Geophysical Research Abstracts,
Vol. 11, EGU2009-3520, 2009
EGU General Assembly 2009

Vortex statistics in a simplified baroclinic model

R. Vitolo (1) and A. Speranza (2)

(1) University of Exeter, School of Engineering, Computing and Mathematics, Exeter, United Kingdom (r.vitolo@exeter.ac.uk), (2) University of Camerino, Department of Mathematics and Informatics

Statistical properties of vortices are examined in a simplified model for the atmospheric baroclinic jet at midlatitudes. The model is derived from the two-layer quasi-geostrophic equations. Examined properties are:
1) the average vorticity on the vortex centres;
2) the impact rate of vortex tracks on selected gridpoints;
3) return periods of the maximum vorticity within the model domain, computed by extreme value analysis.
All these statistical properties possess a remarkably smooth dependence with respect to a parameter representing baroclinic forcing in the model. This smooth dependence can be exploited to enhance the accuracy and precision of statistical estimators. This is particularly useful for return periods in the extreme value setting: an example is provided. It is shown that the distribution of impact counts of vortices on a given observation point in the domain is typically non-Poissonian: it can exhibit both under- or overdispersion, depending on both the baroclinic forcing and the latitudinal location of the observation point. Overdispersion leads to an increased probability of multiple vortices hitting the selected gridpoint within a prescribed timespan.