

SPECIAL PROJECT PROGRESS REPORT

Progress Reports should be 2 to 10 pages in length, depending on importance of the project. All the following mandatory information needs to be provided.

Reporting year 2013/2014

Project Title: The global circulation in various coordinate systems

Computer Project Account: SPDLRDE

Principal Investigator(s): Klaus P. Hoinka
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Name of ECMWF scientist(s) collaborating to the project (if applicable)

Start date of the project: 2012

Expected end date: 2014

Computer resources allocated/used for the current year and the previous one (if applicable)

Please answer for all project resources

		Previous year		Current year	
		Allocated	Used	Allocated	Used
High Performance Computing Facility	(units)	500	0	500	0
Data storage capacity	(Gbytes)	10	10	10	10

Summary of project objectives

(10 lines max)

Summary of the results of the current year

The impact of the choice of the coordinate system has been investigated with two particular topics in mind:

- 1) Wave forcing and zonal mean flow
- 2) Meridional mass circulation for various conserved meridional coordinates.

Summary of problems encountered (if any)

(20 lines max)

Summary of results of the current year (from July of previous year to June of current year)

This section should comprise 1 to 8 pages and can be replaced by a short summary plus an existing scientific report on the project

As for wave forcing our work concentrated on angular momentum because the separation of forcing and mean flow is straightforward in the case. The following coordinate systems have been chosen: standard height coordinates, isentropic coordinates in the vertical and, as an unusual choice, also in the horizontal. The wave driving has to balance essentially the mean flow part of the Coriolis term in height and standard isentropic coordinates but not for the meridional isentropic case where rather new forcing patterns emerge. The results are published in Egger and Hoinka (2014 a)

The meridional mass circulation is, of course, quite sensitive to the choice of the coordinates. With potential vorticity as a meridional coordinate one obtains global cells in the upper troposphere and separate shallow hemispheric cells near the ground. The mean circulation with potential temperature as a meridional coordinate is similar to that in standard isentropic coordinates. Both circulations are forced in the sense that they can be derived and understood approximately if just the heating is known. The results can be found in Egger and Hoinka (2014 b).

List of publications/reports from the project with complete references

Egger, J. and K.-P. Hoinka, 2014a: Wave forcing of zonal mean angular momentum in various coordinate systems. *J. Atmos. Sci.*, 71.2221-2239

Egger, J. and K.-P. Hoinka, 2014b: Zonal mean circulations for two conserved meridional coordinates. *Quart. J. Roy. Meteorol. Soc.*, 140; in press.

Summary of plans for the continuation of the project

(10 lines max)