An internal wave modelling exercise: the COMODO test cases

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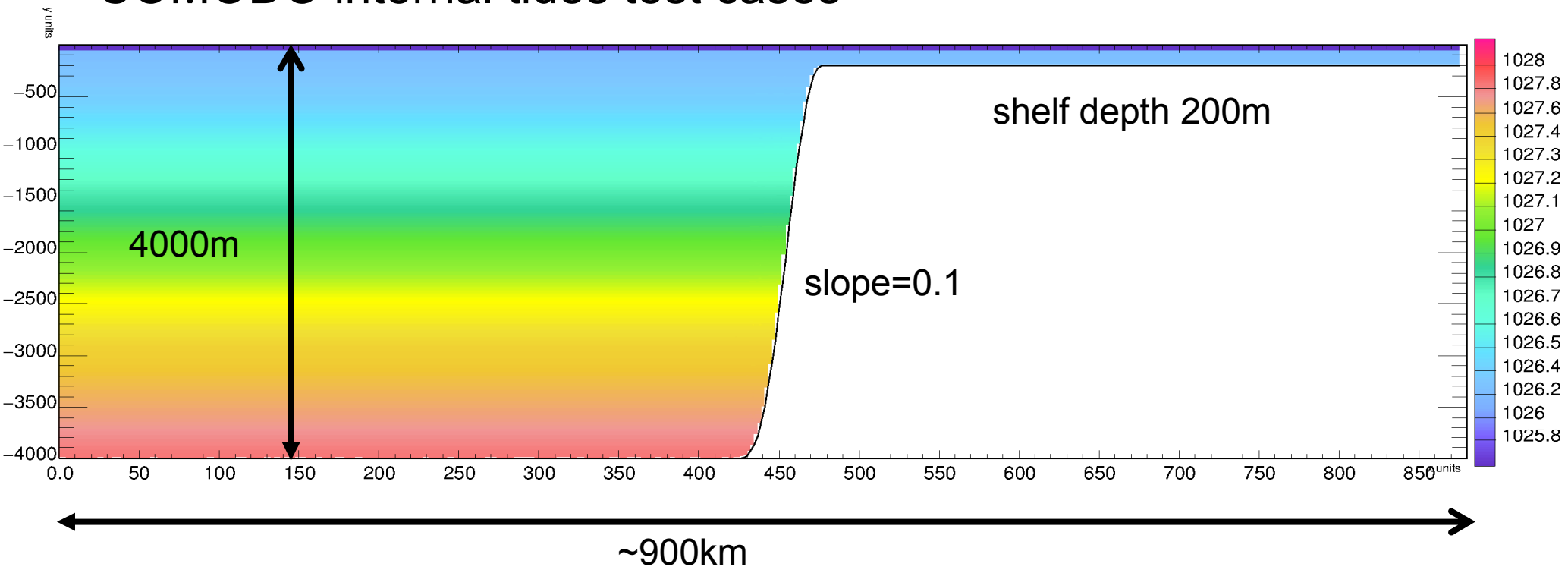
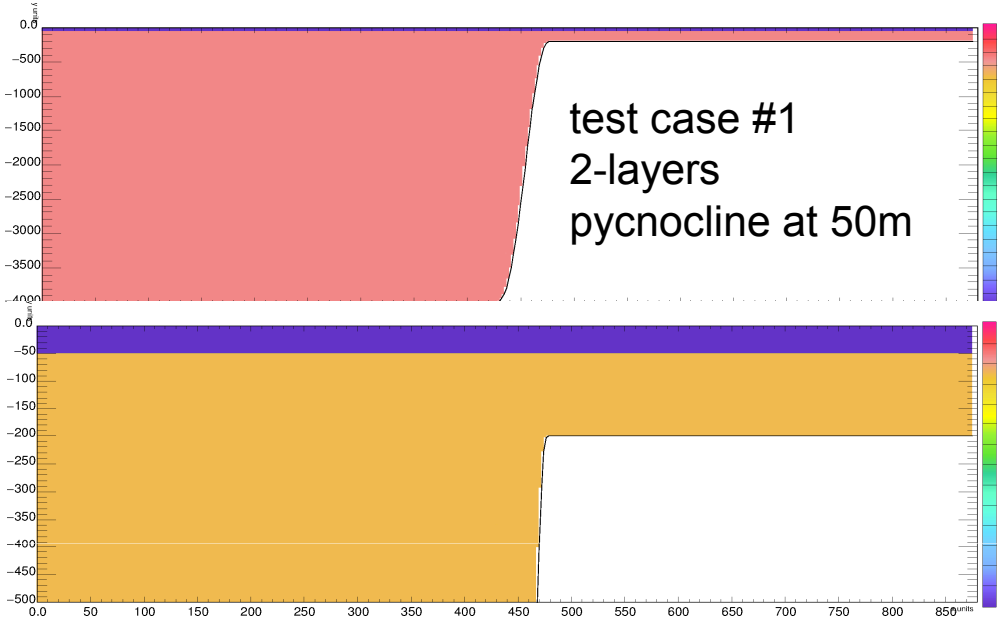
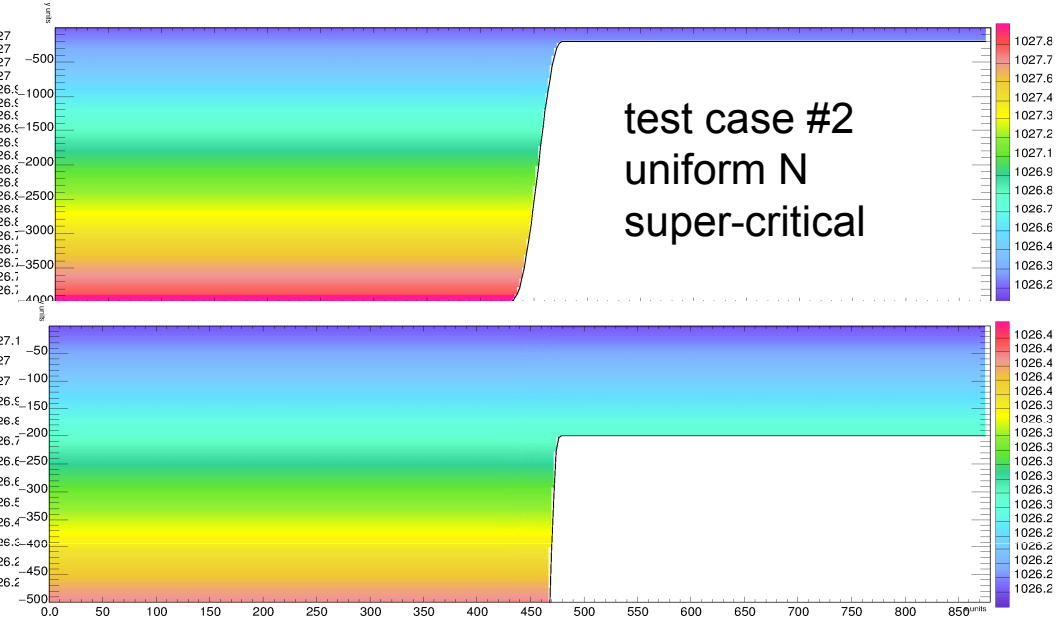
COMODO internal tides test cases



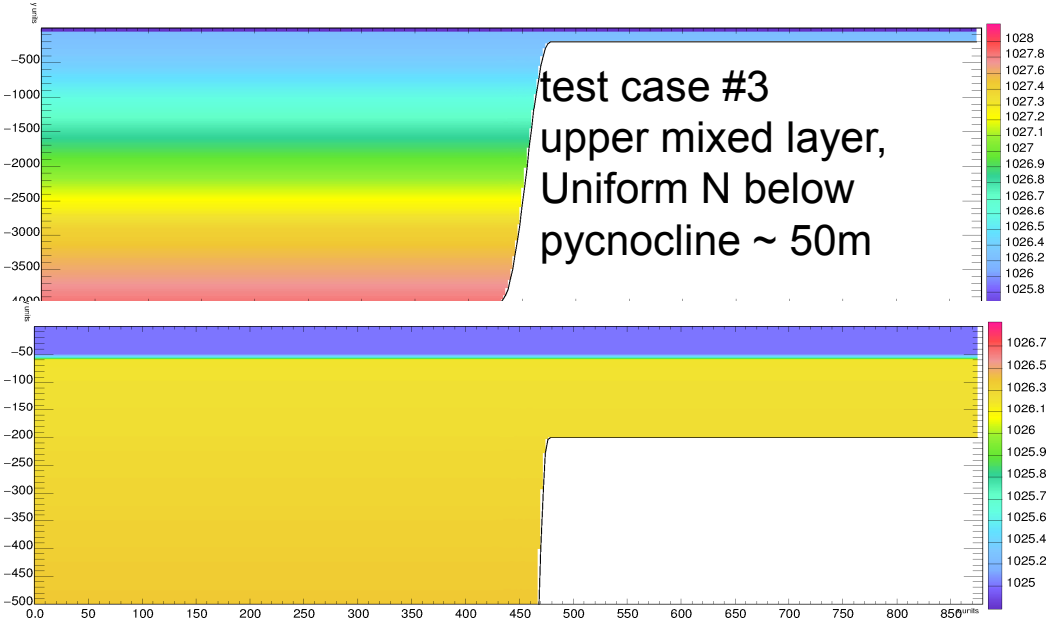
- periodic in y-direction
- open boundaries at both extremities (abyssal plain and shelf)
- barotropic OBCs prescribed at both ends
- frictionless tides

COMODO internal tide test case: 3 academic density distribution



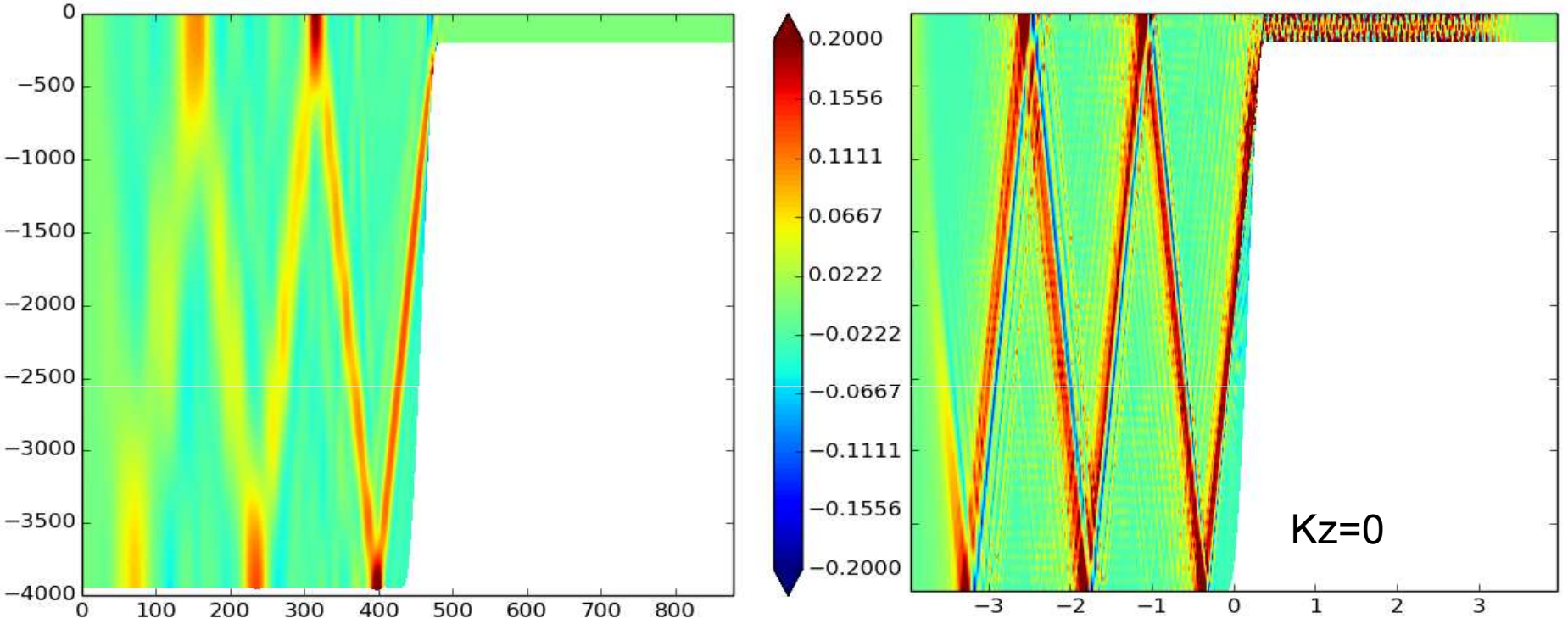


- Additional requirements
  - minimum diffusion
  - 1km grid resolution
  - relaxation toward barotropic dynamics in boundary buffer zone



Test case #2: uniform N

Baroclinic u (snapshot, m/s)

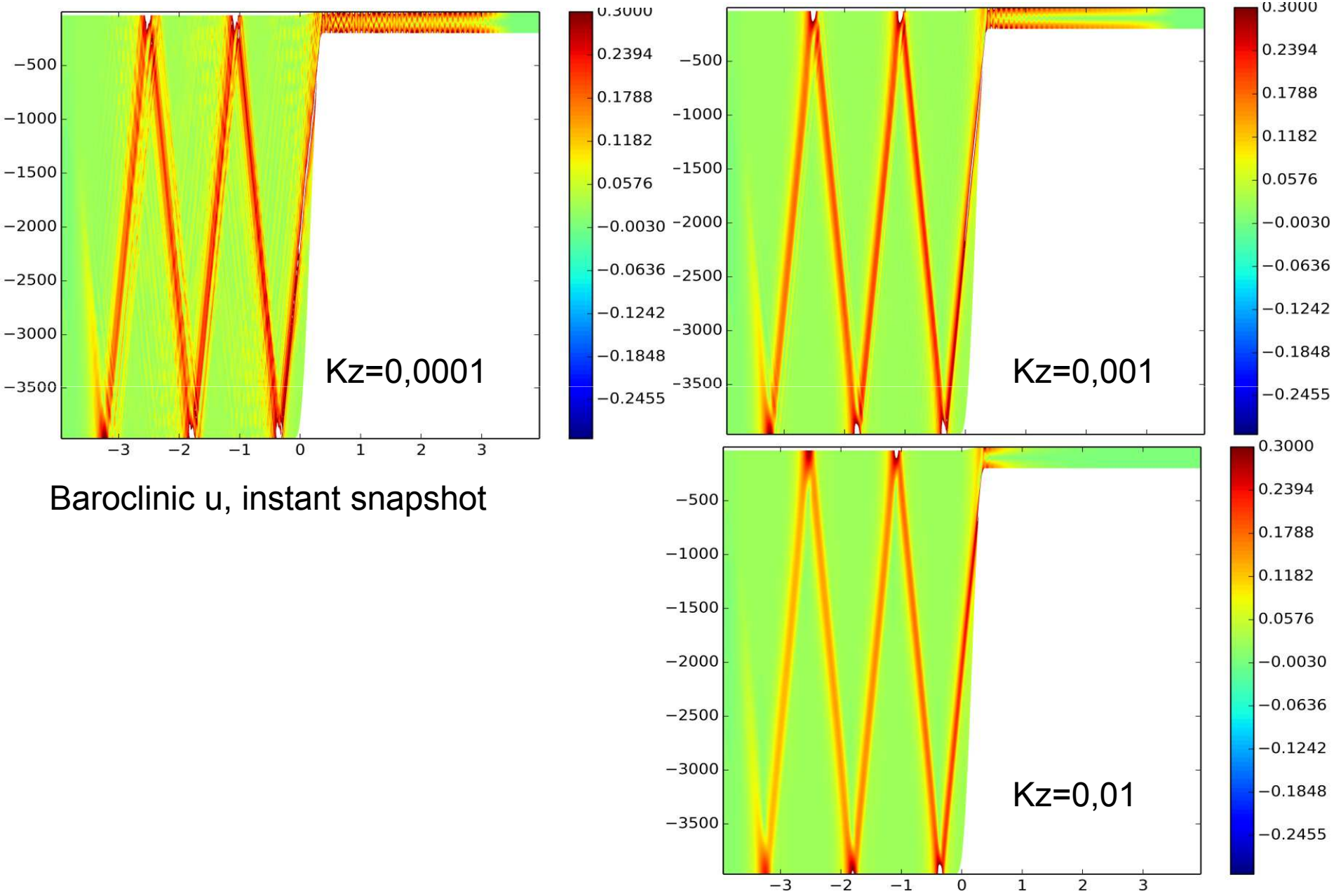


Hycom (time-stepping)

T-UGOm (frequency domain)

Similar solutions on the abyssal plain
Striking absence of IT in Hycom solution on shelf

Sensitivity to Kz



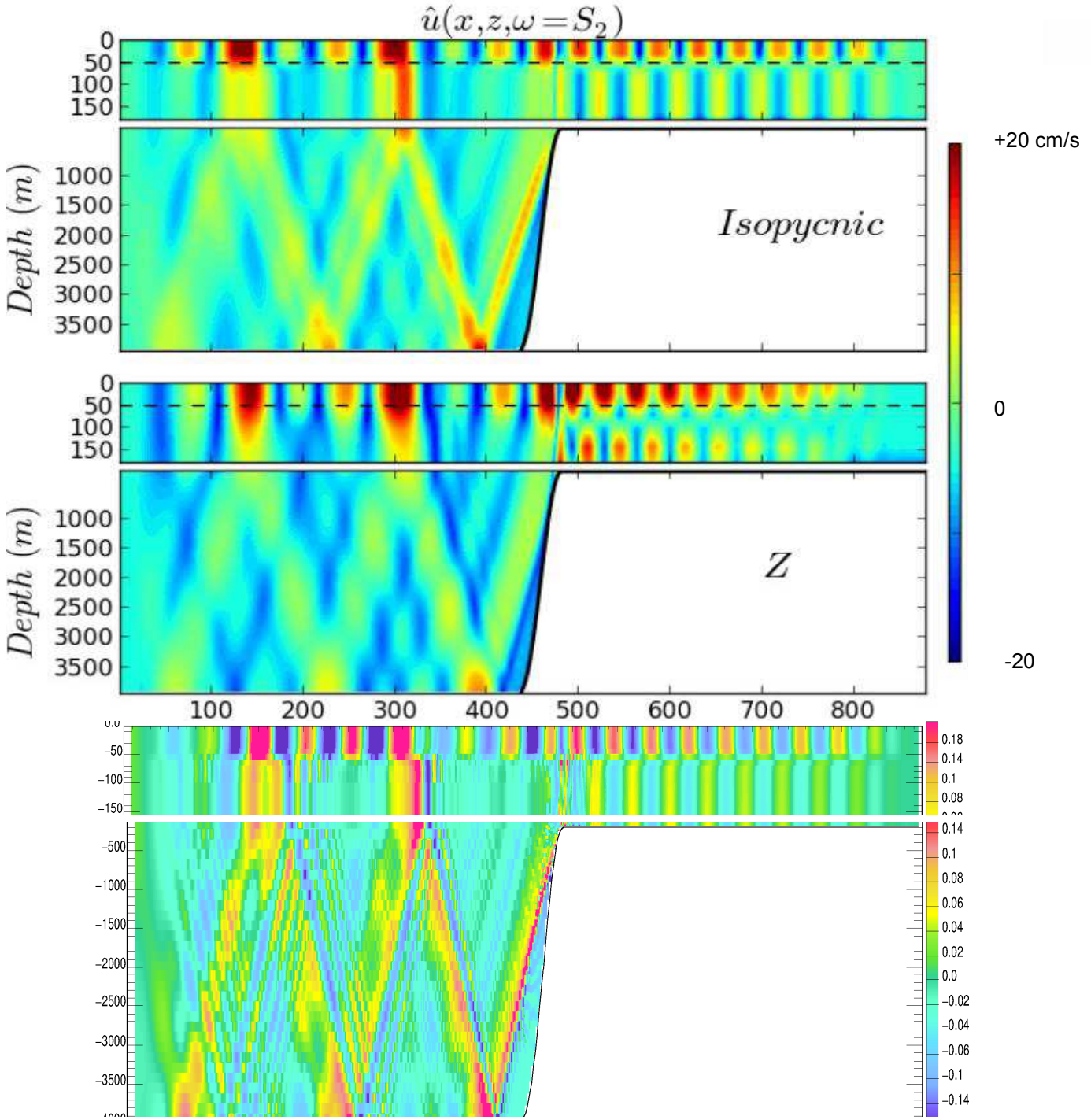
Baroclinic u, instant snapshot

Test case #3

Hycom isopycnal

Hycom Z

T-UGO



Concluding remarks

- COMODO internal tide test cases are interesting to investigate
  - Discretisation (horizontal and vertical, coupling) issues
  - Open boundary conditions issues
  - Hidden diffusion issues
  - Frequency-domain versus time-stepping convergence
- Hycom (time-stepping) and T-UGOm (frequency domain) get similar solutions
- 3D frequency-domain modelling is extremely cheap (compared to time-stepping) and accurate
- LEGOS will base future IT corrections on T-UGOm (frequency-domain) modelling coupled with (frequency-domain) data assimilation