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TRACMASS - A mass conserving trajectory code for ocean and atmosphere general circulation models

Aitor Aldama Campino¹, Kristofer Döös¹, Sara Berglund¹, Dipanjan Dey¹, Joakim Kjellsson^{2,3}, and Bror Jonsson⁴

¹Department of Meteorology, Stockholm University, Stockholm, Sweden (aitor.aldamacampino@misu.su.se)

²GEOMAR Helmholtz Centre for Ocean Research, Kiel, Germany

³Christian-Albrechts-Universität zu Kiel, Kiel, Germany

⁴Plymouth Marine Laboratory, Plymouth, United Kingdom

We present the latest version of the TRACMASS trajectory code, version 7.0. The new version includes new features such as water tracing in the atmosphere, parameterisation scheme for sub-grid scale turbulence, generalisation of the tracer handling, etc. The code has also become more user friendly and easier to get started with. Previous versions of TRACMASS only allowed temperature, salinity and potential density to be calculated along the trajectories, but the new version allows any tracer to be followed e.g. biogeochemical tracers or chemical compounds in the atmosphere. The new parameterisation of sub-grid turbulence will enhance the kinetic energy and dispersion of trajectories in the ocean so that results from eddy-permitting ocean models (dx \square 25km) resemble those from “eddy-resolving” models (dx \square 8km). We will demonstrate some use cases of these new capabilities for atmosphere and ocean sciences.

TRACMASS calculates Lagrangian trajectories offline for both the ocean and atmosphere by using already stored velocity fields, and optionally tracer fields. The velocity fields may be taken from ocean or atmosphere circulation models (e.g. NEMO, OpenIFS), reanalysis products (e.g. ERA-5) or observations (e.g. geostrophic currents from satellite altimetry). The fact that the numerical scheme in TRACMASS is mass conserving allows us to associate each trajectory with a mass transport and calculate the Lagrangian mass transport between different regions as well as construct Lagrangian stream functions.

A live demonstration on how to set up, configure and run the TRACMASS code will be given.