M2 Marine Physics Year 2020–2021

**Numerical Modeling**

**Final Project**

**due date: January 18th, 2021**

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**The project** consists in setting up a realistic configuration of the region of your choice, run the experiment and perform some analysis.

The configuration can be chosen anywhere in the globe (Gulf Stream, Kuroshio, ACC, etc.). The choice of the resolution and size of the domain is up to you, but you must be able to run at least a year and a half of simulation.

Outputs must include snapshots a least every 10 days and monthly (30 days) averages.

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**The report** should be 10 to 15 pages, present the technical steps of your work and an analysis of the results.

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**Question:**

1. What is the largest model time step you can use? Is this consistent with your horizontal resolution and domain?

**Analysis of the simulation:** Plot and comment the following figures:

2. time evolution of surface kinetic energy (KE) integrated over the domain.
3. snapshots of $\zeta/f$ (relative vorticity normalized by the local Coriolis parameter) at the surface at $t = 10,\ 30,\ 90,\ 360$ day (and latter if possible).
4. same plot at $z = -400$ m.
5. snapshots of temperature at $z = -400$ m at $t = 10,\ 30,\ 90,\ 360$ day (and latter if possible).

6. zonal or meridional sections of density and velocity in an interesting part of your domain at $t = 10$ day and $t = 360$ day.

7. Mean surface velocities over the last year of the simulation.

8. map of SSH variance over the last year of the simulation using the snapshots.

9. map of EKE (eddy kinetic energy) estimated over the last year of the simulation using the snapshots.

**Spinup:** Use those figures to discuss the model spin-up. Comment on the existence or not of mesoscale turbulence in the simulation.

**Realism of the simulation:** Try to find papers documenting the circulation in this region and check if it is (at least qualitatively) well reproduced in the simulation by producing relevant comparisons. Comment on the realism of the simulation.