1. Record Nr. UNINA9910132335903321

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Titolo	Oil spill risk management : modeling Gulf of Mexico circulation and oil dispersal / / David E. Dietrich [and three others] ; cover design by Kris Hackerott
Pubbl/distr/stampa	Salem, Massachusetts ; ; Hoboken, New Jersey : , : Scrivener Publishing : , : Wiley, , 2014 ©2014
ISBN	1-119-02792-6 1-119-02791-8 1-119-02802-7
Descrizione fisica	1 online resource (238 p.)
Disciplina	363.73820916364
Soggetti	Oil pollution of the sea - Mexico, Gulf of - Simulation methods Diffusion in hydrology - Simulation methods Ocean circulation - Simulation methods Electronic books.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references at the end of each chapters and index.
Nota di contenuto	Cover; Title Page; Copyright Page; Contents; Preface; Part 1: Applied Oil Spill Modeling (with applications to the Deepwater Horizon oil spill); 1 The 2010 Deep Water Horizon and 2002 Supertanker Prestige Accidents; 1.1 Introduction; 1.2 The Oil Spills Described; 1.3 How Much Material Remains in the Gulf?; 1.4 The Role of Ocean Models to Explain what Happened; References; 2 Gulf of Mexico Circulation; 2.1 General Characteristics; 2.2 Exchanges at Lateral and Surface Boundaries; 2.3 Loop Current Eddies; 2.4 Blocking by the Pycnocline; 2.5 Fate of the Deepwater Horizon Well Blowout Material 2.6 SummaryReferences; 3 Geophysical Fluid Dynamics and Modeling Challenges; 3.1 Modeling the Circulation and Mixing of the Gulf Waters; 3.2 External Boundaries; 3.3 Addressing the Water Column Contamination and Fluxes; 3.4 Effects of Bottom Dynamics on Accumulated Hydrocarbons; 3.5 Churning by Extreme Weather Events;

3.6 Summary; References; 4 Flow and Oil Transport Model Choices, Setup and Testing; 4.1 The DieCAST Ocean Circulation Model; 4.2 Korotenko Oil Transport Module KOTM; 4.3 Gulf Modeling Approach; 4.4 Model Vertical Eddy Viscosity and Diffusivity
4.5 Surface Wind Driving and Open Boundary Conditions4.6 Comments on Modeling Equatorial Dynamics and the Gulf of Mexico; 4.7 Modeling Multi-Century Gulf Currents; References; 5 Modeling the 2010 DWH Oil Spill; 5.1 Introduction: the BP/Deepwater Horizon Accident; 5.2 Deepwater Blowouts: Processes Affecting the Transport and Fate of Oil throughout the Water Column; 5.2.1 Crude Oil Composition; 5.2.2 Characteristics of Macondo crude oil; 5.2.3 Subsea Oil Plumes; 5.2.4 Surface oil slicks; 5.3 Oil Spill Model for Gulf of Mexico (GOSM); 5.3.1 Circulation sub-model for the Gulf of Mexico
5.3.2 Description of the GOSM5.3.3 Wind and Wave Forcing; 5.3.4 GOSM Setup; 5.4 Results and Discussion; 5.4.1 Modeling the GoM Circulation; 5.4.2 Trajectory Modeling; 5.4.3 Ensemble Modeling; 5.5 Summary; References; Part 2: Special Topics in Oil Spill Modeling; 6 DieCAST Model Origin and Development; 6.1 Introduction; 6.2 Recent Model Attributes; 6.3 Challenges in Modeling the Gulf of Mexico Circulation; 6.4 Complications of Modeling near-Equatorial Circulation; 6.5 Non Hydrostatic Effects; 6.6 Sponge Layers in the Global Model; 6.7 Inflow Considerations; References
7 Brief History of the Community Ocean Modeling System (COMS)7.1 COMS history; 7.2 Background and motivations; 7.3 COMS elliptic solver history; 7.4 Evolution of DieCAST; 7.5 Outlook; References; 8 DieCAST Model Equations; 8.1 Model Equations; 8.2 Model Layer Depths; References; 9 Some Basic Physical, Mathematical and Modeling Concepts; 9.1 Buoyancy, Density and the Hydrostatic Approximation; 9.2 Pycnocline Slope: Geopotential Surface as a Natural Vertical Coordinate; 9.3 Rotation and Coriolis Terms; 9.4 Pycnocline and the Florida Strait Sill Depth; 9.5 Surface and Bottom Mixed Layers References

Sommario/riassunto

This book is designed to help scientifically astute non-specialists understand basic geophysical and computational fluid dynamics concepts relating to oil spill simulations, and related modeling issues and challenges. A valuable asset to the engineer or manager working off-shore in the oil and gas industry, the authors, a team of renowned geologists and engineers, offer practical applications to mitigate any offshore spill risks, using research never before published.