

GC34A-05 Trend and interannual variability of summer precipitation and the atmospheric water vapor convergence in the Arctic circumpolar region

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This study investigated trend and interannual variability of summer (June, July and August) precipitation and the atmospheric water vapor convergence in the Arctic circumpolar region, with an emphasis on recent increase of those around the Lena river basin in eastern Siberia. Data used in this study are an archived precipitation data (PREC/L) and atmospheric re-analysis data (JRA-25, JRA-55). Previous studies have revealed a negative correlation in the summer atmospheric circulation pattern between the Lena and Ob river basins. However little is known about the atmospheric water cycles in the Arctic circumpolar region, including the Mackenzie river basin. Hence we compared the trend and interannual variability of summer precipitation and the atmospheric water vapor convergence in three large North Eurasian river (Lena, Yenisei, and Ob) basins together with the Mackenzie basin. The analyzed results are as follows.

- 1) In the highest five-year summer precipitation in the Lena river basin during the period 1958 to 2012, the center of the cyclonic circulation shifted to the east, from the Kara and Barents Seas over the region across the Yenisei and Lena. In the years, significant cyclonic deviation was present. The deviation distribution of the height field and the atmospheric water vapor flux from the west to the Lena river basin were significantly increased, so as to form a positive deviation of summer precipitation.
- 2) Significant increases (positive trend) in the summer precipitation were detected from 1984 to 2011 in the Lena, Yenisei, and the Mackenzie river basins. However, summer precipitation showed significant decreases (negative trend) over Mongolia and Europe/Russia. This was because anticyclones dominated in these regions.
- 3) A significant enhancement of cyclonic circulation was detected from 2005 to 2008 on the Eurasian side of the Arctic Ocean. However, anticyclones appeared over Mongolia. These probably increased the atmospheric water vapor convergence over the Lena river basin in this period.
- 4) A significant positive correlation in the summer precipitation appeared from around 1995 to 2005 between the Lena and Yenisei river basins. On the contrary, the negative correlation between the Lena and Ob river basins became unclear from 1993.

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