



1 On non-linear Eady model with the stratosphere: extreme value analysis of solutions

I. Bordi (1), **K. Fraedrich** (2), F. Lunkeit (2), M. Petitta (1) and A. Sutera (1)

(1) Department of Physics, University of Rome "La Sapienza", P.le Aldo Moro 2 00185 Rome, Italy

(2) Meteorologisches Institut, Universität Hamburg, D-20146 Hamburg, Germany

The effect of the stratosphere on the baroclinic adjustment of Eady non-linear model is presented when the single eddy mode restriction is considered. The classical Eady model has been modified by including an additional layer (the stratosphere), Ekman's dissipation at the bottom boundary and a relaxation term at the surface and the tropopause respectively.

Results obtained for the rigid lid case are compared with those for the linear Eady model with Ekman's dissipation at the surface. For this case the model solutions consist of a steady zonal correction and an eddy field with a travelling constant amplitude wave. Moreover, the equilibrated field shows that the steering level of the eddy component raises to a height close to the condition for a marginally unstable wave with respect to the uncorrected zonal mean field. When realistic values for the static stability in the stratosphere are taken into account, the zonal correction becomes time dependent and shows a degree of chaotic behaviour, while the eddy field is fully chaotic. Results suggest that the resulting steering level, in average, is higher than the one computed for the classical rigid lid with an Ekman's dissipation at the surface.

Here the effects of changes of the zonal wind vertical shear and of a further decreasing of the static stability in the stratosphere are analysed by applying the extreme value analysis. Results obtained for different parameter settings characterising the stratosphere are shown and their implications on the atmospheric dynamics are discussed.