Improved Diurnal Variability Forecast Of Ocean Surface Temperature through Community Model development (DIVOST-COM)

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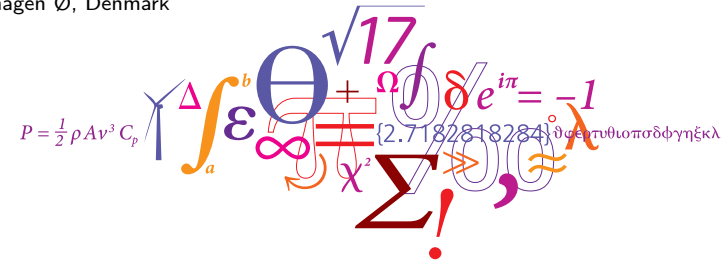

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Outline

- Introduction
- Observations
- Modelling
- DIVOST-COM

Diurnal Warming

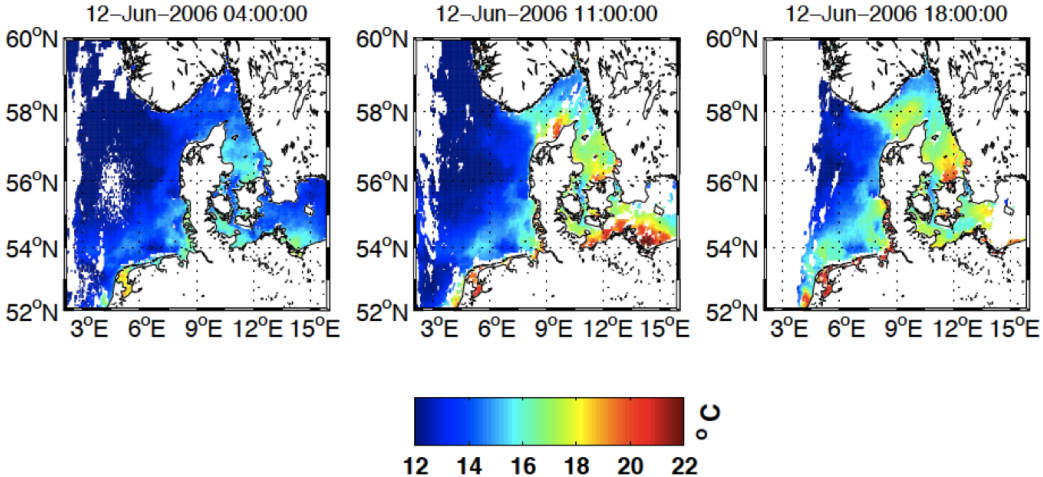


Figure: Example of SEVIRI SST changing during the course of a day.

Spatial patterns of SST diurnal variability in the Baltic

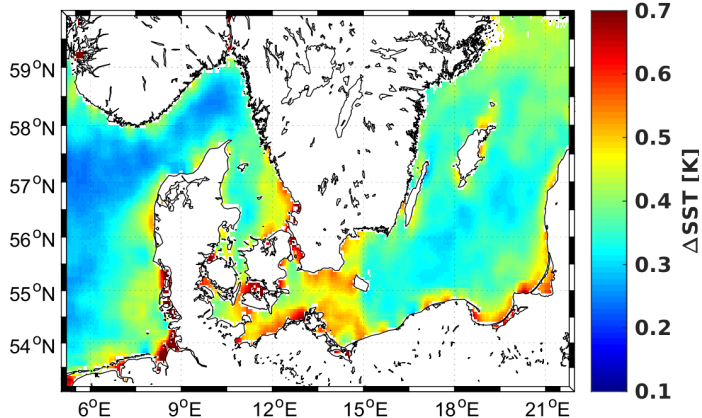


Figure: Maximum of monthly averaged ΔSST_{day}, i.e. the mean $\text{SST}_{day} = \text{SST}_{foundation}$[1].

[1] Karagali I. & J.L. Høyer (2014), Characterisation and quantification of regional diurnal SST cycles from SEVIRI, *Ocean Sci.*, **10**, 1–14.

Characteristics of SST diurnal variability in the Baltic

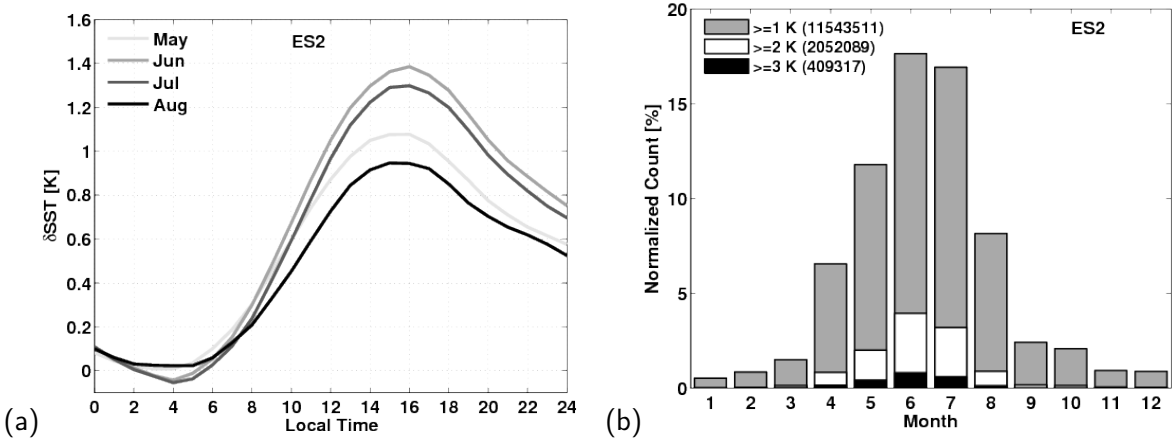
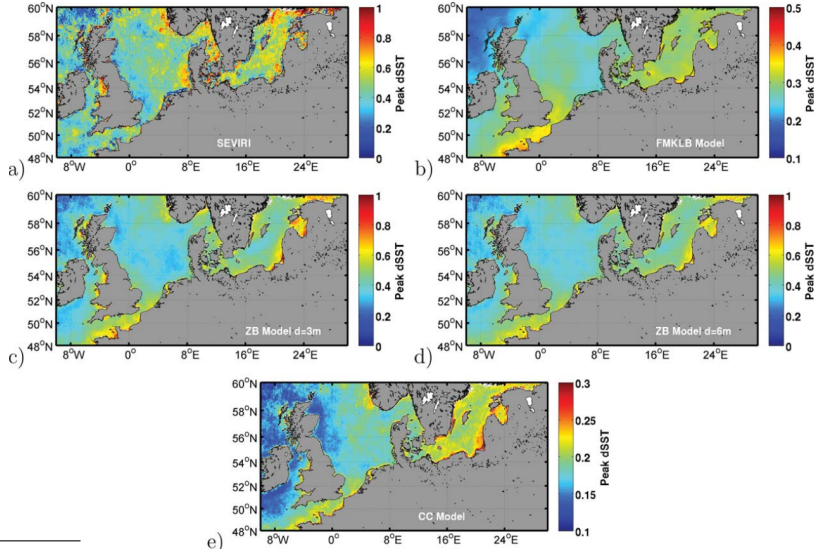


Figure: a) Monthly averaged daily cycle (hourly averaging grid cells with δSST$\geq$0.5 K at least once during a day). b) Monthly distribution of δSST $\geq$ 1, 2 and 3 K for 2006-2011, normalised over the total number of quality 5 retrievals [1].

Modelling SST diurnal variability in the Baltic

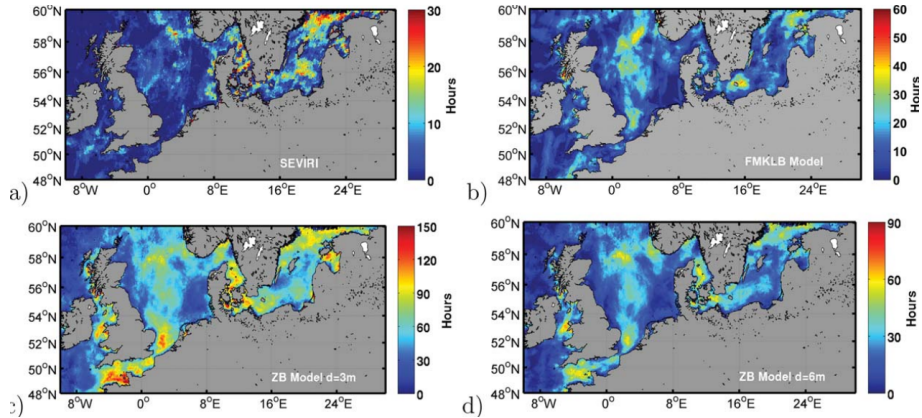
Spatial extent of averaged daily dSST max (February 2009 to January 2010) from (a) SEVIRI, (b) FMKLB, (c, d) ZB, & (e) CC schemes [2].



[2] Karagali I. & J.L. Høyer (2013), Observations and modeling of the diurnal SST cycle in the North and Baltic Seas, *J. Geophys. Res. Oceans*, 118, 4488–4503.

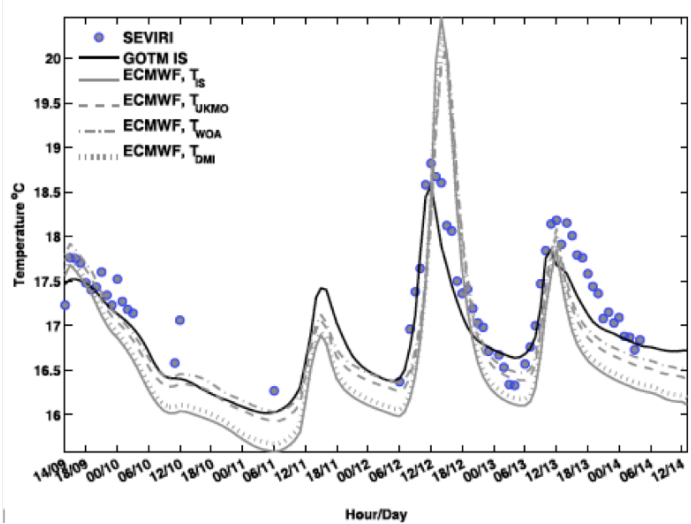
Modelling SST diurnal variability in the Baltic

Spatial extent of warming $\geq$2 K (February 2009 to January 2010) from (a) SEVIRI, (b) FMKLB, and (c and d) ZB schemes[2].



GOTM at Arkona Becken

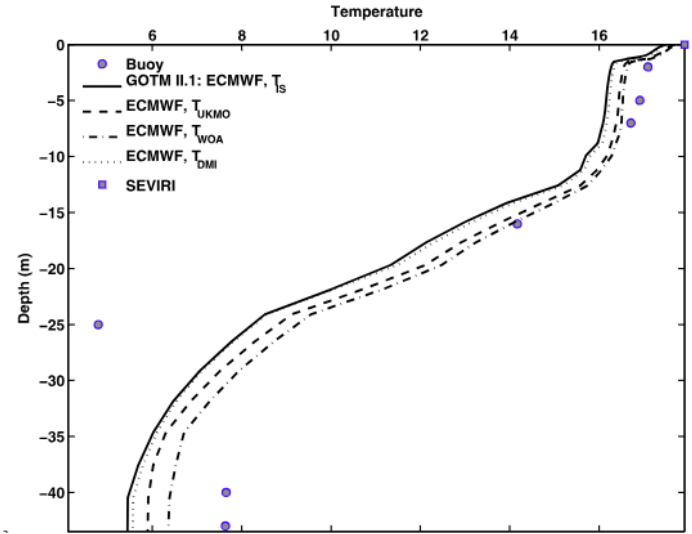
GOTM top layer temperature (solid), with in situ (black) or ECMWF (gray) forcing fields with options III.1 and VI.7, and SEVIRI (circles) sub-skin SST, 9–14 July 2013 [3].



[3] Karagali I, Høyer JL & Donlon CJ (2017), Using a 1-D model to reproduce the diurnal variability of SST, *J. Geophys. Res. Oceans*, **122 (4)**, 2945–2959.

GOTM at Arkona Becken - profile

Vertical temperature from the measurements (circles), GOTM with ECMWF forcing elds (lines) and SEVIRI on 13 July 2013, 13:00 [3].



66-SE-Call2 Projects

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Information on the 18 Service Evolution projects

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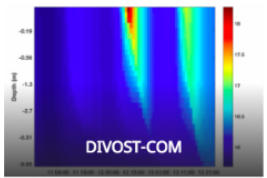
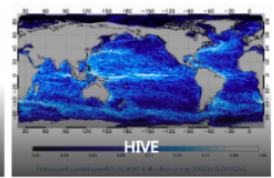
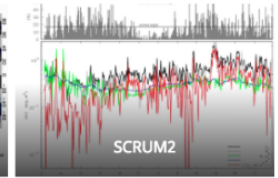






Rationale, support & impact

DIVOST-COM aims to develop and integrate a diurnal variability model with the Baltic MFC 3-D physical-biological model and the SST TAC level 4 analysis thus improving the CMEMS modelling and satellite products for the Baltic Sea.

Supported CMEMS Service Evolution overarching themes:

- Better describing the ocean biogeochemical parameters.
- Providing consistent ocean-atmosphere products.
- Contributing to a better monitoring and description of the ocean state and its variability.

Impact on CMEMS production systems and products:

- MFC PHY-BIO forecasting system (improved upper ocean temperature representation –> detection of algal blooms, improvement on heat and gas exchange with atmosphere)
- SST TAC (diurnal SST field to complement L4 product)

DIVOST-COM structure

WP1
Model Set-Up and Validation Datasets
- GOTM2Grid
- $GOTM_{DMI}$ pretesting @ Arkona Becken

WP2
Model System Development & Experiments
- Reference Run
- Sensitivity Tests

WP3
Updated run & Impact Assessment
- Temperature
- Heat flux
- Diurnal warming
- Algal blooms

WP4
Recommendations

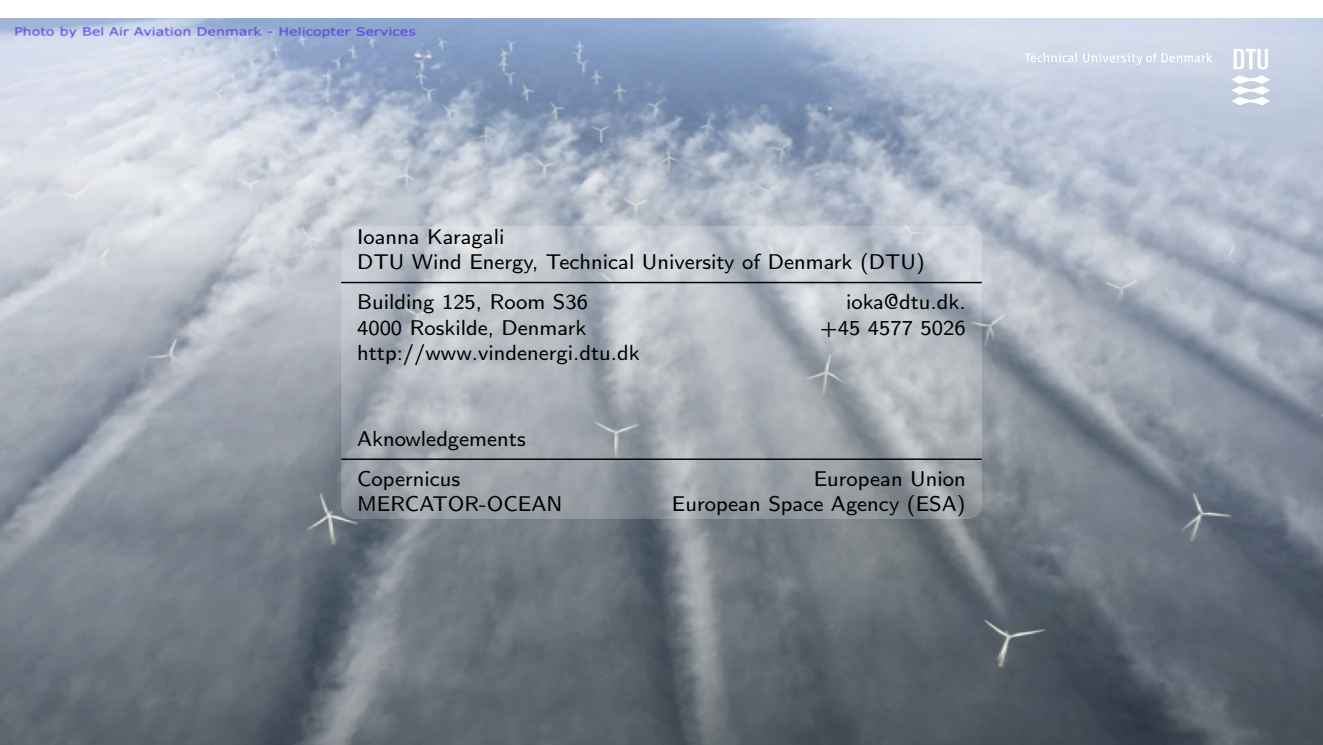
Team

- Ioanna Karagali (DTU Wind Energy, Researcher, Project PI)

- Jun She (DMI, Senior Researcher, BAL MFC)

- Jacob Høyer (DMI, Senior Researcher, SST TAC)

- Jens Murawski (DMI, Senior Researcher)



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Aknowledgements

Copernicus
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European Union
European Space Agency (ESA)