

NOOS PROJECT SUMMARY: **Multi Model Ensemble Prediction System**

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KEYWORDS: data exchange, multi model ensemble, ensemble prediction system, SST, SSS, water transports, currents

<i>Project title:</i> NOOS Multi Model Ensemble Prediction System	
Project Aims	<p>Several NOOS partners provide operational ocean forecasting models for the North Sea area on a daily basis. A range of information and emergency response systems is based on the available forecasts. All these systems can benefit from a systematic combination of the variety of forecasts in a Multi Model Ensemble (MME).</p> <p>The project aims at providing a MME system, which</p> <ul style="list-style-type: none"> • shall provide the basis for the development of uncertainty estimates for all forecast products on temporal and spatial scale • shall provide a supplement to validation by comparison of the contributing forecasts in order to reveal the degree of agreement and deviation for different parameters (benefit model developers) • shall provide some added value to the users of every single ensemble member <p>Exactly the same approach is applied in the Baltic Sea area based on model forecasts provided by several BOOS members. A close cooperation between this NOOS project and the BOOS counterpart is aimed at.</p>
Lead agency Lead scientist	<p>Bundesamt für Seeschifffahrt und Hydrographie (BSH) Federal Maritime and Hydrographic Agency Frank Janssen, frank.janssen@bsh.de</p>
Participants	<ul style="list-style-type: none"> • BSH, Frank Janssen, Inga Golbeck, Xin Li, Stephan Dick • DMI, Jacob Woge Nielsen, Vibeke Huess • FCOO, Johan Söderkvist • Met Office, Niall McConnell, Pete Sykes • Met.no, Harald Engedahl, Bruce Hackett • RBINS, Sebastien Legrand, Jose Ozer <p><i>BOOS - Participants</i></p> <ul style="list-style-type: none"> • <i>FMI, Simo-Matti Siiriä</i> • <i>MSI, Urmas Raudsepp</i> • <i>SMHI, Patrik Ljungemyr, Lars Axell</i>
Present status: <i>Ongoing</i>	<p>Project partners (BSH, DMI, FCOO, Met Office, Met.no and RBINS) provide daily 48 h-forecasts of computed sea surface temperature (SST), – salinity (SSS), – currents (SSC), sea bottom temperature (SBT) and – salinity (SBS), as well as daily water transport, based on different circulation models. The format of the input data to the MME is not fully standardised yet and a substantial amount of work is needed in reformatting the data to be used in the MME. The data are interpolated onto a common grid and ensemble products and uncertainty measures are produced. Figures showing the MME and uncertainty estimates of each parameter are produced on a daily basis and displayed on the NOOS website. Lately, monthly comparisons of computed SST with L3 satellite SST, provided by Copernicus, have been developed. In addition, up to 4-monthly movies</p>

	<p>reflect the temporal and spatial variation of standard deviation fields for SST, SSS and SSC. The paper “Golbeck et al (2015) Uncertainty estimation for operational ocean forecast products - A Multi-Model Ensemble for the North Sea and the Baltic Sea” has been submitted in February 2015.</p>
Project timescale	<ul style="list-style-type: none"> • Sept. 2012: Start of planning phase / Pre-operational phase • Apr. 2013: Initialisation of MME • Aug. 2013 – Nov. 2014: Presentation of results at Baltic Sea Science Conference (Klaipeda), NOOS AM (Brussels), FutOOre (Hamburg), MyOcean-2 AM (Athens), EGU (Vienna), 7th EuroGOOS conference (Lisbon) • 22. Jan. 2014: MME Figures available on NOOS / BOOS websites • Aug. 2014: Definition of NOOS project • Oct. 2014: Development of MME for SBT and SBS • Feb. 2015: Submission of paper “Golbeck et al (2015) Uncertainty estimation for operational ocean forecast products - A Multi-Model Ensemble for the North Sea and the Baltic Sea” • Aug. 2015: Up to 4-monthly movies showing standard deviation of SST, SSS, SSC, SBT and SBS provided on NOOS / BOOS websites • Sept. 2015: Monthly comparison of computed SST to L3 satellite SST showing bias and RMSE provided on NOOS / BOOS websites
Planned Developments and Activities (2015 - ...)	<ul style="list-style-type: none"> • Higher standardization of input data provided by NOOS partners. (This is urgently needed to make the MME sustainable when project funding is no longer available.) • Implementation of weighted-average methods (i.e. Bayesian model averaging) • Comparison with in-situ and satellite data • Include sea ice and biogeochemical parameters
Link to project documents (password protected URL ??)	<p>http://www.noos.cc/index.php?id=mme ftp://ftp.bsh.de/outgoing/opmodel/my_ocean/MME/</p>