



Gravity waves in the Southern Hemisphere derived from balloon observations and the ECMWF analyses

Valérien Jewtoukoff (1), Albert Hertzog (1), Riwal Plougonven (1), Alvaro de la Camara (2), and François Lott (2)

(1) Ecole Polytechnique, Laboratoire de Meteorologie Dynamique / IPSL, Palaiseau, France, (2) Ecole Normale Supérieure, Laboratoire de Meteorologie Dynamique / IPSL, Paris, France

The increase of spatial resolution allows the ECMWF operational model to explicitly resolve a significant portion of the atmospheric gravity wave (GW) field, but the realism of the simulated GW field in the ECMWF analyses still needs to be precisely evaluated. Here we use data collected during the Concordiasi stratospheric balloon campaign to assess the representation of GWs in the ECMWF analyses over Antarctica and the Southern Ocean in spring 2010. We first compare the balloon momentum fluxes with those in ECMWF analyses throughout the campaign and find a correct agreement of the geographical and seasonal patterns. However, we also note that ECMWF analyses generally underestimate the balloon fluxes by a factor 5, which may be essentially due to the spatial truncation of the ECMWF model. Intermittency of wave activity in the analyses and observations are found comparable. These results are confirmed on two case studies dealing with orographic and non-orographic waves, which thus supports that the ECMWF analyses can be used to study the geographical and seasonal distribution of GW momentum fluxes. We then used both datasets to provide insights on the missing GW drag at 60 [U+25E6] S in general circulation models in the Southern Hemisphere spring. These datasets suggest that most of the missing drag may be associated with non-orographic GWs generated by weather systems above the Southern Ocean.