Contents

Introduction: Motivation, Objectives, Target

Harro Heyer	
Models of Coastal Waters in Germany –	
Performance and Application Examples	1
Existing Data Base	
Ralf Weisse, Lidia Gaslikova, Beate Geyer, Nikolaus Groll and Elke Meyer coastDat – Model Data for Science and Industry	5
Angela Schäfer and Roland Koppe The Marine Network of Integrated Data Access and the Data Portal German Marine Research	19
Rainer Lehfeldt and Johannes Melles MDI-DE – German Marine Data Infrastructure	29
Ronny Beyer, Axel Orths and Lothar Neumann Data Management Centre of the Federal Waterways and Shipping Agency, Northern Region Office	45
Oliver Lojek, Knut Krämer, Anna Zorndt, Nils Goseberg and Torsten Schlurmann Velocity and Turbulence Measurements at the Ems Barrage	55
Modelling Foundations	
Hans Burchard, Ulf Gräwe, Peter Holtermann, Knut Klingbeil and Lars Umlauf Turbulence Closure Modelling in Coastal Waters	69
Bert Putzar and Andreas Malcherek Modelling of Sediment Transport and Morphodynamics	89
Arne Hammrich and Dagmar Schuster Fundamentals on Ecological Modelling in Coastal Waters Including an Example from the River Elbe	107
Livia Mittelbach, Martin Pohl, Peter Schulze and Heinz Konietzky Numerical Simulation of Rip-Rap Revetments in Tidal Areas	119



Emil Stanev and Johannes Schulz-Stellenfleth Methods of Data Assimilation	133
Cordula Berkenbrink and Hanz Dieter Niemeyer Analysis of Salinity Alterations due to Estuarine Waterway Deepening by Artificial Neural Networks	153
Anja Brüning and Elimar Precht Statistical Analyses of Metocean Data for Offshore Wind Design in German Waters	167
Marko Kastens Statistical Estuary Data Analysis in Models and Measurements — Some Methods and their Limitations	185
Andreas Schöl, Birte Hein, Jens Wyrwa and Volker Kirchesch Modelling Water Quality in the Elbe and its Estuary – Large Scale and Long Term Applications with Focus on the Oxygen Budget of the Estuary	203
Applied Modelling: Hydrodynamics	
Joanna Staneva, Arno Behrens and Nikolaus Groll Recent Advances in Wave Modelling for the North Sea and German Bight	233
Silvia Maßmann, Frank Janssen, Thorger Brüning, Eckhard Kleine, Hartmut Komo, Inge Menzenhauer-Schuhmacher and Stephan Dick An Operational Oil Drift Forecasting System for German Coastal Waters	255
Thorger Brüning, Frank Janssen, Eckhard Kleine, Hartmut Komo, Silvia Maßmann, Inge Menzenhauer-Schumacher, Simon Jandt and Stephan Dick	
Operational Ocean Forecasting for German Coastal Waters	273
Elisabeth Rudolph Storm Surges in the Elbe, Jade-Weser and Ems Estuaries	291
Jana Kristandt, Benedict Brecht, Helmut Frank and Heiko Knaack Optimization of Empirical Storm Surge Forecast – Modelling of High Resolution Wind Fields	301
Mohamed Tayel and Hocine Oumeraci Extreme Storm Surge Prediction Using Hydrodynamic Modelling and Artificial Neural Networks	319

Guntram Seiß Hydrodynamic Numerical Models Suitable for Application to the	
German Fairways and Ports at the Baltic Sea Coast	343
Gerald Herrling, Johanna Elsebach and Anne Ritzmann Evaluation of Changes in the Tidal Regime of the Ems-Dollard and Lower Weser Estuaries by Mathematical Modelling	353
Applied Modelling: Sediment Transport	
Manfred Zeiler, Peter Milbradt, Andreas Plüß and Jennifer Valerius Modelling Large Scale Sediment Transport in the German Bight (North Sea)	369
Frank Kösters, Iris Grabemann and Reiner Schubert On SPM Dynamics in the Turbidity Maximum Zone of the Weser Estuary	393
Holger Weilbeer Sediment Transport and Sediment Management in the Elbe Estuary	409
Dennis Oberrecht and Andreas Wurpts Impact of Controlled Tidal Barrier Operation on Tidal Dynamics in the Ems Estuary	427
Monika Donner and Oliver Stoschek Simulation of High Suspended Sediment Concentrations and Options for a Reduction in the Lower Ems	435
Dennis Oberrecht and Andreas Wurpts Investigations of Rheological Flow Properties Based on Lab Data of Fluid Mud Samples and an Extended Model Approach	455
Denise Webr A Numerical Model for Fluid Mud Dynamics in Estuarine Systems – Overview and Outlook	463
Applied Moedlling: Coastal Defense	
Jan-Moritz Müller and Gabriele Gönnert Recent Developments in Hamburg's Coastal Protection	473
Ulrich Winskowsky and Birgit Matelski Model-Based Verification of Dikes along the West Coast of Schleswig-Holstein	481

Cordula Berkenbrink and Hanz Dieter Niemeyer Integrated Design of Sea- and Estuarine Dikes	491
H. Oumeraci, A. Kortenbaus, A. Burzel, M. Naulin, D. R. Dassanayake, J. Jensen, T. Wahl, C. Mudersbach, G. Gönnert, S. Thumm, B. Gerkensmeier, P. Fröhle, KF. Daemrich,	
E. Pasche and G. Ujeyl	
XtremRisK – Integrated Flood Risk Analysis for Extreme Storm Surges at Open Coasts and in Estuaries: Key Results and Lessons Learned	503
The Coast Under Global Change	
Arne Arns, Jürgen Jensen and Thomas Wahl	
A Consistent Return Level Assessment Considering Present Day and Future Mean Sea Level Conditions	525
Anna C. Zorndt and Torsten Schlurmann	
Investigating Impacts of Climate Change on the Weser Estuary	541
Rita Seiffert and Fred Hesser	
Investigating Climate Change Impacts and Adaptation Strategies in German Estuaries	551
Hanz Dieter Niemeyer, Cordula Berkenbrink, Anne Ritzmann, Heiko Knaack, Andreas Wurpts and Ralf Kaiser	
Evaluation of Coastal Protection Strategies in Respect of	
Climate Change Impacts	565
Authorindex	579

.

-