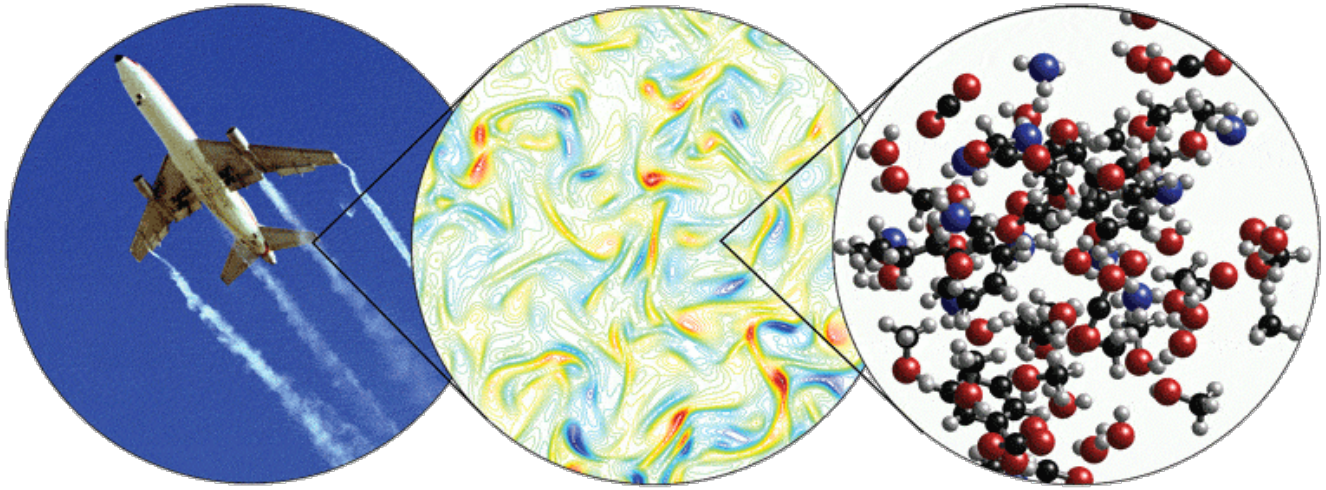
Computer Simulationspraktikum Umweltwissenschaften

Ralf Schneider


Vision 2050:
„Die Bürgerinnen und Bürger Deutschlands und Europas leben gut innerhalb der ökologischen Belastbarkeitsgrenzen der Erde."
Zentrale Herausforderung: Ökologische Grenzen einhalten
Grundlegender Wandel nötig in:
Gesellschaft
Wirtschaft
Energie
Konsum/Ressoucen
Landwirtschaft
Mobilität
Maßnahmen zu:
übergreifende Maßnahmen
Umwelt- und klimaverträglich wirtschaften, Energie- und Ressourcenwende
Zukunftsfähige Landwirtschaft, intakte Natur
Nachhaltige Mobilität, lebenswerte Städte
Gesunde Lebensbedingungen
Internationale Dimension der Umweltpolitik

Multi-scale problems



WWW Uppsala Univ. Sweden

Classification:

A) Micro Info local

B) Micro Info global

C) Combination (A)+(B)

D) Self-similarity

Multi-Scale Strategy:

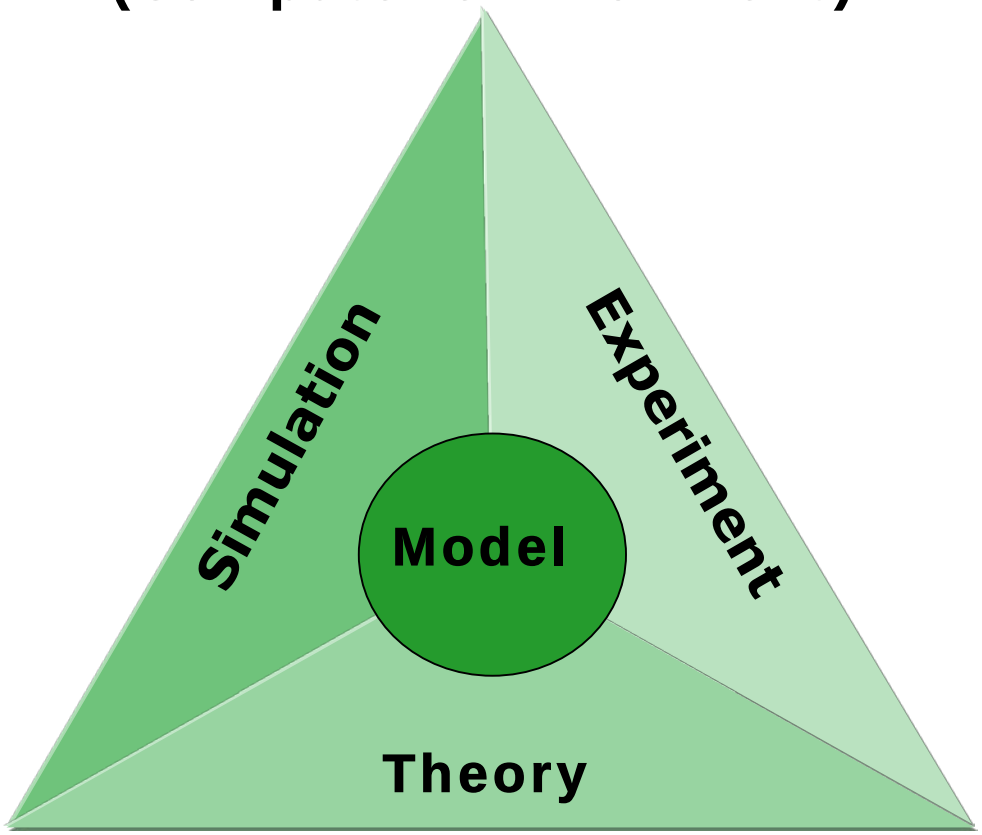
Serial coupling

Coupling “on the fly”

Renormalisation

Computational Science

Architecture
(Computer environment)

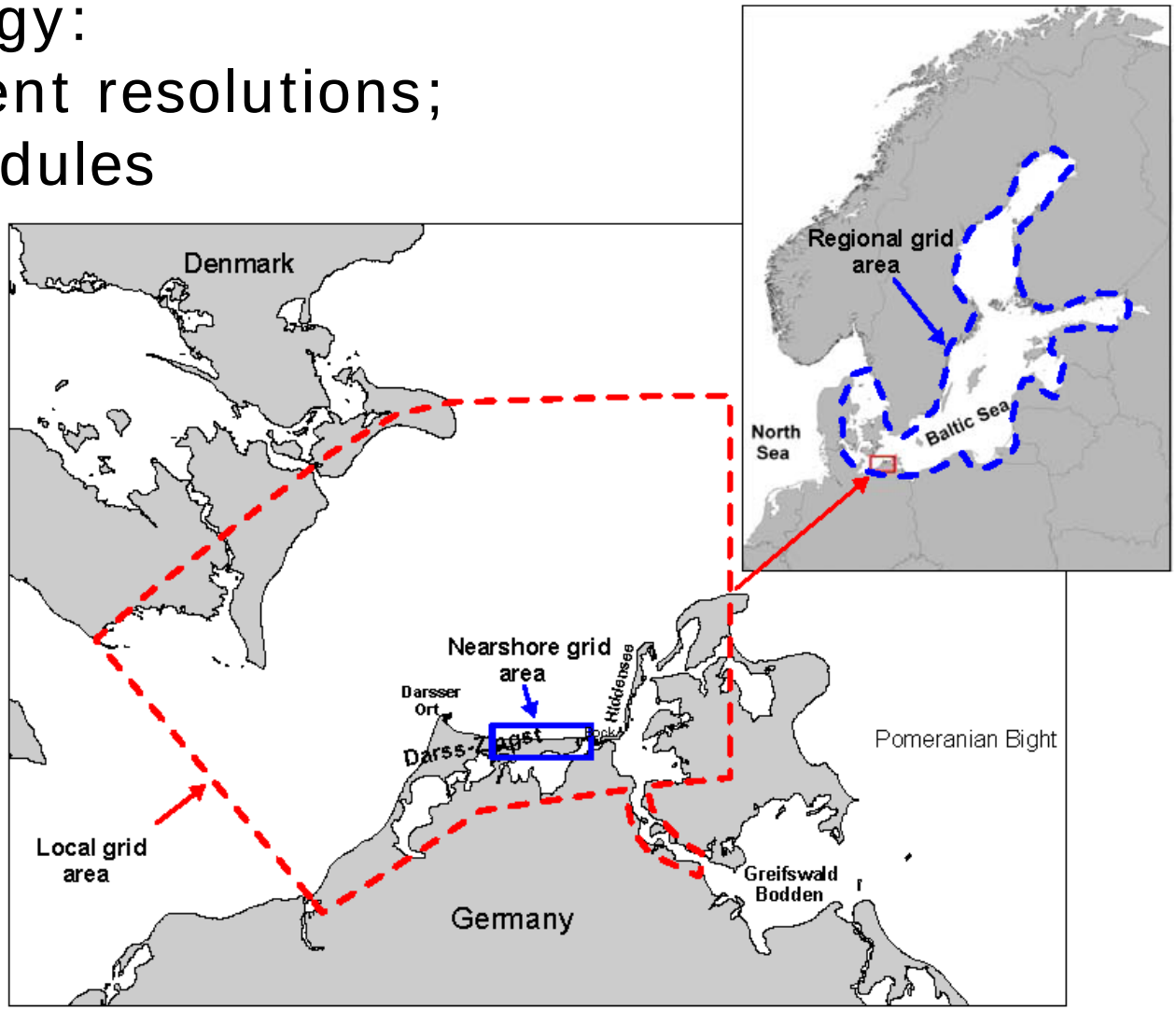


Algorithm
(Mathematical Model)

Application
(Scientific problem)

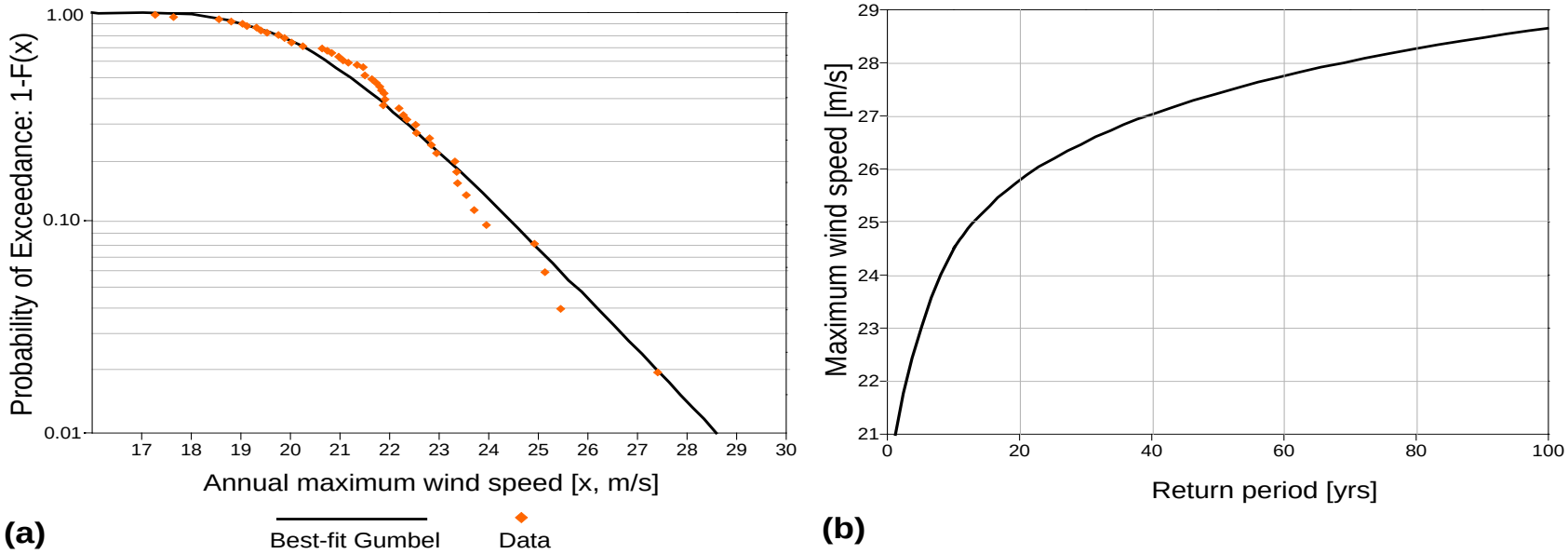
Sediment transport

multi-scale strategy:
coupling of different resolutions;
partly parallel modules



Ansatz for data reduction

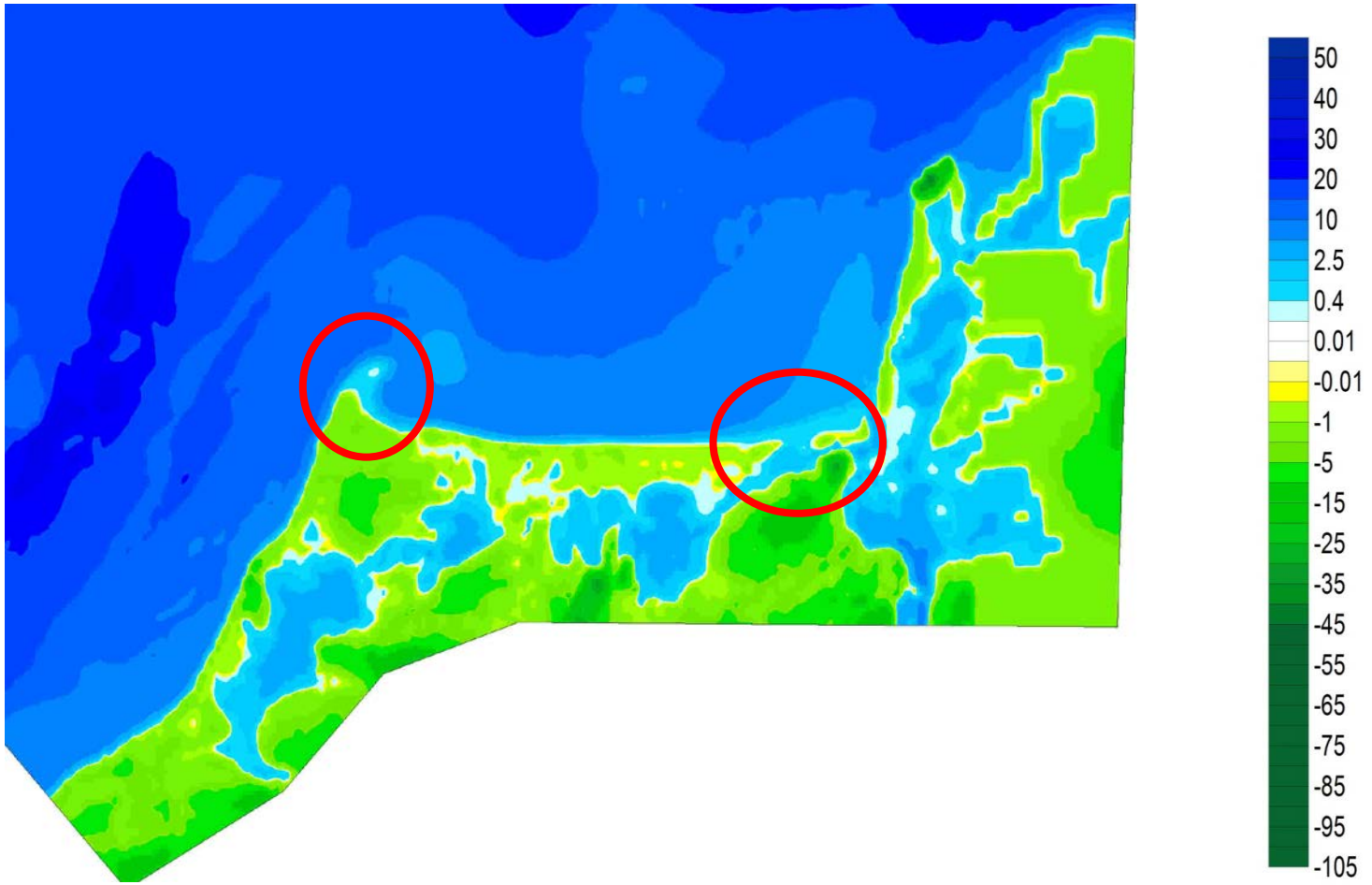
statistical reduction of wind data:
4 classes (strength, direction)



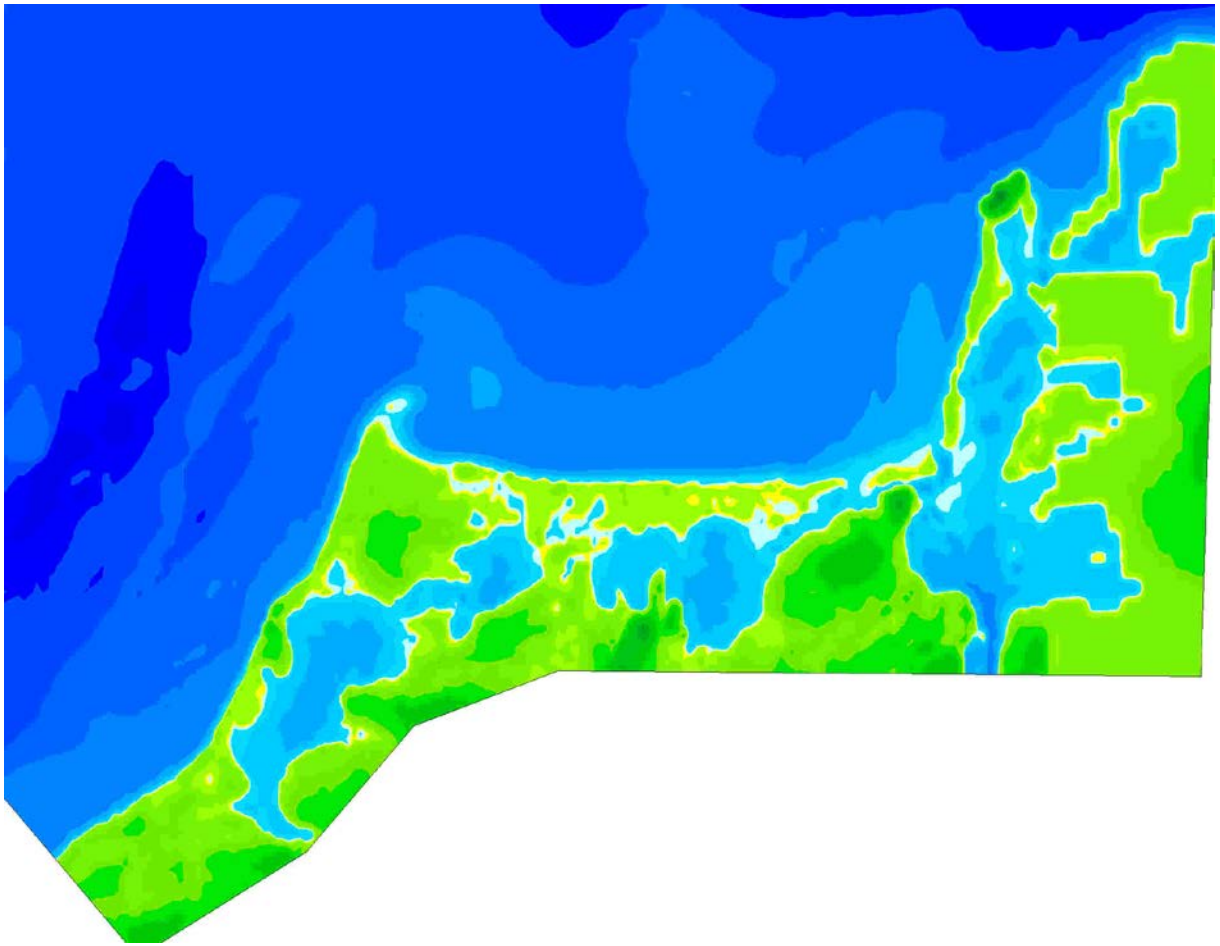
identifikation of storms

1 statistically representative wind series (1 month):
Up-scaling for the whole year

1696



1800



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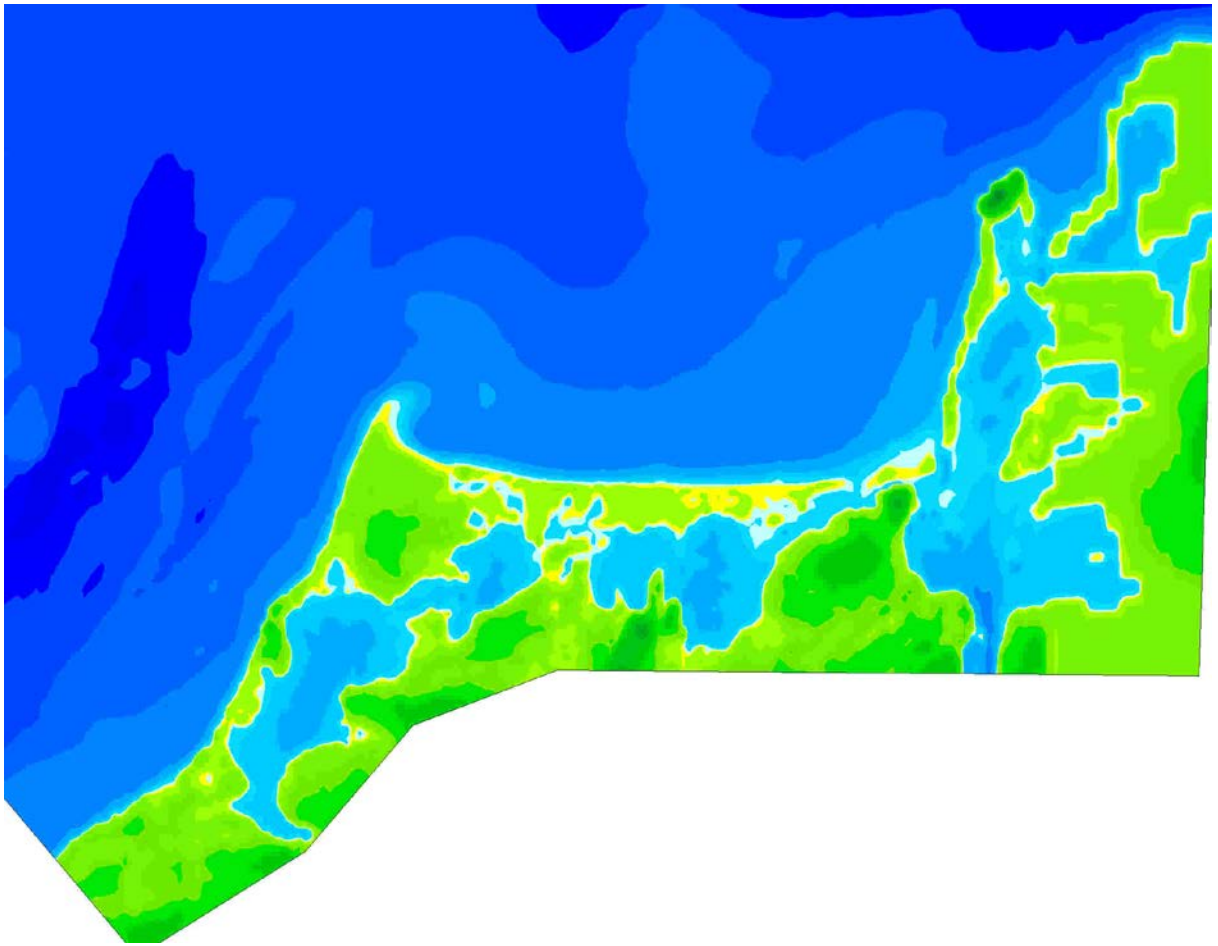
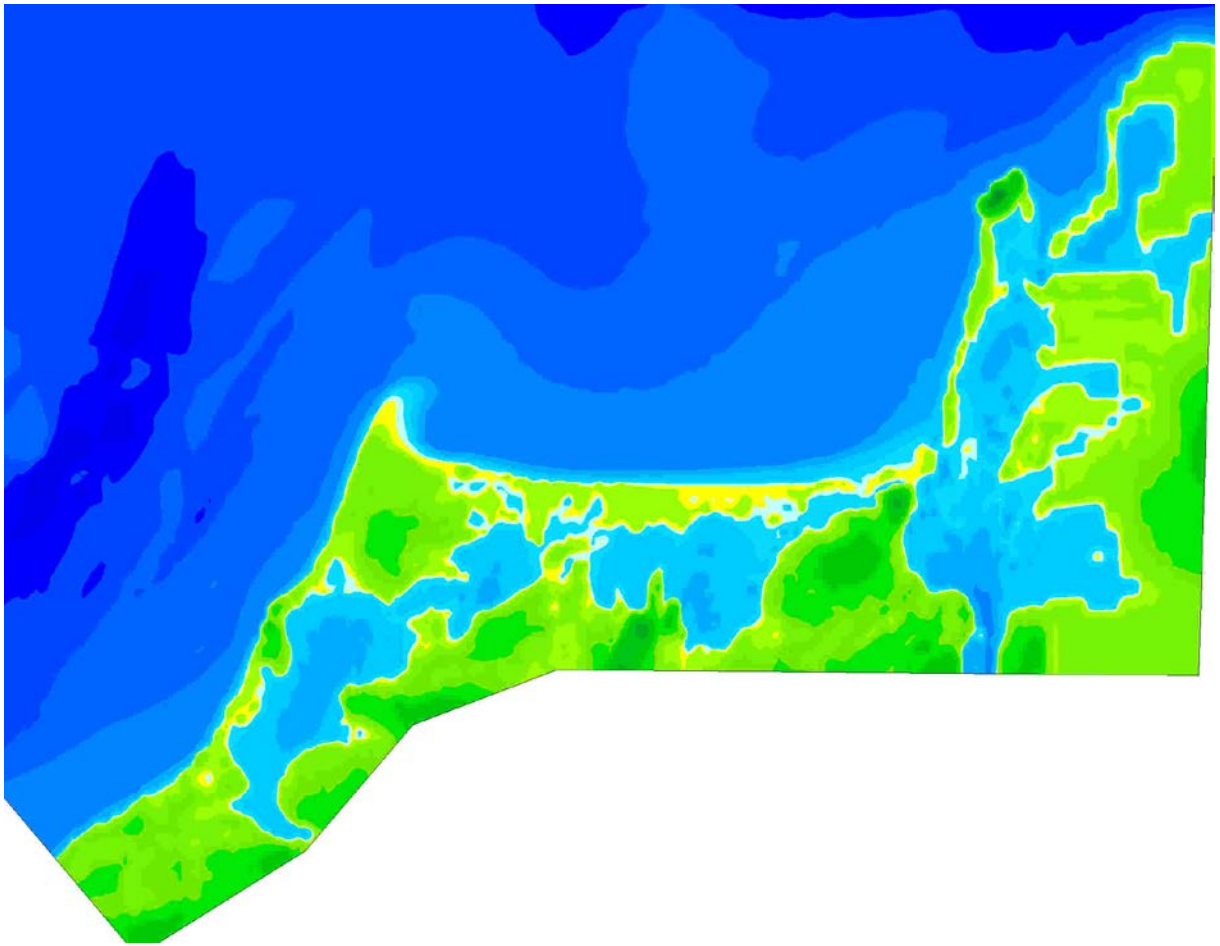
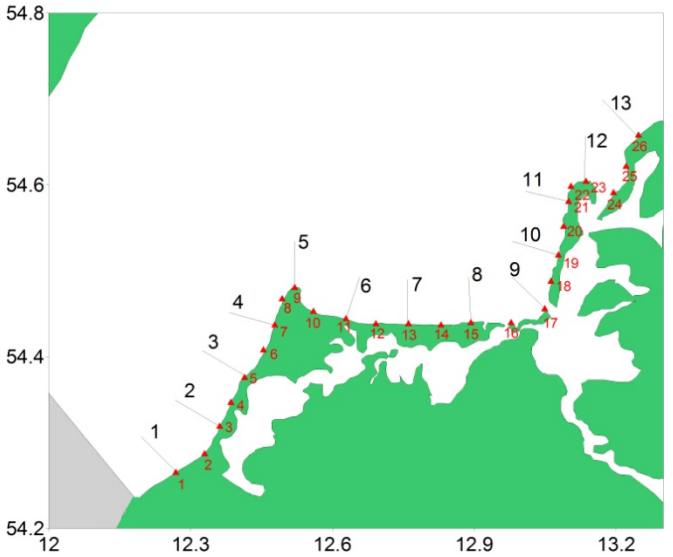


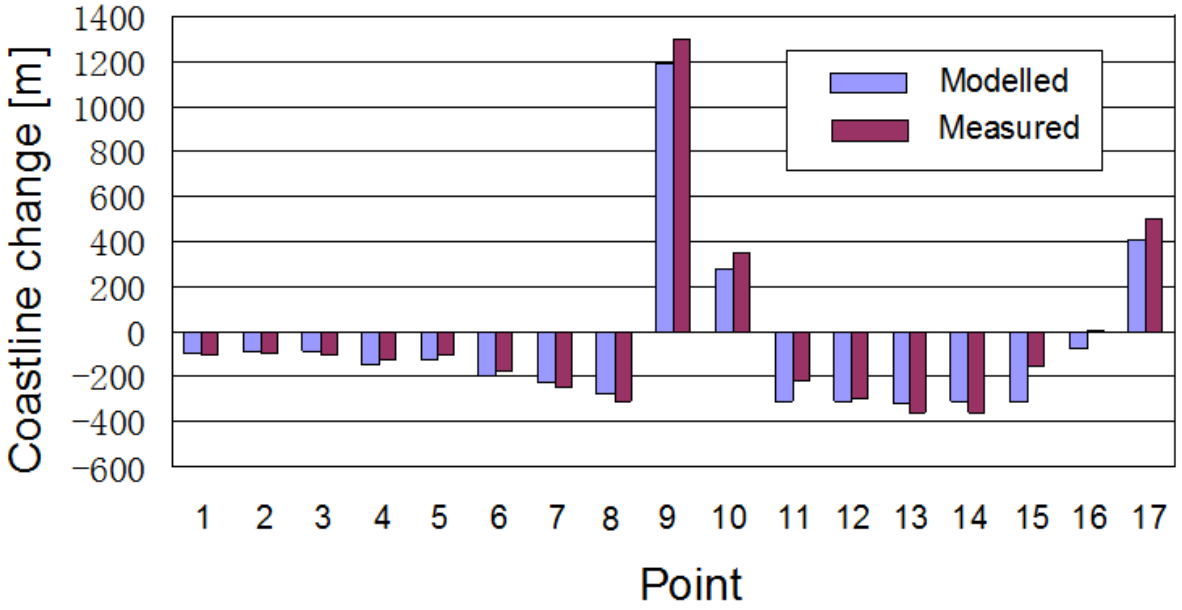
2000



Model validation

model agrees with measurements

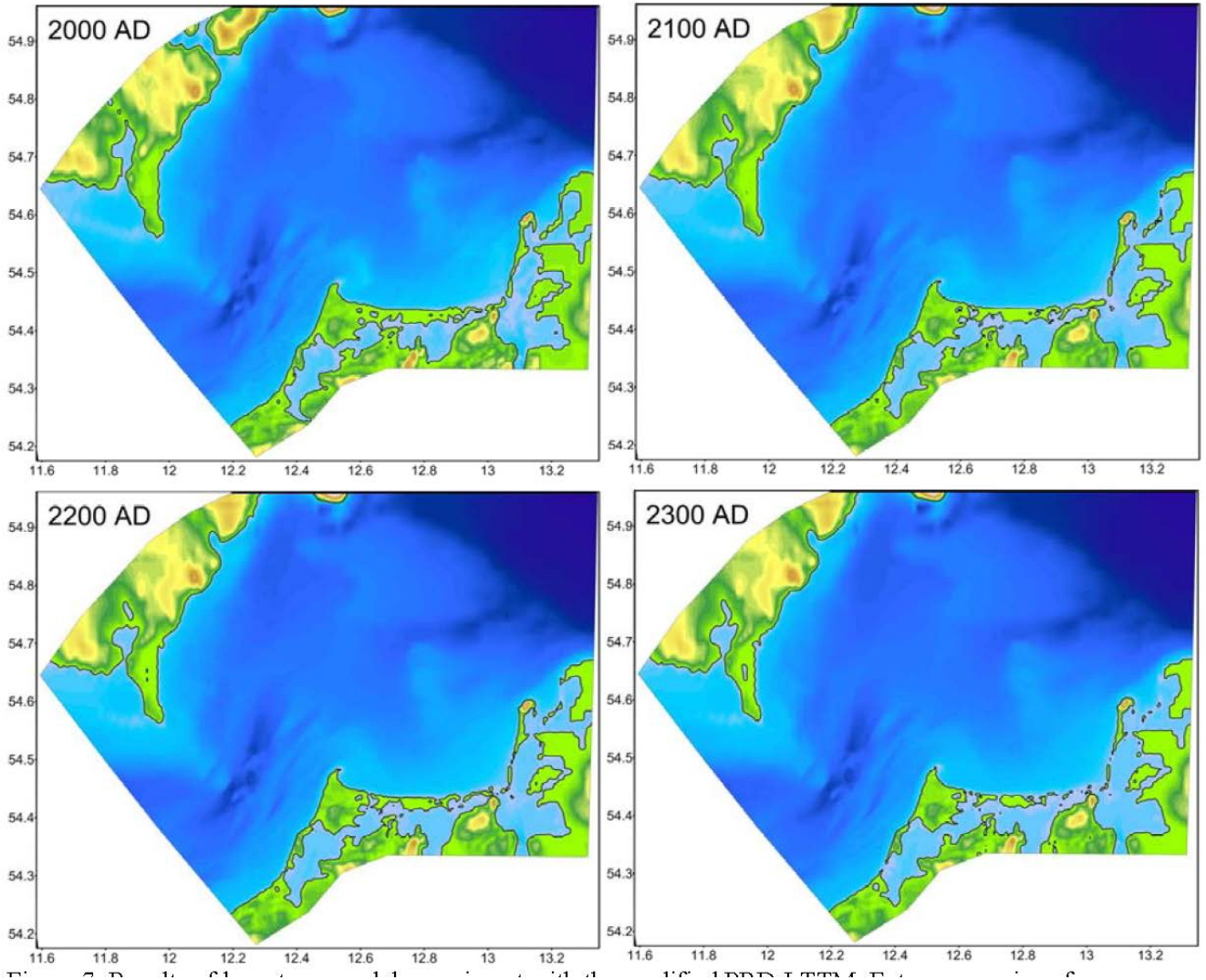




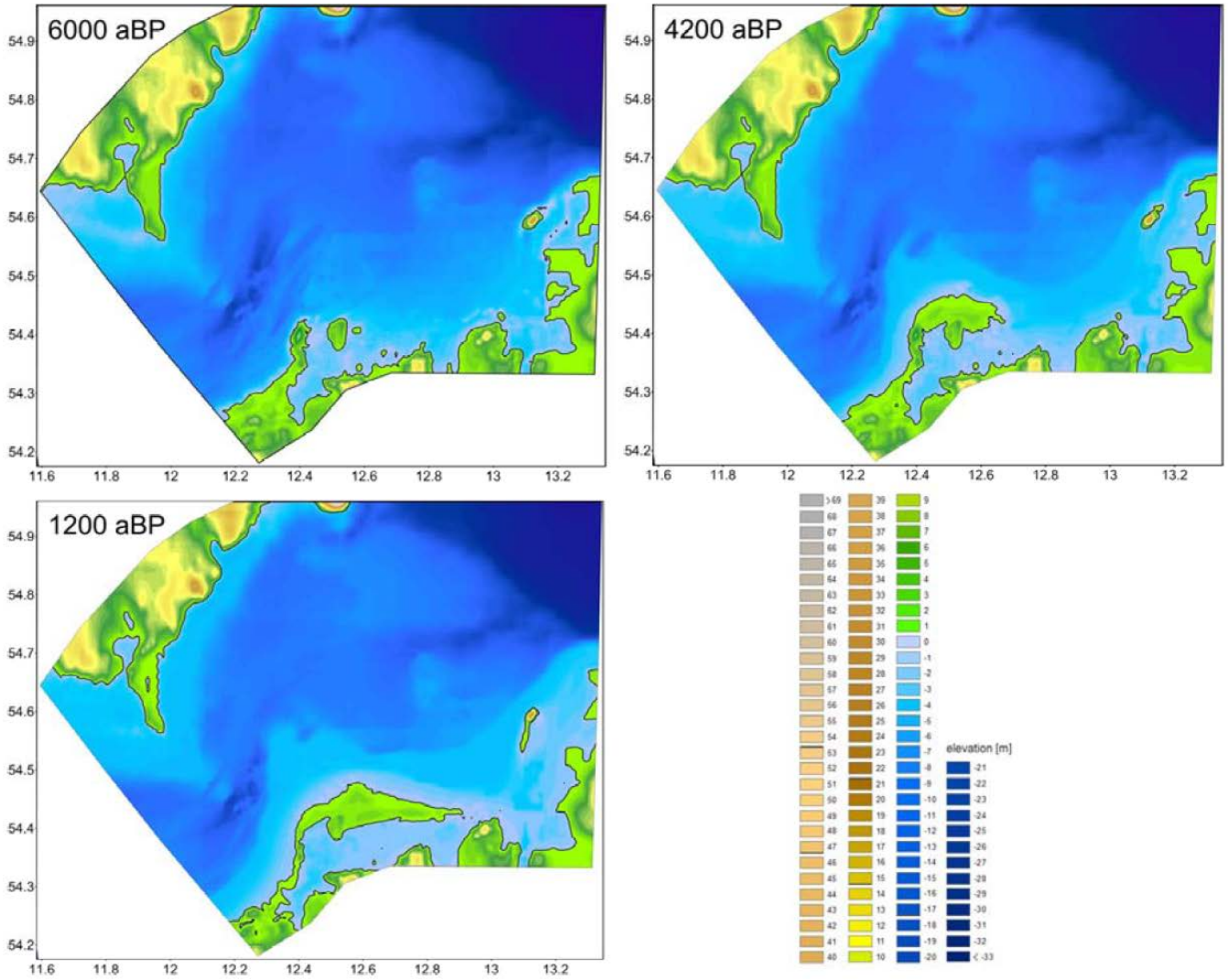
Darsser coast: long time effects (waves, flows along the coast)

Zingster coast: short term effects (storms)

Predictions



Millenium-scale modeling



Continuum of Ecological Models

- From populations to ecosystems

Write down some strengths and weaknesses of each of these approaches

This course

- Just a taste of what‘s out there
- Develop simple models of population dynamics
- Use of Octave