

Balloon-borne observations of lower stratospheric water vapor at the Antarctic Syowa Station

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A variation of water vapor in the lower stratosphere has a large radiative forcing. It is considered that increase and decrease of lower stratospheric water vapor before and after 2000, respectively, altered the surface temperature trend by up to 30% in each period. However, since the water vapor content abruptly changes with height around the tropopause, it is hard to capture its variation exactly by satellite observations with a low vertical resolution. Many in-situ (i.e., balloon-borne and aircraft) observations with a high vertical resolution have been performed in low and middle latitudes, but few in the polar region. At the Antarctic Syowa Station (69.0S, 39.6E), three balloon-borne cryogenic frost-point hygrometer observations were performed in 2013 by the 54th Japanese Antarctic Research Expedition (JARE54), so that high precision and high vertical resolution data up to about a 25km altitude were obtained successfully. In this paper, a preliminary result of these observations is presented, and it will be discussed how important it is to continue the water vapor observation at Syowa Station.

Keywords: water vapor, sonde, Antarctic, lower stratosphere