Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

AHW25-03 Room:414 Time:May 2 09:30-09:45

Water vapor origins in all over Japan in winter simulated by the regional isotope circulation model

TANOUE, Masahiro[1*] ; ICHIYANAGI, Kimpei[1] ; YOSHIMURA, Kei[2] ; SHIMADA, Jun[1]

[1]Graduate School of Science and Technology, Kumamoto University, [2]Atmosphere and Sea Research Institute and Institute of Industrial Science, University of Tokyo

In this paper, water vapor origins in all over Japan in winter were simulated by using a regional isotope circulation model with stable isotopes in water (δ^{18}O and δD). Precipitation and stable isotopes were simulated for the period between December to February in 2001 — 2010, spatial distributions of them were reproduced observations well. Simulated daily sea-level pressure patterns were divided into two types: winter monsoon (WM) type and extratropical cyclone (EC) type. In the WM type, precipitation rate was high and low along the Japan Sea side and the Pacific Ocean side, respectively. Spatial distribution of δ^{18}O in precipitation was recognized the latitude effect (values decrease with increasing latitude) on the Pacific Ocean and the Japan Sea. Spatial distributions of d-excess (=δD-8$\times\delta^{18}$O) in precipitation and evaporation were above 16 ‰ around Japan, those were extreme high (above 22 ‰) especially on the Pacific Ocean and the Japan Sea. Simulated water vapor evaporated from the Japan Sea was predominant in all over Japan in the WM type without southwestern islands of Japan. Interestingly, a portion of this moisture moved eastward to the Pacific Ocean, however, the moisture was not contributed to total amount of precipitation along the Pacific Ocean side because it was little precipitation. In contrast, precipitation rate was high in all over Japan in the EC type. Spatial distribution of δ^{18}O in precipitation was recognized the latitude effect on the Pacific Ocean and the Japan Sea and the amount effect (values decrease with increasing precipitation amount) across Japan. Spatial distributions of d-excess in precipitation and evaporation were below 14 ‰ around Japan without the western part of the East China Sea. Simulated water vapor evaporated from the Pacific Ocean was predominant in all over Japan. Comparing δ^{18}O and d-excess in precipitation between the WM type and the EC type, those were 2 ‰ and 8 ‰ higher along the Japan Sea side in the WM type than in the EC type, respectively.

Keywords: stable isotopes in precipitation, water vapor origins, regional isotope circulation model, in all over Japan