**Japan Geoscience Union Meeting 2010**
(May 23-28 2010 at Makuhari, Chiba, Japan)


AAS003-15 Room: 301B Time: May 27 16:00-16:15

# A study of the longitudinal dependency of meridional mass transport in the stratosphere

Takenari Kinoshita[1*], Kaoru Sato[1]

[1]U. Tokyo

There is a material circulation in the stratosphere called "Brewer-Dobson circulation" that flows from the equator to the polar regions. This circulation is examined by a lot of studies using the residual-mean meridional circulation on the Transformed Eulerian Mean (TEM) equations. However, the TEM equations express zonal-mean fields and do not provide a three-dimensional view of transport. Several previous studies extended the TEM equation system to three dimensions but usually under the quasi-geostrophic assumption, which is not satisfied for small-scale phenomena such as gravity waves. Miyahara [2006] and Kinoshita et al. [2010] derived a three-dimensional wave activity flux and residual circulation applicable to gravity waves.
The present study examined the longitudinal dependency of mass transport in the Southern Hemisphere in October (corresponding to the ozone recovery period), by applying the new formulae to ERA-Interim reanalysis data. As a result, it is found that the meridional transport is outward from the polar night jet in the Eastern Hemisphere and inward in the Western Hemisphere. The wave activity flux divergence (i.e., westerly wind deceleration) is dominant in the region of 60~120E along the coast of the Antarctic continent while the convergence is dominant in the eastern region of the Andes. In these regions, strong Stokes Drift is observed. The westward and downward wave activity flux is distributed near the region of wave activity flux convergence (the region of Eliassen-Palm flux divergence) at 10 hPa. This feature suggests that Rossby waves are generated or reflected in the region.
Further analysis is needed regarding the three-dimensional refractive index providing wave propagation characterizations in particular the eastern region of Andes. Moreover, the mass transport driven by atmospheric waves including gravity waves will be examined by using a high-resolution general circulation model.

Keywords: mass transport, stratosphere, residual mean circulation