planetary scale (wavenumber 1) wave activity. The full paper on this subject is to appear in Journal of the Meteorological Society of Japan, Vol. 65, No. 1.

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EFFECTS OF MOUNTAINS ON THE JANUARY GENERAL CIRCULATION IN THE SOUTHERN HEMISPHERE: A NUMERICAL EXPERIMENT (ABSTRACT)

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Effects of mountains on the January general circulation in the Southern Hemisphere are investigated by use of a general circulation model (MRI.GCM-I) developed at the Meteorological Research Institute. The model uses staggered grids (Arakawa's C scheme) in the spherical coordinate space with the intervals 5° and 4° in the longitudinal and the latitudinal directions, respectively. The modified σ-coordinate is used in the vertical direction, where both the surface and the top (=100 mb) are coordinate surfaces. The atmosphere is divided into five layers. Four cases of numerical experiment are performed with all the mountains retained (M), all the mountains removed (NM), only Asian mountains removed (NAS), and only Rockies and Greenland mountains removed (NRG). Each case is integrated under the perpetual January condition for 210 days. The NM stationary field mainly represents thermal effects, while the difference field M-NM extracts orographic effects. Cross-equatorial response to the Tibetan Plateau forcing and the Rockies and Greenland mountains forcing is revealed in the difference fields M-NAS and M-NRG, respectively.

Middle latitudes in the Southern Hemisphere are dominated by thermally forced stationary waves with wavenumbers 2 to 4. The Antarctica forces wavenumber-1 stationary wave which has a structure similar to the thermally forced wavenumber-1 stationary wave found in high latitudes in the Northern Hemisphere. Mountains increase the net poleward eddy heat transport although a compensation effect is remarkable between the stationary eddy component and the transient component. However, they act as a cooler in the Southern (summer) Hemisphere. This may be attributed to the differences between M and NM in the vertical distribution of clouds and/or of albedos of snow. Cross-equatorial response in middle and high latitudes in the Southern Hemisphere is stronger to the Rockies and Greenland mountains forcing than to the Tibetan Plateau forcing.

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