

Climatology and Seasonality of the ice-ocean-atmosphere-terrestrial system on the Yamal

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Goals

- Document climatology and trends in ice, Ts and NDVI down to a weekly time scale
- Is the seasonality changing?

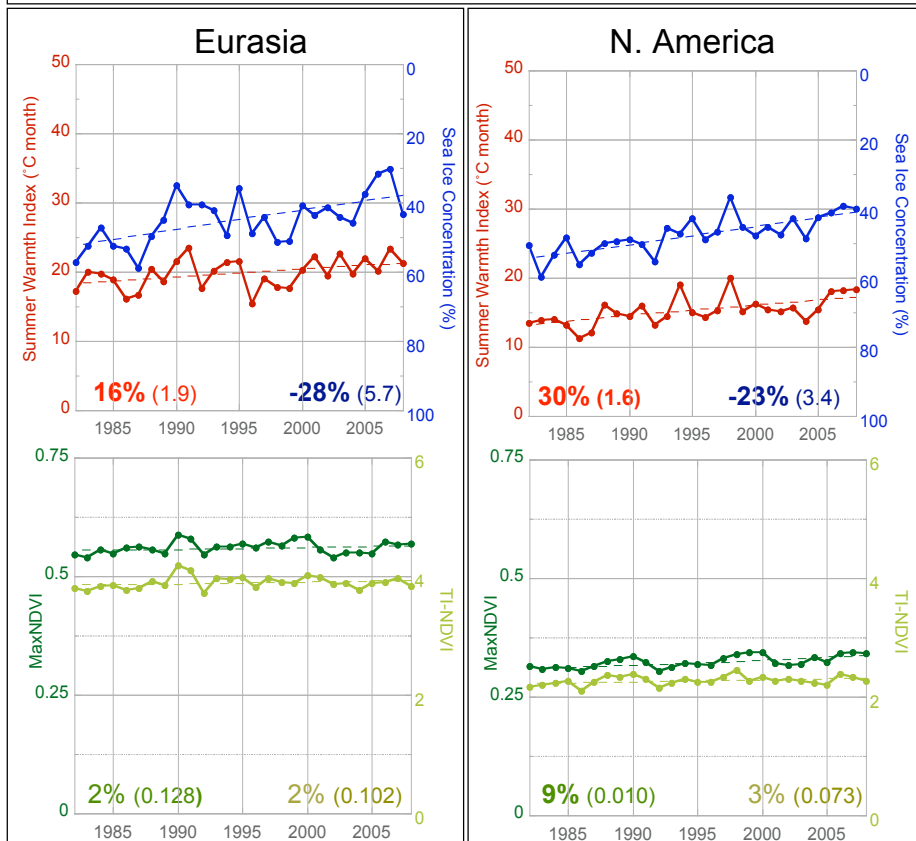
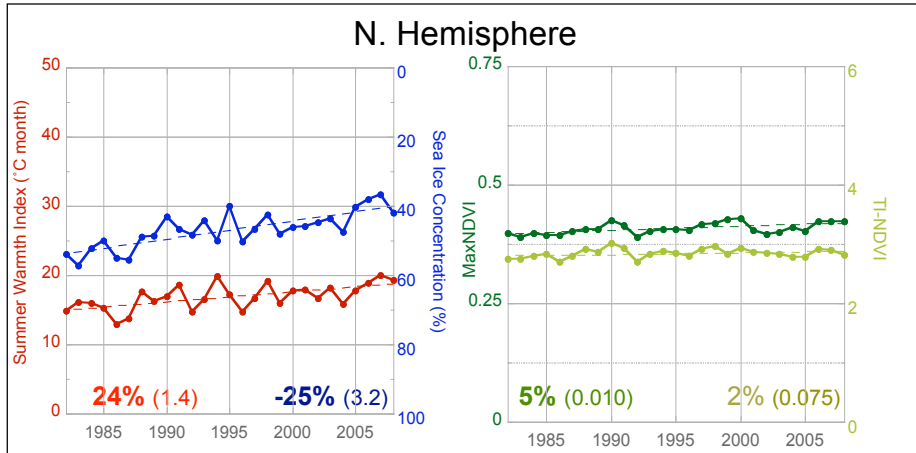
Remote sensing data & methods

- Data: 1982-2008 (27 yrs, weekly)
 - Passive Microwave Sea Ice Conc. (25-km)
 - AVHRR Land Surface Temp. (25-km)
 - GIMMS NDVI (Max and Integrated) (14-km) **New** version that is corrected for Arctic



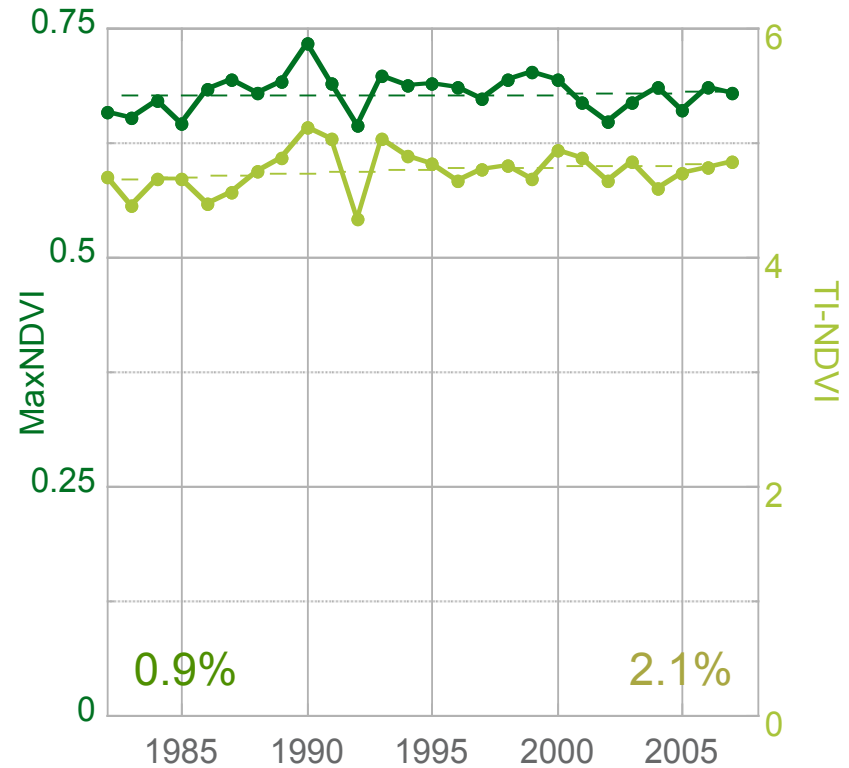
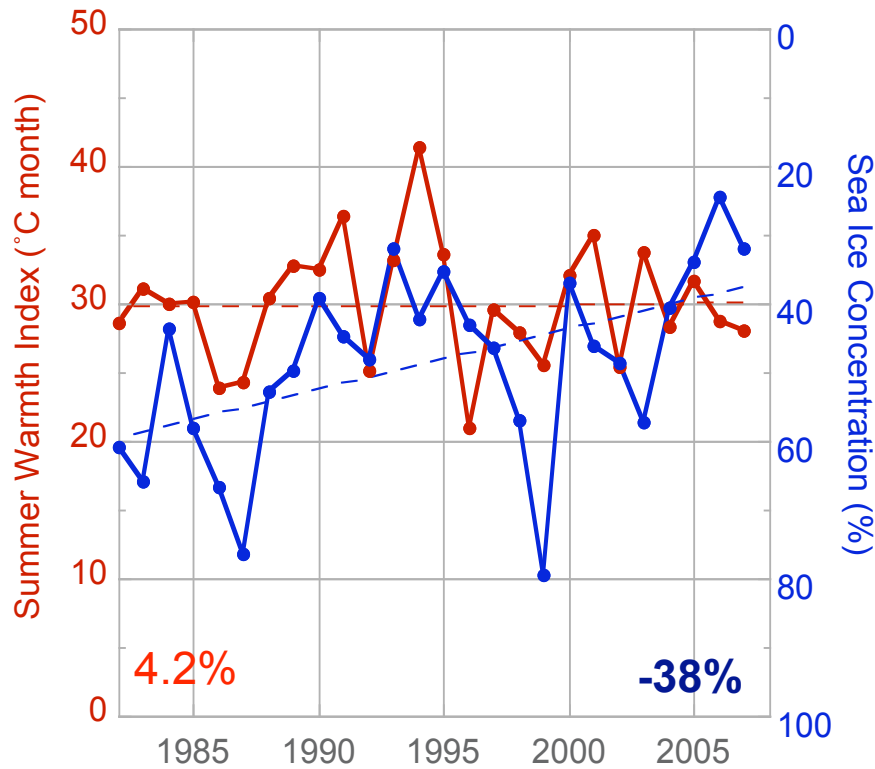
- Divided Arctic Ocean (Treshnikov, 1985) to examine trends and variability in **50-km land-ocean coastal domains**

Contrasts: N. America vs Eurasia



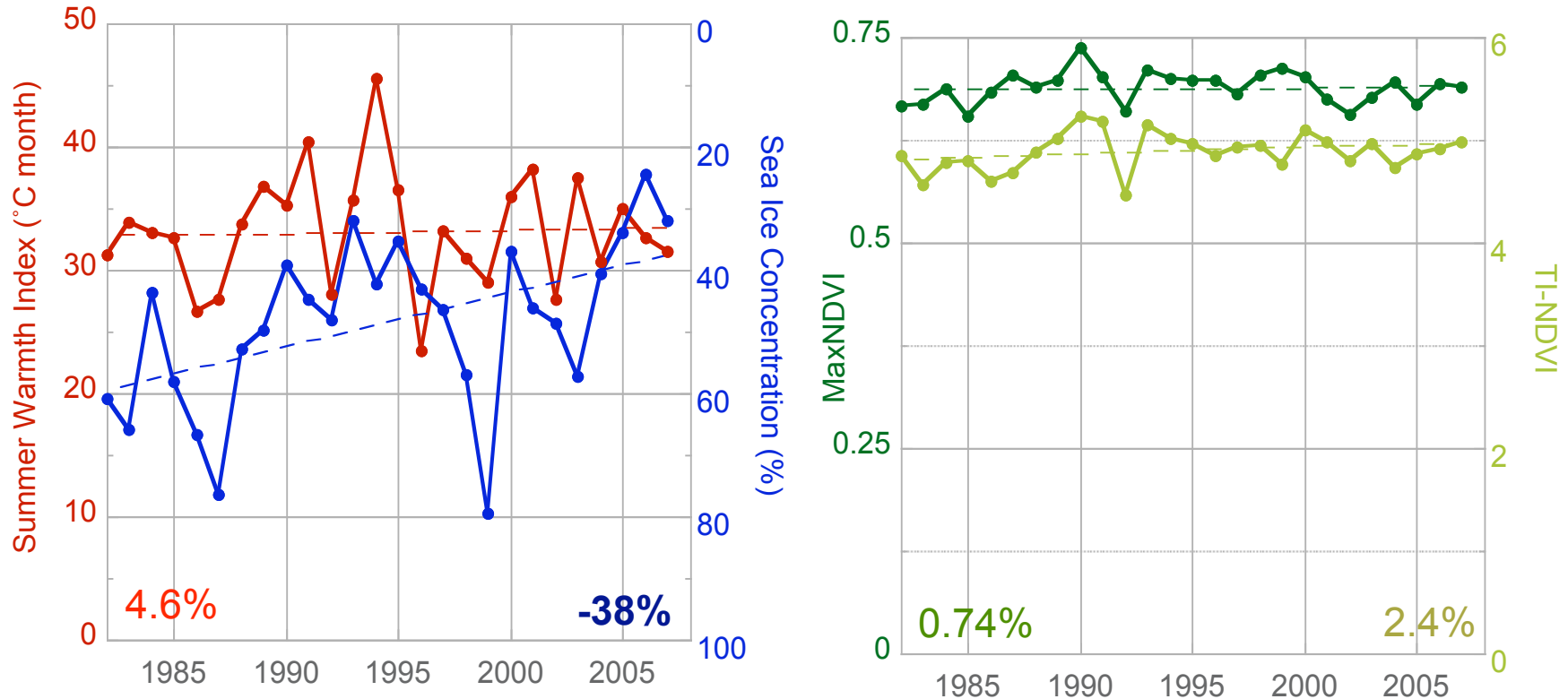
- Trends are larger in N. America
- Variability is larger in Eurasia

Yamal 50-km series



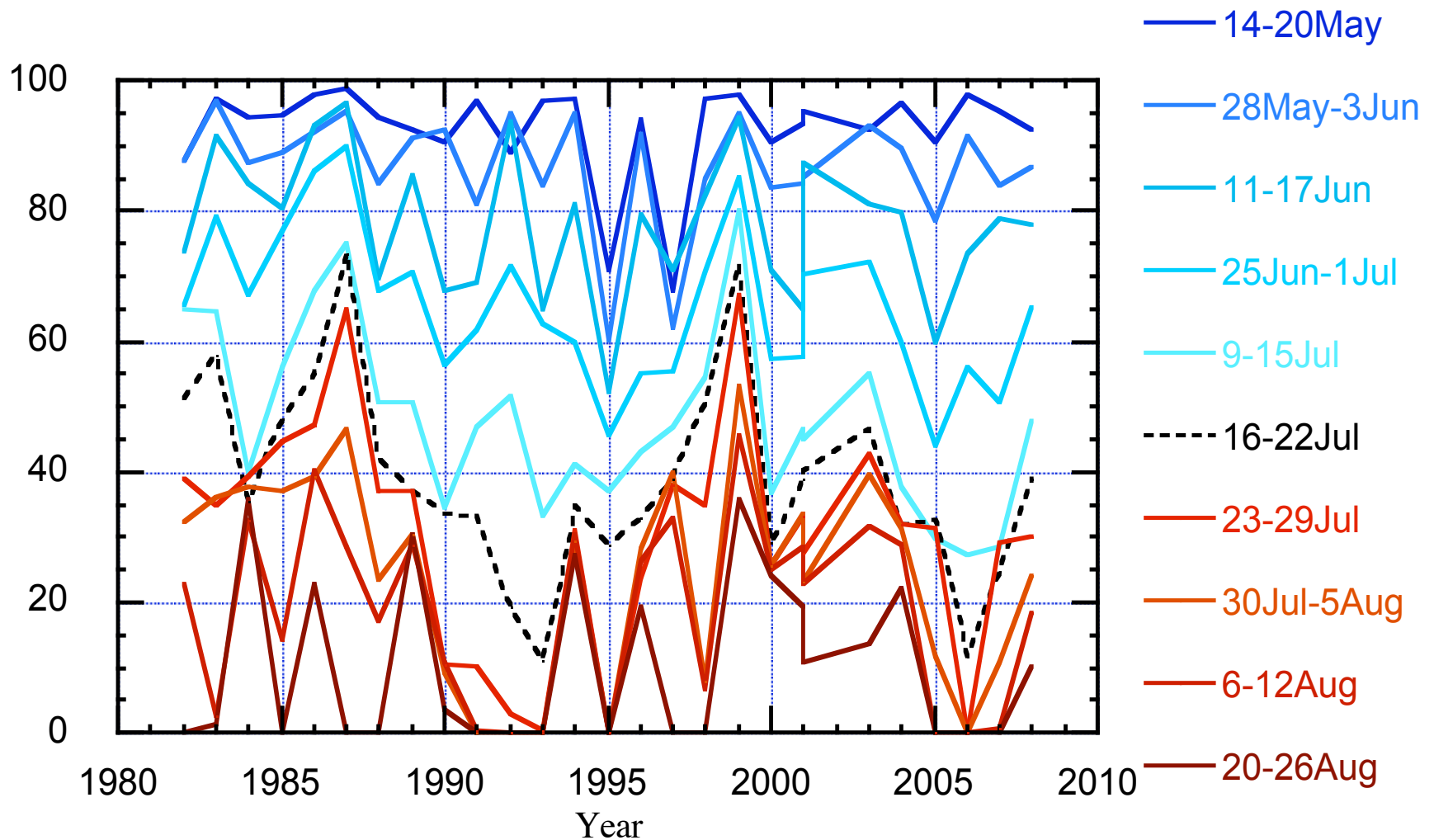
- Sea ice shows significant decreases (Ice is 50-km only due to geographic limitations)
- SWI and NDVI display very small positive trend

Yamal full tundra series



- NDVIs nearly identical in 50-km and full tundra
- SWI has weak warming trend, is highly variable, and bit warmer than 50-km time series

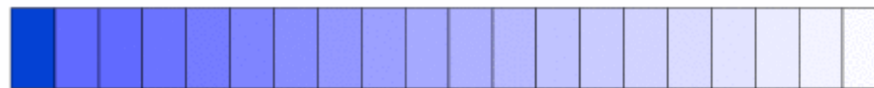
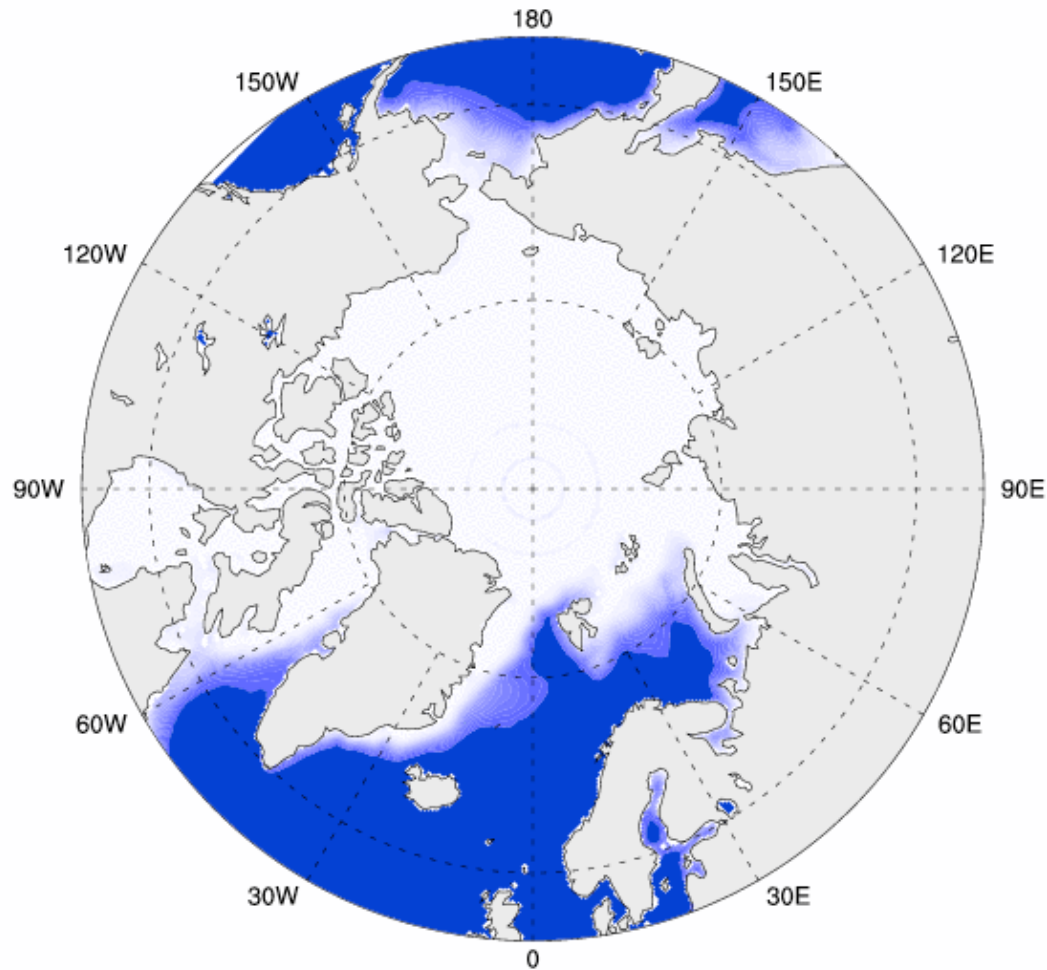
May to August Yamal 50-km sea ice time series shown for different weeks



- Shows how variable the ice can be around Yamal

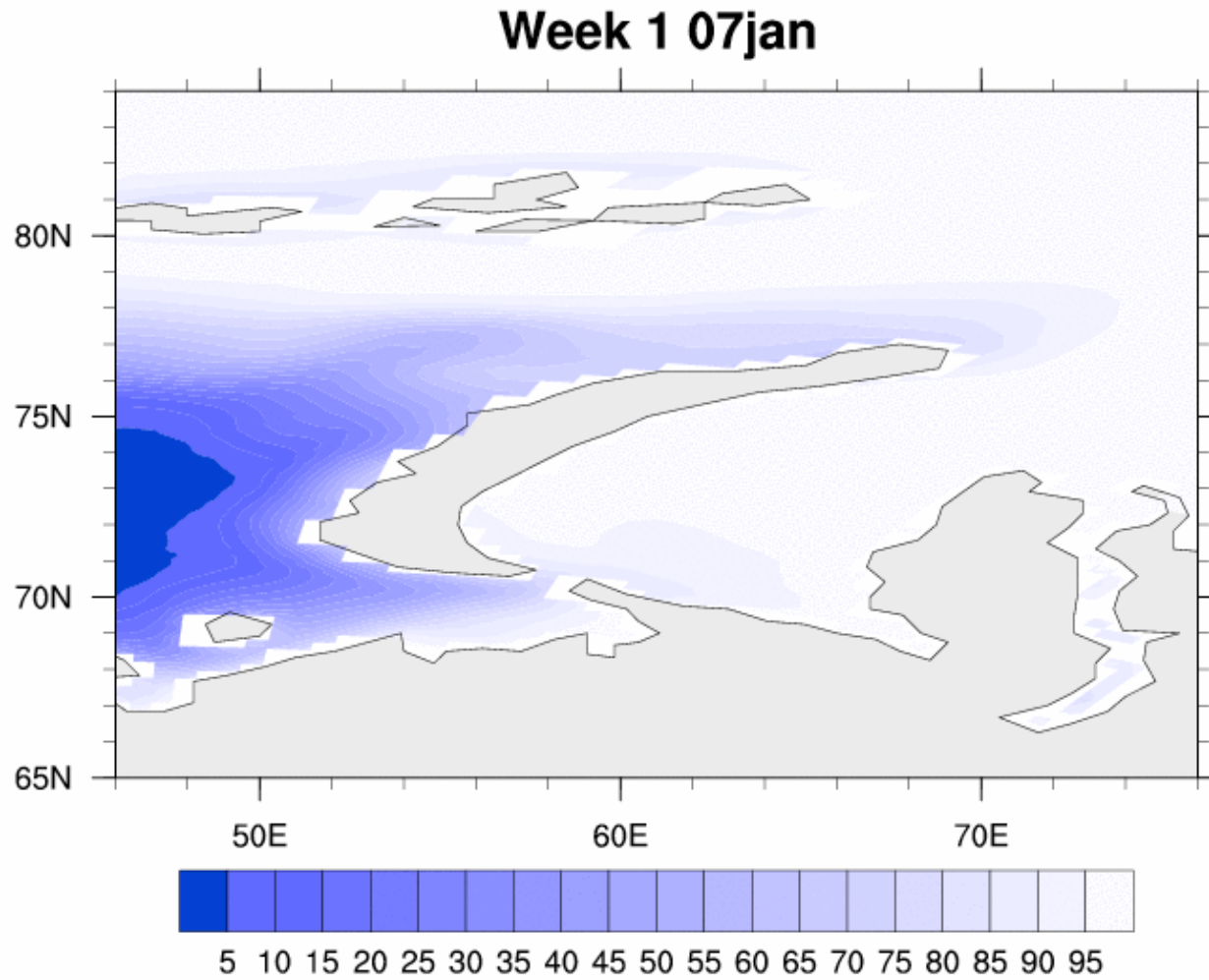
Sea ice Climatology Movie

Week 1 07jan

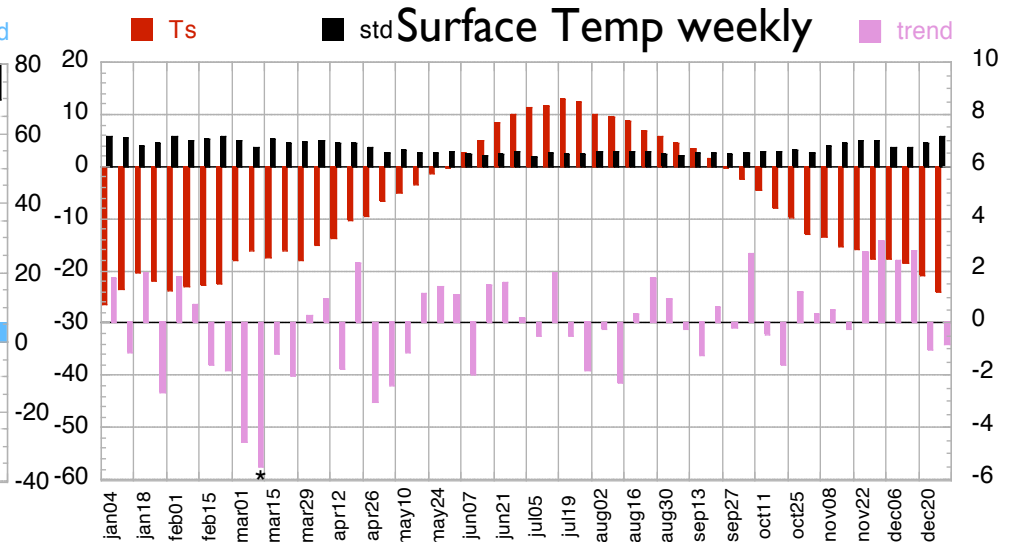
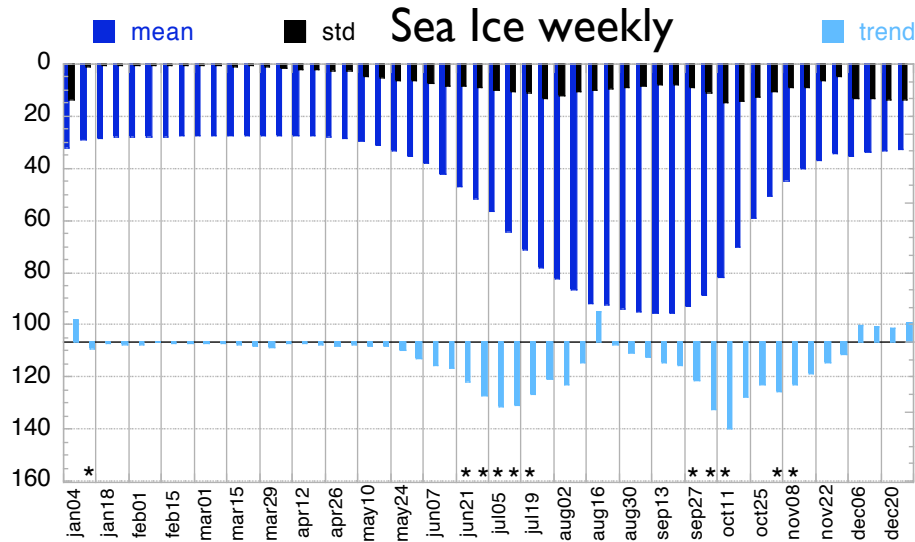


5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95

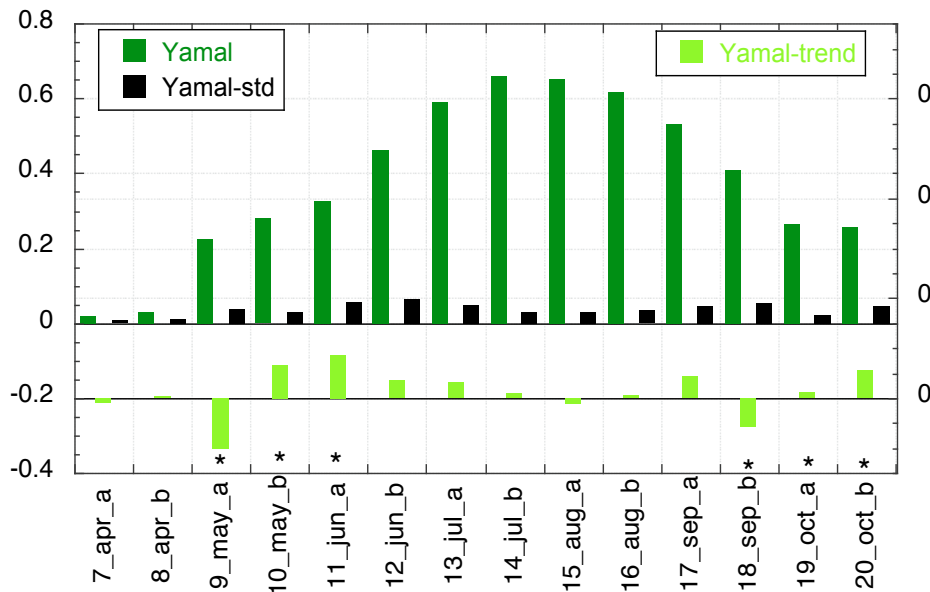
Yamal Sea ice Climatology Movie



Yamal Weekly Climo & Trends

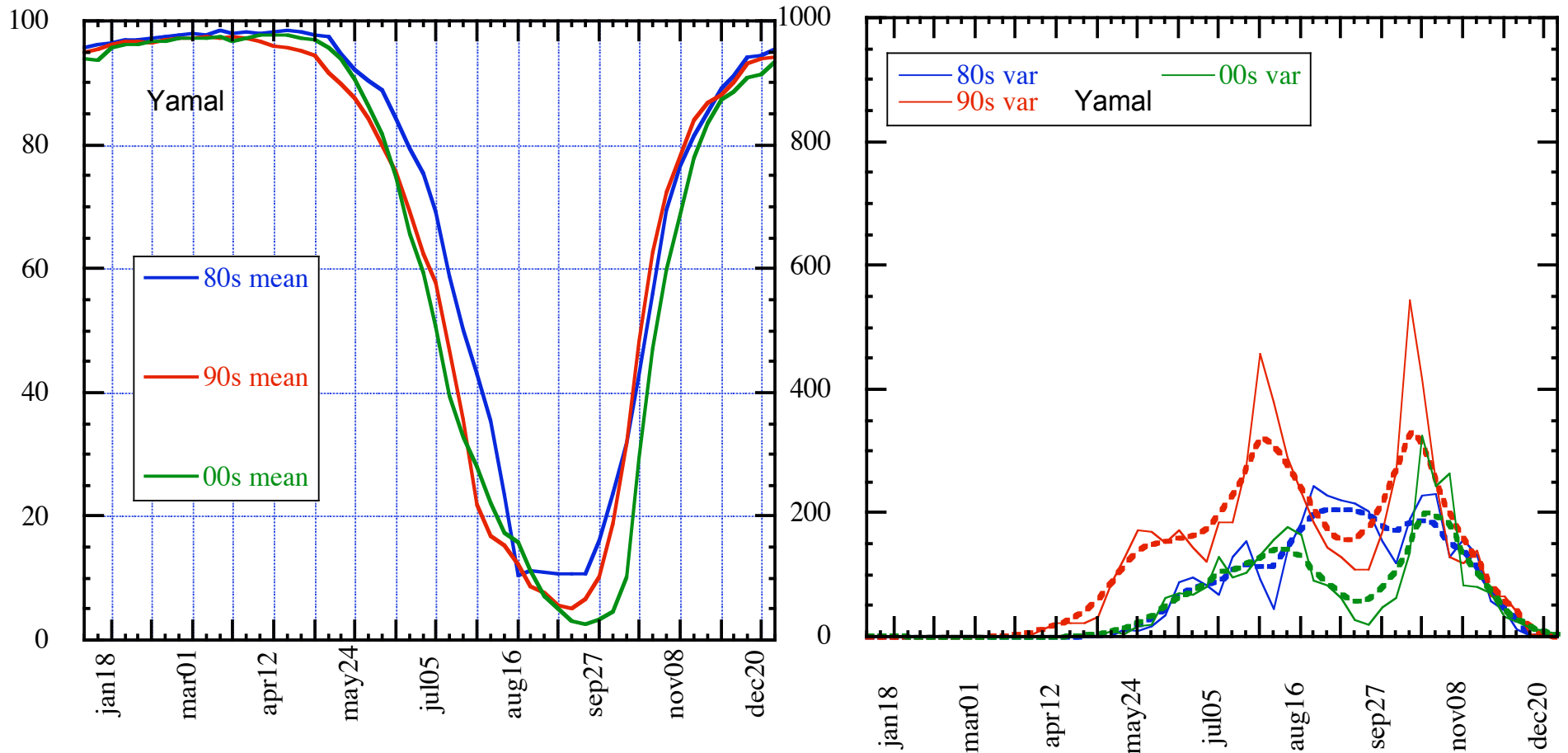


MaxNDVI Biweekly April-October



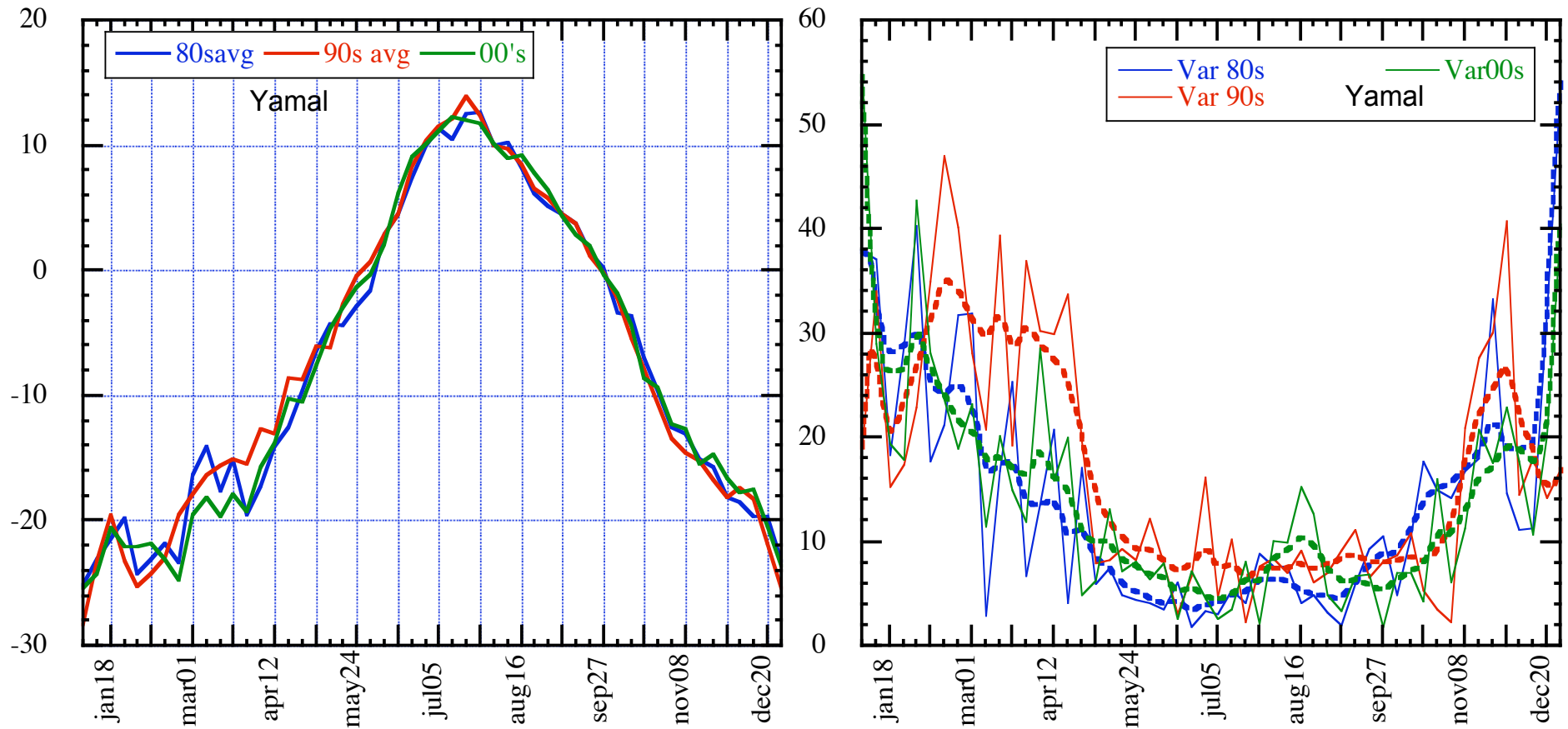
- Ice decreasing trends in spring and fall
- Ts - highly variable trends
- NDVI - mainly spring increase

Decadal sea ice Means and Variance



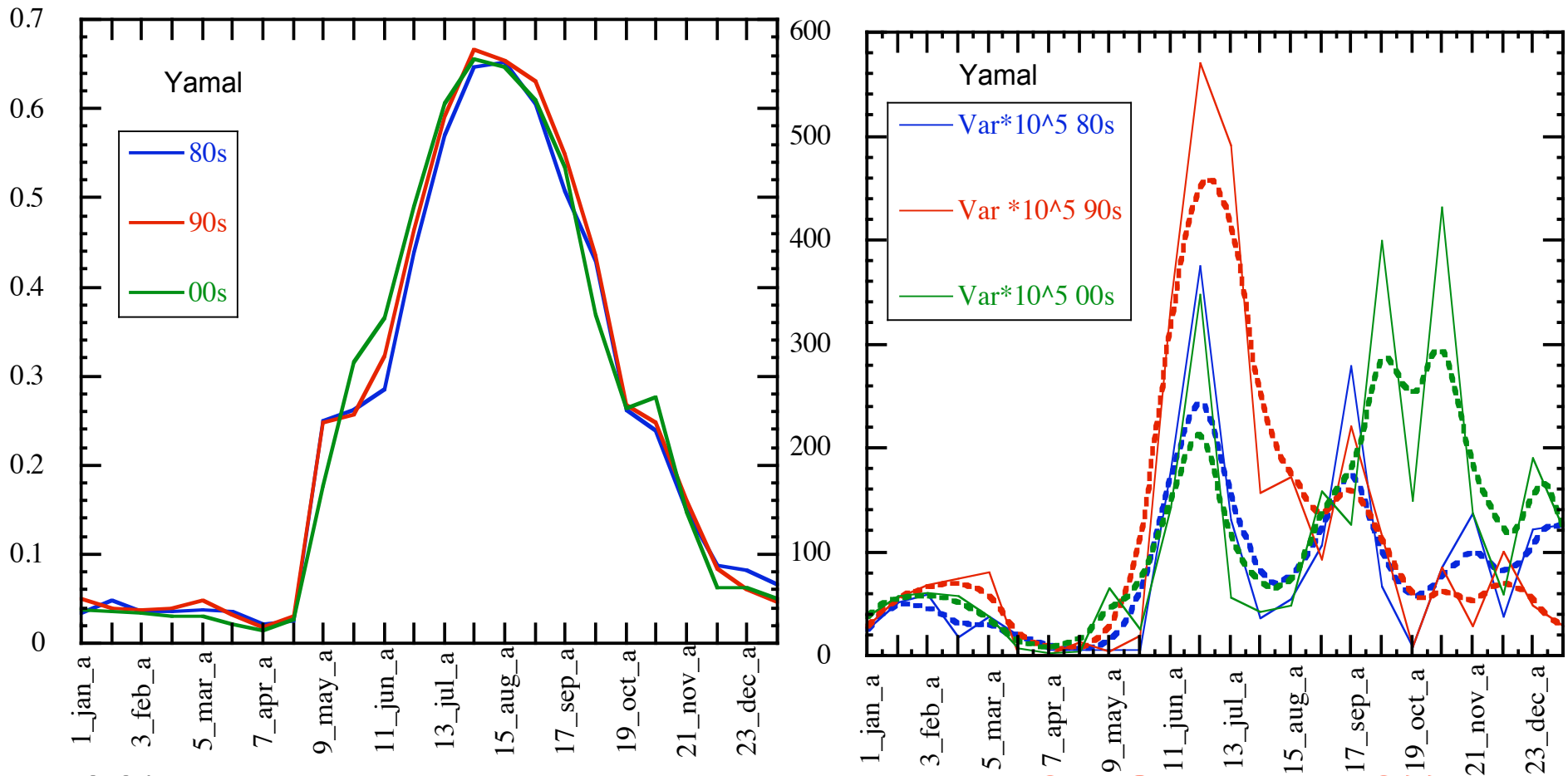
- 90's spring earlier & 00s spring earlier and fall later
- 90's variability was higher from Mar-Aug & Sep-Nov

Decadal T_s Means and Variance



- 90's spring was warmer
- 90's variability was higher from Feb-Jul

Decadal NDVI Means and Variance

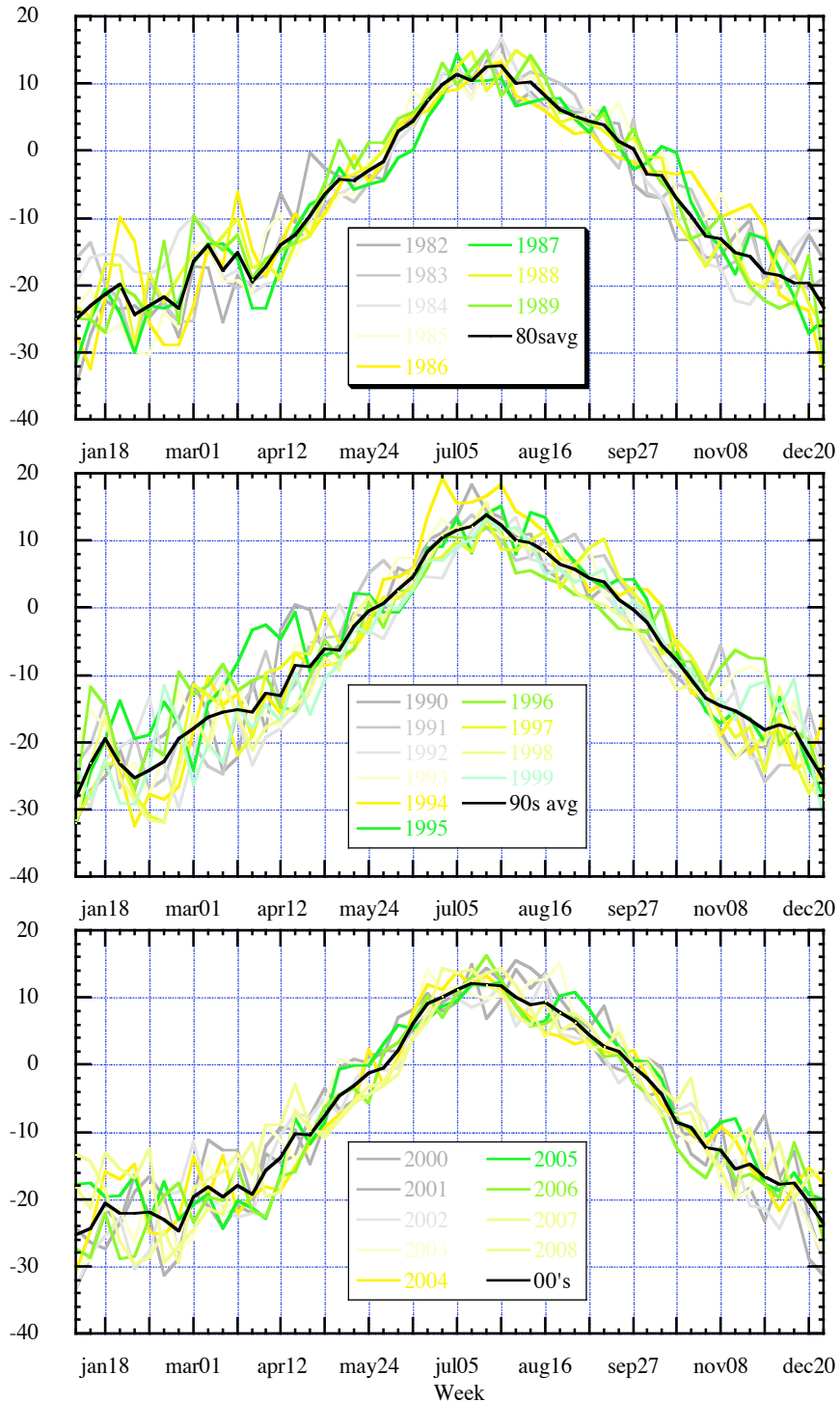


- 00's spring slightly earlier green up, **SHOULDERS??**
- 90's variability was higher from May-Aug

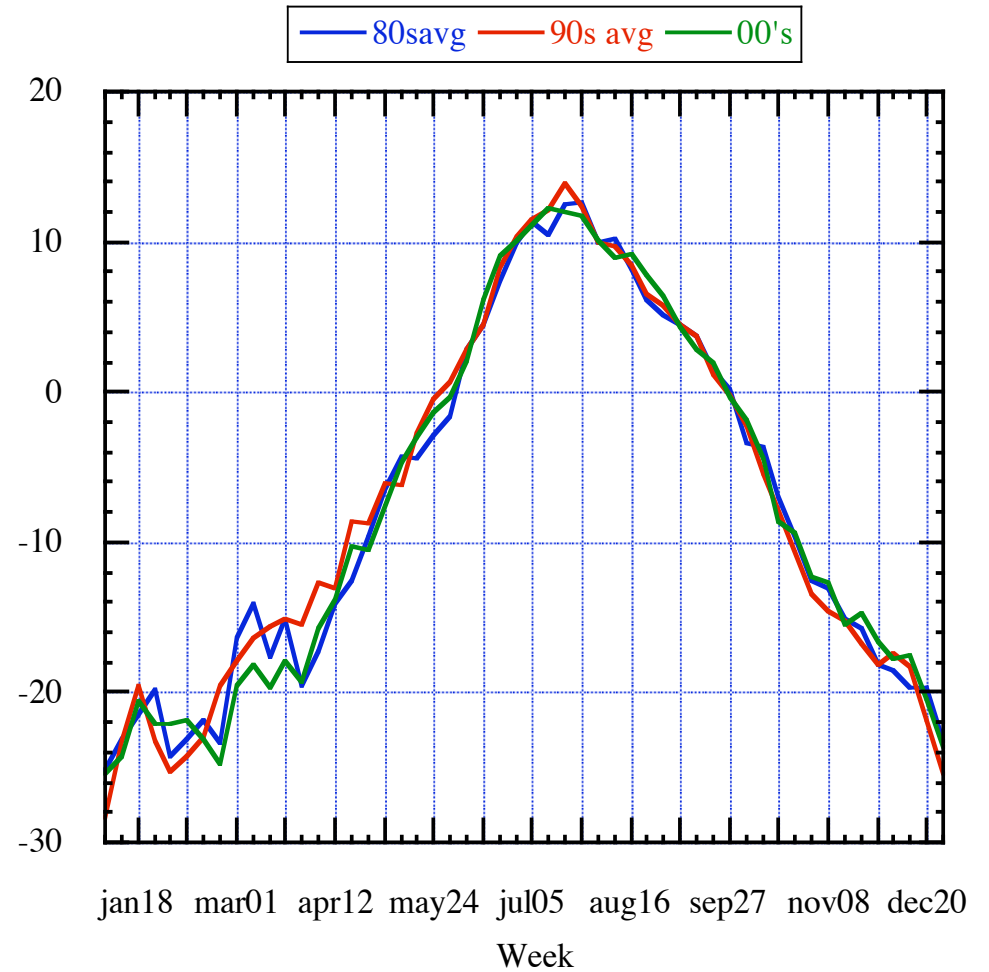
Conclusions

- Greening has not changed much on Yamal
- Land temperatures have warmed slightly in fall and even cooled in spring
- Ice show significant declines with earlier melt and later freeze up.
- On a weekly (biweekly) time scale the 1990s had the most variability (El Niño and Pinatubo?)
- NDVI shoulder value concerns

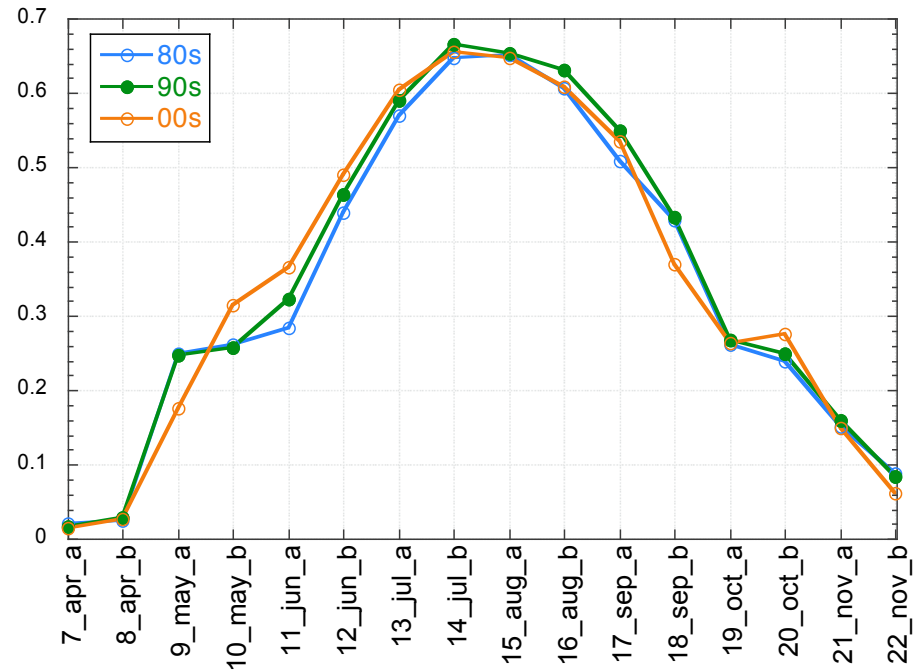
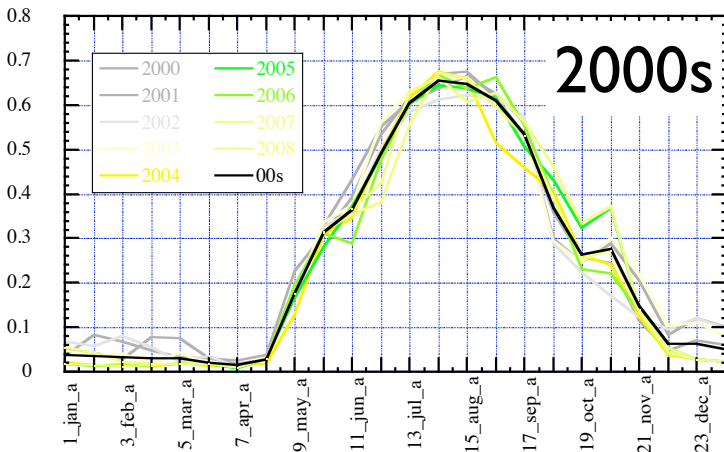
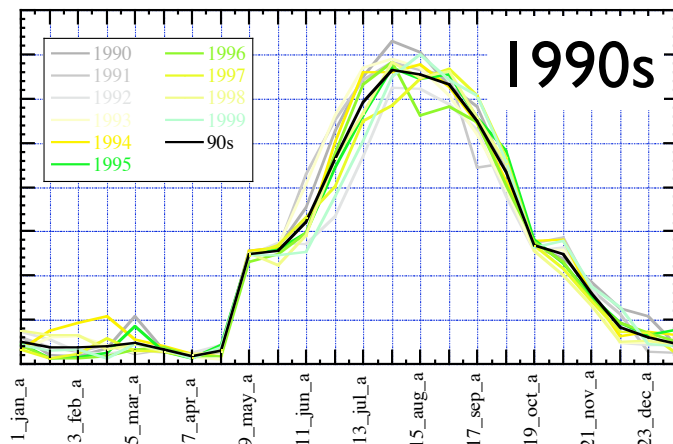
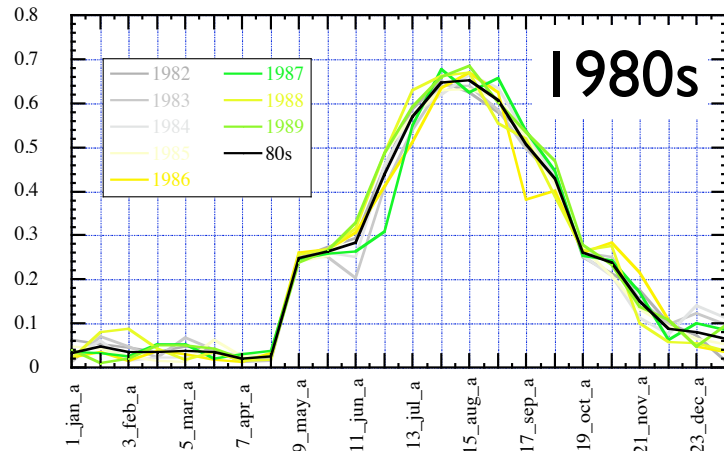
Yamal Seasonality Decadal Curves



Surface Temp weekly



Yamal Biweekly MaxNDVI decades



NDVIs blah blah blah

Yamal Weekly ice curves

