Implementation of a regional model using a hybrid *s-on-top-f-z* vertical coordinate system in NEMOv3.6

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We implement the hybrid *s-on-top-of-z* vertical coordinate system described by Shapiro et al. (2013) in NEMOv3.6 and present results from a regional model covering the northern Indian Ocean and the Arabian Gulf. The vertical discretization in the upper ocean uses a smoothed envelope bathymetry which reduces the slope of shallow model levels to preserve model stability. Using this technique the model may use realistic, un-smoothed bathymetry combined with an s-coordinate system without adverse effects. Model levels deeper than the shelf edge are arranged horizontally with a smooth transition between the upper s-coordinate and the lower z-coordinate zones. Results from model runs with different vertical coordinate systems are presented to demonstrate the usefulness of this approach for regional models.

The new code for NEMOv3.6 fits neatly into the existing structure of domzgr.F90 and could form the basis for wider adoption.
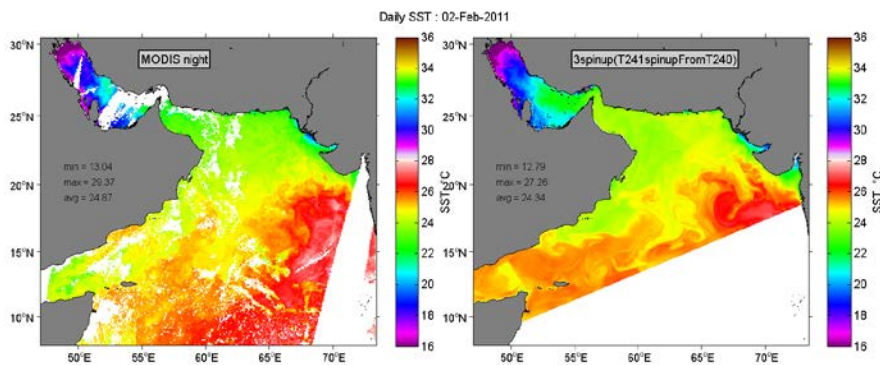

Figure 1 Comparison of MODIS night time SST (left) with daily averaged SST from NEMO model (right)

References

Shapiro, G., Luneva, M., Pickering, J., and Storkey, D.: The effect of various vertical discretization schemes and horizontal diffusion parameterization on the performance of a 3-D ocean model: the Black Sea case study, Ocean Sci., 9, 377-390, doi:10.5194/os-9-377-2013, 2013.