Geophysical Research Abstracts,
Vol. 11, EGU2009-2103, 2009
EGU General Assembly 2009

Predictability of orographic drag for real atmospheric profiles

H. Wells and S.B. Vosper
Met Office, Exeter, U.K. (helen.wells@metoffice.gov.uk)

Current parametrizations of sub-grid scale orographic drag are deterministic in nature. This makes sense since it is well known that the drag is predictable for steady flow over small hills (where linear theory is valid). However, even for steady flow over small hills, fine-scale vertical structure in the atmospheric profiles and/or non-linear effects can have a significant effect on the drag. For example, partial internal wave reflection can cause constructive or destructive interference, leading to a high or low drag state respectively. Because of the sensitivity of the drag to the details of the profiles it may be more appropriate to develop stochastic parametrizations of orographic drag.

We will present ongoing work to assess whether a stochastic, or partially-stochastic, approach should be adopted. We compare results from linear and non-linear numerical models of steady flow over orography for idealised and realistic atmospheric profiles to investigate the effect of fine-scale vertical structure and non-linear enhancement. We then select two real profiles which look similar (in terms of wind-speed and stability) but which produce different wave responses and hence result in a different drag response. By idealising one of these profiles and then varying the parameters which define it, we assess the sensitivity of the drag to various features in the profile.