Time-series Measurement of Suspended Particulate Matter (SPM) in Turbid Coastal Waters

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4th Workshop on Remote Sensing of the Coastal Zone
Coasts and Climate Conflicts
Chania (Crete, Greece), 18-20 June 2009
Time Series Station
University of Oldenburg

- MST
- T, C
- T, C
- T, C
- T, C, P
- approx. sealevel
- 9.0 m above seafloor
- 7.5 m above seafloor
- 5.5 m above seafloor
- 3.5 m above seafloor
- 1.5 m above seafloor

container

seafloor
<table>
<thead>
<tr>
<th>Meteorology</th>
<th>Oceanography</th>
</tr>
</thead>
<tbody>
<tr>
<td>• wind speed</td>
<td>• water level</td>
</tr>
<tr>
<td>• wind direction</td>
<td>• temperature, salinity at 5 depths</td>
</tr>
<tr>
<td>• air temperature</td>
<td>• dissolved oxygen at 1 depths</td>
</tr>
<tr>
<td>• air pressure</td>
<td>• daylight reflectance (Radiometer)</td>
</tr>
<tr>
<td>• humidity</td>
<td>• spectral transmission (MST)</td>
</tr>
<tr>
<td></td>
<td>• currents (ISM and ADCP)</td>
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<tr>
<td></td>
<td>• nutrients</td>
</tr>
<tr>
<td></td>
<td>• yellow substance fluorescence</td>
</tr>
<tr>
<td>• Database 6 years</td>
<td></td>
</tr>
<tr>
<td>• Time series data of 25 parameters</td>
<td></td>
</tr>
<tr>
<td>• Real time data via web</td>
<td></td>
</tr>
<tr>
<td>• Measuring at extrem events:</td>
<td></td>
</tr>
<tr>
<td>High wind speeds (Gales)</td>
<td></td>
</tr>
<tr>
<td>Extrem high water level (Storm Surges)</td>
<td></td>
</tr>
<tr>
<td>Sea Ice</td>
<td></td>
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</tbody>
</table>
Intercalibration

Methods

MST (Multi-Spectral Transmissometer): Particle concentrations are calculated via measuring the spectral attenuation coefficient in the water.

SPM (Suspended Particle Matter): Water samples are filtered, filters dried and weighed.

LISST (Laser In-Situ Scattering and Transmissometry): Particle concentrations are measured by a laser diffraction method in a range of 2.5 to 500 μm.
Correlation
Surface SPM Concentration

Oct 17
2007
Profiling measurements
FK Senckenberg
SPM Time Series Station

![Graph showing SPM Time Series Station with different time intervals (dT = 4 min, dT = 1 hour, dT = 1 tide). The graph includes data from November to February, with a peak likely corresponding to a storm surge on December 10, 2007.](image)
MERIS - Modelling

High water, 3 June 2004

Low water, 29 March 2004

mg/l

Europe Space Agency ESA
ADCP Current Speed
ADCP Current Speed

![Graph showing ADCP current speed with depth markers: -1 m, -5 m, -15 m. The graph displays current measurements over a period of 25 to 26 February.]
ADCP Backscatter Validation

Acoustic backscatter [dB]

SSC [mg/l]

27.07 18:00  28.07 0:00  28.07 6:00

SSC [mg/l] vs. Acoustic backscatter [dB] with regression line $y = 0.238x + 8$
Storm Surge “Britta”
1. Nov. 2006
Conclusions

• MST derived SPM data correspond well with SPM data derived from standard methods

• A single storm surge can have less impact on SPM dynamics than longer lasting gales

• Background data for estimating the influence of climate change on coastal sediment dynamics