The intermittency of gravity waves momentum fluxes in the Antarctic troposphere and lower stratosphere revealed by the PANSY radar observation

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It is known that the momentum fluxes associated with gravity waves (GWs) significantly vary both in time and space. The intermittency can largely affect the vertical profile of momentum flux convergences (i.e., wave forcing to the mean wind) in the middle atmosphere and hence the mean momentum flux values are not sufficient to determine the momentum deposition by GWs. Recent observations with high time resolution enable us to make an analysis of momentum flux characteristics in term of the intermittency (*e.g., Herzog et al., 2012*). In this study, the long-duration observation data with high time and vertical resolution and good accuracy from the PANSY radar at Syowa station (69.0°S, 39.0°E), which is the largest MST (Mesosphere-Stratosphere-Troposphere) radar in the Antarctic, are used to study the intermittency of GWs in the Antarctic troposphere and lower stratosphere.

A parameter to describe the intermittency quantitatively is the Gini coefficient I_g (*e.g., Plougonven et al., 2013; Alexander et al., 2016*). In all seasons, the I_g is large (0.6–0.7) in the troposphere, while it is small (0.3–0.5) in the stratosphere. This means that the intermittency in the stratosphere is lower than in the troposphere. *Alexander et al.* (2016) estimated using simulation data from a GW-permitting GCM which contains no GW parameterizations (*Watanabe et al.,* 2008) that I_g in the lowermost stratosphere over the coastal region of the Antarctica are 0.5–0.6. The mean value of Gini-coefficient obtained in this study roughly accords with that by *Alexander et al.* (2016) but is slightly smaller. The seasonal variation of the intermittency is also seen. In June and July 2016, I_g is quite small (0.3–0.4) in the stratosphere and the region with small I_g extends to the upper troposphere, while the mean I_g is 0.4–0.5 in October 2015 to September 2016 except for June and July 2016. It is also worth noting that the intermittency of GWs in the troposphere is largely affected by strong disturbances which occur several times a year. This result means that the intermittency of GWs varies greatly year to year.