Project: **970**

Project title: **TARANTO**

Project members: **Uwe Mikolajewicz, Katharina Six (MPI-Met), Feifei Liu (Hereon), Gerhard Schmiedl, and Kay Emeis (CEN, Uni HH)**

Allocation period: **1.1.2021 - 31.8.2021**

In the past months, we have done further analysis for the submitted paper 'Drivers of the decadal variability of the North Ionian Gyre upper layer circulation during 1910-2010: a regional modelling study' based on the comments of two reviewers about the mechanisms triggering the NIG circulation reversal by strong AdDW outflows. It is shown that the spreading of the dense AdDW outflow in the North Ionian Sea leads to a reversal of the density gradient at intermediate depth (Fig.1), which rearrange the vertical density distribution from a doming in the central NIG to a depression, as illustrated by a transect in the northern Ionian Sea (Fig.2). We finalized the paper which is published in Climate Dynamics [DOI 10.1007/s00382-021-05714-y].

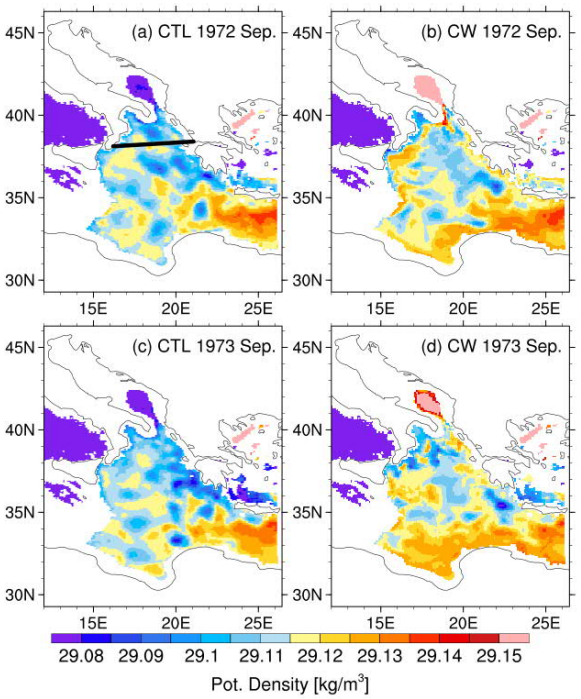

Fig.1 Spatial distribution of the monthly mean potential density at the depth of 671m in September 1972 for (a) CTL and (b) CW and in September 1973 for (c) CTL and (d) CW. The black line in (a) denotes the location of the transect of the vertical density plotted in Fig.2.
CTL: control run
CW: 'Cold Winter' simulation.
For detailed description, please see Liu, F., Mikolajewicz, U. and Six, K.D., 2021. Climate Dynamics, pp.1-13.

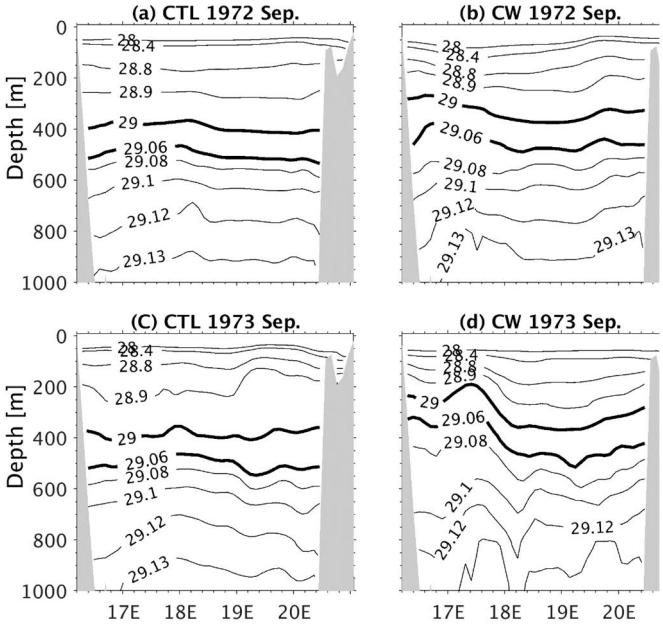

Fig.2 Vertical distribution of the monthly mean potential density [kg m^{-3}] along a transect in the northern Ionian Sea (black line in Fig.1a) in September 1972 for (a) CTL and (b) CW and in September 1973 for (c) CTL and (d) CW

In addition, we are preparing the second paper, which is aiming at establishing a transfer function to reconstruct past climate variability and marine biogeochemical variations from the sediment records. For this purpose, we investigate the relationships between variations modelled in the sediment and in the upper oceans/external forcing. We find that temperatures recorded in sediment flux of detritus and the local annual mean SST and/or spring SST are highly correlated over wide areas of the Eastern Mediterranean Sea (Fig.3), implying that the surface signal can be reconstructed with some confidence from the sediment records. This work will be continued in the next year to finally complete the paper for submission.

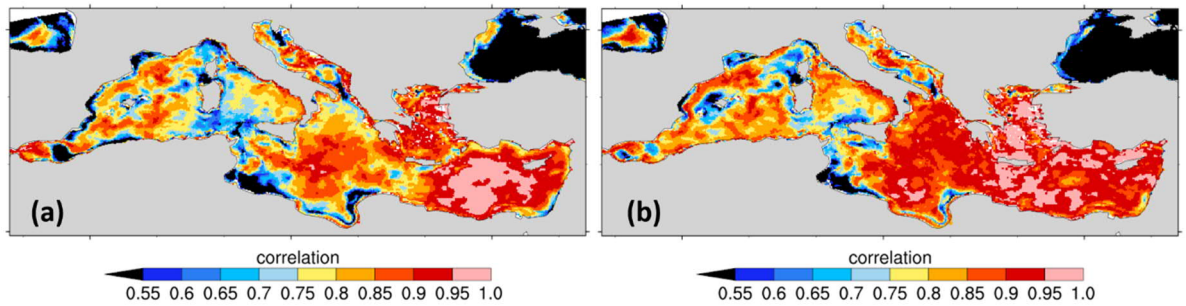

Fig.3 Spatial distribution of the correlation coefficient between the10-year running mean annual mean temperature tracer recorded in the simulated sediment flux of detritus and the simulated 10-year running mean (a) annual mean SST and (b) spring SST in the Mediterranean Sea. Areas marked with black color has low correlations and are not statistically significant.