Overview of recent climate over South Korea

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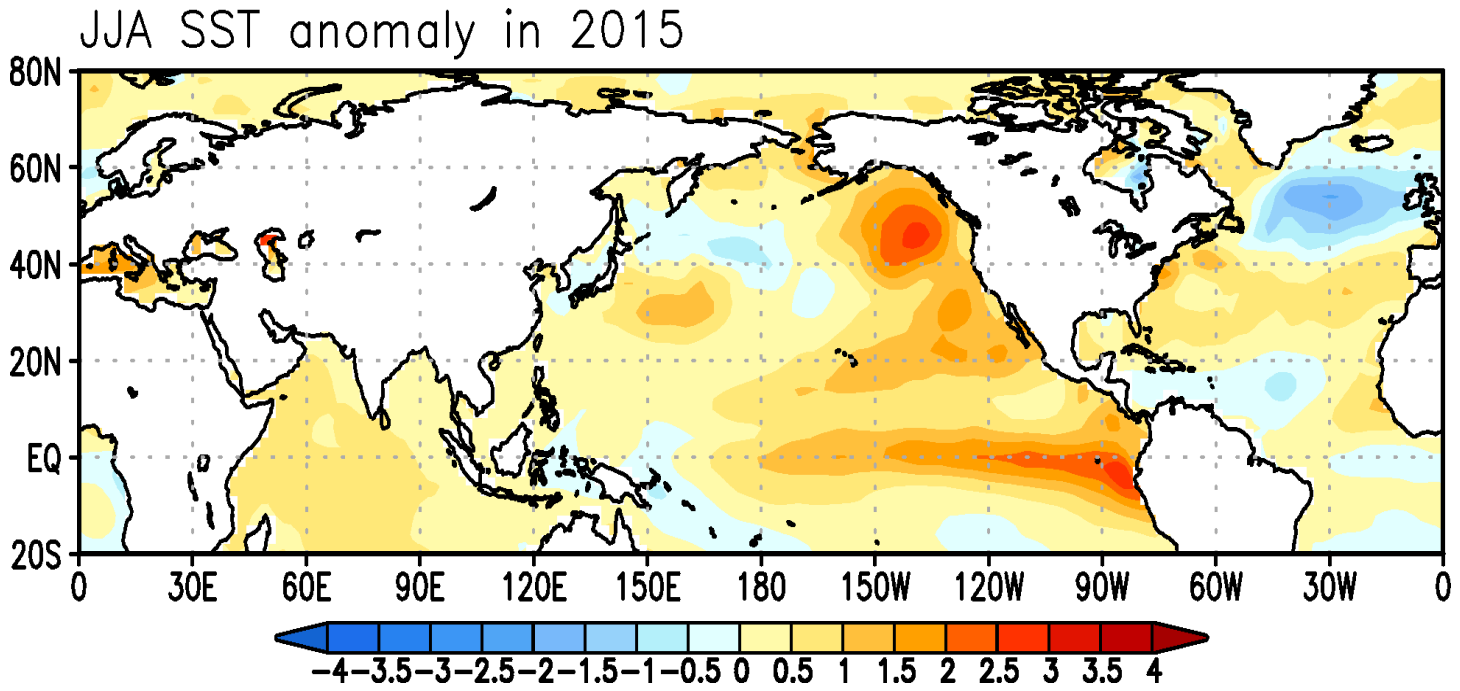
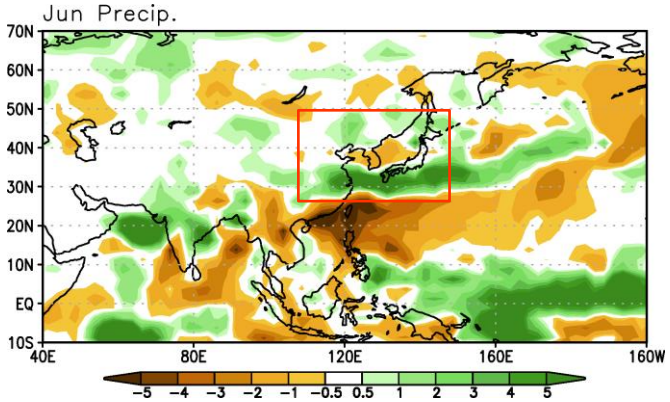
JJA SST anomalies in 2015



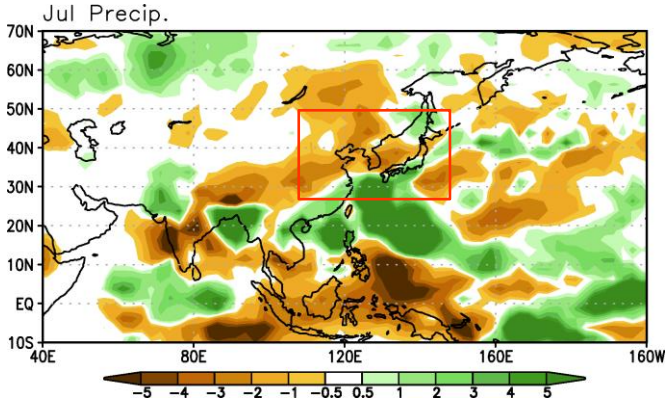
- ElNino ~ positive SST anomalies in the central-equatorial Pacific
- Warmer SST anomalies in the entire Indian Ocean
- Tripolar SST anomalies in the North Atlantic Ocean ~ +NAO

J-J-A Precipitation in 2015

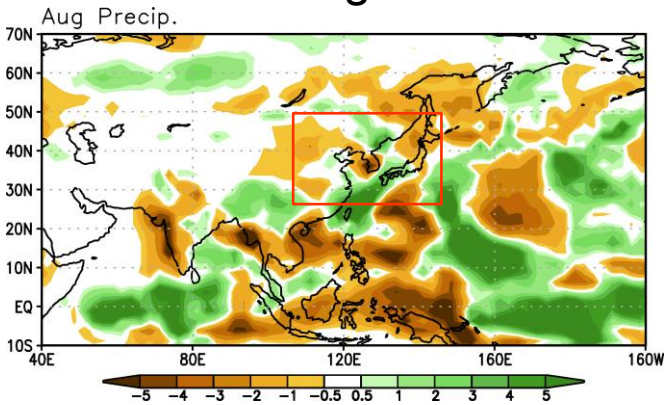
Jun



Jul

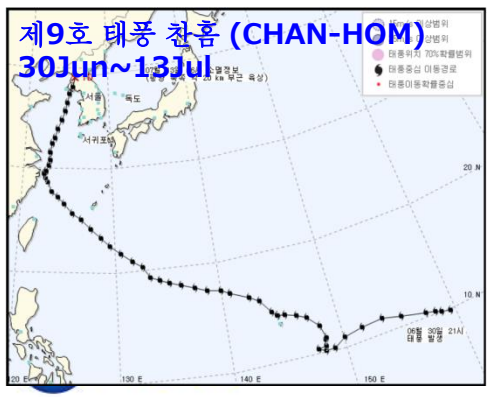


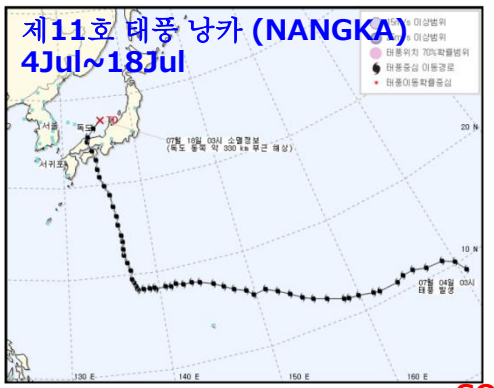
Aug

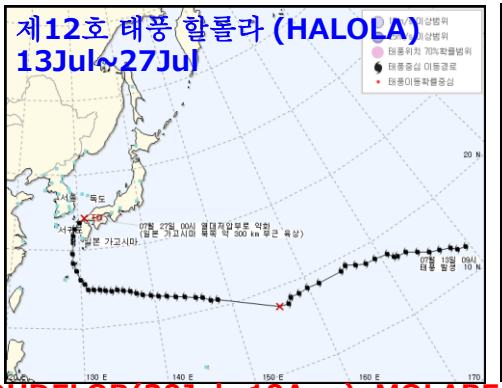


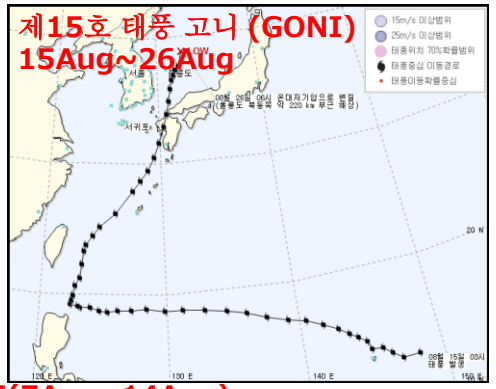
In the EA,

- Jun: tripolar rainfall pattern, strong Mei-yu band
- Jul: dipole rainfall pattern with dry area over the northern China/Korea and wet area over the western North Pacific
- Aug: dry rainfall centered on Korea peninsula





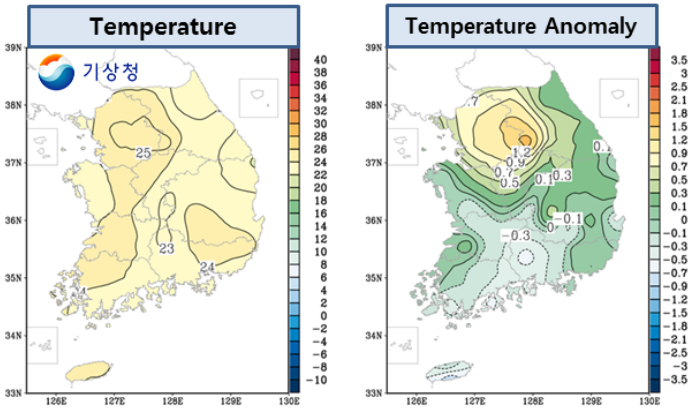


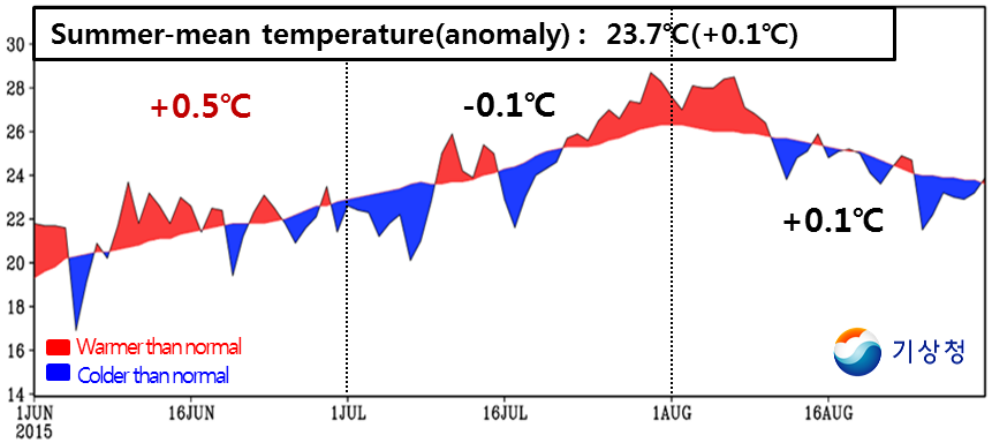


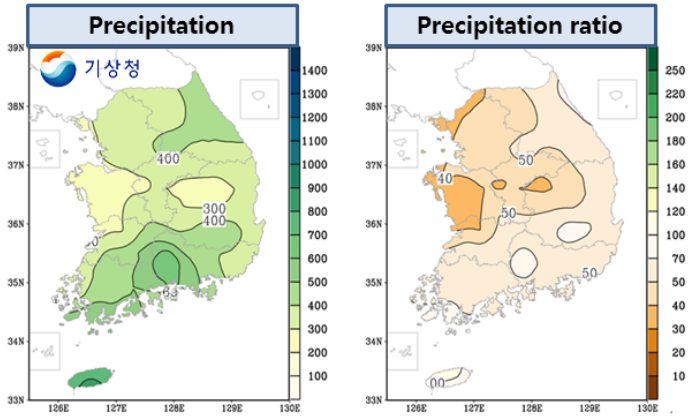
* LINFA(2Jul~10Jul)

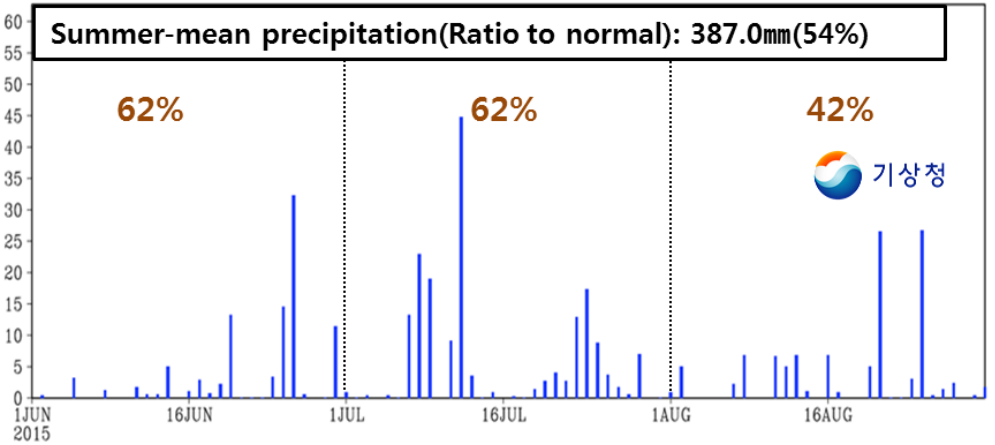
SOUDELOR(30Jul~10Aug), MOLABE(7Aug~14Aug), TSANI(15Aug~25Aug)

Temp. and precip. over South Korea



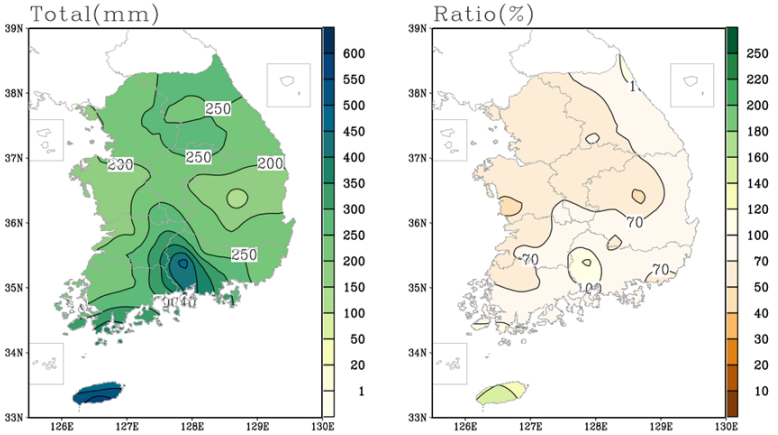






- Large intra-seasonal variability of temperature during summer
- Severe heat wave and tropical night during late June ~ early August
- Below normal rainfall during all three months of summer

2015 Changma Characteristics



< Precipitation(mm) and its ratio to normal(%) during Changma period(6.24～7.29) >

- Changma onset and retreat dates are similar to normal.
- Precipitation during Changma period is below normal.

< Rainy days and precipitation for Changma period in 2015, 2014, normal year >

	2015		2014		Normal (1981-2010)	
	Rainy days	Precipitation(㎜)	Rainy days	Precipitation(㎜)	Rainy days	Precipitation(㎜)
Central	18.5	220.9	12.9	145.4	17.2	366.4
Southern	16.7	254.1	15.7	145.9	17.1	348.6
Jeju	13.5	518.8	21.0	441.5	18.3	398.6
Korea	17.5	240.1	14.8	158.2	17.1	356.1

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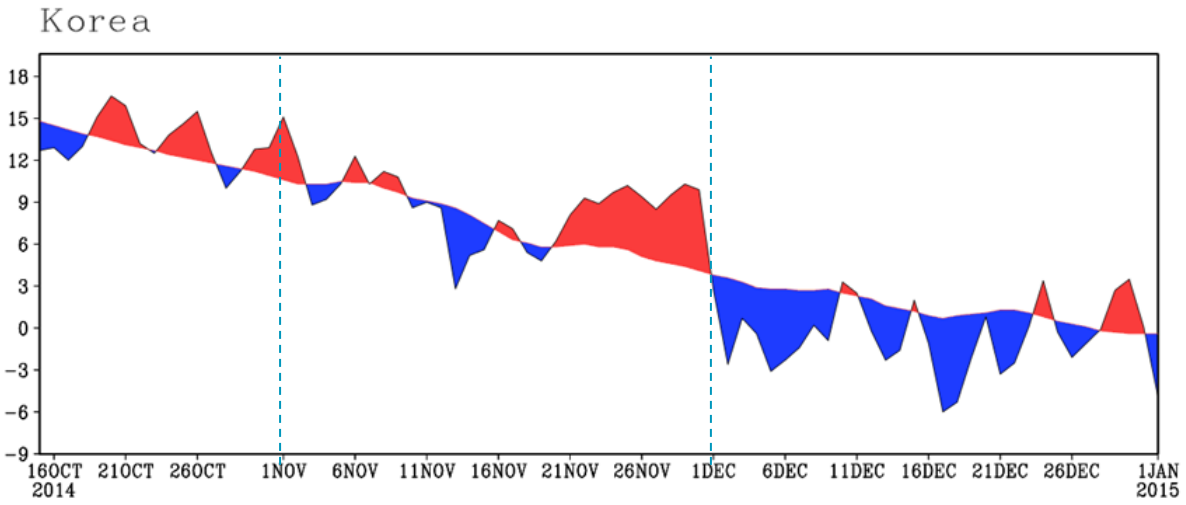
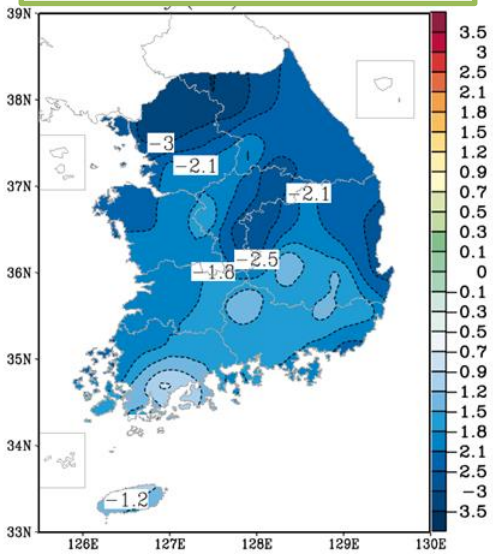
Temperature over South Korea in Dec 2014

Temperature



Temperature anomaly:-2.0℃



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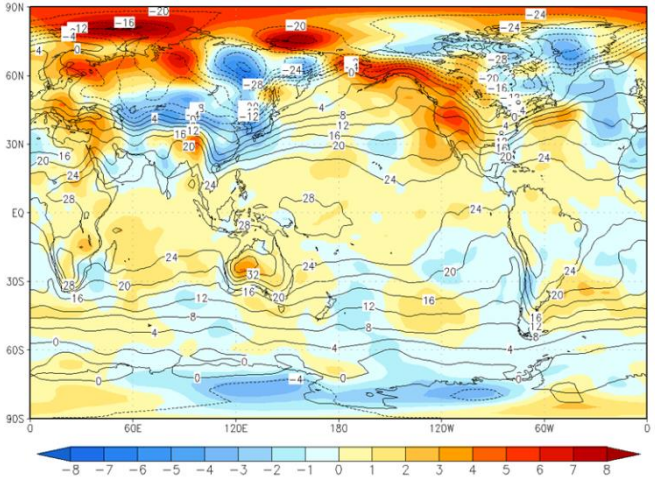
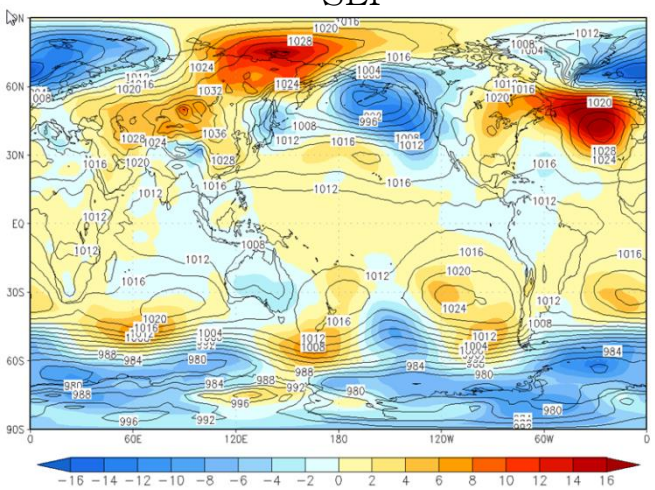
Circulation in Dec 2014

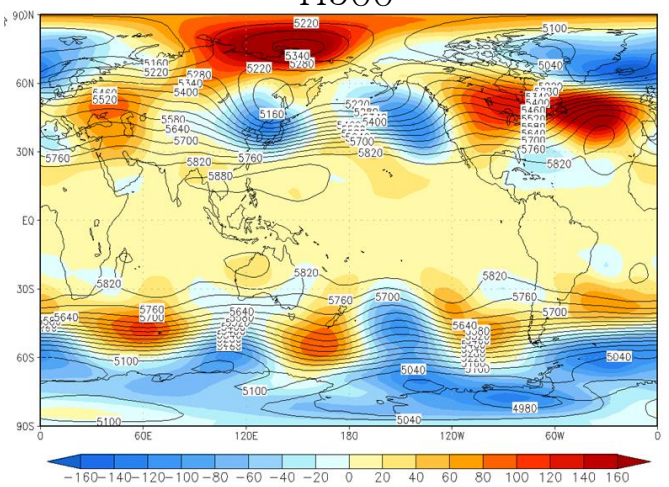
T2M



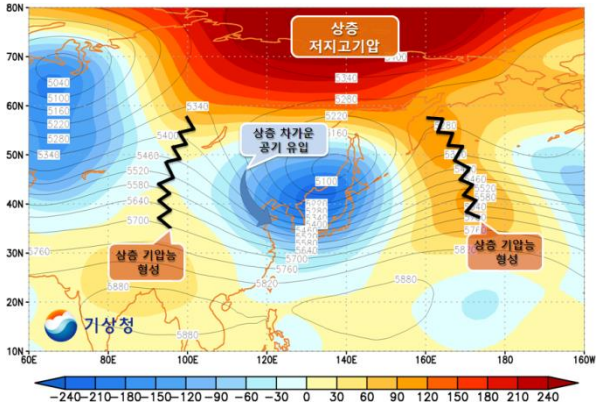
SLP



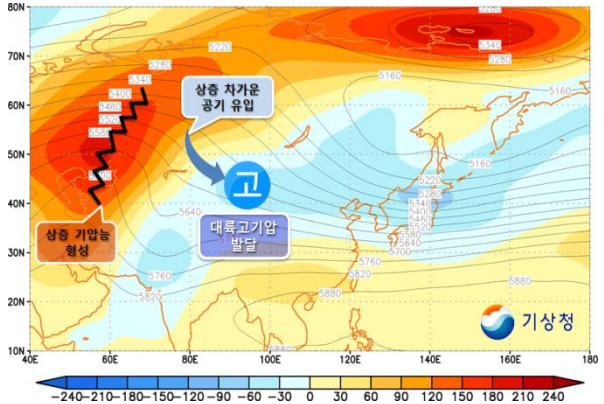
H500



1st week of Dec

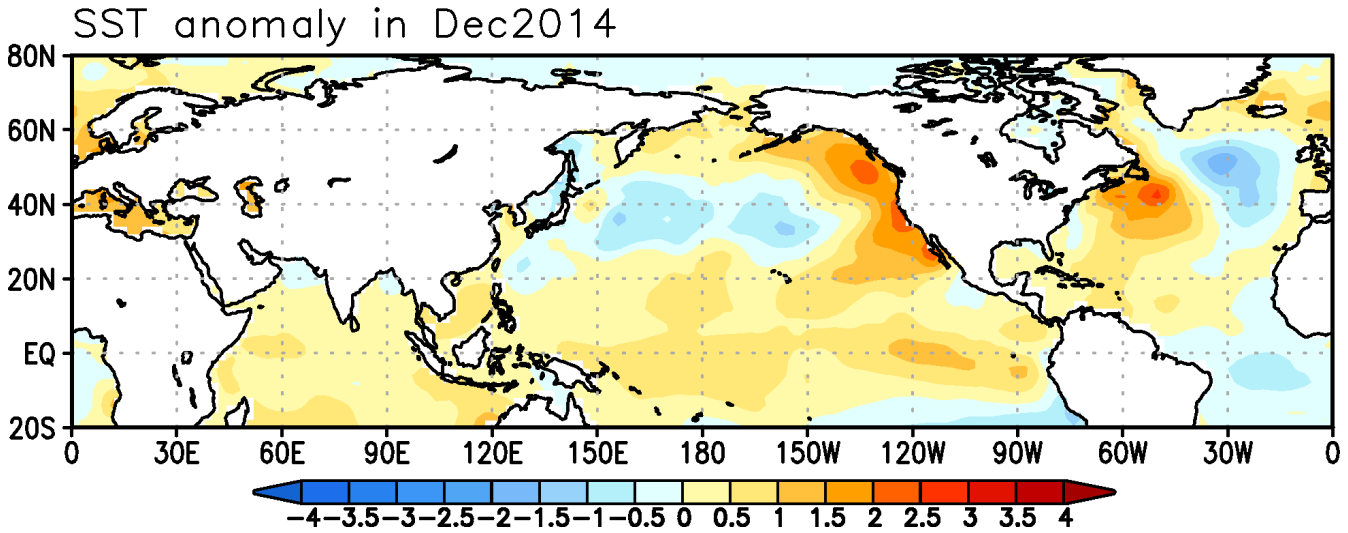


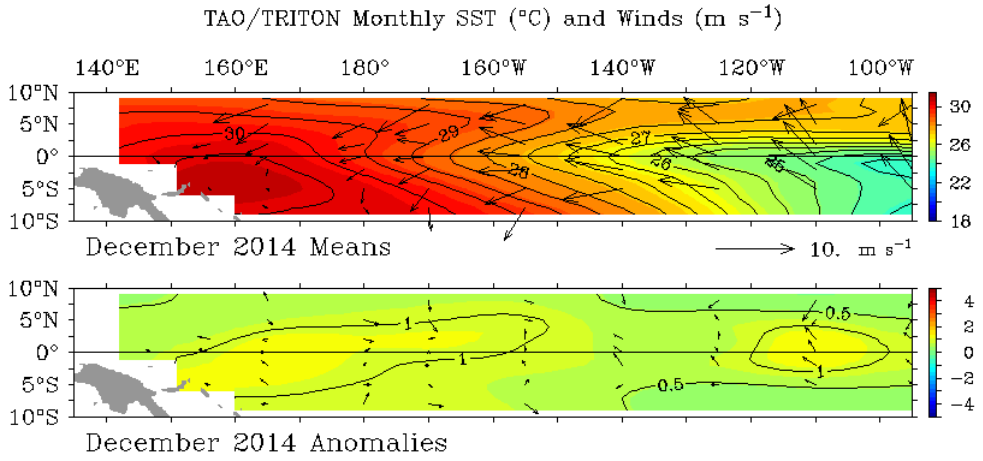
2nd week of Dec



< Geopotential height anomalies at 500hPa in (left) Dec 1~7 and (right) Dec 8~16 >

Potential factor (1) – SST





TAO Project/NOAA

- No SST gradient between tropical western and central-eastern Pacific
- Very weak westerly wind burst over the tropical western Pacific
- No air-sea coupling between atmosphere and ocean

Potential factor (2) – Snow cover

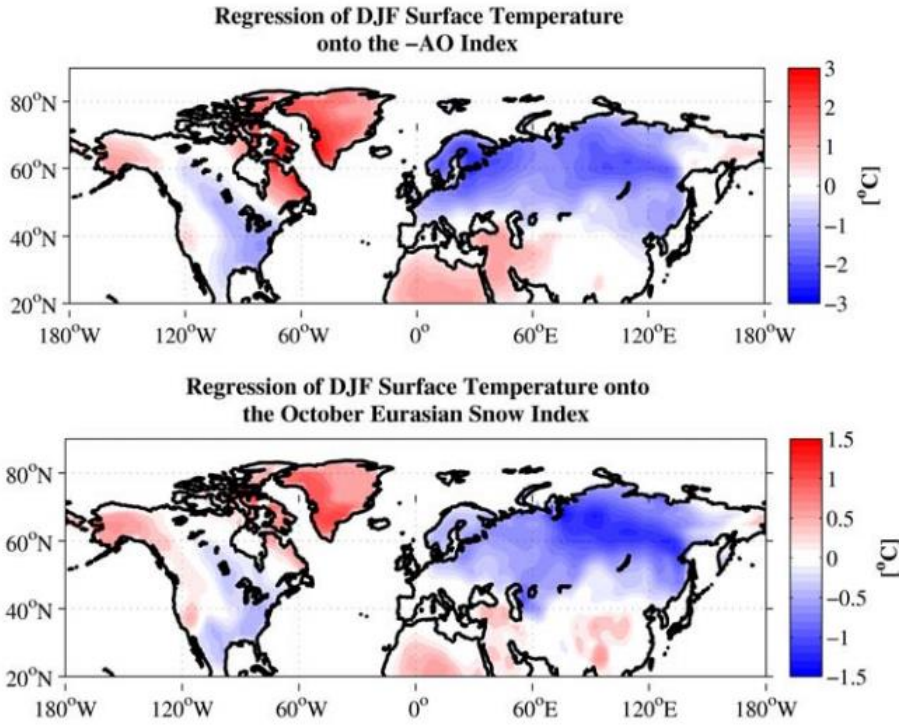
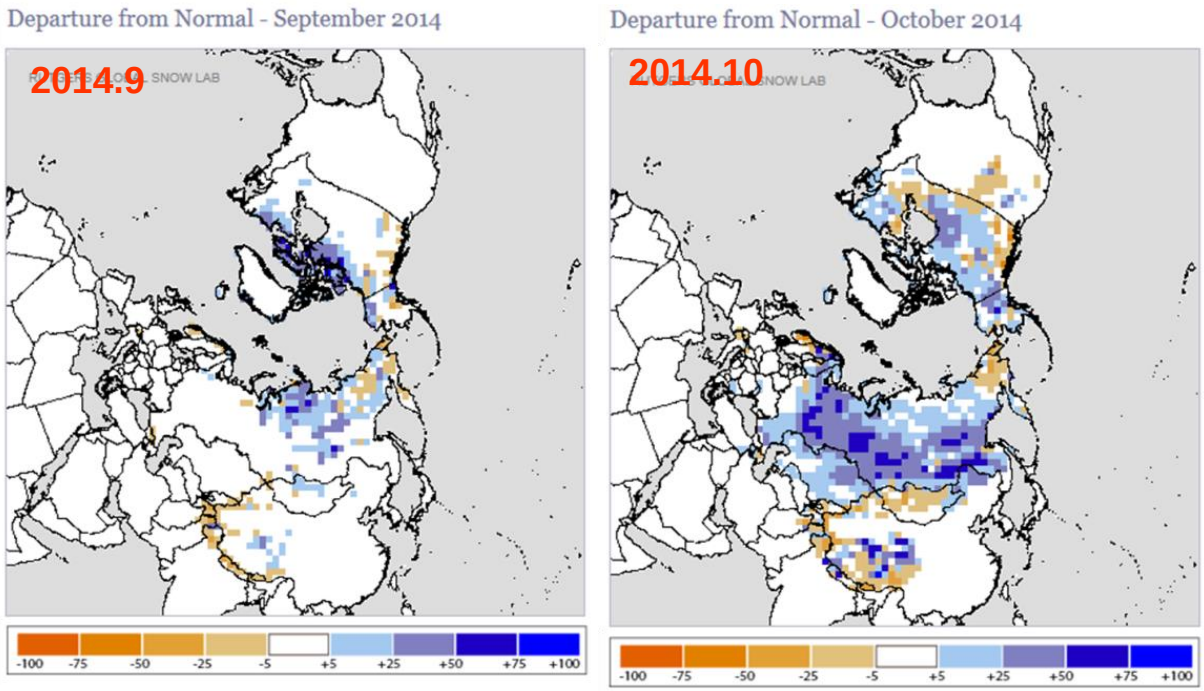


Fig. 1 a) Regression of DJF land surface temperatures from NCEP/NCAR reanalysis onto the standardized inverted DJF AO index (top). b) As in a) but for regression onto the standardized October Eurasian snow cover index (bottom). Units are in °C.

- Eurasian October snow cover anomalies correlated with DJF-mean surface temperature anomalies
  ~ AO pattern of variability
- October is the month snow cover makes its greatest advance, mostly across Siberia.
- Above normal of snow cover
  → a strengthened Siberian high and colder surface temperature across Northern Eurasia in the fall
  → a positive wave activity flux anomaly in the late fall and early winter → stratospheric warming and tropospheric negative AO in January

Cohen et al. 2011

Snow cover in Fall 2014



From Rutgers University-Global Snow Lab

- Snow arrived early over the NH continents in Fall 2014.
- NH rankings were 3rd most extensive in September and October since 1967.
- Eurasia ranking 2nd greatest in October

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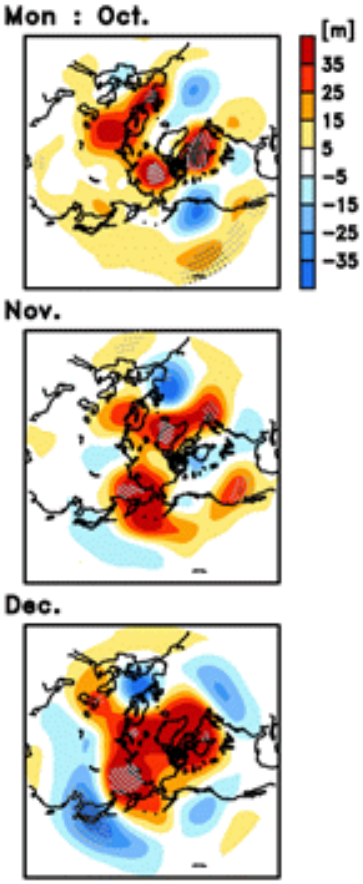
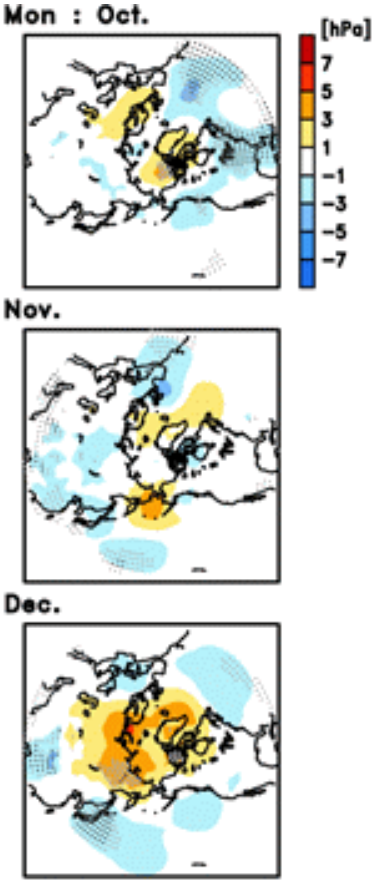
Potential factor (3) – Laptev Sea Ice

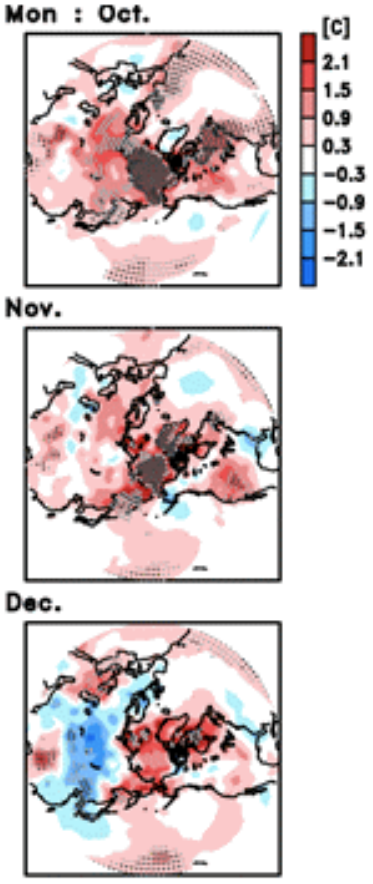
GPH at 500hPa

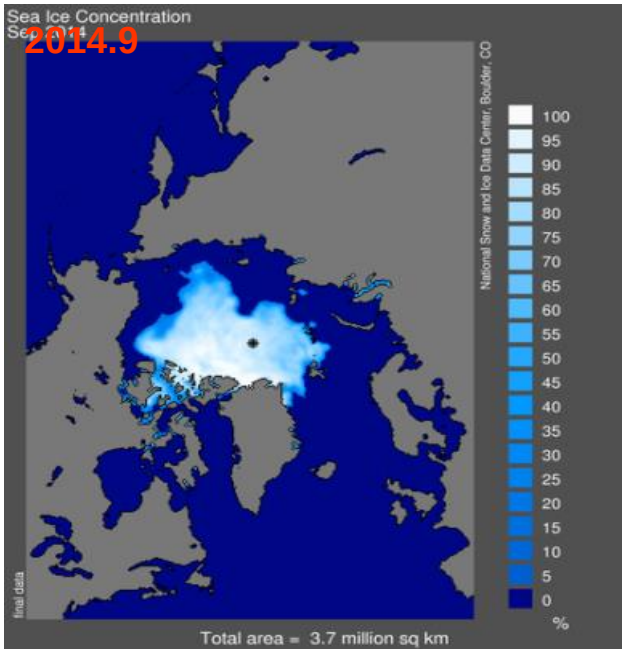


SLP



T2M





The composite maps of 500hPa-geopotential height, SLP, and T2M anomalies

When normalized time series of Sep-Oct mean sea ice concentration anomalies averaged over Laptev Sea is less than 0.75*sigma.

(year: 1995, 2005, 2006, 2007, 2009, 2011, 2012, 2014)

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감사합니다

Changma onset and retreat

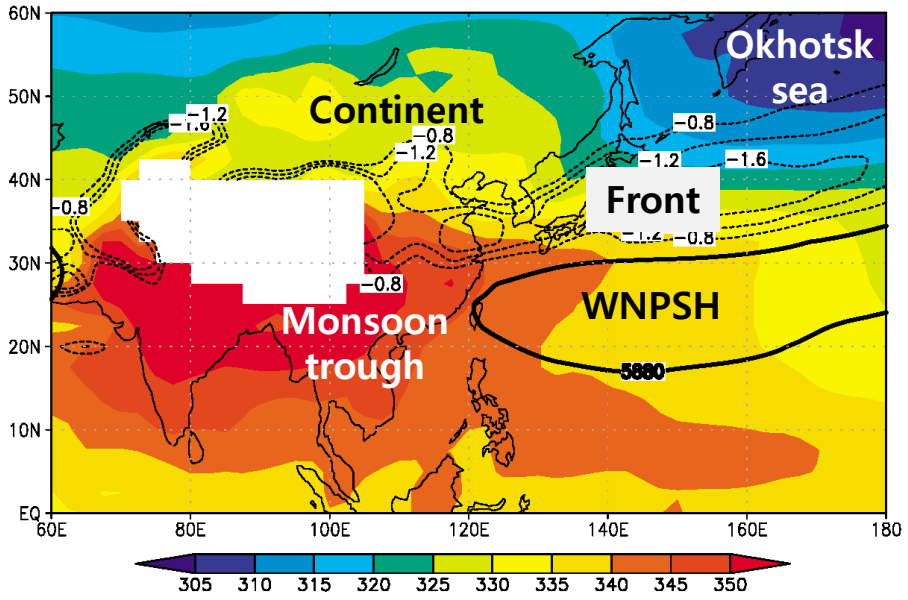
How to define Changma onset ?

- θ_e 355K line averaged over 122.5~135E > 32.5N and 3-day lasting
- 5850 gpm line averaged over 122.5~135E > 32.5N and 3-day lasting
- Minimum value(meridional gradient of θ_e) > 32.5N and 3-day lasting

How to define Changma retreat ?

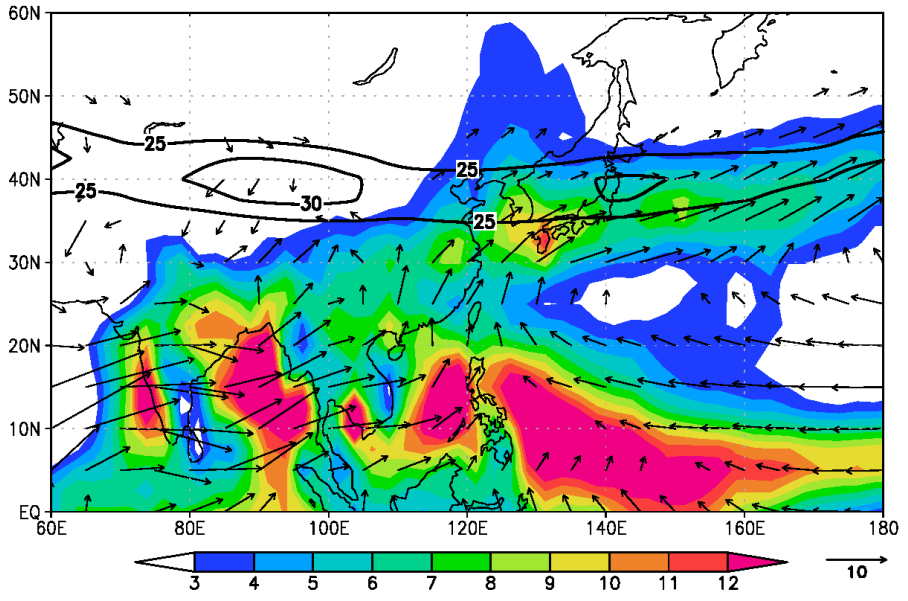
- Minimum value(meridional gradient of θ_e) > 42.5N and 2-day lasting
- Maximum value(meridional gradient of U200) > 42.5N and 2-day lasting

General characteristics during the Changma period



- EPT (color)
- Meridional gradient of EPT(dashed line)
- 5880 gpm (thick black line)

The climatological locations of front and air masses can be determined by EPT and its gradient.



- Precipitation (color)
- 200-hPa zonal wind (thick line)
- 850-hPa wind (vector)

Low level moisture flux and upper level Jet are important factors for Changma.

Prof. Seo's group