Some features of reconstructions in atmospheric circulation over the Asian-Pacific region in 2000-2006

Pacific Fisheries Research Centre (TINRO-centre), Vladivostok, Russia, 2006
General direction of the wind circulation over the Far East region in the different seasons

**The winter monsoon**

- Siberian High
- Aleutian Low

**The summer monsoon**

- Far East Low
- Hawaiian High

General direction of the wind circulation over the Far East region in the different seasons.
Charts of sea level atmospheric pressure, averaged for the “cold” and “warm” seasons, have been used.

Condition of the main Atmospheric Action Centers as well as direction and intensity of wind transfer over the each far East Seas were defined.
To estimate the intensity and direction of monsoon transfer over the Far East Seas, meridional Katz index of atmospheric circulation $I_m$ was calculated as a number of isobars crossing latitudes inside and on boundaries of the three areas (including the Bering, Okhotsk and Japan Seas), taken into account their orientation. The formula was used:

$$I_m = \frac{I_s - I_n}{N}$$

Where:
- $I_s$ – a number of the isobars orientated from the south to the north;
- $I_n$ – their number orientated from the north to the south.
- $N$ – a number of the crossed latitudes

Actually, $I_m > 0$ characterizes southern wind (summer monsoon), $I_m < 0$ characterizes northern wind (winter monsoon).

The meridional Katz indices were calculated for three marked areas including each of the Far East Seas.
Synoptic conditions over the Far East Seas in the cold seasons (October-March) 2000-2006

Direction of moving of the Aleutian Low in 2000-2006
Year-to-year variability of a meridional Katz index (Im) (as indicator of a winter monsoon) in the Far East Seas in the cold seasons 2000-2006

Direction of moving of the Aleutian Low in 2000-2006

Synoptic situation over the Far East Seas in the cold season 2005/2006
Synoptic conditions over the Far East Seas in the warm (April-September) seasons 2000-2006

Direction of moving of the Far East Low in 2000-2006
Year-to-year variability of a meridional Katz’s index (Im) (as indicator of a summer monsoon) in the Far East Seas in the warm seasons 2000-2006

- **Bering Sea**

- **Sea of Okhotsk**

- **Japan Sea**

Direction of moving of the Far East Low in 2000-2006
Direction of moving of the summer and winter Atmosphere Action Centers in 2000-2006

- Far-Eastern Low (summer) in 2003
- Aleutian Low (winter) in 2003/04
Year-to-year variability of ice cover (%) (from Ustinova et al., 2004) in the Far East Seas in 2000-2006.
Intensity of the “summer wind transfer”

Bering Sea

Sea of Okhotsk

Japan Sea

Intensity of the “northern wind transfer”

Bering Sea

Sea of Okhotsk

Japan Sea
What will be a climatic regime in the Far East Seas the nearest years?
Generalized synoptic situations appropriate to certain types of atmospheric processes over the Japan, Okhotsk and Bering Seas (after Glebova, 1999; 2001)

The charts of surface pressure, averaged for 10-days, were used for classification of the atmospheric processes.
Synoptic situations leading to formation of the different types of atmospheric processes over the Far East Seas

The winter “cold” types

The winter “warm” types

The summer “monsoon” types

Year-to-year variability of the repeatability of the atmospheric types (quantity of the 10-days periods for year)
Total repeatability (per year) of the winter atmospheric processes causing strengthening (“cold” types) and easing (“warm” types) of northern monsoon over the Far East Seas

The “cold” atmospheric types

The “warm” atmospheric types

The summer “monsoon” types

Japan Sea

Sea of Okhotsk

Bering Sea

Japan Sea

Sea of Okhotsk

Bering Sea
Real and expected repeatability of the winter (A) and spring-summer “monsoon” (B) atmospheric types over the Far East Seas in 2000-2009
Conclusion

Wind transfer dependence on conditions of seasonal Atmospheric Action Centers is determined for Far East region.

When the Aleutian Low moves toward the West, intensity of winter monsoon decreases. Displacement of the Far East Low toward the East usually causes strengthening of southern wind transfer over the Far East Seas.

When these processes occur, a climate becomes warmer in the Far East region.

The latest this situation was in 2003-2005.

Since 2005, the both Atmospheric Action Centers began an opposite movement. Possibly, these changes in atmospheric regime are harbingers of cooling in the Far East region in the nearest future.
Thank for attention