



Modelling the Wadden Sea

Welcome and introduction

Piet Hoekstra and Peter Herman



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Models in science and society



- **Models**

Integration and reflection of available knowledge

Representation and simulation of real world, including:

- Abstractions
- Simplifications
- Approximations

- **Application of models**

- Predictions, Forecasting, Hindcasting
- Scenario runs for coastal management
- Extrapolation of extreme events/conditions (no data available)
- Diagnostic modelling: how does the system work ? For example: to explain observed features.
-other



Variety of models



- **Examples Coastal Morphology**
 - 1) **Conceptual models: beach states**
 - 2) **Physical scale models: flumes and basins**
 - 3) **Physical-deterministic models for hydrodynamics, sediment transport and morphodynamics:**
 - 1) Numerical models
 - 2) Analytical models
 - 3) Idealized stability models
 - 4) **Behaviour-oriented models (black box)**
 - 5) **Data-driven models**
 - 6) **.....**



Field data and models

- **Input data for model**
- **Boundary conditions to run the model**
- **Calibration data: parameter settings**
- **Validation of model (independent data set); from level of submodule to full coupling of modules**
- **Process analyses and improvement of algorithms for upgrading of model**
- **DMI – Data-Model Integration techniques (integrated approach with data-assimilation procedures)**



Aims of thematic meeting



- 1) **Become familiar with and appreciate modelling approaches in different disciplines related to Wadden Sea ecosystems**
- 2) **Representative selection: by no means a full or complete overview**
- 3) **Selection of issues related to present state and future development of the Wadden Sea; main focus on physical and biological processes and interactions:**
 - 1) Biological modelling / carrying capacity
 - 2) Bio-engineering and self-organization
 - 3) Hydrodynamic processes and SPM transport
 - 4) Coastal morphodynamics



Present and Future challenge

- **Modelling approaches in the framework of interdisciplinary research for the Wadden Sea.**
- **How to model e.g. interactions between physical and biological components of the system, taking into account:**
 - Lack of data
 - Lack of knowledge on cause-effect relations
 - Existence of mutual interactions and feedbacks (bio-engineering)
 - Problems of scale in time and space; resolution
 - Changing boundary conditions and human intervention
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NCK 2012: 20th anniversary (est. 1992)

- **Objectives**

- Increase research quality through cooperation
- Strengthen position of Dutch coastal research nationally as well as internationally
- Maintain high quality fundamental coastal research
- Translate research results into operational applications (such as models, software tools, guidelines, innovative coastal defense methods for end-users)
- Reinforce coastal research and education at Universities: train the next generation of researchers and coastal zone managers



- **NCK Activities**
 - 1) Annual NCK meeting (3 days, incl. excursion)
 - 2) Thematic meetings
 - 3) NCK Summerschool (bi-annual, 2011)
 - 4) NCK website
 - 5) Platform to establish consortia for national and international research cooperation (NL, EU, USA)