Multidisciplinary Mediterranean and Black Sea Cast Database Developed in Framework of Large Scale European Project "SESAME"

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Haifa Bay
SESAME

Southern European Seas: Assessing and Modelling Ecosystem changes

Integrated Project supported by EU Commission (FP6)

Duration: 2006-2010
SESAME Consortium

Coordination: HCMR
Participants
Countries: 23
- 12 EU
- 4 Mediterranean
- 2 Accession
- 3 NIS
- 1 Associate
Institutes: 58
Scientists: 380
Scientific Objectives of SESAME

1. To assess the changes or regime shifts in the ecosystems of the Southern European Seas (Mediterranean and the Black Sea - SES) over the last 50 years and assess the potential mechanisms that relate these changes to changes in natural and anthropogenic forcings.

2. To assess the current status of the SES ecosystems through analysis of existing and newly collected data as well as through model simulations.

3. To predict changes in the SES ecosystem responses to likely changes in climate and anthropogenic forcings during the next five decades.

4. To assess and predict changes in the ability of the ecosystems to provide goods and services (with potentially high societal importance).
Data Management Objectives:

1. Provide easy access to SESAME data for the SESAME consortium as well as to the international science community, industry, educators, media, and public in a timely manner;

2. Coordinate actions of data collection;

3. Implement common standards and effective mechanisms for collection and availability of SESAME related data:
   - historical data (public domain data and product of WP1)
   - newly collected data (product of WP2 and WP3)
   - model data (product of WP4-WP6).
Major databases

- SESAME Cast database contains vertical observed profiles of physical, chemical and biological data.
- SESAME Bio database contains taxonomy-related data.
- SESAME TimeSeries database contains time series of physical, chemical and biological data observed at fixed stations.
- SESAME Modeled TimeSeries contains time series of physical, chemical and biological data extracted from numerical models output.
Why SESAME need a new cast data management system?

- Two comprehensive large scale data storages are supported by oceanographic community:
  - WOD09
  - SEADATANET

- Both of them have sophisticated data management systems and online interfaces.

- However, aiming worldwide data storage, these databases are not optimized to suite the requirements of regional and relatively short time investigations:
  - Relative large time delay between data submission and data availability
  - Absence of flexible data management system on level of investigator.
MEDACC - Mobile MEDiterranean ACCess based system for visualization and manipulation of multidisciplinary cast data

http://isramar.ocean.org.il/Download.asp
Why MS ACCESS?

- MS Office is commonly accepted software in Windows
- Easy administration (installation, security, compacting, backup and restore, import-export utility)
- Graphic query interface with simple translation to SQL
- Built in VB for applications
- Possibility to include Dynamic-link library
- Easy transfer from PC to PC
- Major limitations: One table have to by less than 2GB
Start from relation database for management MEDAR/MEDATLAS data

GF3 – parameters vocabulary accepted in MEDAR/MEDATLAS

Import oceanographic data
- MEDATLAS format for physical and geochemical data.
- SeaBird CTD files
- Excel table arranged like an ODV file, for geochemical and physical data.
Development SESAME parameters vocabulary

- Unlimited number parameters.
- Creation new table for single parameter
- Each parameter have to be in vocabulary table
- GF3 is defined as SDN standard (P091 in SDN Common vocabularies) however it does not sufficient for SESAME data
- Introduction SESAME parameter vocabulary

Combination of:

- P021 - SeaDataNet Parameter Discovery Vocabulary (Terms describing fine-grained related groups of measurement phenomena designed to be used in dataset discovery interfaces)
- P061 - BODC data storage units (Terms used by BODC to describe the measurement units for data held in its repositories.)
SESAME parameters vocabulary is on line supported vocabulary.

New Entry can be created by combination of P0321 and P061 or introducing by new sequence number entry SES34UPOX or SES45SES27.

All entries are connected with SDN vocabulary P011 (BODC Parameter Usage Vocabulary: Terms describing fine-grained related groups of measurement phenomena designed to be used in dataset discovery interfaces).
Metadata and data accumulation and dissemination

- Start from public available data
- On line submission of metadata and data from SESAME partners
- Import new data in integral mobile databases by SEASAME data management team.
- Conversion integral MS ACCESS databases to MS SQL databases
- Providing on line interface for data selection and download
Public available databases

- **MEDAR/MEDATLAS II** (historical data before 2000, was imported into SESAME-CAST-Mobile database. The XBT measurements, especially those carried out before 2000, have significant errors and were rejected.
- The **MATER** project collection.
- The World Ocean Database 2005 (**WOD05**).
- The **CORIOLIS** Database of the French Operational Data Centre.
- The **ICES** Oceanographic Database.
- The **Black Sea inter-disciplinary multivariable historical database** supported by the Institute of Marine Sciences (Turkey).
- The **DYFAMED** database supported by Observatoire Océanologique de Villefranche sur Mer (France).

08-Jun-10
Scanning public available data sources in order to accumulate all SESAME relevant data.

- Multiparametric data from MEDAR/MEDATLAS II + MATER
On line management of data flow from SESAME partners

- On line submission of metadata regarding data providers
- On line submission of metadata regarding datasets
- Editing of metadata by registered data providers
- On line interface for metadata analysis
- On line submission of datasets
Observations in SESAME cruises

CTD casts during 2006-2010
## Contents of SESAME cast DB

<table>
<thead>
<tr>
<th>Item</th>
<th>Number of cruises</th>
<th>Number of casts</th>
<th>Number of T/S levels</th>
<th>Number of Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contents of MEDAR/Medatlas II collection (without XBT)</td>
<td>2,713</td>
<td>131,113</td>
<td>15,156,004</td>
<td>129</td>
</tr>
<tr>
<td>Contents of SESAME Cast DB on the end of <strong>2010</strong></td>
<td>4,221</td>
<td>166,175</td>
<td>18,069,236</td>
<td>249</td>
</tr>
</tbody>
</table>

![Graph showing cast number over years from 1860 to 2000](chart.png)
Mediterranean Cruises
Spatial distribution of casts
MEDACC - External Quality Control Wizard

- Direct connection with MEDACC DB
- Auto and manual modes;
- Metadata quality check (location, chronology, sea depth...);
- Data quality control (climatic check, spikes, density inversion...)
- SEADATANET QC Flags convention
MEDACC
Oceanographic interface

- EXCEL and SURFER based graphical data presentation
- Chart drawing by running SURFER and EXCEL VB codes automatically edited by VB ACCES
- Export selected data to ODV generic format and MEDATLAS format
Plot of Sections

[Image: Map and data visualization showing sections and labels such as 'ID=1040', 'Lon=26.500 Lat=33.333 Date=22/Jul/1990 Cruise=LBD/S02IS', 'Summer 1991 POEMBC: SHIKMONA']
Hydrolog - MEDACC
External Oceanographic Analysis Tools

- Direct connection with MEDACC DB
- Sophisticated data profile charting
- SURFER based vertical and horizontal mapping
- Calculation oceanographic parameters
On line interface to SESAME data

http://isramar.ocean.org.il/SESAMEMETA/default.aspx
On line interfaces for SESAME-CAST DB

- Based on MEDACC converted in MS SQL DB
- WEB interface on asp net technology
- Selection cruises according to controls
- Results in a table form
- Extended analyses of cruise metadata
- Download cruise by cruise in ODV format, according to SESAME data policy
Download limitation

- Data download is available for registered users only.
- Official SESAME participants are automatically registered with their login and password from the SESAME PROGECTA website.
- The availability of the data is determined by the data originator and can be classified to 3 types:
  - **Public data** is available to all registered users.
  - **Partner only data** is restricted to SESAME partners only.
  - **Originator only data** is available to the SESAME WP leaders only, and can be requested by Email to the data originator. A list of WP leaders who are given access to all data is available here.
General information regarding particular selected cruise

Information about Cruise: SESIL02

<table>
<thead>
<tr>
<th>Coordinates:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Country:</td>
<td>Israel</td>
</tr>
<tr>
<td>Data provider:</td>
<td>Israel Marine Data Center (ISRAMAR)</td>
</tr>
<tr>
<td>Ship:</td>
<td>SHIKMONA</td>
</tr>
<tr>
<td>Start Date:</td>
<td>7/Sep/2003</td>
</tr>
<tr>
<td>End Date:</td>
<td>12/Sep/2003</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measured parameters</th>
<th>Units</th>
<th>Number casts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure (spatial co-ordinate) exerted by the water column by profiling pressure sensor and corrected to read zero at sea level</td>
<td>Decibars</td>
<td>21</td>
</tr>
<tr>
<td>Temperature of the water column</td>
<td>Degrees Celsius</td>
<td>21</td>
</tr>
<tr>
<td>Concentration of oxygen (O2) per unit mass of the water column [dissolved phase]</td>
<td>Micromoles per kilogram</td>
<td>21</td>
</tr>
<tr>
<td>Fluorescence of the water column</td>
<td>Not specified</td>
<td>21</td>
</tr>
<tr>
<td>Practical salinity of the water column by computation using unesco 1983 algorithm</td>
<td>Parts per thousand</td>
<td>21</td>
</tr>
<tr>
<td>Light attenuation coefficient</td>
<td>per metre</td>
<td>20</td>
</tr>
</tbody>
</table>