

# October 2017- March 2018 Arctic Winter Seasonal Review

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Organisation météorologique mondiale

# Arctic Winter Highlights

## Temperature & Precipitation

- Average surface temperature: third highest since 1949
- Precipitation: slightly above 1950-2010 average

Source: NCEP/NCAR R1 Reanalysis

## Arctic (NH) Sea Ice

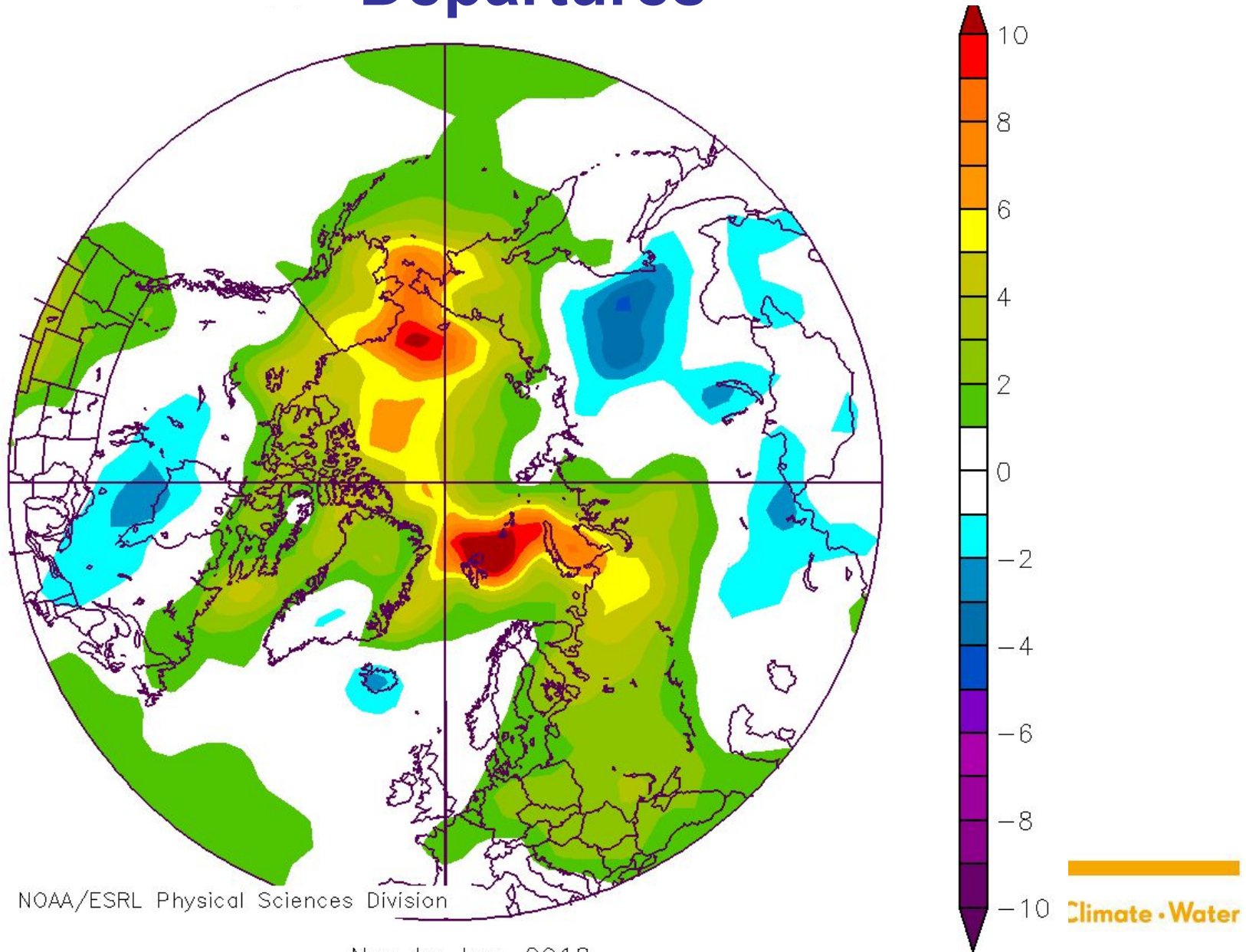
Maximum Ice Extent (how much of the Arctic is covered in sea-ice) is recorded every March using satellites and compared to all previous years since 1979: March 2017 ice extent was 14.48 million km<sup>2</sup>, second lowest on record.

- Mean Extent
  - Oct-Apr: Second lowest on record
  - Jan-Apr: Lowest on record

Source: NSIDC

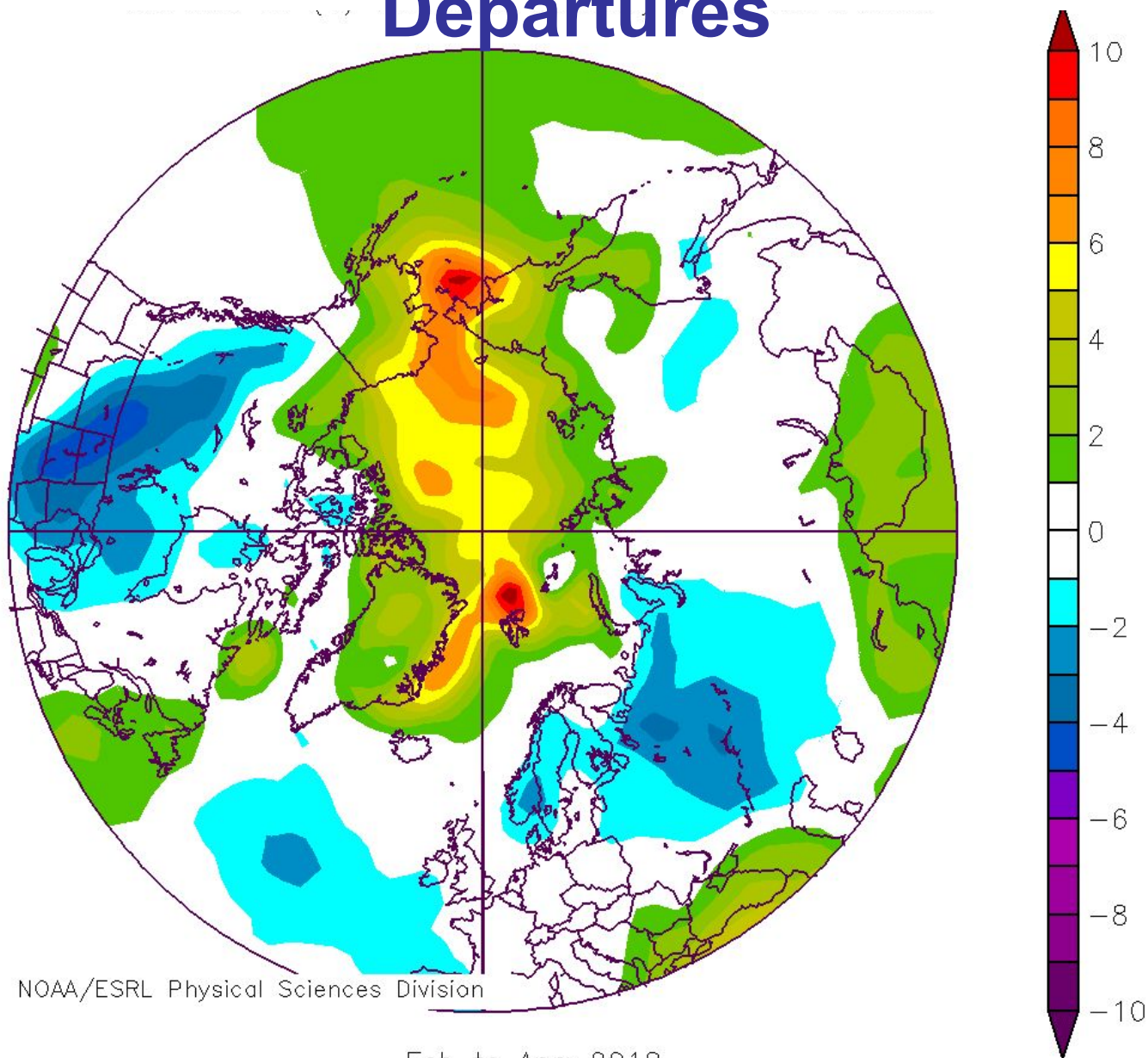


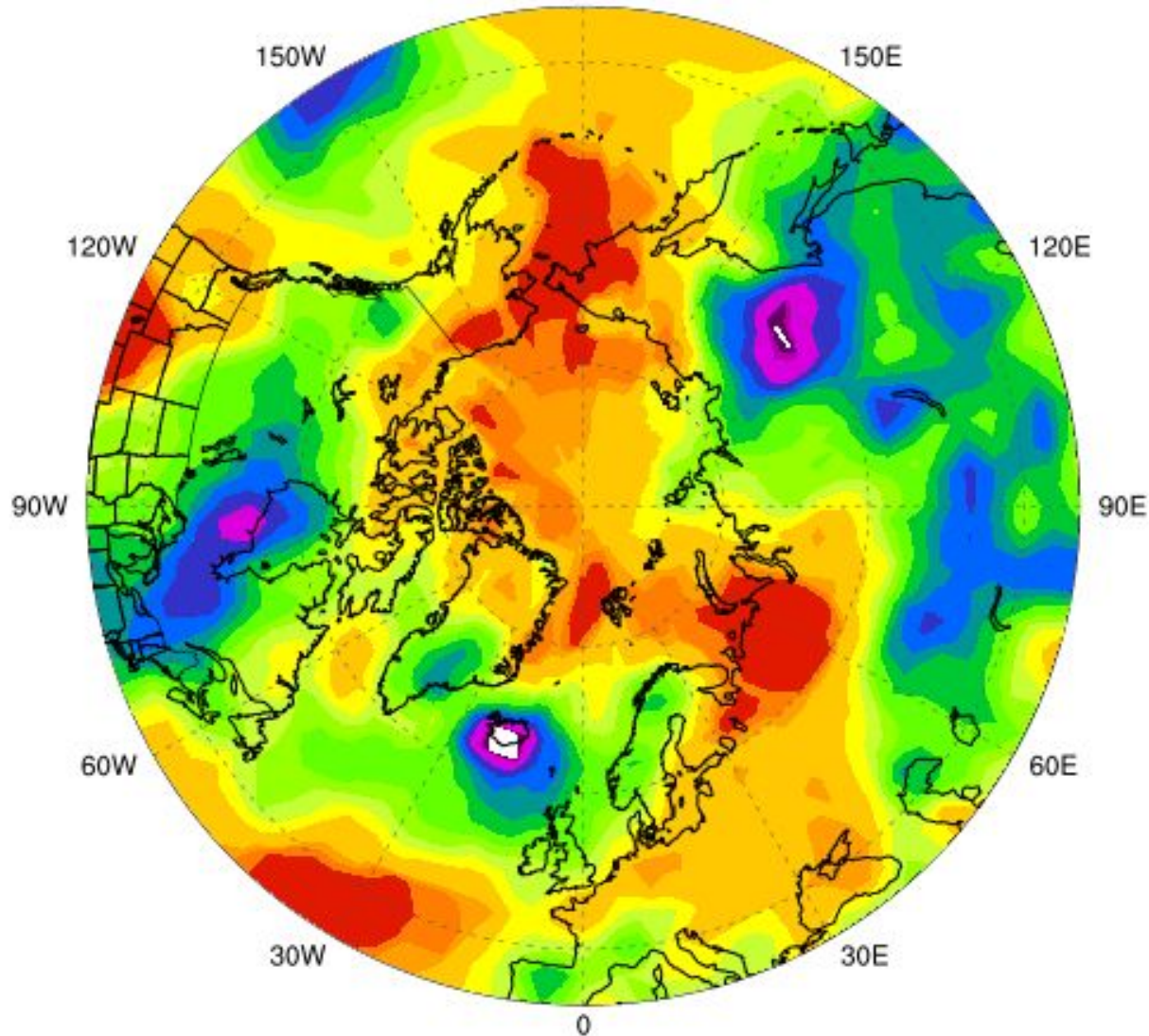
# Nov 2017 to Jan 2018 Seasonal Temperature Departures





# Feb to April 2018 Seasonal Temperature Departures





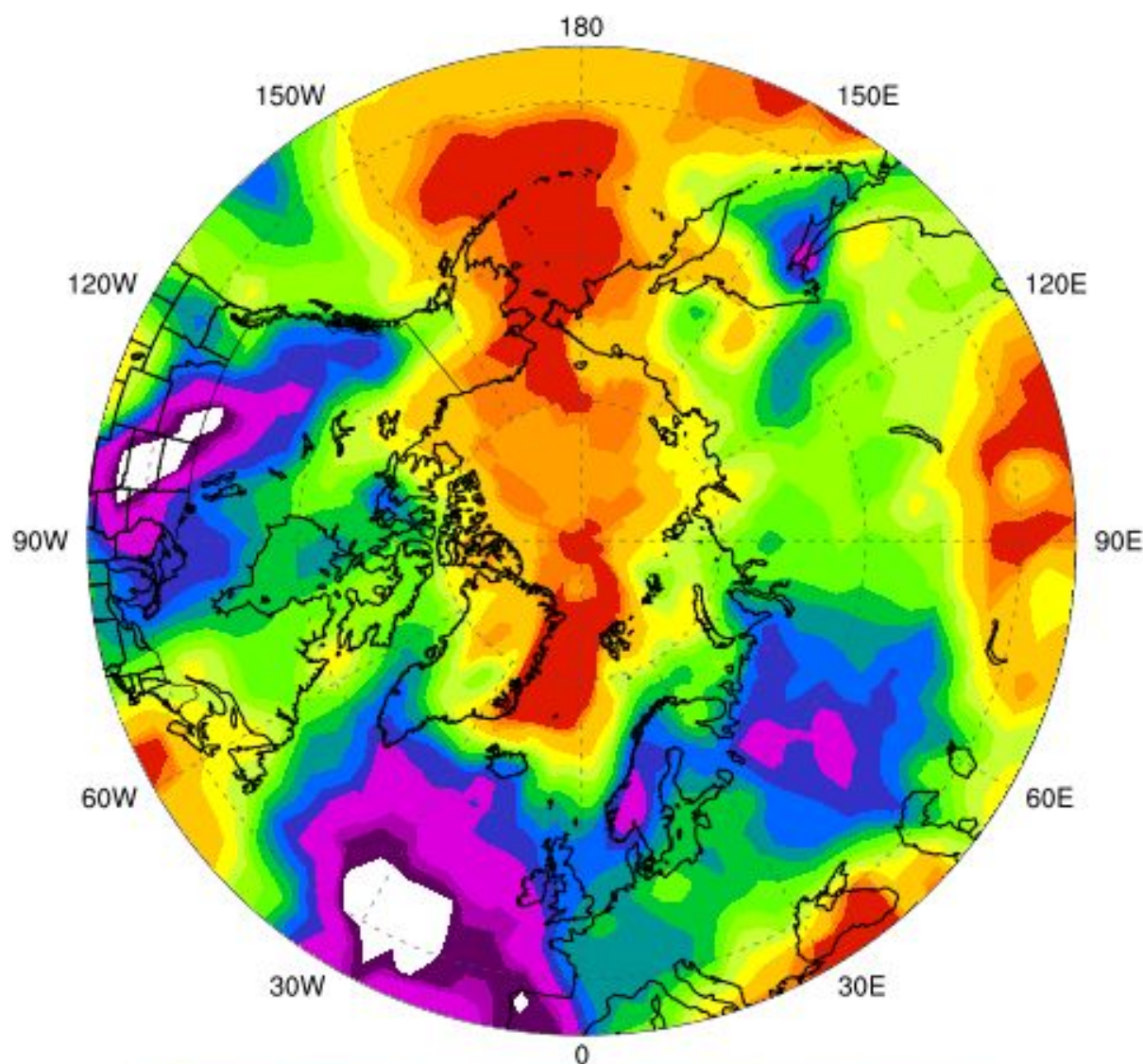
# Nov 2017- Jan 18 Seasonal Temperature Ranks (since 1949)



1 2 3 4 10 16 22 28 35 42 48 54 60 67 68 69 70

Brian Brettschneider 2018 (Data Source: ESRL R1).  
Ranks are from 1 (High) to 70 (Low). [Since 1949]  
Comparison is with all November - January time periods.





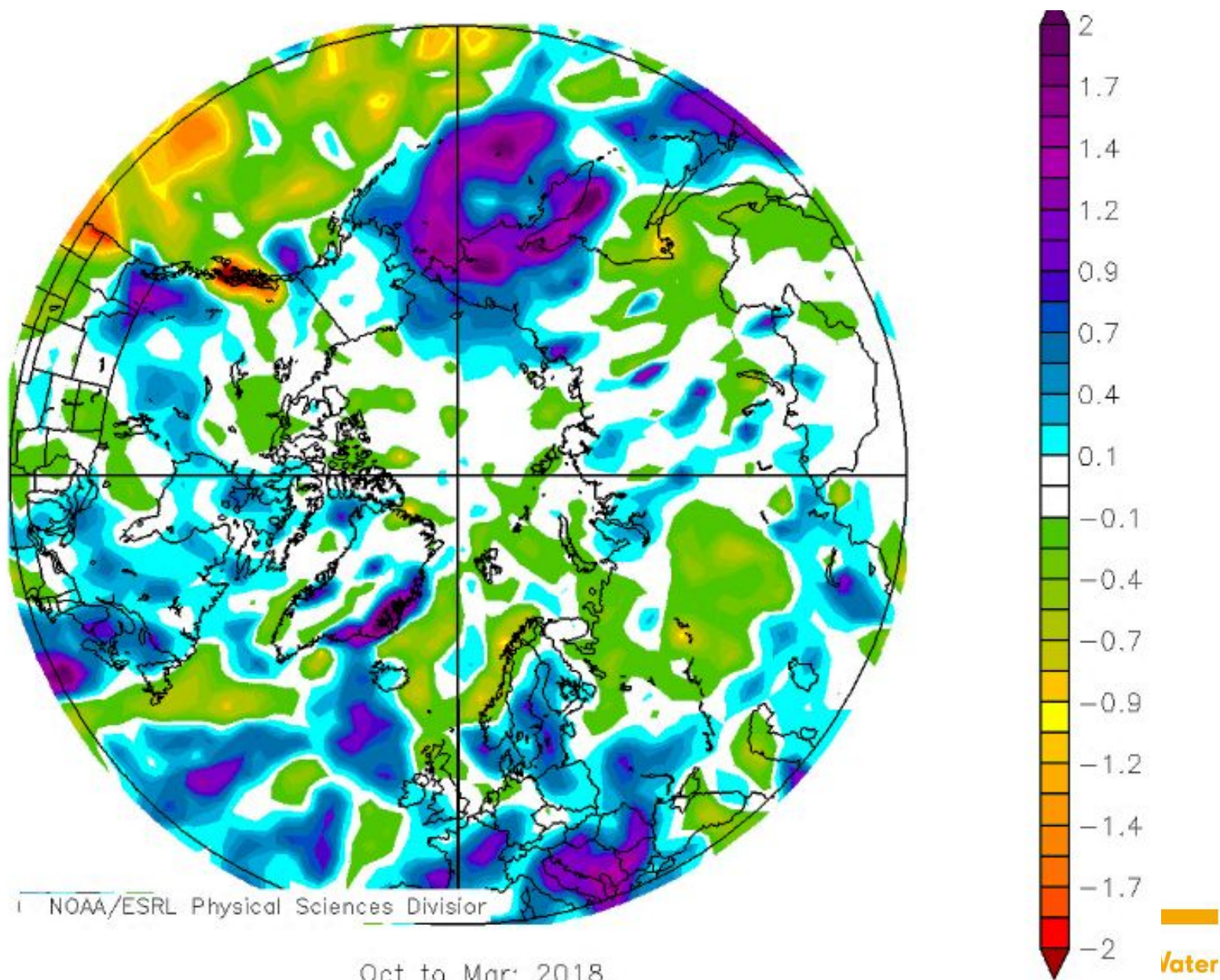
## Feb – April 2018 Seasonal Temperature Ranks (since 1949)



1 2 3 4 10 16 22 28 35 42 48 54 60 67 68 69 70

Brian Brettschneider 2018 (Data Source: ESRL R1).  
Ranks are from 1 (High) to 70 (Low). [Since 1949]  
Comparison is with all February - April time periods.

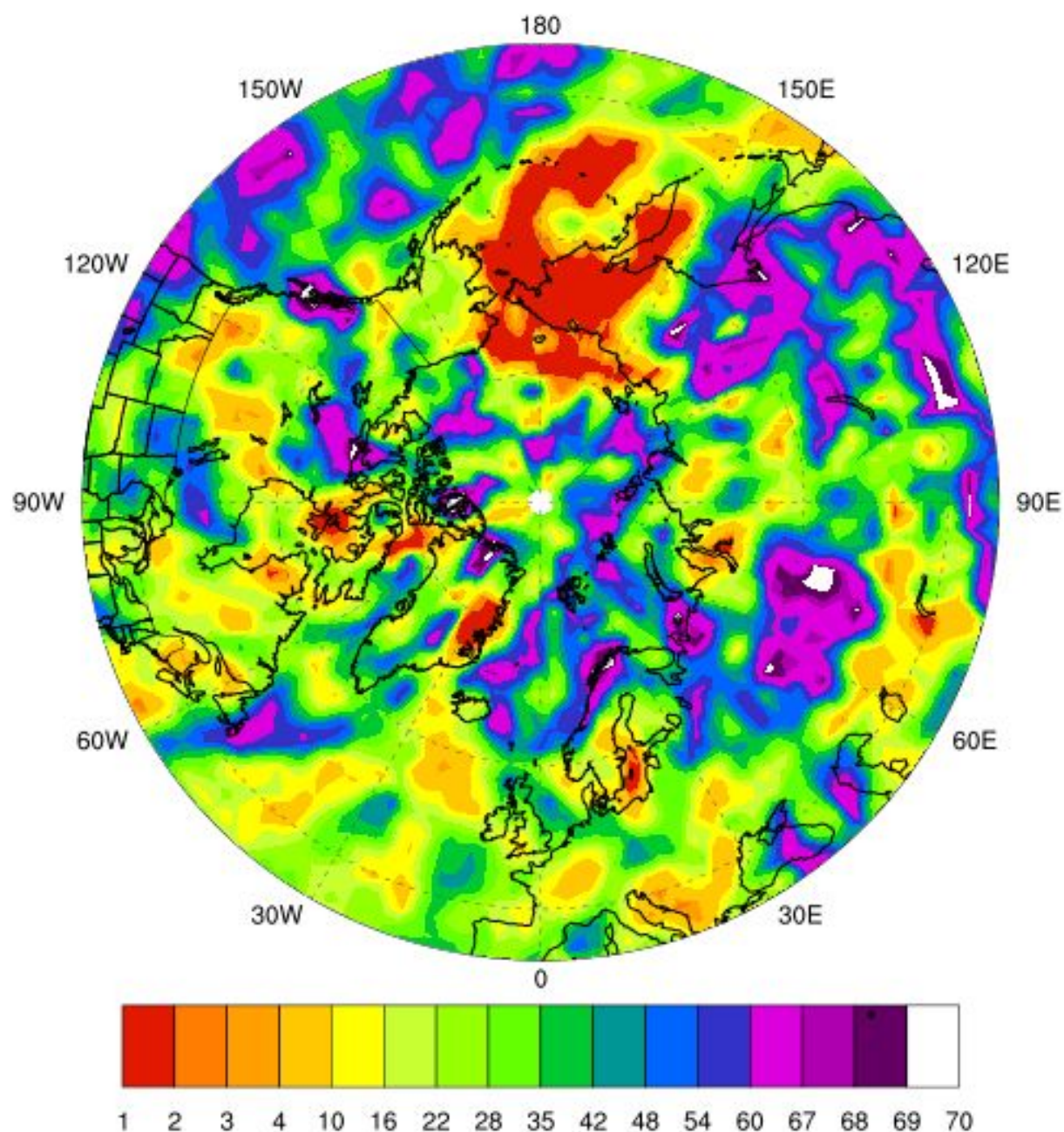
# Oct 2017- Mar 2018 Seasonal Precipitation





# Precipitation Ranks (since 1949)

## Oct 2017 to March 2018

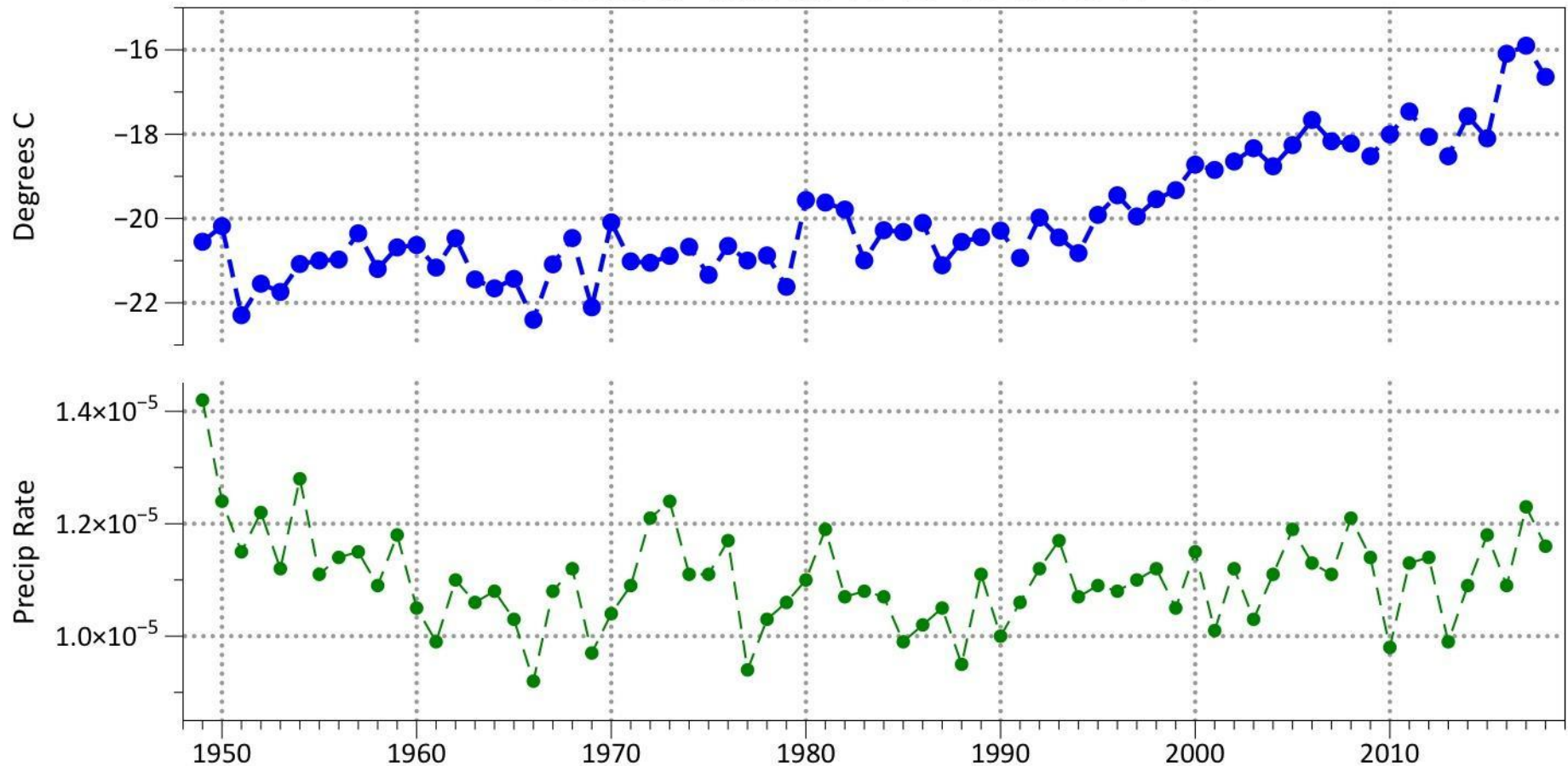


Brian Brettschneider 2018 (Data Source: ESRL R1).  
Ranks are from 1 (High) to 70 (Low). [Since 1949]  
Comparison is with all October - March time periods.



# Average Arctic Temperature and Precipitation

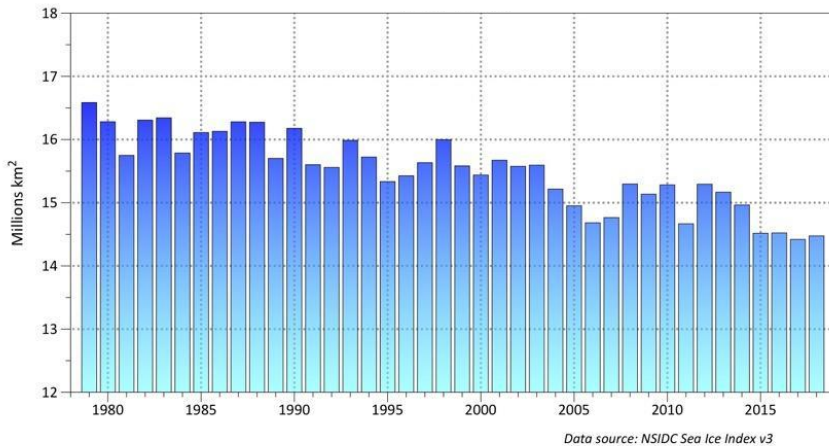
October-March 1948-49 to 2017-18



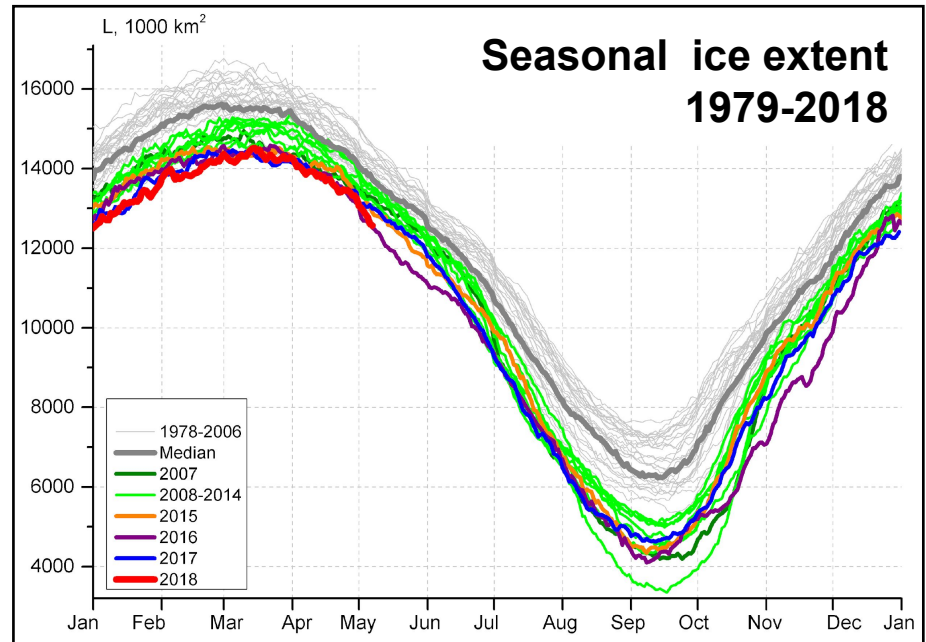
Data source: NCEP/NCAR R1 Reanalysis

# 2018 Arctic (NH) Max Ice extent and ice age

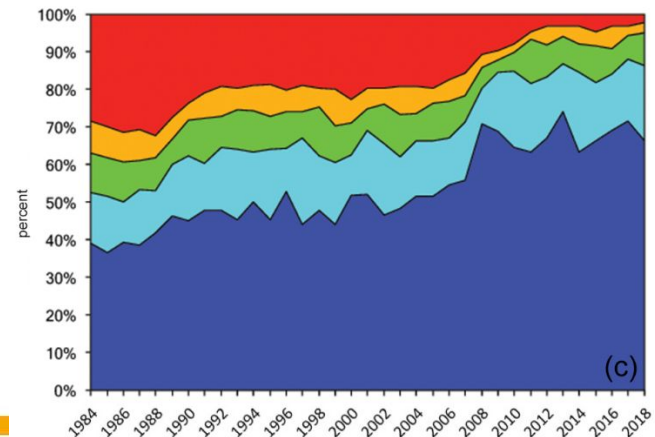
## Arctic ice extent Max 1979-2018



## Ice extent 17 March 2018



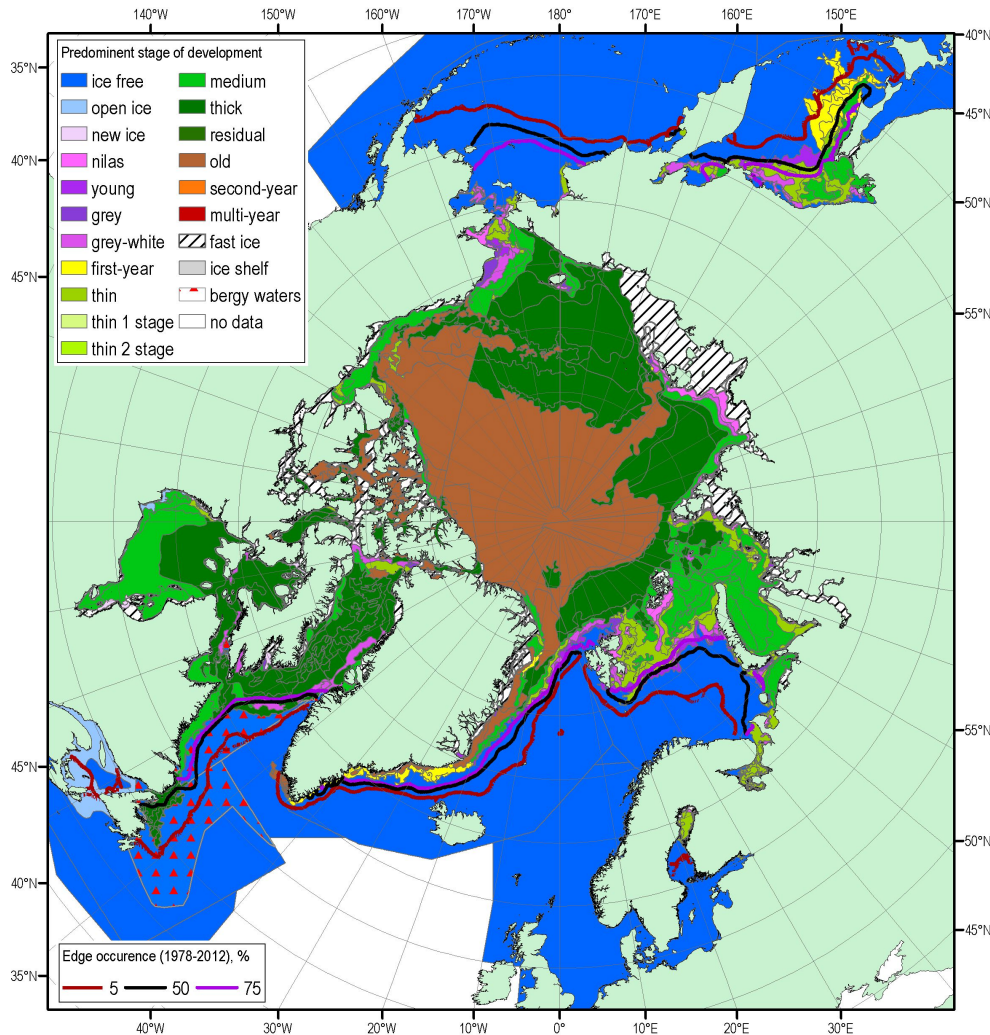
## Percent of Sea Ice Extent During Week Nine for Different Age Classes



## Age of Sea Ice (Years) 1984-2018

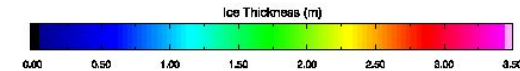
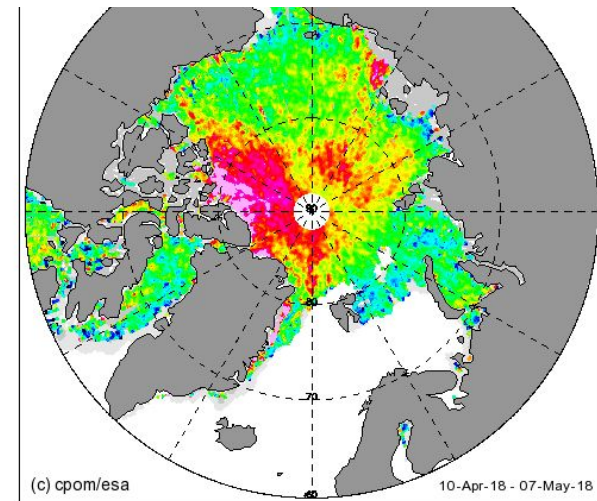


# Current Ice Conditions (April-May 2018)



**Blended Arctic ice chart (AARI, CIS, NIC) for 23-26 April 2018 and ice edge occurrence for 21-25 April for 1979-2012**

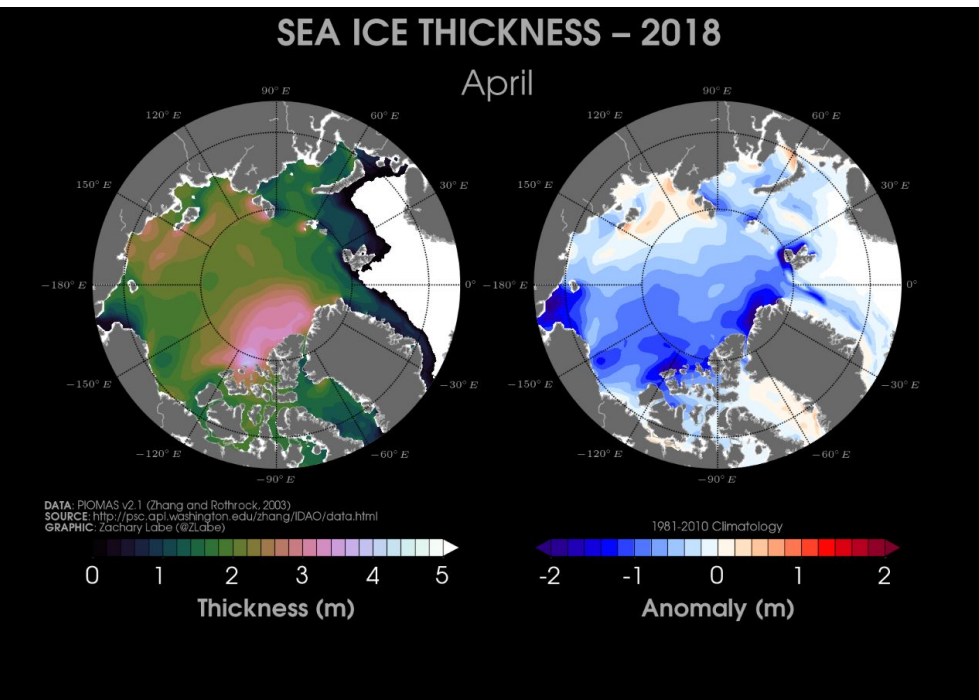
## CryoSat Sea Ice Thickness



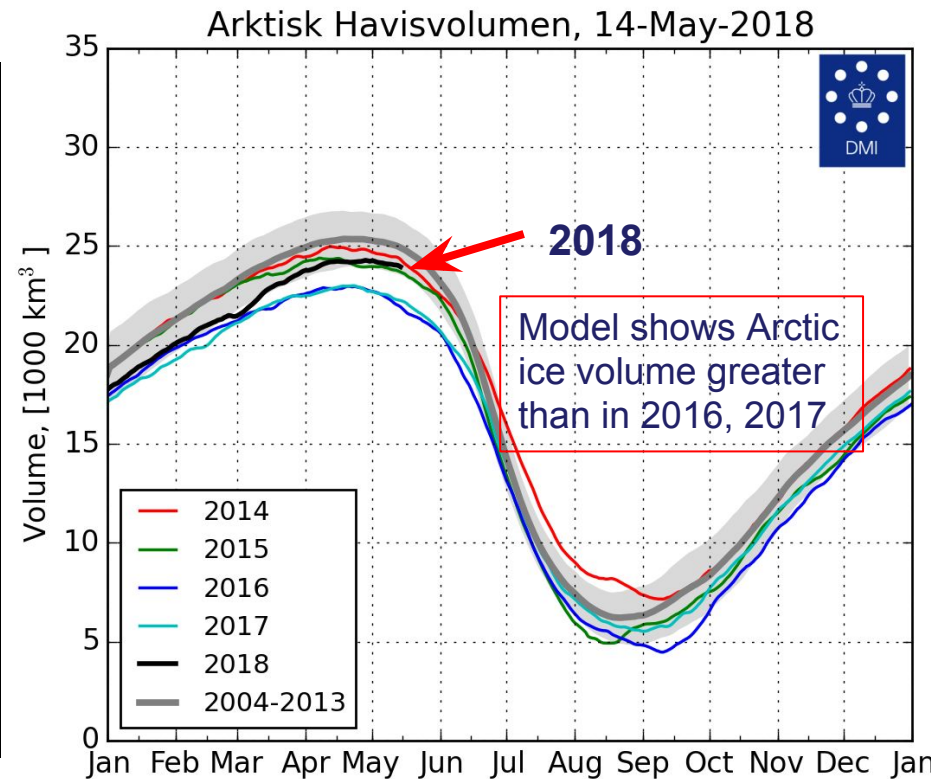
**Fast ice thickness in general 20-50 cm lower than normal though ice thickness at North Pole was close to potential 180-190 cm**



# Pan-Arctic Ice Ocean Reanalysis, Modeling and Assimilation System



(Zhang and Rothrock, 2003) run out of the Polar Science Center at the University of Washington. Sea Ice Thickness

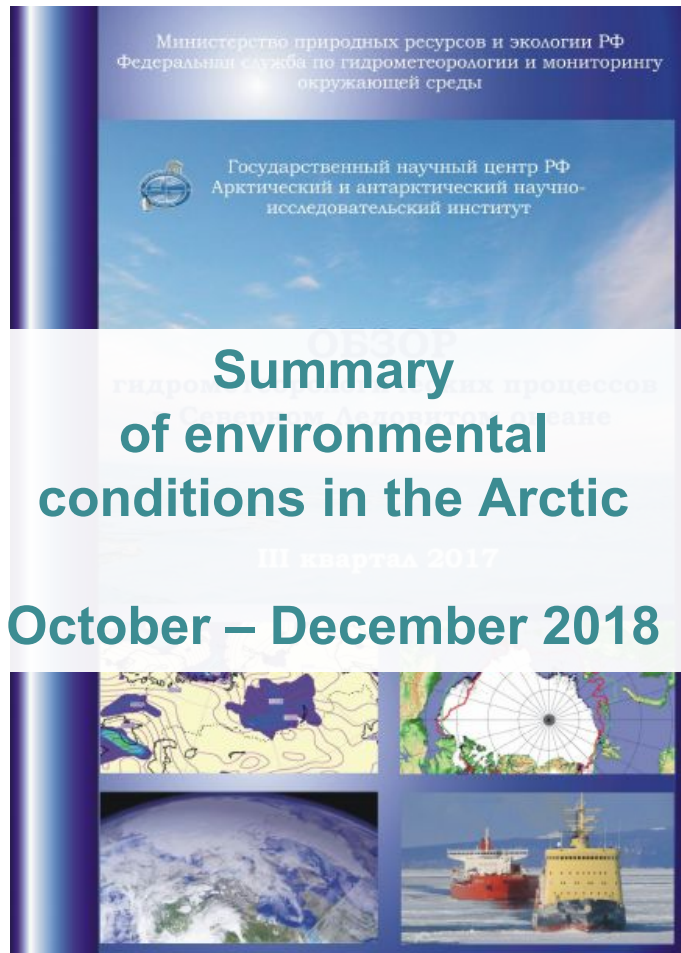


Danish Meteorological Institute North Atlantic - Arctic Ocean model HYCOM-CICE - <http://ocean.dmi.dk/models/hycom.uk.php>





# Planned content of summaries / Pan-Arctic bulletin



- ✓ Based on Arctic and Antarctic Research Institute (AARI) of Roshydromet experience from 1920s & scientific background
- ✓ Monitoring and content of the bulletin will be grouped by 5 spheres and sections:
  - i. **Atmosphere**
  - ii. **Sea Ice**
  - iii. **Oceanography**
  - iv. **Land hydrology & snow**
  - v. **Permafrost**
- ✓ Each section will contain variables described with varying periodicity – from 1M to 1Y
- ✓ To follow the end-users needs, proposed list of variables should extend the WMO-No.485
- ✓ To begin with, bulletin will include atmosphere and sea-ice with full content by end of demo-phase
- ✓ Content will be generated by Eurasian node based on harmonized sustained input from 3 nodes and WMO programs (e.g. GCW, JCOMM)



# i) Atmosphere

№	Data source	Averaging period	Type	Full name of the product
1	<b>Atmosphere</b>			
1.1	Surface air temperature			
	WMO stations, buoys	1 M - 1 Y	C	Mean monthly (mean quarterly, mean annual) SAT and its anomalies (°C) at the stations in the Arctic
	Reanalysis	1 M	C	Mean monthly SAT and its anomalies (°C)
1.2	Sea level pressure			
	Reanalysis	1 M	C	Mean monthly SLP and its anomalies (hPa)
1.3	AT500			
	Reanalysis	1 M	C	Mean monthly <u>geopotential</u> height at 500 <u>hPa</u> and its anomalies
1.4	Type of atmosphere processes			
	Synoptic charts	1 M	G, T	Catalogue of macro synoptic processes using <u>Vangengeim-Girs</u> index with sub-monthly description
1.5	Precipitation (for snow see 4.3)			
	WMO stations	1 M	C	Mean monthly (mean quarterly, mean annual) precipitation and its anomalies (mm/day) for stations in the Arctic
1.6	Extreme weather phenomena			
	WMO stations	1 M	T	Observed extreme weather phenomena for stations in the Arctic

Type: C – chart, G – graph, T - table





## ii) Sea ice

No	Data source	Averaging period	Type	Full name of the product
<b>2</b>	<b>Sea ice</b>			
<b>2.1</b>	<b>Ice extent</b>			
2.1.1	Satellite	1 D	G, T	Seasonal ice extent variability and its anomalies for the Northern Hemisphere, meridian sectors and Arctic Ocean areas since 1978
<b>2.2</b>	<b>Ice conditions</b>			
	Ice chart	7 D	C	Chart of ice conditions in the Arctic Ocean (concentration, stages of development) and climatic ice edge positions for mid-month
<b>2.3</b>	<b>Ice phenomena</b>			
	WMO stations	3 M - 1 Y	T	Observed fast ice thickness (by end of month) and ice seasonal phenomena at the stations in the Arctic
<b>2.4</b>	<b>Ice dynamics</b>			
	Satellite, buoys, reanalysis	1 M	C	Mean monthly values of ice drift (km/day)

**Type: C – chart, G – graph, T - table**



## iii) Oceanography

№	Data source	Averaging period	Type	Full name of the product
<b>3</b>	<b>Oceanography</b>			
<b>3.1</b>	<b>Sea surface temperature</b>			
	WMO stations	1 M	T	SST (°C) (mean monthly/end of month) at coastal stations in the Arctic
	Satellite, reanalysis	1 M	C	Mean monthly SST and its anomalies (°C) for the Arctic Ocean
<b>3.2</b>	<b>T,S analysis</b>			
	Ships, ITP-buoys	3 M	G, T	T,S analysis for the Arctic Ocean based on available data
<b>3.3</b>	<b>Sea level</b>			
	WMO stations	1 M	G, T	Mean monthly sea level & anomalies (cm) at the Arctic coastal stations
<b>3.4</b>	<b>Waves</b>			
	Reanalysis (model)	1 M	C	Occurrence of maximums of significant waves height (3% significance) and typical wind-wave conditions in the Arctic Seas

**Type: C – chart, G – graph, T - table**





## iv) Land hydrology & snow

№	Data source	Averaging period	Type	Full name of the product
<b>4</b>	<b>Land hydrology</b>			
<b>4.1</b>	<b>River ice</b>			
	WMO stations	season	T	Observed ice thickness and seasonal ice phenomena at the stations at main Arctic rivers estuaries
<b>4.2</b>	<b>Level and run-off</b>			
	WMO stations	1 Y	T	Typical level and annual run-off (km <sup>3</sup> ) at the stations at main Arctic rivers estuaries
<b>4.3</b>	<b>Snow cover</b>			
	WMO stations	1 M	C, G	Mean monthly snow cover (cm) at the stations in the Arctic

## v) Permafrost

№	Data source	Averaging period	Type	Full name of the product
<b>5</b>	<b>Permafrost</b>			
<b>5.1</b>	<b>Active layer</b>			
	GCW stations	1 Y	T, G	Annual dynamics of the permafrost active layer depth at the CALM and GTN-P stations in the Arctic

**Type: C – chart, G – graph, T - table**





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Thank you!