

# GETM

## *A General Estuarine Transport Model*

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# Coastal modelling challenges I

- **Drying and flooding algorithm** for simulation of Wadden Sea areas.
- **Bottom-fitted coordinates** for better representing near-bed currents.
- **Surface-fitted coordinates** for fine near-surface resolution at high tidal range.
- **General vertical coordinates** for better fitting the model grid to internal structures.

# Coastal model challenges II

- **Flexible horizontal coordinates** for better representing complex bathymetry and higher resolutions of specific regions without nesting.
- **Monotone high-order advection schemes** for better representing fronts and stratification.
- **Higher order turbulence models** for good representation of vertical mixing.

# Why a new 3D model?

	Vertical discretisation	Horizontal discretisation	Barotropic time-stepping	High-order turbulence closures	Drying/Flooding	Public Domain
MOM-4	$z$	CU	MSP	N	N	Y
POM	$s$	CU	MSP	Y	N	Y
ROMS	$s$	CU	MSP	Y	N	Y
POL3DB	$s$	CA	MSP	Y	N	Y
GHER-M	$2 - \sigma$	CA	MSP	Y	N	Y
COHERENS	$\sigma$	CA	MSP	Y	N	Y
TRIM-3D	$z$	CA	IMP	N	Y	N
MIKE-3	$z$	CA	ADI	Y	N	N
TELEMAC-3D	$\sigma$	FE	IMP	Y	Y	N
<b>ECOM</b>	$s$	CU	IMP	Y	Y	<b>Y</b>
<b>MOHID</b>	$s$	CA	ADI	Y	Y	Y
<b>GETM</b>	$s$	CU	MSP	Y	Y	Y

# Turbulence Models in GETM

<http://www.gotm.net>



[Challenge](#)

[Aim](#)

[The Idea](#)

[Key features](#)

[Software](#)

[Fortran code](#)

[Test cases](#)

[Forcing](#)

[How to run?](#)

[Information](#)

[What's New](#)

[Publications](#)

[E-mail list](#)

[FAQ](#)

[User Group](#)

[Hot Links](#)

[Who's Who?](#)

[Guestbook](#)

## General Ocean Turbulence Model

GOTM is a one-dimensional numerical model developed and supported by a [core team](#) of ocean modellers. GOTM aims at simulating accurately [vertical exchange processes](#) in the marine environment where [mixing](#) is known to play a key role. GOTM is freely available under the [GPL](#) (Gnu Public License).

The interested user can download the [source code](#), a set of [test cases](#) (Papa, November, Flex, ...) and a comprehensive [report](#).

You are warmly invited to join the GOTM [mailing list](#) and send any comments/questions to the [GOTM team](#) or become a GOTM [contributor](#). The GOTM developers are grateful to their [sponsors](#).

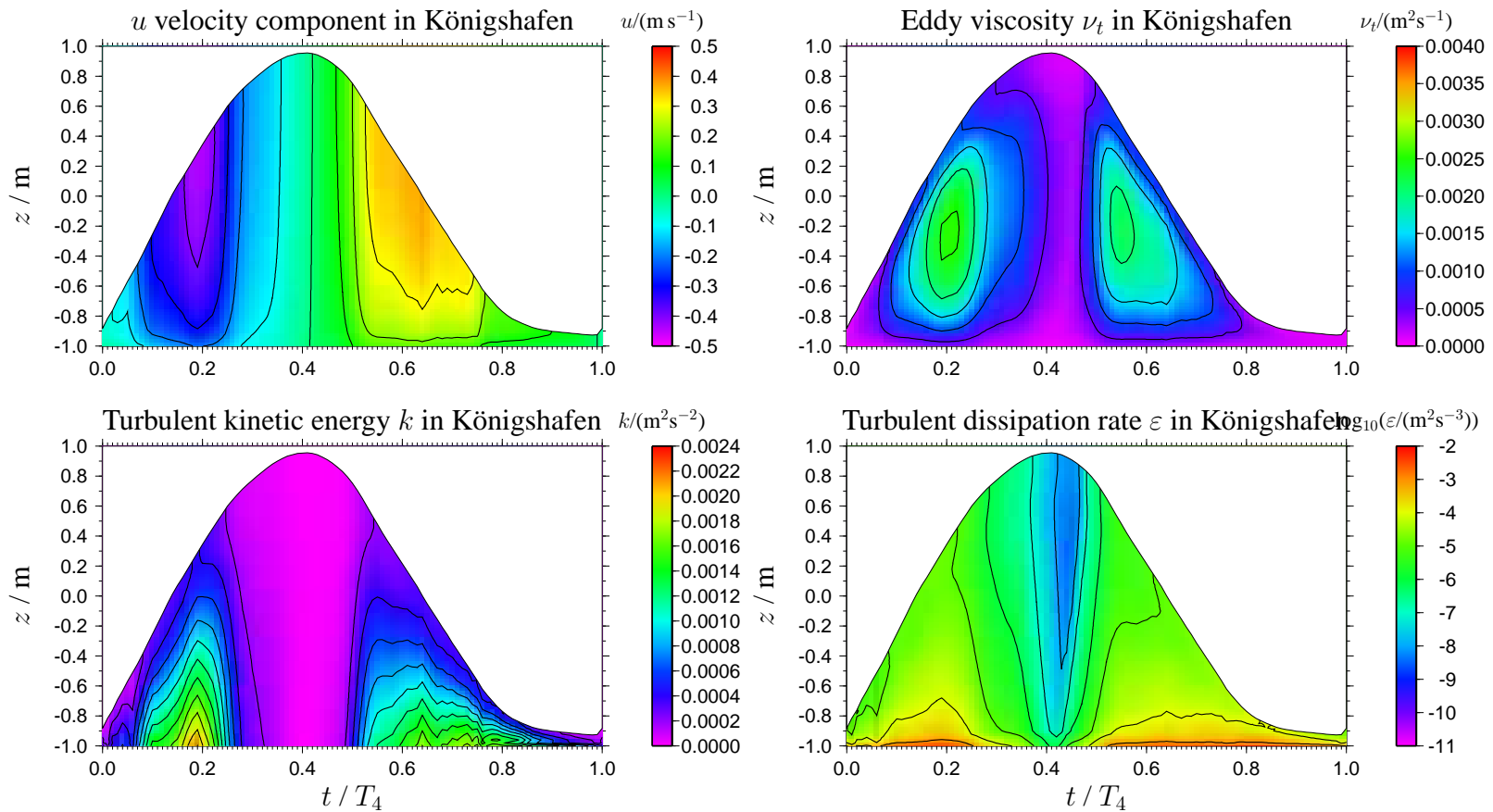
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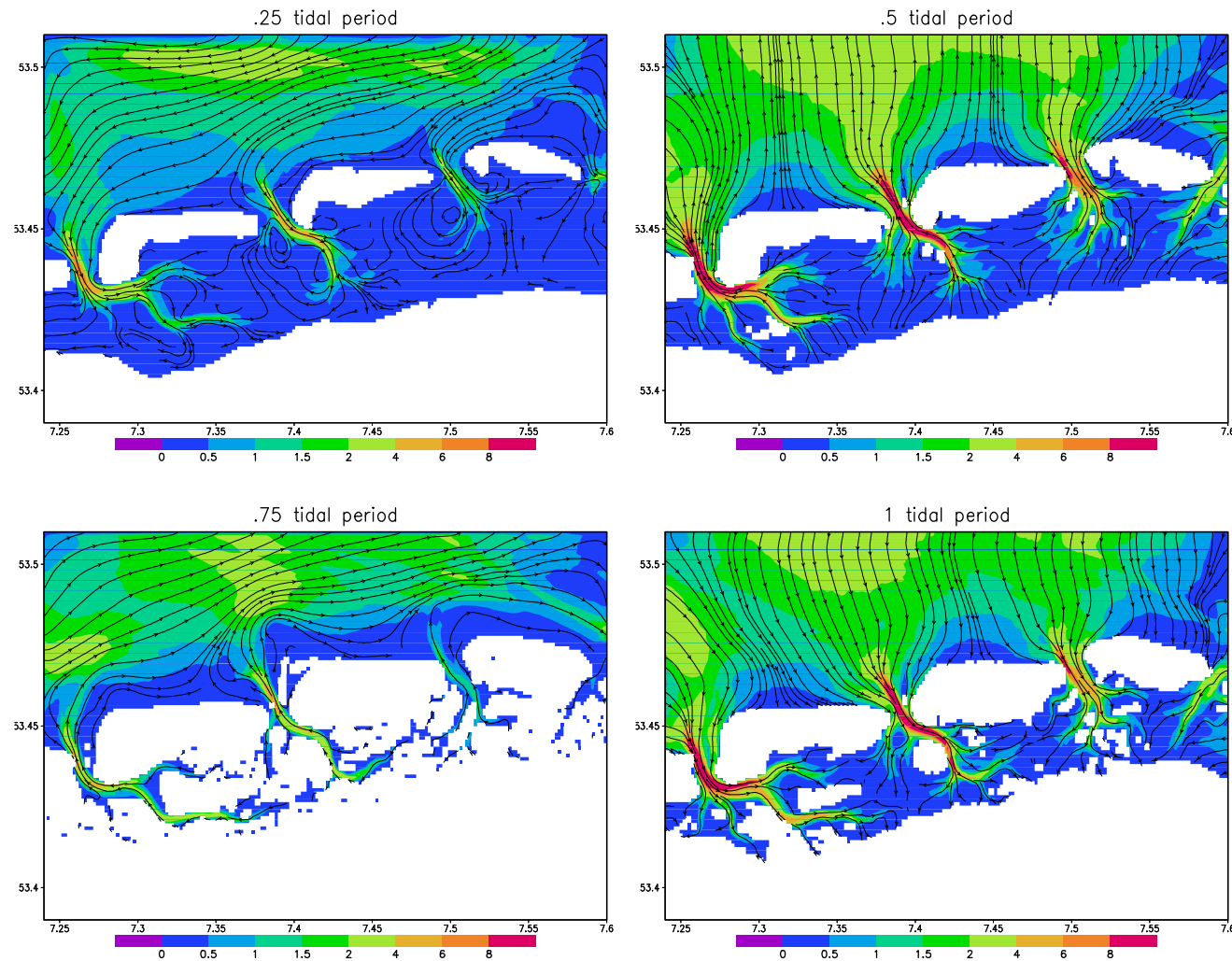
# North Frisian Wadden Sea



Burchard and Bolding [2002]

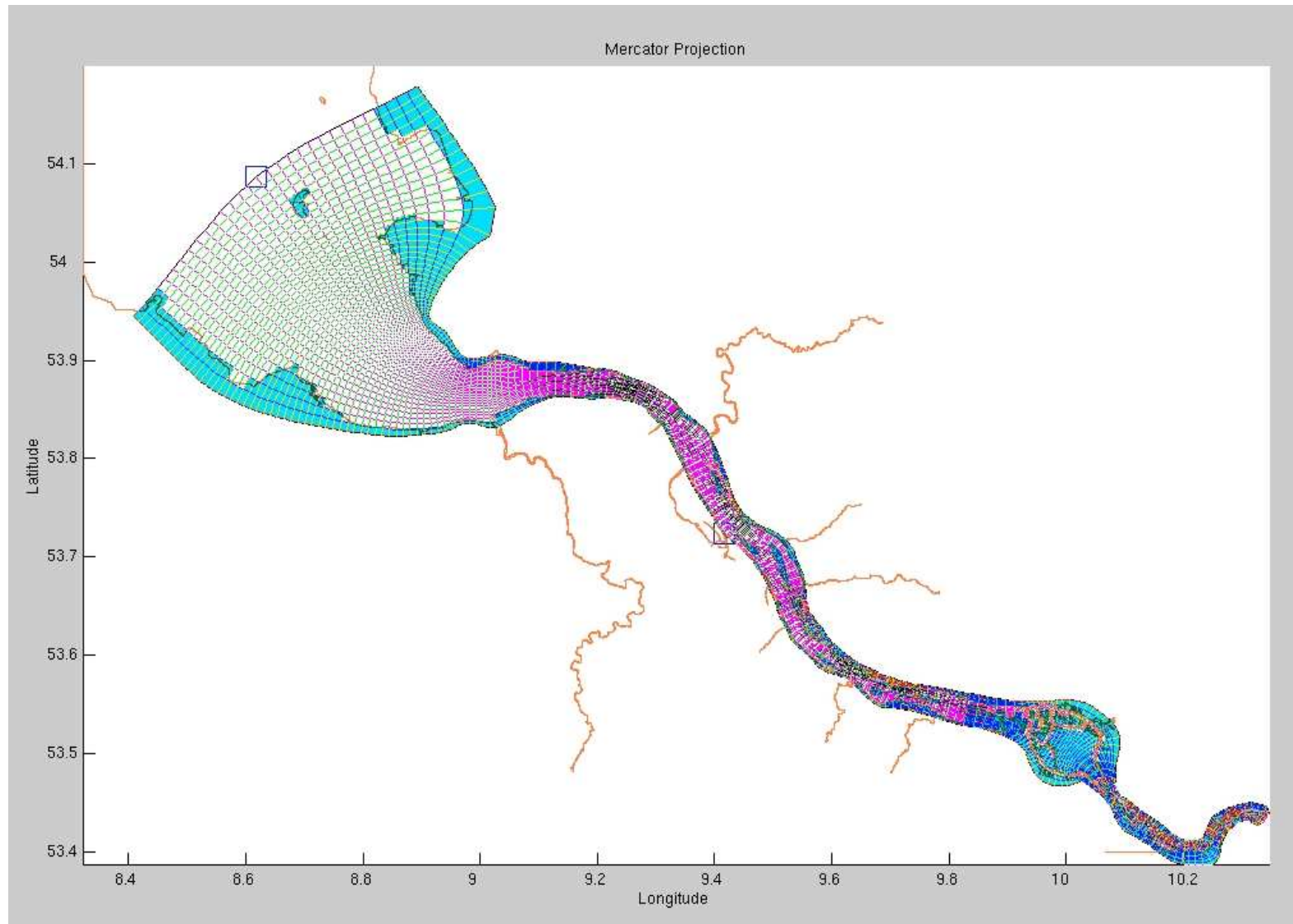
# East Frisian Wadden Sea

## VERTICALLY INTEGRATED VELOCITY

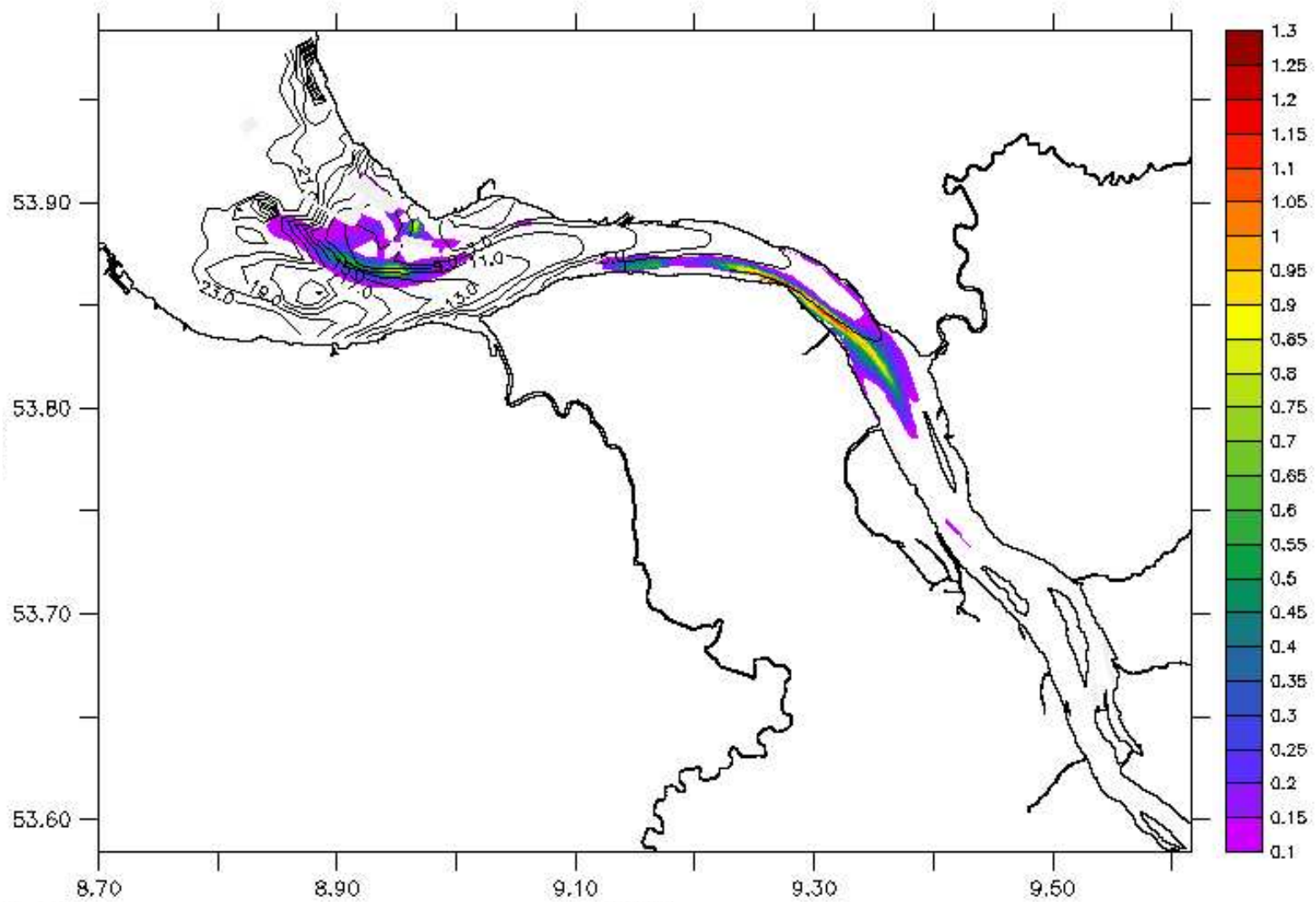


Stanev et al. [2003]

# Tidal Elbe I



# Tidal Elbe II



Suspended particulate matter concentration

Burchard et al. [2003]

# Conclusions, literature

- GETM is one of the very few Public Domain models designed for small scale coastal and estuarine applications.
  - The study of coastal and estuarine dynamics is a challenge for Physical Oceanographers.
  - An OGCM with high resolution does not converge to a coastal or estuarine model.
1. Burchard, H. and K. Bolding, GETM, a general estuarine transport model. Scientific Documentation, European Commission, Report EUR 20253, 157 pp., 2002.
  2. Burchard, H., K. Bolding, and M.R. Villarreal, Three-dimensional modelling of estuarine turbidity maxima in a tidal estuary, *Ocean Dynamics*, submitted 2003.
  3. Stanev, E.V., J.-O. Wolff, H. Burchard, K. Bolding and G. Flöser, On the Circulation in the East Frisian Wadden Sea: Numerical modelling and data analysis, *Ocean Dynamics*, **53**, 27-51, 2003.