

Climatological aspects of the accumulation of high potential temperature airmass just below the tropopause over the Asian monsoon region

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Asian summer monsoon system is the most prominent monsoon circulation on the current earth, giving impacts on atmospheric general circulation including stratosphere. In this Asian summer monsoon region, high potential temperature airmass is accumulated in strongly closed anti-cyclonic circulation in the Tibetan High, which is centered at around the Tibetan Plateau and touched with the westerly jet to the north. The present study focuses on this remarkable accumulation of high potential temperature airmass just below the tropopause in the Asian summer monsoon system.

This high potential temperature airmass should be originated from the high equivalent potential temperature airmass produced in the lower troposphere through the sensible and latent heating at the earth surface. This hypothesis is also supported by many research that elucidated the accumulation of a variety of chemical tracers that is originated from land surface (Park et al. 2008; Pan et al. 2016; Chandra et al. 2017).

Accumulated high potential temperature airmass just below the tropopause over the Asian summer monsoon region belongs to the "middle world" (Hoskins 1991), connected along the isentropic surface with the stratosphere. Therefore, the role of the Asian summer monsoon on the troposphere-stratosphere exchange was discussed in the literature (Chen 1995; Dunkerton 1995; Postel and Hitchmann 1999; Terao 1999).

In the present study, the climatological aspects of the high potential temperature airmass accumulated just below the tropopause in the Asian summer monsoon region was analyzed using reanalysis datasets. It was shown that the accumulation of high potential temperature airmass in the Tibetan High is exceptionally prominent compared with other region and seasons (Fig. 1).

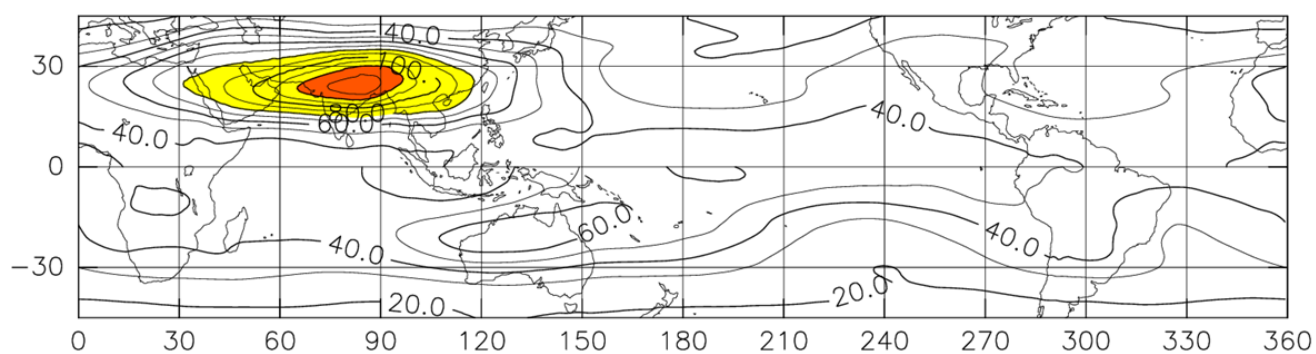
To uncover the origin of high potential temperature airmass, the present paper investigated the production process of the high equivalent potential temperature airmass in the atmospheric boundary layer. Especially the present paper focused on the Northeastern Indian subcontinent, which is near the center of the Tibetan High, and known as strong diabatic heating region (Xavier et al. 2009).

The climatological aspects of the atmospheric structure just below the tropopause will be discussed intimately related with the land-atmosphere interaction including the heating process of the atmospheric boundary layer. The important expected contribution of port MAHASRI research initiative will also be discussed.

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The air mass of potential temperature between 355-360 K in unit area and unit potential temperature increment ($\text{kg m}^{-2}\text{K}^{-1}$). For the northern and southern hemisphere, JJA and DJF average was shown, respectively. Calculated from ERA-Interim from 1979 to 2015.