Project: **939**

Project title: **Global eddy permitting ocean modeling with focus on the Agulhas system**

Project lead: **Dmitry Sein**

Report period: **1.1.2015 - 31.12.2015**

During the first phase of the project the historical simulations were planned. To analyze the model ability in simulating Agulhas system and its impact in the Atlantic Ocean circulation we were going to perform 120 years model spin-up and further 60 years (1948-2007) simulation using CORE2 atmospheric forcing.

The simulations were started in September 2015 and at the current stage of the project we finish the spin-up and analyze the obtained results.

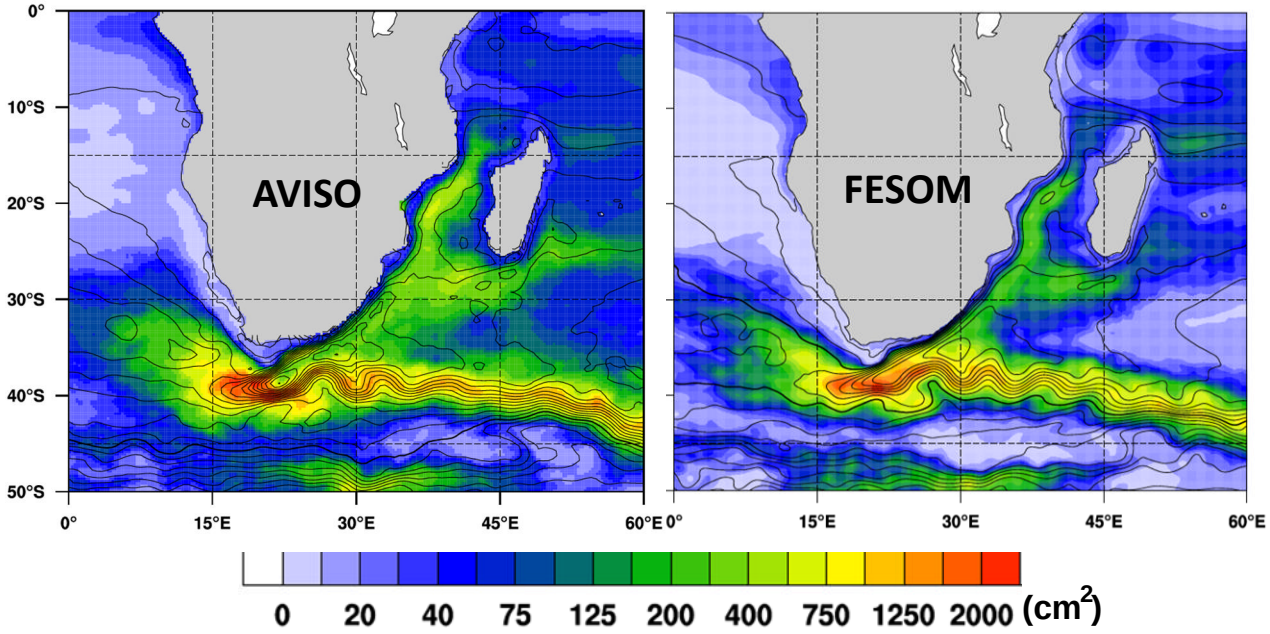

Fig.1 *Sea surface height variance (colored) and mean sea surface height (contour lines). Left: observations (AVISO), right: simulated by FESOM.*

Simulated sea surface height (SSH) and its variance were validated against the AVISO (http://www.aviso.altimetry.fr) data. Comparing modelled mean SSH and SSH variance based on 5 daily means (Fig. 1), with observations we can conclude that the eddy activity simulated by FESOM agrees with observations in the Agulhas region.

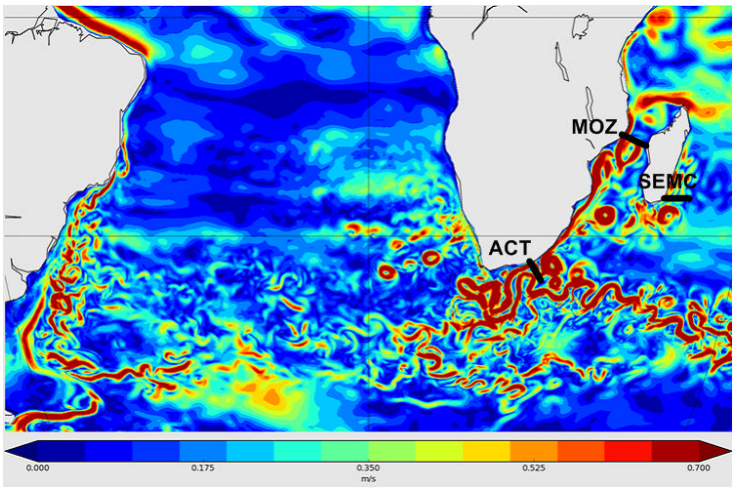

Fig. 2 *Velocity snapshot at 50 m. MOZ, ACT and SEMC are cross-sections shown in Fig.3*

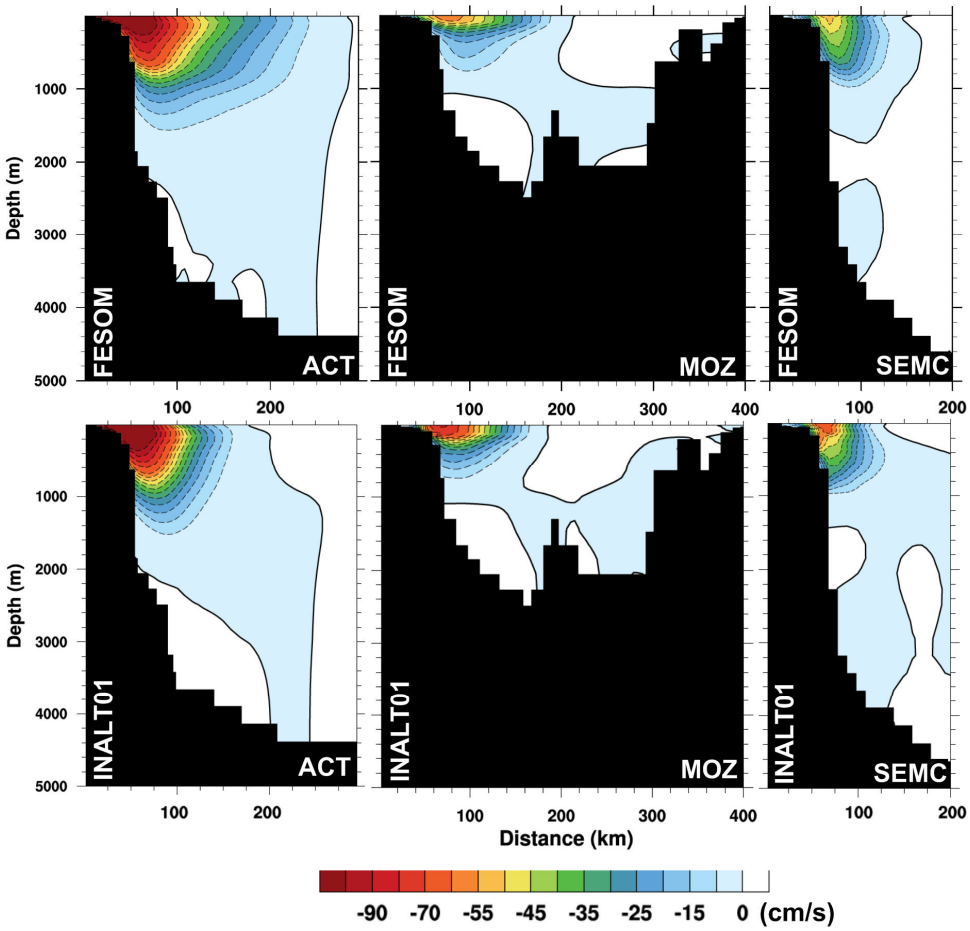

Fig.3 *Mean cross-section (see Fig.2) velocities*

In order to estimate the ability of the FESOM to represent the ocean circulation, we provide the inter-comparison between INALT01 and FESOM simulations. Indian Ocean and Atlantic Nest (INALT01) is a nested configuration of NEMO (Durgadoo et al 2013). It consists of a global base model at 1/2^{o} resolution within which a 1/10^{o} nest of the South Atlantic and western Indian Oceans is hosted

Comparing the cross-section velocities of the Agulhas current between FESOM and INALT01 (Fig.3) we conclude that despite the different numerics, both models show very similar dynamics in the region.

The detailed analysis of Agulhas leakage is in progress. As a preparation for the future climate change simulations focusing on the Agulhas system and its impact on the global ocean, we have derived the atmospheric forcing from the MPI-ESM climate change simulations (RCP8.5 scenario).

References

Jonathan V. Durgadoo, Benjamin R. Loveday, Chris J. C. Reason, Pierrick Penven, and Arne Biastoch, 2013: Agulhas Leakage Predominantly Responds to the Southern Hemisphere Westerlies. J. Phys. Oceanogr., 43, 2113–2131. doi: http://dx.doi.org/10.1175/JPO-D-13-047.1