

## Characteristics of enhanced moisture transport towards Antarctica from radiosonde measurements at coastal stations and over Southern Ocean

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Intense precipitation events associated with enhanced poleward moisture transport towards Antarctic ice sheet can strongly affect the total ice sheet mass balance and thus its contribution to global sea level. In this study we use radiosonde measurements to identify cases with enhanced moisture transport towards the ice sheet, which in some cases are defined as atmospheric rivers. Radiosonde measurements during atmospheric river events at three coastal stations in East Antarctica - Neumayer, Novolazarevskaya and Syowa - are used to calculate vertical profiles of moisture transport and explore its dependence on the wind speed and humidity. Further, we compare to the ship-based radiosonde measurements made within an atmospheric river over the Indian sector of the Southern Ocean on 3-4 January 2017 during the Antarctic Circumnavigation Expedition. This case, when an atmospheric river resulted in intense precipitation over the Southern Ocean without reaching Antarctica, provides an interesting comparison to the atmospheric river cases occurring in the same sector and reaching the Antarctic coast. Coastal station analysis showed that both the low-level jet and elevated specific humidity values found between 800 and 900 hPa explain the moisture transport peak within this layer. Frequent measurements during the atmospheric river event over the ocean allowed to see the profile evolution: increase in the total integrated moisture transport was accompanied by descending of the low-level jet and the peak in the moisture transport towards lower levels. We explore possible mechanisms that feed the atmospheric rivers with moisture as well as the large-scale forcings favoring convergence and the strong coherent moisture advection at specific heights observed by radiosondes. Comparison of the ERA-Interim reanalysis data to observations show that the reanalysis underestimates the humidity inversion and low level jet values, and sometimes misplaces the position of the peaks. These measurements give a unique opportunity to evaluate other reanalysis products, models and satellite products.