Project of Strategic Interest NEXTDATA

Scientific Report
for the reference period 01 - 01 - 2014 / 31 – 12 - 2014

WP 1.3 Marine observation system and climate reconstructions

WP Coordinator: Nadia Pinardi
INGV, Bologna

1. Scheduled activities, expected results and Milestones

During the third year, RR Quality Indices (QI) were calculated and a consistency analysis was carried out for some of the essential climate variables (temperature, salinity, sea level anomaly). This analysis is related to the estimation of the accuracy of the Mediterranean Sea climate reconstruction.

2. Deliverables expected for the reference period

D1.3.5: Report on RR quality indexes and transmission of the data to the archives and the General Web Portal.

3. Activities which have been actually conducted during the reference period

3.1 Research activities

During 2014 the research activities have been dedicated to:

- Completion of the RR production.
- Evaluation of the RR quality indices.
- Discussion of possible future developments towards a new and higher quality RR covering a shorter time period than the actual 1955-2012, but with increased quality.

3.2 Applications; technological and computational aspects

The RR was carried out on the INGV Cray supercomputer machine and stored in the INGV archiving system.

3.3 Training
None

3.4 Dissemination

The Mediterranean Sea Reanalysis: the past history of the Mediterranean Sea from observations and model. *EUROGOOS side event.* 27 october 2014.

Fig. 1. Leaflet of EUROGOOS side event on Mediterranean Sea Reanalyses organized by INGV.

3.5 Participation in conferences, workshops, meetings
PINARDI N., FRATIANNI C. AND LYUBARTSEV V., (submitted oral contribution): The history and transient nature of salinity anomalies in the Mediterranean Sea from advanced reanalysis.
EGU OS2.3 Eastern Mediterranean and arid climate oceanography (e.g. Dead Sea, Red Sea…): a tribute to A. Hecht.
C. FRATIANNI: NextData Reconstruction-Reanalysis : 1953 – 2012. Presentation of NEXTDATA RR at *EUROGOOS* side event. 27 ottobre 2014.

4. Results obtained during the reference period

4.1 Specific results (Data libraries, Measurements, Numerical simulations, etc)

The quality of RR system has been assessed for the whole RR period, from 1955 to 2012. The QI values for each of the four variables assessed are listed in Tab. 1 and can be summarized as follows:

- **Sea Surface Temperature (SST):** RMS of the difference between monthly mean values of Hadley Center and RR SST is 0.54°C. The SST RMS error is characterized by a high seasonal cycle with maximum values occurring during spring and summer and RR presents a positive BIAS (RR warmer than Hadley SST).

- **Temperature:** RMS QI along the water column is on average 0.4°C with RMS maximum values around 0.9°C at approximately 30 m, the base of the mixed layer and the start of the seasonal thermocline.

- **Salinity:** RMS QI along the water column are on average 0.12 PSU with maximum RMS QI at the surface of about 0.3 PSU. BIAS QI is on average negative in the first 200 m of water column and positive below. The volume mean salinity shows a drift of about 0.03 PSU/decade toward higher salinity values, an effect that is under investigation at the moment.

- **Sea Level Anomaly (SLA):** misfit RMS is 3.68 cm, almost double of the estimates of satellite along-track altimetry errors.

Variable	BIAS	RMS
SST [°C]	0.23±0.29	0.54±0.16
Volume T [°C]	-0.02±0.05	0.41±0.02
Volume S [PSU]	-0.02±0.01	0.12±0.01
SLA [cm]	0.11±0.07	3.68±0.25

Tab. 1 Summary of RR QI in terms of BIAS and RMS for different variables averaged over the entire basin and RR time period.

4.2 Publications
None

4.3 Availability of data and model outputs (format, type of library, etc)
RR data have been transferred to the NextData archive and General Portal

4.4 Completed Deliverables
Deliverable 1.3.5 has been completed as expected.

5. Comment on differences between expected activities/results/Deliverables and those which have been actually performed.

There are no differences between the expected activities and results obtained during the reference time period.

6. Expected activities for the following reference period

During the fourth year of the Project, we will likely try to understand the salinity drift shown in the analysis. Such evaluation will likely produce a new RR covering a shorter time period than the actual RR but with an increased quality deriving from potential increase in resolution of the atmospheric forcing. Two publications in a peer reviewed journal are in preparation.
Furthermore, we will start to develop derived products, such as basin heat transport and heat content, mixing indicators, upwelling indicators, Northern Ionian Reversal Index (NIR) and a quantification of variability (different decadal means, eddy variability, etc).