



## On the relationship between sea ice albedo and atmospheric precipitable water in the Arctic Polar Cell

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In recent years, the **Arctic sea ice** melting condition has become a main research topic in the global warming issue. Sea ice in the Arctic is so sensitive to climate warming that it can regulate the amount of solar insolation absorbed by the earth and the exchanges of momentum, heat, and chemical constituents between the atmosphere and the ocean. According to previous studies, both the phenomenon of **positive sea ice albedo feedback** and the **atmospheric precipitable water** are important factors to affect climate in the Arctic region. Monitoring the changes of sea ice, the ice albedo and the atmospheric precipitable water in the Arctic are useful to comprehend the causation of climate change. In this study, the satellite measurements of specific humidity, air temperature, sea surface pressure, ground atmospheric pressure, and sea surface temperature are used to analyze the environment changes in Arctic between latitude 60N and 90N from 1997 to 2007. The main purpose is to improve our knowledge on the relationship between sea ice albedo and atmospheric precipitable water and how the ice albedo affects the distribution of precipitable water in the Arctic Polar Cell. Results show that in different seasons, when positive sea ice albedo feedback is active, precipitable water in both marine and terrestrial areas are significantly increased in the summer. Also, it is demonstrated that precipitable water has an increasing trend in marine region in winter due to the positive sea ice albedo feedback. However, precipitable water in the Scandinavia and the Rocky Mountains is less than in the period of before positive sea ice albedo feedback is prevailing. A possible cause is in that an Arctic oscillation (AO) system was in the negative phase at this stage, resulting in cold air southward and taking away atmospheric water vapor. In summary, positive sea ice albedo feedback has significantly affected the sea ice area, temperature and precipitable water in the Arctic Polar Cell. With the impact of climate warming in recent years and its possible consequence of weather extremes, the relationship between sea ice albedo and atmospheric precipitable water in the Arctic Polar Cell deserves more attention.

**Keywords:** Arctic sea ice, positive sea ice albedo feedback, atmospheric precipitable water