MARMOD database: Marmara Sea marine data

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MARMOD project

- Full title: An integrated modelling system for the Marmara Sea
- Funding Agency: Ministry of Environment and Urbanization of Turkey
- Coordinators:
    - **Institute of Marine Sciences, Middle East Technical University**
    - **Laboratory, Measurement and Monitoring Department, Ministry of Environment and Urbanization**
- Participants:
    - Institute of Marine Sciences and Management, Istanbul University
    - TUBITAK Marmara Research Center
    - Institute of Marine Sciences and Technology, Dokuz Eylül University
- Time period: 2016-2017 (Phase 1), 2017-2020 (Phase 2)

MARMOD project

- Ultimate goal
  - Create an Integrated Modeling System 'that will be used in the development of water quality improvement plans with environmental management and ecological approach specific to the Marmara Sea"

- Objectives:
  - Create integrated database of the Marmara Sea
  - Apply a coupled hydrodynamic biogeochemical model to identify and predict effects of the Black Sea, urbanisation, agriculture and industry on the environmental health of the Marmara Sea.
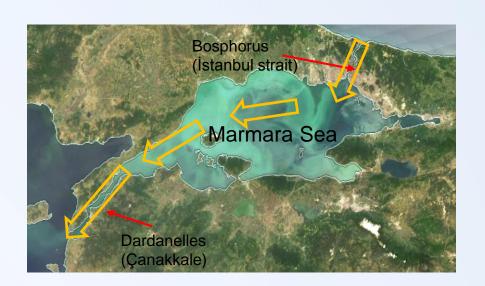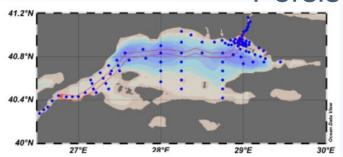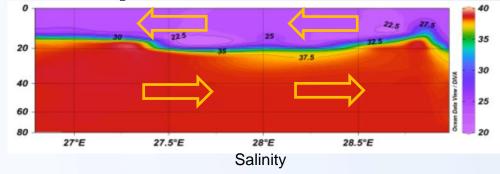
Area of research

Turkish Strait System (TSS)
- Bosphorus (İstanbul) strait
- Marmara Sea
- Dardanelles (Çanakkale) strait

Persistent two layer structure

Salinity

Database objectives and data suppliers

- Objectives
  - Provide comprehensive environmental data for setting up the hydrodynamic biogeochemical model

- Data suppliers
  - **IMS-METU** (75% of data)
  - Ministry of Environment and Urbanization of Turkey
    - IU-IMST
    - TUBITAK MAM

Database general information

- The database is essentially the Ocean Data View* (ODV) collection:
  - 273 cruises
  - 9,092 stations, including
    - 8445 stations with CTD profiles
    - 3703 stations with bottle sampling
  - 18 parameters
  - 1,134,078 values
  - Time period 1985 - 2017

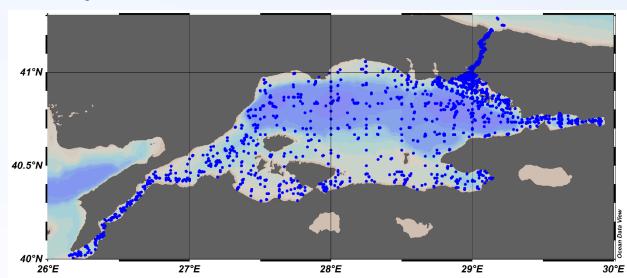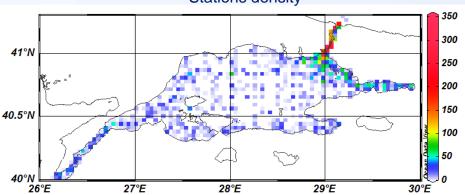*R. Schlitzer, Ocean Data View, 2017, available at http://odv.awi.de
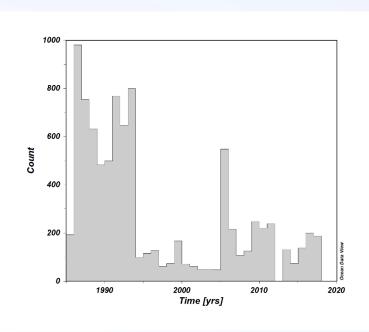
Spatial distribution

Stations density

Temporal distribution

Time histogram

Season histogram

Statistics per parameter

Parameter	Stations	Values	% of good data
Temperature	9011	1128947	99.7%
Salinity	9058	1128995	99.1%
Dissolved oxygen	1413	9056	99.3%
NO2_N	832	5302	87.7%
NO3+NO2_N	3024	18061	96.3%
NH4_N	1065	6008	92.8%
TN	779	4051	99.3%
PO4_P	3260	19289	99.8%
TP	985	5011	98.2%
Si	2196	13795	99.4%
Chl_A	1665	6059	99.6%
Secchi Disc	1044	1044	99.5%
DO_CTD	841	111007	74.7%
DO_CTD_Saturation	655	92671	78.6%
pH_CTD	506	30985	99.9%
Fluorescence	467	60840	96.8%
Turbidity	376	48238	94.4%
PAR	946	110577	81.4%

MARMOD₂

T.C. ÇEVRE VE ŞEHİRCİLİK BAKANLIĞI
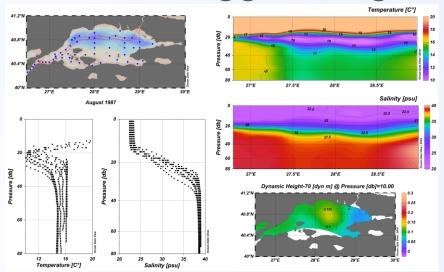
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TÜBİTAK MAM

METU

Quality control

- Quality Control of data was performed with help of ODV following the procedures elaborated by SeaDataNet
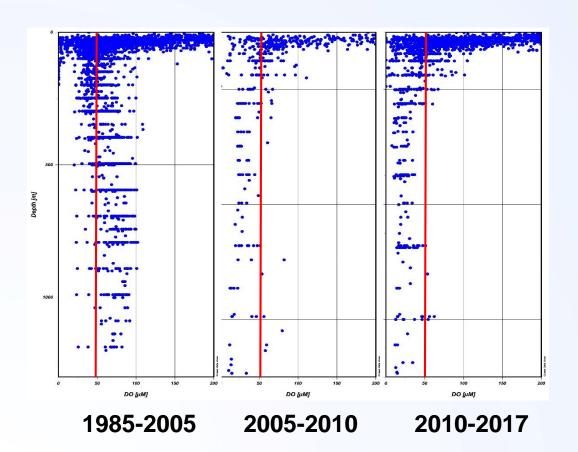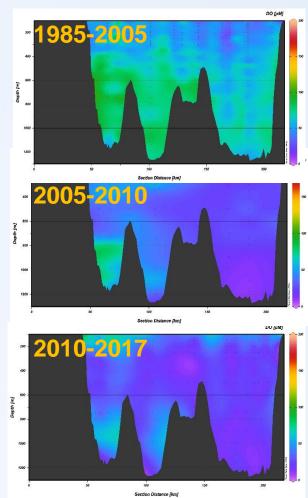
- 96.8% of data are flagged as good

Oxygen depletion

1985-2005   2005-2010   2010-2017

1985-2005

2005-2010

2010-2017

Transect Dardanelles - Bosphorus

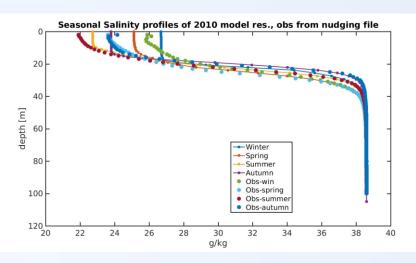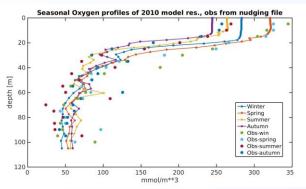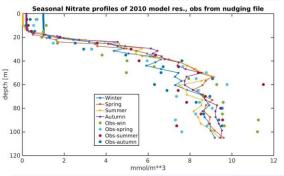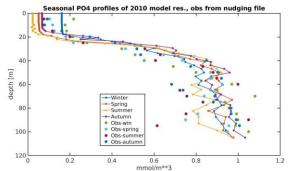# Data usage: initialization and verification of the model

Selected model results

- Basin-borne nutrient loads at least 2 times exceed loads from the Black Sea

- If the Black Sea loads would be fully eliminated the Marmara Sea deep waters could recover from hypoxia in 7-8 years

- If terrestrial loads would be reduced by 40%, the hypoxia in the deep waters could be recovered in 6 years

- Reducing of terrestrial loads is a priority measure

MARMOD Database: future plans

New data from:

- external sources
- regular monitoring
- new transects to be included in the monitoring program for investigating pollution propagation
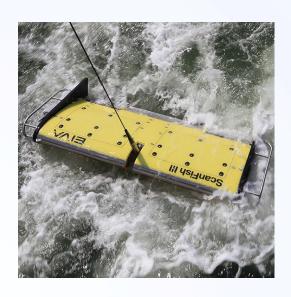
MARMOD Database: future plans

Within the II phase of MARMOD

– New data to be acquired in four seasonal cruises on a regular grid including data from underway instruments: ScanFish, ADCP, thermosalinograph, fluorometer

Acknowledgements

- Ministry of Environment and Urbanization of Turkey

- DEKOSIM - the Marine Ecosystem and Climate Research Center at IMS-METU

- NASA/Goddard Space Flight Center Earth Science Data and Information System (ESDIS) project for the use of imagery from the NASA Worldview application (https://worldview.earthdata.nasa.gov/)

Thank you