MFS – SOOP/VOS system and services

Giuseppe M.R. Manzella, Franco Reseghetti

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What is MFS – VOS?

- **Ship Of Opportunity Program in the Mediterranean**
- **Observational component of the Mediterranean Forecasting Systems (basin scale and regional systems)**
- **The Information System for a (small number of users)**
- **The GEOSS – GMES/EMODnet initiative**
MFS-VOS in the Mediterranean

✓ Started in September 1999 as part of the Mediterranean Forecasting System – Pilot Project

✓ Providing temperature profiles to EC projects: MFSPPP, MFSTEP, ADRICOSM, ECOOP, MERSEA, MyOcean (EC, IOC, MATT)
Requirements defined in the P.P.

An ideal sampling design is based on four goals:

- 1. provide repetitive measurements along transects from coast to coast,
- 2. the transects must cross significant dynamical features of the circulation,
- 3. the sampling distance should resolve, as well as possible, the mesoscale,
- 4. the technologies for data collection must be robust and simple, to be used on ships of opportunity, eventually by ship personnel.
MFS-SOOP (XBT) in the Mediterranean
Participants

- CSIC CEAB (Spain), CNRS LOB COM (France), CNR ISMAR SP (Italy), ENEA (Italy), HCMR (Greece), IOF (Croatia), IOLR (Israel), LBM (Slovenia), METU IMS (Turkey), OGS (Italy), SAHFOS (UK), UC-OCY (Cyprus)
Phases of monitoring system and QA/QC

- Design of the Monitoring System
- Field work
- Data telemetry
- NRT data QC
- Sampling strategy and technology
- QA protocols for field work
- Technology for full resolution data transmission
- Methodology for NRT QC
Quality Approach in Eurofleets: Data Acquisition

From Cruise preparation ... to data creation ... to data centers

Check Lists:
1. description of methods
2. personnel
3. description of activities
4. CSR cl

Hardware & Software Check

Real Time/ Near Real Time Quality Control

Data Display

Data Transfer and processing follow up

Documentation

Data base
Technology

- Sippican system
- Industrial computer
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1. Check List
2. Description of principles
3. Expected Results
4. Responsibility
5. Working Procedures
6. Deviation/Deficiencies
7. Expected data
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Why full resolution data?
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Errors associated to XBT

• Wind/ship contact
• Ground connection
• False increase of temperature due to wire stretching
• Fall Rate Equation
The NRT.QC.XBT procedure then proceeds with 8 steps that in synthesis are (Manzella, Scoccimarro, Pinardi, Tonani - 2003)
- initial visual check
- gross range check*
- position control*
- elimination of spikes*
- interpolation at 1 metre interval*
- gaussian smoothing*
- general malfunction control*
- comparison with climatology*
- final visual check, confirming the validity of profiles and providing an overall consistency
Users

- Research in general
- Marine and weather forecast
- Climate variability/change
- Intercomparison with satellite data
Estimated heat ocean content increase
Between 1957-66 and 1987 – 96 = 12.8 x 10^{22} J

Estimated uncertainty = 8 x 10^{22} J
Estimated accuracy in the Mediterranean
Several factors reduce the reliability of XBT measurements.

Gouretski & Reseghetti (DSR, 2010) have proposed a correction scheme of XBT bias (depth-variable XBT fall-rate correction with thermal bias) in agreement with side-by-side inter-comparisons and some direct fall-rate estimates.

The correlation between the probe fall rate and the water temperature (as earlier reported) is confirmed.

Cheng et al. (JAOT, submitted)
New almost “automatic” technique à la Hanawa but using temperature profiles instead of vertical gradient profiles.
Different FRE structure:

\[ Z(t) = Bt - At^2 + \text{transient} \]

Then

Temperature correction
Possible improvements (viscosity effects + explanation of regions where XBT accelerates/decelerates) are under analysis
E-SURFMAR

• MFS SOOP established a collaboration with the European meteo services (EUMETNET) implementing meteorological observation system in the Mediterranean (as part of the EUMETNET program E-SURFMAR)
Transect with XBT drops + BAROS: Genoa-Palermo
Transect with BAROS: Livorno-Palermo-Malta
Transect with BAROS++ (with incoming XBT activity): Genoa-Alexandria-Beirut-Mersin-Naples-Marseille-Genoa
• VOSCLIM - Acquisition systems

• MINOS

• BATOS

• BAROS

1. Wind sensor
2. Temperature/Humidity sensor and Inmarsat antenna
3. 4-PC unit and junction box
4. Sea Surface Temperature Sensor
Possible Transects with BAROS: ARKAS LINE ships

Salerno-La Spezia-Genoa-Gemlik-Yilport-Marport-Izmir-Salerno-
Cagliari-Genoa-Livorno-Barcelona-Algiers-Cagliari
MOON-VOS services

Basic requirements

Following the Inspire Directive MOON-VOS portal allows

- Discovery
- View
- Downloading

Provide high quality data
Provide NRT and additional historical data
Allow selection
Enable downloading in different formats
Provide advanced view
Collaborative Information System

Data collected in the Mediterranean by the MOON Network

Kick-off meeting
NRT-data access

Kick-off meeting
Kick-off meeting
Problems and opportunities

• Sustainability of the observing system

• Implement services:
  – Development of services ‘on demand’ (mainly at national level e.g. Ministry of Environment)

• Enlarge the bases of users
  – EU Initiatives
Several GMES-related projects are currently funded under the 7th Framework Programme and over the last decade, numerous R&D projects funded either by the European Commission through its successive Framework Programmes or by the European Space Agency through its "GMES Services Element" (GSE) programme have contributed to the implementation of GMES.
EMODnet PP

- The overall objectives of the EMODnet Physics preparatory action is to provide access to archived and near real-time data on physical conditions in Europe's seas and oceans by means of a dedicated portal and to determine how well the data meet the needs of users from industry, public authorities and scientists.
EUROPEAN MARINE OBSERVATION AND DATA NETWORK

PHYSICAL PARAMETERS

DG MARE

ETT/ENEA, MARIS, IFREMER, NERC/BODC, EuroGOOS/SMHI
The Portal

- access to RT and DM marine data from measurement stations and ferryboxes.
- metadata for these data sets using EMODnet/INSPIRE standards.
- metadata maps and overviews for whole sea-basins showing the availability of data and monitoring intensity of that basin.
Fixed Station

• 1. wave height and period;
• 2. temperature of the water column;
• 3. wind speed and direction;
• 4. salinity of the water column;
• 5. horizontal velocity of the water column;
• 6. light attenuation;
• 7. sea level.
Ferryboxes

- Measurements from ferryboxes that should cover at least:
  1. temperature of the water column;
  2. salinity of the water column.
The EMODnet PP pillars

EMODnet

PP

EuroGOOS

SeaDataNet

MyOcean

EuroGOOS ROOSs
User dialogue

Near Real Time

Archived Data
Welcome to EMODnet - Physical Parameters

The European Commission, represented for the purposes of this project by the Directorate-General for Maritime Affairs and Fisheries (DG MARE), is conducting service contracts for creating pilot components of the European Marine Observation and Data Network (EMODNET). The overall objective is to create pilots to migrate fragmented and inaccessible marine data into interoperable, continuous and publicly available data streams for complete maritime basins observation. The final objective is to provide layers of physical data and metadata available for use by public authorities, scientists and industry, and contribute towards the definition of an operational European Marine Observation and Data Network (EMODNET) and contribute to developing the definition of the Global Monitoring for Environment and Security (GMES) marine core service.

This EMODNET-Physical Parameters Portal is one of the EMODNET portals and it is aimed at providing access to archived and real-time data catalog on the physical conditions in Europe’s seas and oceans.

The geographical coverage includes:
- the Western Mediterranean Sea (ROOS Med and SeaDataNet),
- the Adriatic Sea (ROOS Med and SeaDataNet),
- the Ionian Sea and the Central Mediterranean Sea (ROOS Med and SeaDataNet),
- the Aegean - Levantine Sea (ROOS Med and SeaDataNet),
- the Great North Sea, including the Kattegat, and the English Channel (ROOS NWS – North West Shelf – and SeaDataNet)
- the Celtic Sea (ROOS IBI and SeaDataNet)
- the Bay of Biscay and the Iberian Coast (ROOS IBI and SeaDataNet)
- in the Atlantic Ocean, the Macaronian bio-geographic region, being the waters surrounding the Azores, Madeira and the Canary Islands / Canarias and...
Conclusions

• Continuing to serve the forecasting system in the Mediterranean
• Visibility to the programme
• Sustainability of the MFS SOOP – VOS
• Opportunities in GMES
  – Opportunities to maintain an observing system
  – Opportunities to be included in a system of systems
EMODnet Opportunities

• The EU has arranged funding for the coming 3 years (2012 - 2014) for further developing the EMODnet portals

• EMODnet development will provide a great opportunity for data providers to promote the importance of their services for societal uses, to motivate extra monitoring and to establish sustained funding by Member States and EU.