Activity 3 – Run an idealized ocean basin III

1. Stability for the default case

Estimate the largest theoretical barotropic and baroclinic time-steps for the default case [BASIN from Activity 2]. You can find more information here: https://croco-ocean.gitlabpages.inria.fr/croco_doc/model/model.numerics.timestepping.html

Find the largest possible barotropic and baroclinic time-steps by running the code.

2. Stability for the higher resolution case

Edit the file param.h and increase the number of points:

```
#if defined BASIN
      parameter (LLm0=120,    MMm0=100,    N=20)
```

Find the largest possible barotropic and baroclinic time-steps for this case.

3. Impact of explicit/implicit viscosit

We will run the default case with different numerical choices and compare the evolution of the gyre and the barotropic vorticity budget.

- Start from the default BASIN case of Activity 2 (with vorticity diagnostics included)

- Run the following setups:

- Simulation 1: choose numerical options to have no implicit horizontal viscosity/diffusion and an explicit horizontal viscosity/diffusion of 10000 m²/s
- Simulation 2: choose numerical options to have no horizontal implicit nor explicit viscosity/diffusion

- For each simulation, compare the velocity (or vorticity) field. Do you see any differences?

- Plot the different terms of the barotropic vorticity budget and eventually the kinetic energy budget averaged over the last year of the simulation.