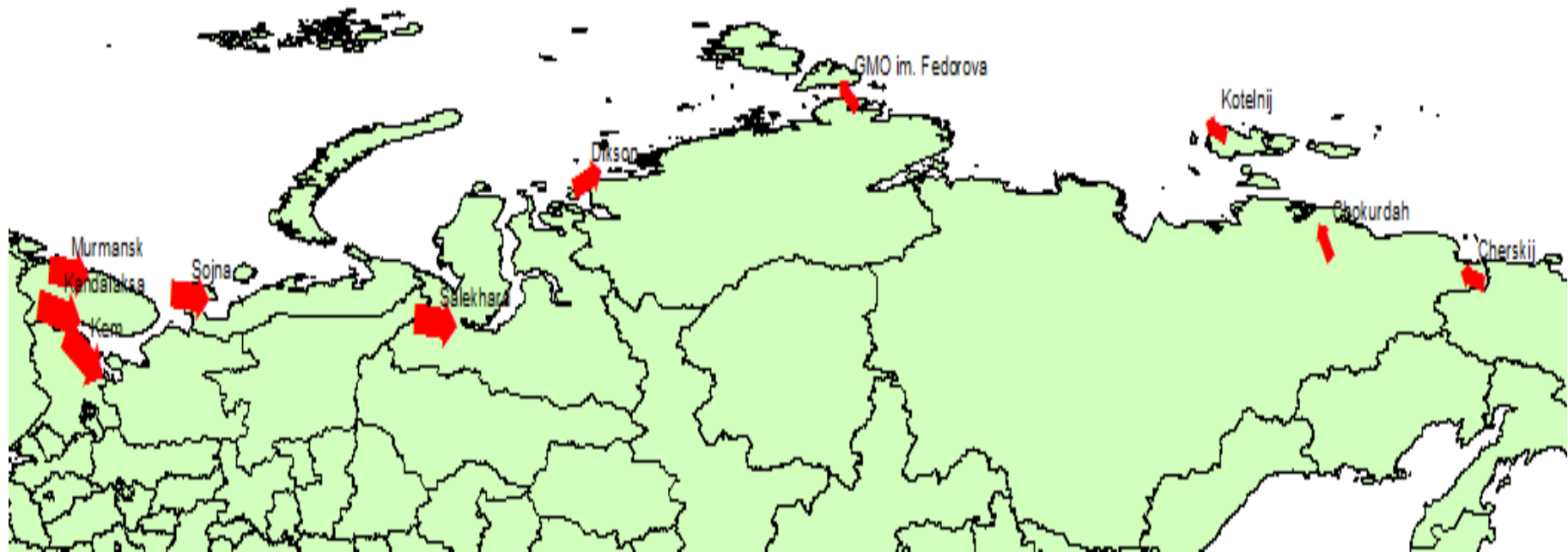
# Zonal component of horizontal water vapor flux



# Resultant water vapor flux



# Resultant water vapor flux, 1977-1978



# Результирующий поток влаги, 2012-2013



---

# Conclusions

- Decreasing of arctic sea ice extent in summertime does NOT lead to amplification of amount of water vapor flux during winter from ocean to continent
  - On the whole, absolute values of the amount of water vapor flux decreased in winters which were after summertimes with record minimum arctic sea ice extent.
  - At some stations, conversely, we can see the amplification of water vapor flux from continent to the ocean
  - At the eastern stations west direction of water vapor flux changed to the east
-



*Thank you for your attention!*

