Quantifizierung mariner Turbulenz durch Beobachtungen und numerische Simulationen

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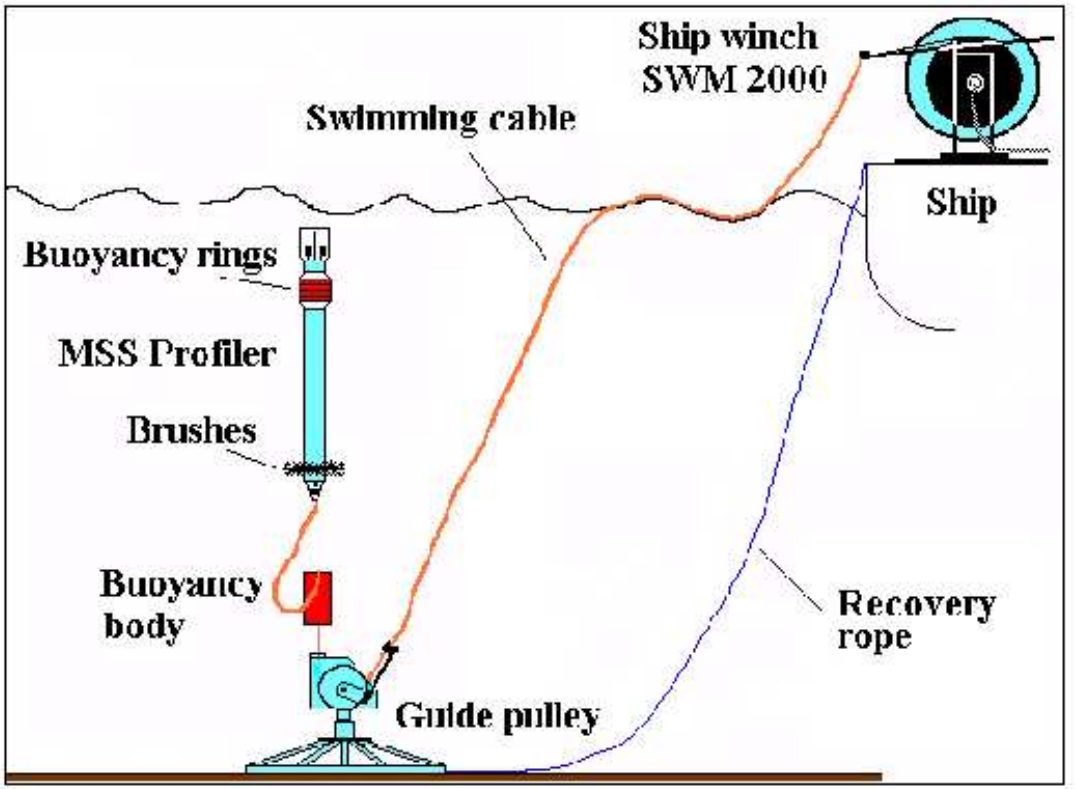
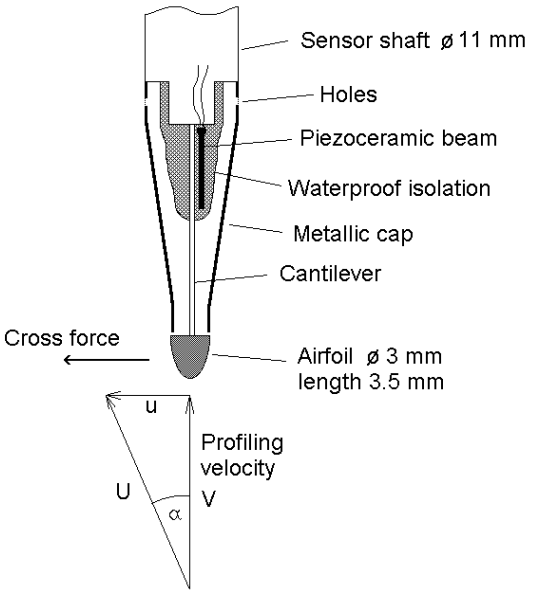
Inhalt

- Moderne Beobachtungsmethoden: Mikrostruktursonden und hochauflösende ADCP
- Neue Modellwerkzeuge: GOTM und GETM
- Verifikation von GOTM und GETM durch Beobachtungen
- Projektierte Anwendung: Vermischung im Arkona-Becken

Mikrostruktursonde

Messung der Dissipationsrate $\left\langle (\partial_j \tilde{v}_i)^2 \right\rangle$ mit Hilfe moderner Technologie:

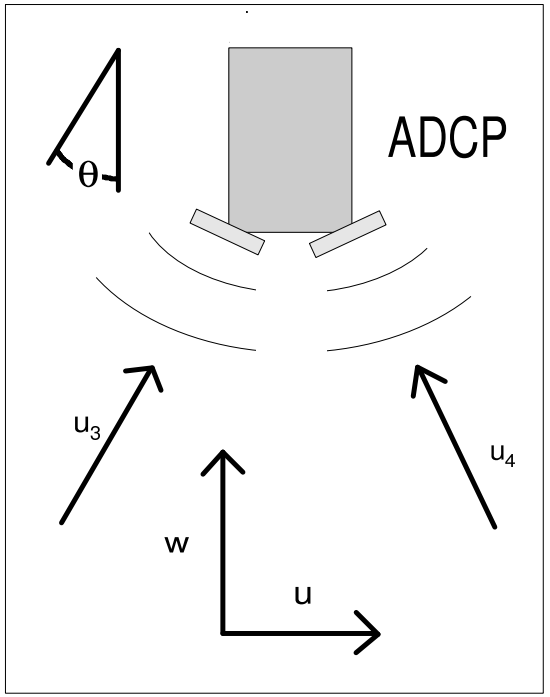




Zusammenarbeit mit ISW-Wassermesstechnik Dr. Hartmut Prandke, Petersdorf

Hochauflösendes ADCP

Messung der Schubspannung $u_*^2 = \langle \tilde{u}\tilde{w} \rangle$ und der Turbulenz-produktion $P = -\langle \tilde{u}\tilde{w} \rangle \partial_z \bar{u}$ mit Hilfe neuer ADCP-Technologie:



$$u_3 = u \sin\theta + w \cos\theta; \qquad u_4 = -u \sin\theta + w \cos\theta; \qquad (1)$$

$$\begin{aligned} \langle \tilde{u}_3^2 \rangle &= \langle \tilde{u}^2 \rangle \sin^2\theta + \langle \tilde{w}^2 \rangle \cos^2\theta + 2\langle \tilde{u}\tilde{w} \rangle \sin\theta \cos\theta \\ \langle \tilde{u}_4^2 \rangle &= \langle \tilde{u}^2 \rangle \sin^2\theta + \langle \tilde{w}^2 \rangle \cos^2\theta - 2\langle \tilde{u}\tilde{w} \rangle \sin\theta \cos\theta \end{aligned} \qquad (2)$$

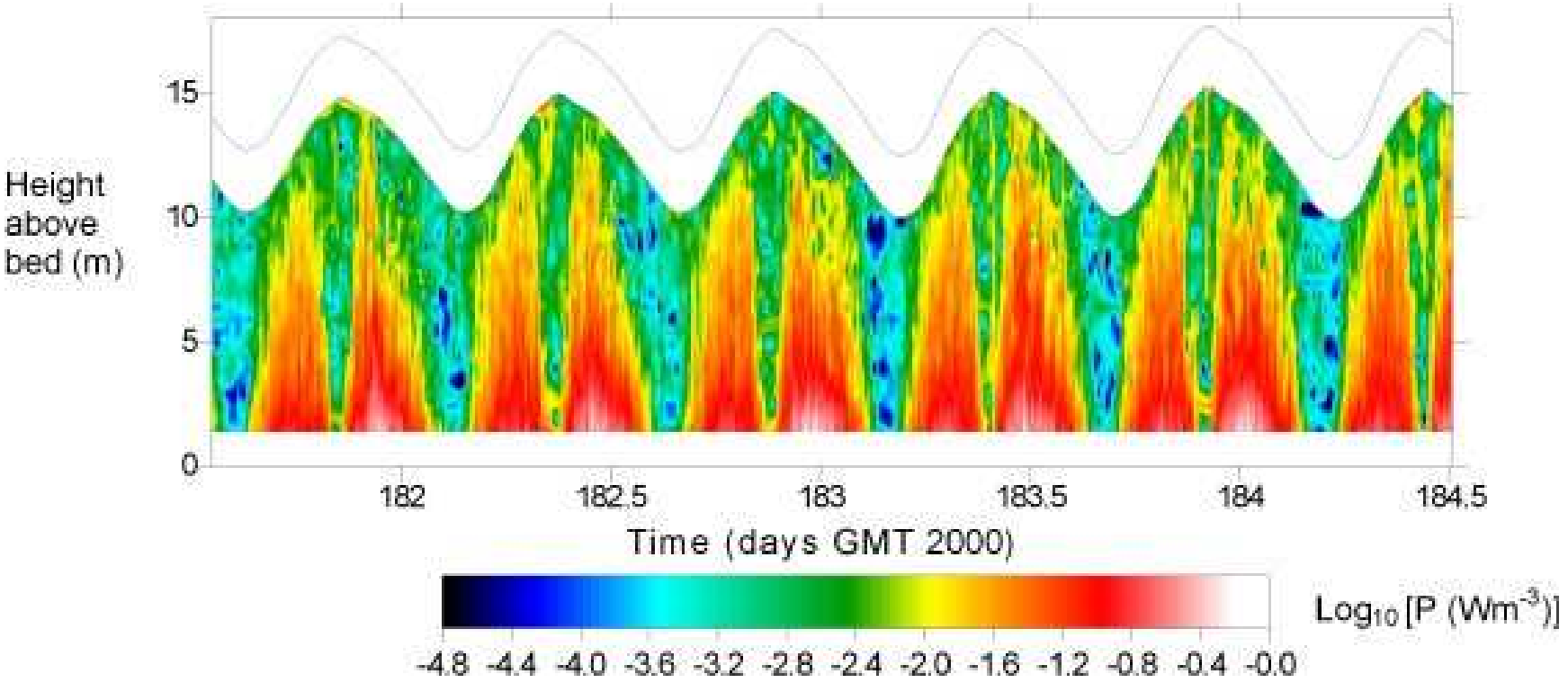
$$\langle \tilde{u}\tilde{w} \rangle = \frac{\langle \tilde{u}_3^2 \rangle - \langle \tilde{u}_4^2 \rangle}{4 \sin\theta \cos\theta} \qquad (3)$$

Fehler bei RDI-mode 1: $\approx 0.1 \ldots 0.25$ Pa

Fehler bei RDI-mode 12: $\approx 0.01 \ldots 0.025$ Pa

Hochauflösendes ADCP

Beispiel aus der Menai Strait, Nord-Wales:



pers. comm. Tom P. Rippeth, Bangor, Wales

Turbulenzmodellierung

http://www.gotm.net

GOTM

- 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

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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.

Page "www.gotm.net" maintained by webmaster. Last update: 10/28/00 18:10:02

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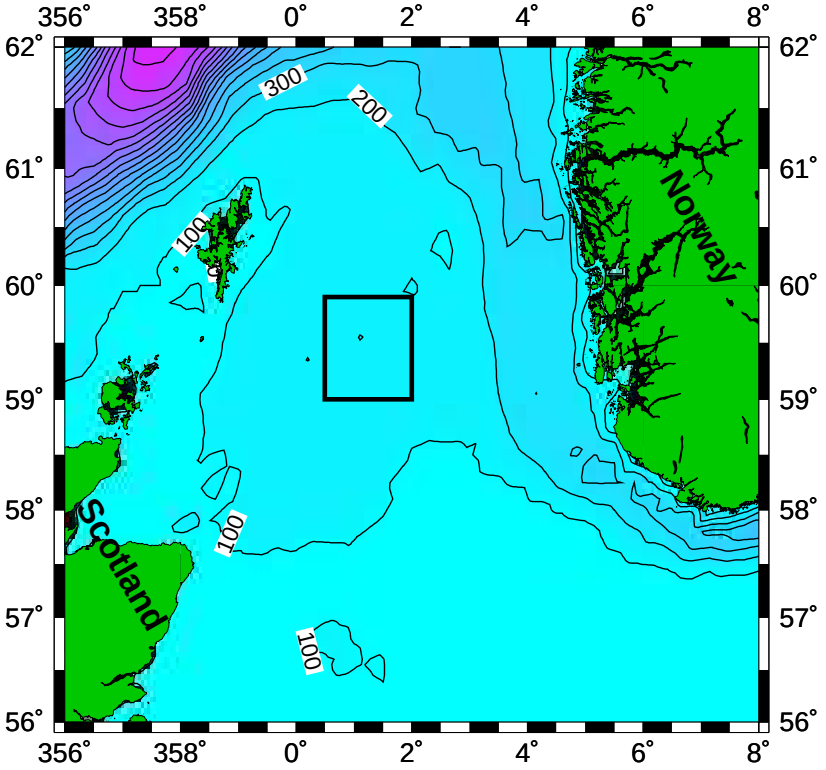
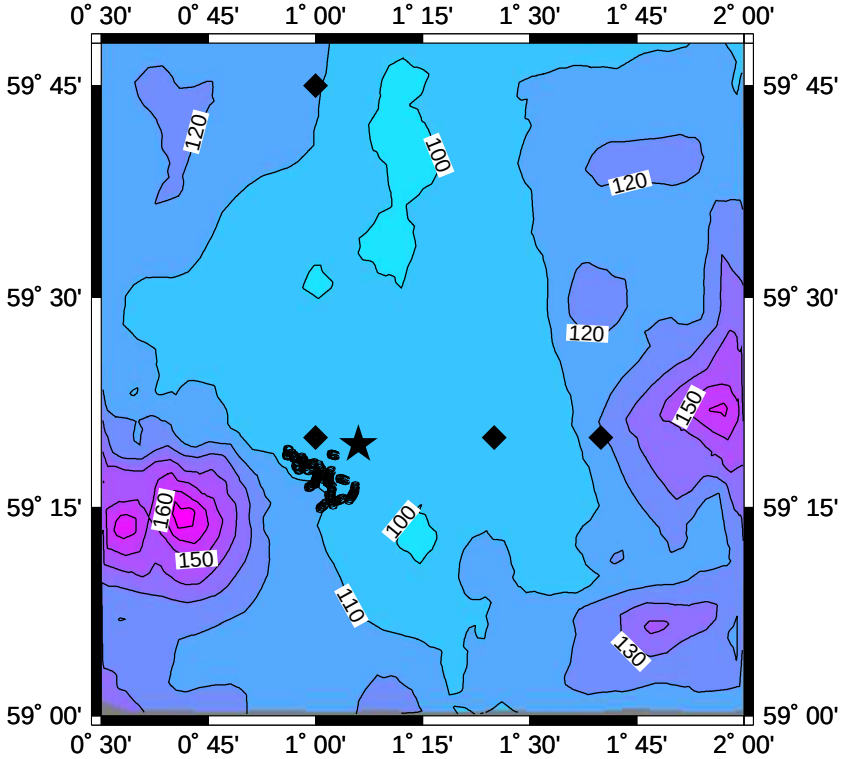
Nördliche Nordsee: GOTM

Bathymetrie und Stationskarte

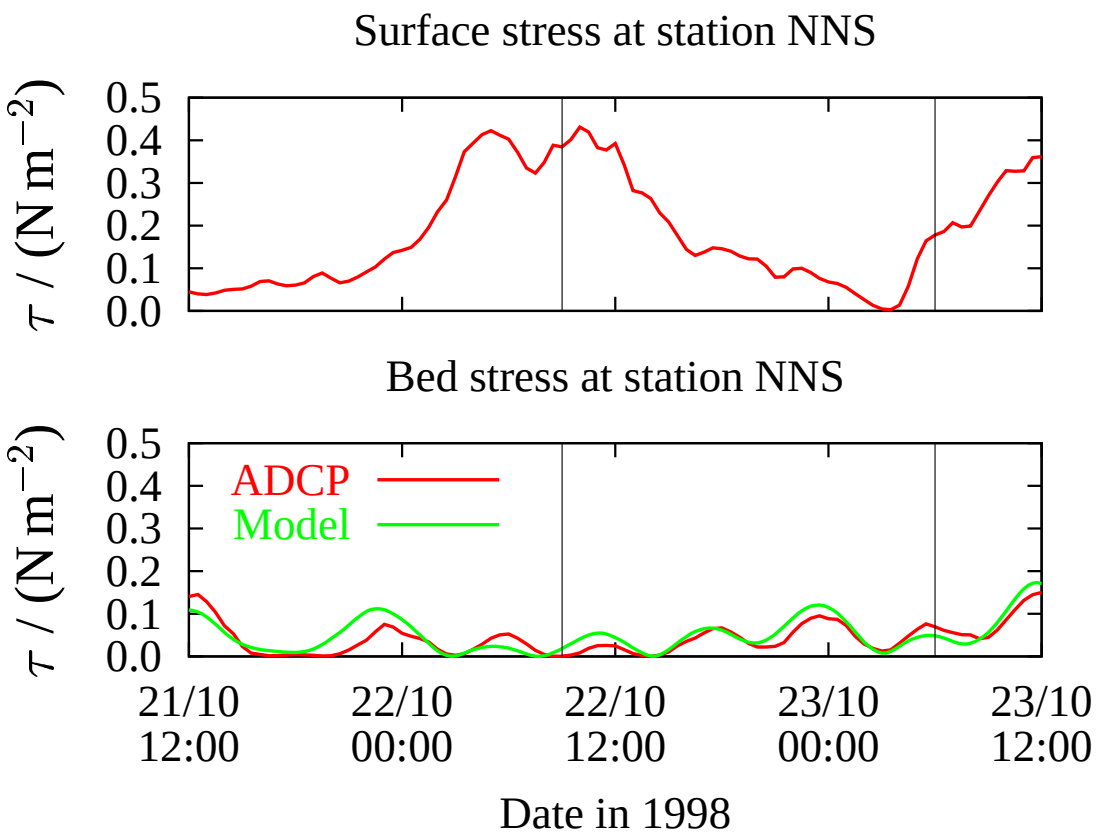




Burchard et al. [2002]

Nördliche Nordsee: GOTM

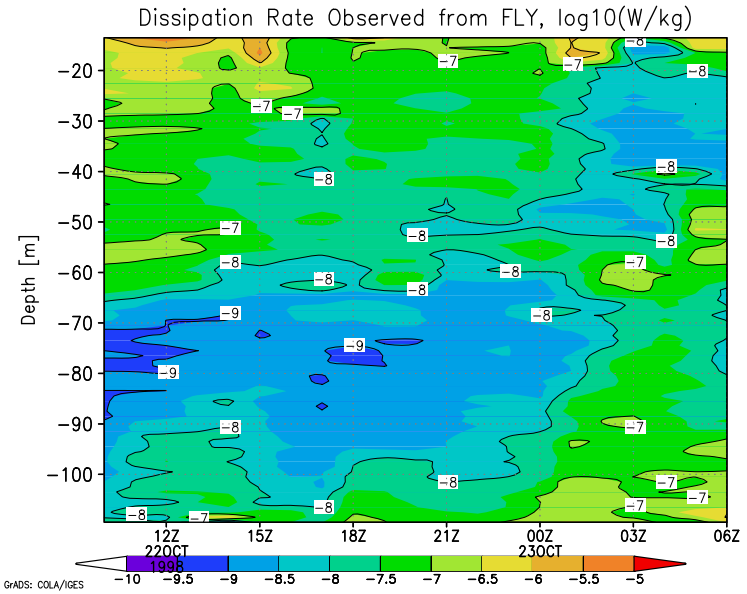
Wind und Gezeiten

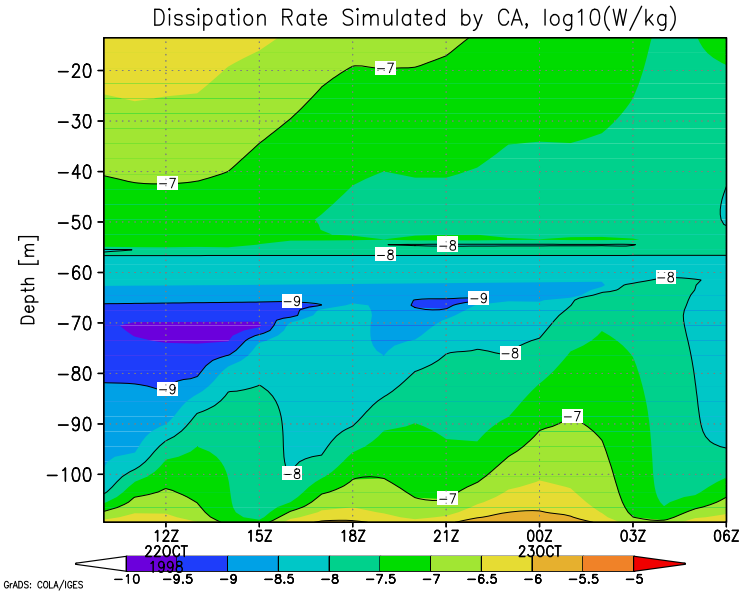


Burchard et al. [2002]

Nördliche Nordsee: GOTM

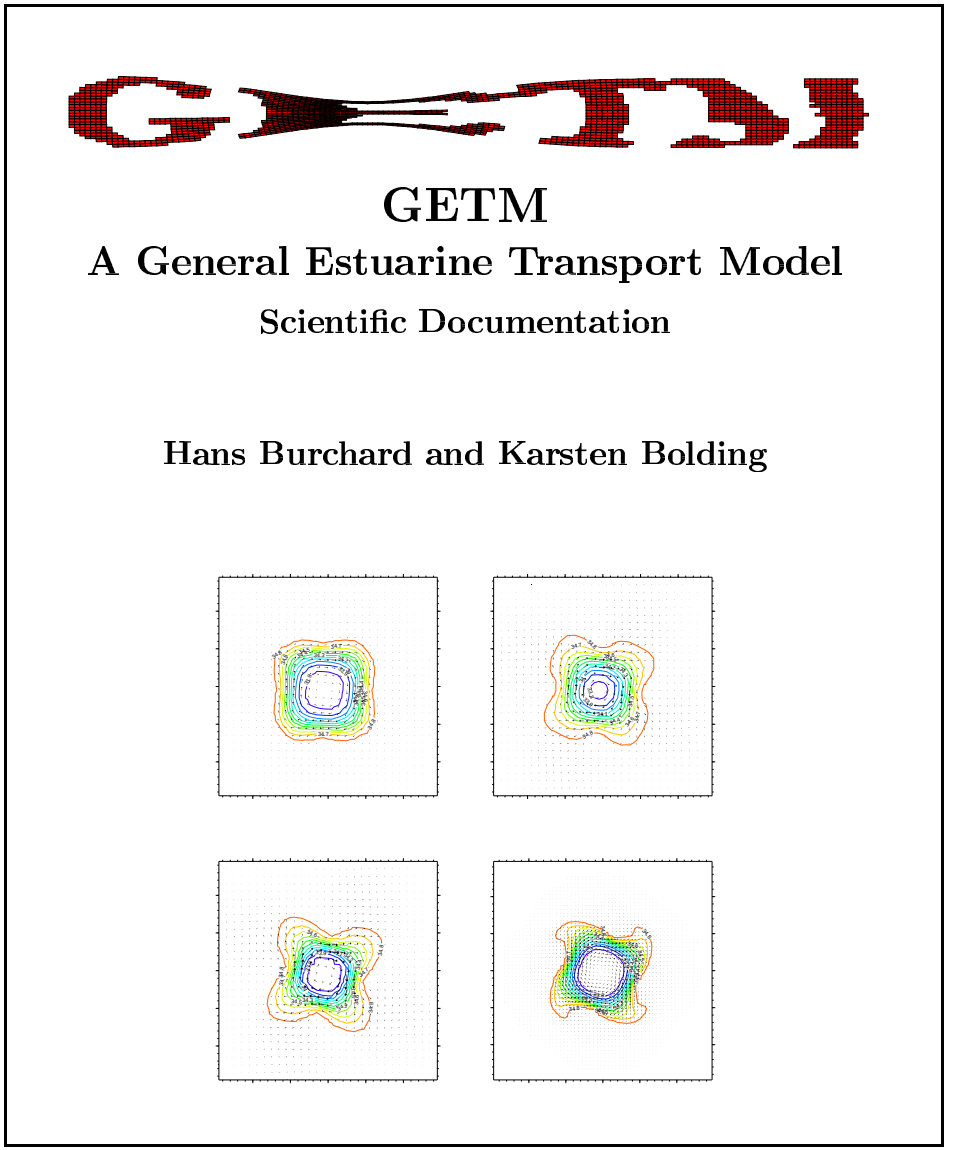
Dissipationsraten



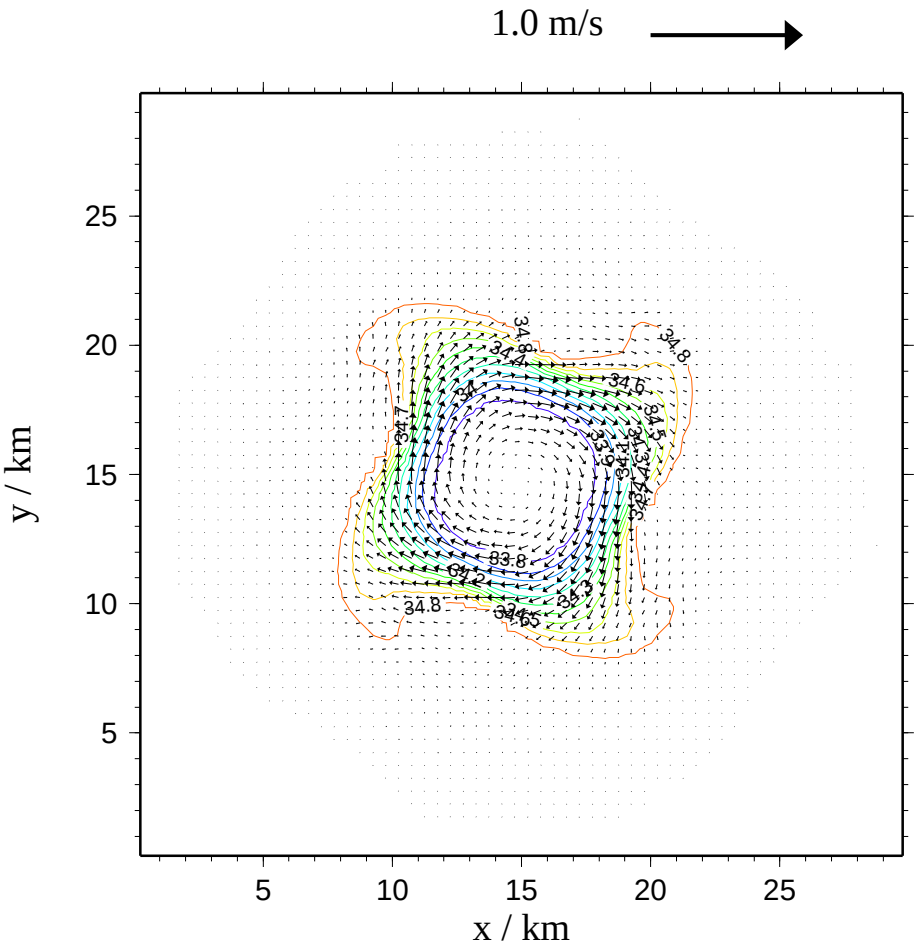


Burchard et al. [2002]

Strömungsmodellierung

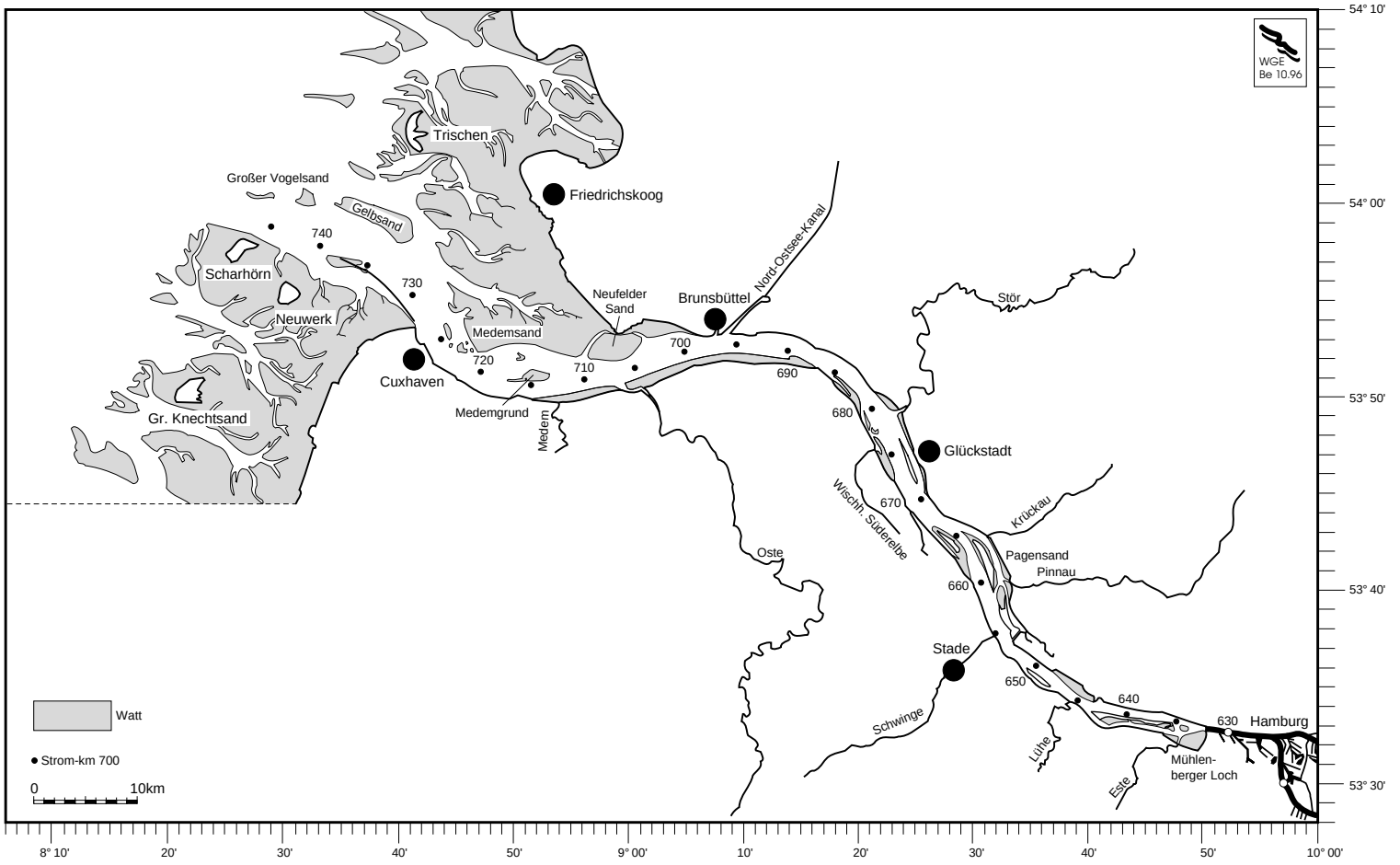


Süßwasserlinse



Burchard and Bolding [2002]

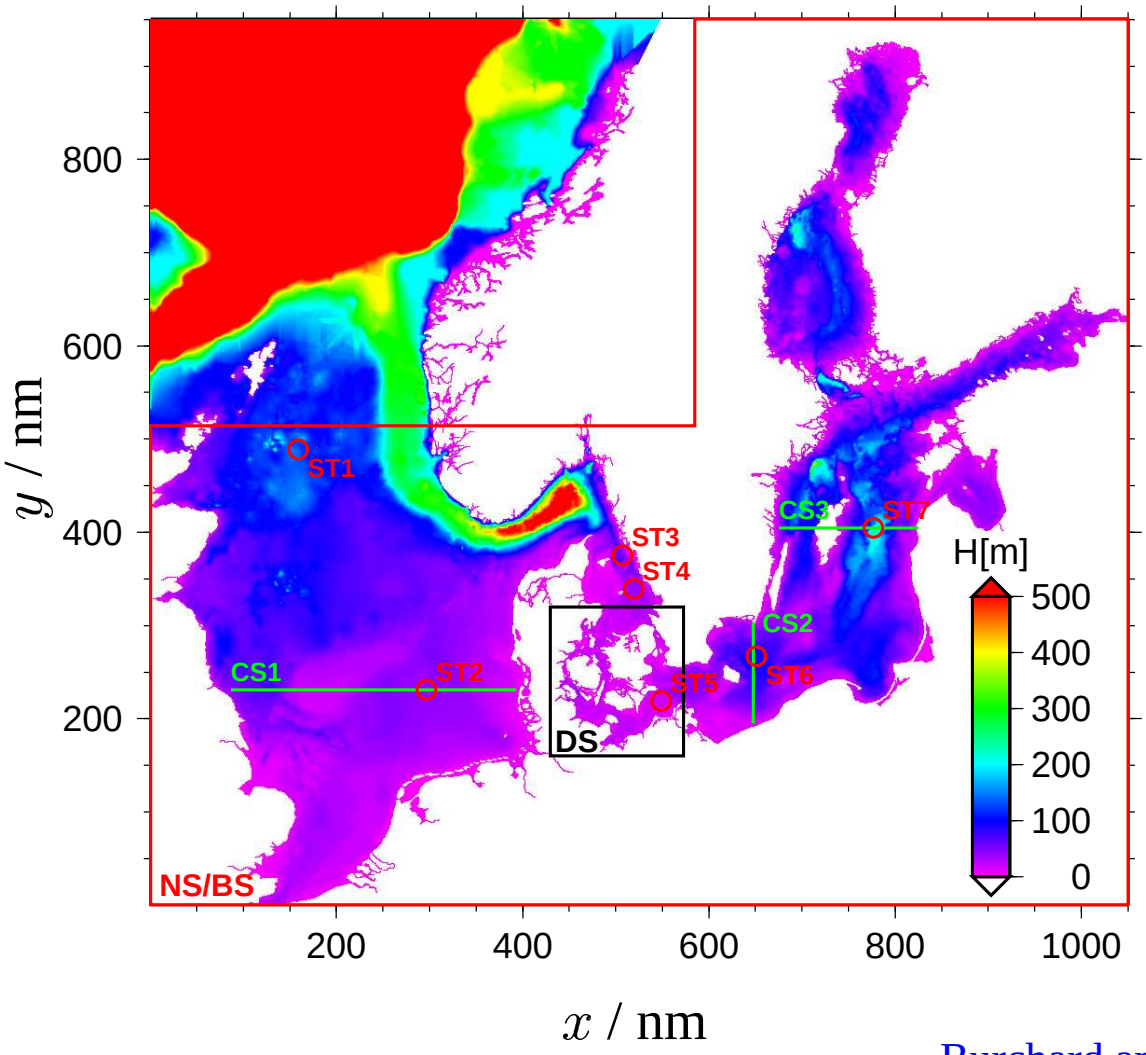
Tide-Elbe in 3D: GETM



Animation

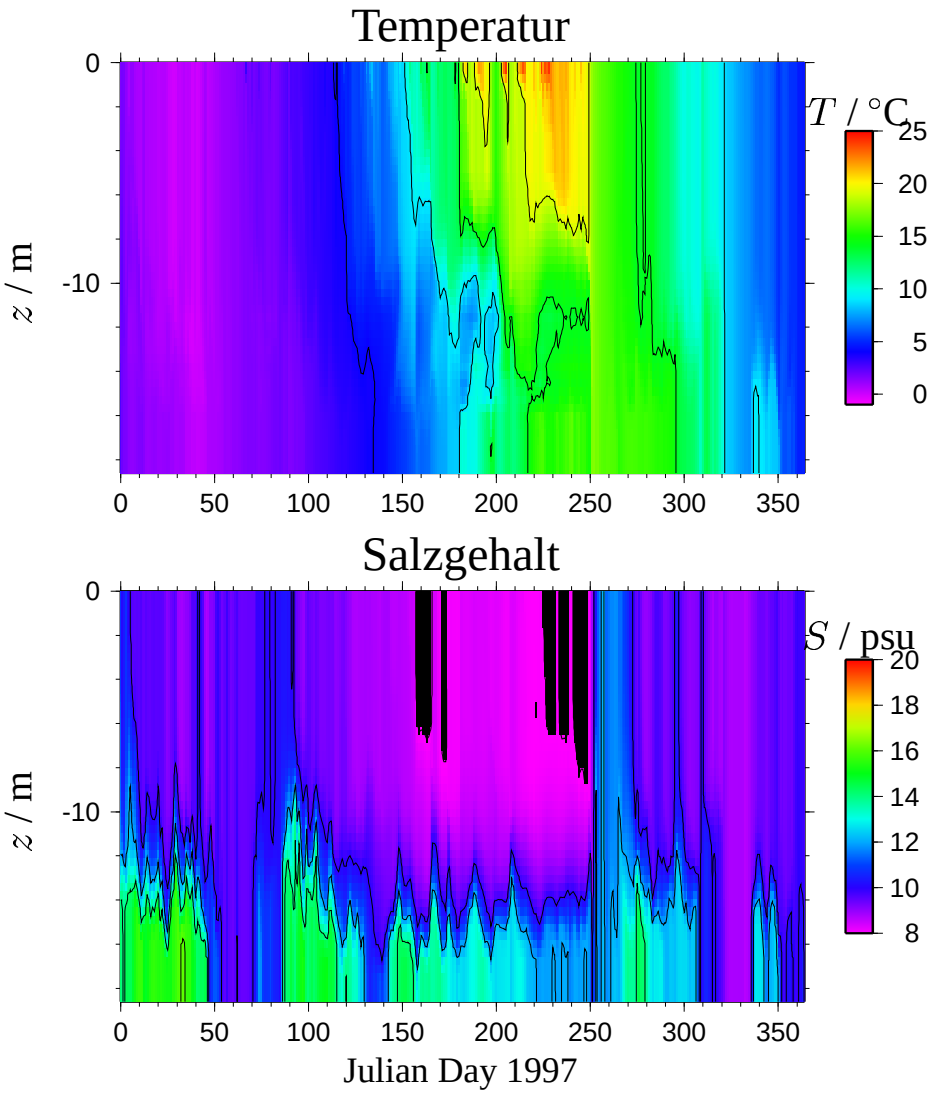
Zusammenarbeit mit Manuel Ruiz Villarreal, Spanish Institute of Oceanography, A Coruña

Nordsee und Ostsee in 3D



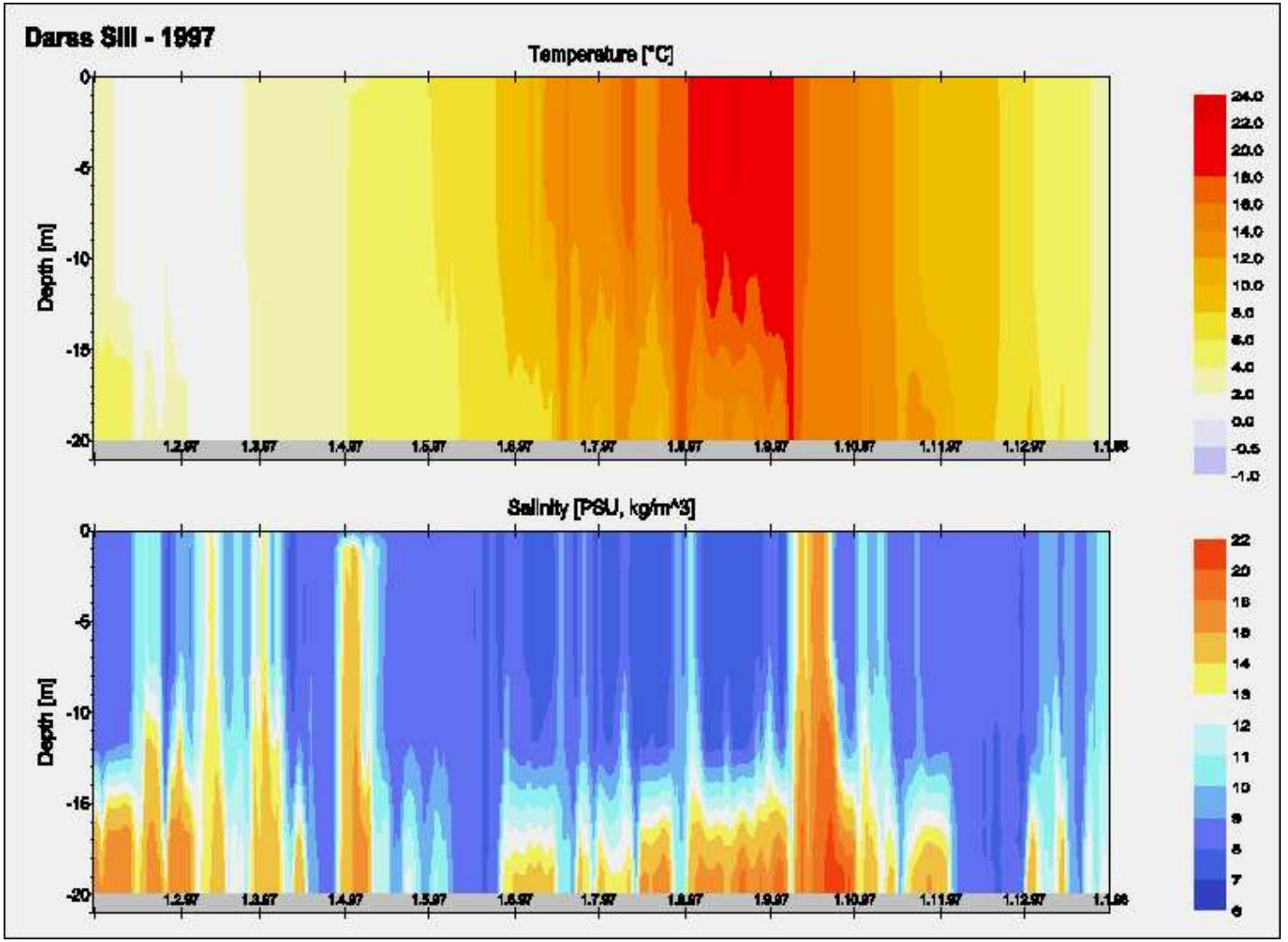
Burchard and Bolding [2001]

Darsser Schwelle, GETM

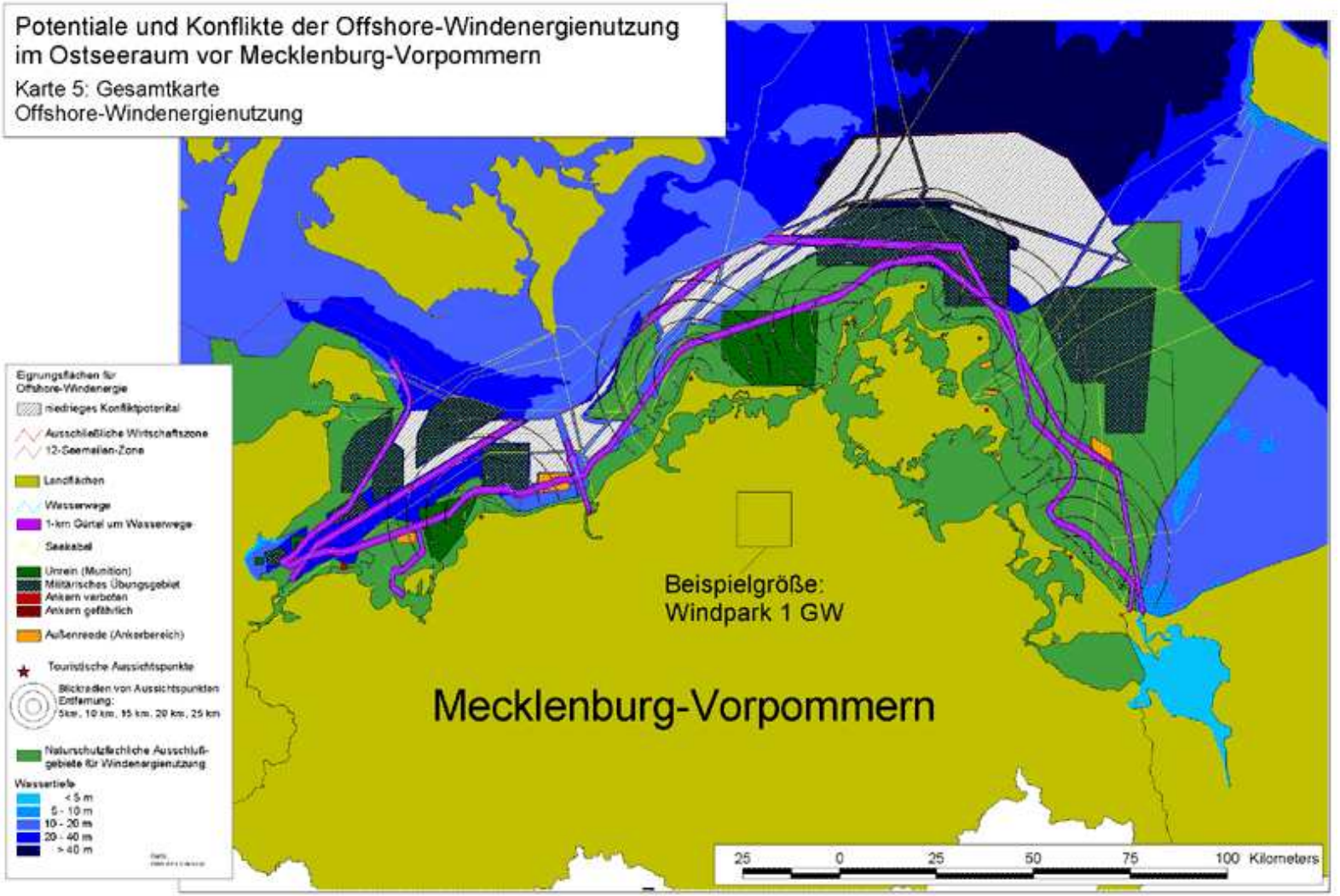


Burchard and Bolding [2001]

Darsser Schwelle, Messungen



Ausblick: Offshore Windparks



Quelle: B.U.N.D. MV