WE-Heraeus Summer School on Physics of the Ocean

9 – 14 July 2017

Venue: "Physikzentrum Bad Honnef", Germany

Agenda with Potential List of Speakers

(3 July 2017)

Sunday, 9 July 2017: Arrival, Reception, and Introduction

15.00 – 17.30	Arrival of participants at the "Physikzentrum Bad Honnef", Hauptstr. 5, 53604 Bad Honnef, Germany
	Registration, room allocation, coffee and pastries available
17.30 – 18.00	Welcome reception (Martin Visbeck & David Marshall)
18.00 – 20.00	*Dinner*
20.00 – 21.30	Introduction to the Summer School and 'Speed Dating'

Monday, 10 July 2017: Large Scale and Coastal Oceanography

08.00 – 09.00	Breakfast
09.00 – 09.10	Plan of the Day
09.10 – 10.40	Lecture #1: Introduction to Large-Scale Wind-Driven Circulation (David Marshall)
10.40 – 11.10	*Coffee break*
11.10 – 12.40	Lecture #2 Introduction to Large-Scale Density-Driven Circulation (Torsten Kanzow)
12.40	*Lunch*
14.00 – 15:30	Lecture #3: Global Ocean Observing Systems (Martin Visbeck)
15.30 – 16:00	Introduction to Super Problems (Martin Visbeck)
16.00 – 16.30	*Coffee break*
16.30 – 18.00	Exercises / Discussions (posters on display)
18.00 – 20.00	*Dinner*
20.00 – 21.30	Evening Lecture #9: Ocean and Society (Martin Visbeck)

Tuesday, 11 July 2017: Regional and Operational Oceanography

08.00 – 09.00	*Breakfast*
09.00 – 09.10	Plan of the Day
09.10 – 10.40	Lecture #4: Southern Ocean Circulation (Sabrina Speich)
10.40 – 11.10	*Coffee break*
11.10 – 12.40	Lecture #5: Tropical Oceanography (Peter Brandt)
12.40	*Lunch*
14.30 – 15:30	Lecture #6: Operational Oceanography (Birgit Klein)
15.30 – 16.00	*Coffee break*
16.00 – 18.00	Exercises / Discussions
18.00 – 20.00	*Dinner*
20.00 – 21.30	Participants Poster Session

Wednesday, 12 July 2017: Regional Oceanography and Observing Systems

08.00 – 09.00	*Breakfast*
09.00 – 09.10	Plan of the Day
09.10 – 10.40	Lecture #7: Polar Oceanography (Ursula Schauer)
10.40 – 11.00	*Coffee break*
11.00 – 12.30	Lecture #8: Introduction to Coastal Dynamics (Thomas Pohlmann)
12.30 – 14:30	*Lunch*
14.30 – 16:00	Lecture #11: Mesoscale Ocean Dynamics (William Dewar)
16.00 – 16.30	*Coffee break*
16.30 – 18.00	Exercises / Discussions
18.00 – 20.00	*Dinner*

Thursday, 13 July 2017: Small Scale Ocean Physics and Mixing

08.00 – 09.00	*Breakfast*
09.00 – 09.10	Plan of the Day
09.10 – 10.40	Lecture #10: Global and Regional Ocean Modelling (Arne Biastoch)
10.40 – 11.00	*Coffee break*
11.00 – 12.30	Lecture#12: Ocean Mixing (Marcus Dengler)
12.30	*Lunch*
14.30 – 18.00	Excursion (hiking and work on Super Problem)
18.30 – 20.00	*Dinner*
20.00 – 21.30	Presentations of Super Problem Results

Friday, 14 July 2017: Ocean Biochemistry

08.00 – 09.00	*Breakfast*
09.00 – 09.10	Plan of the Day
09.10 – 10.40	Lecture #13: CO_2 in the Ocean (Reiner Schlitzer)
10.40 – 11.00	*Coffee break*
11.00 – 12.30	Lecture #14: Ocean Biogeochemistry (Dieter Wolf-Gladrow)
12.30 – 13:00	Summary of the Week (Martin Visbeck & David Marshall)
13.00	*Lunch*
15.00	End of summer school

This Summer School is funded by

Wilhelm und Else Heraeus Stiftung

and coordinated by

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GEOMAR Helmholtz Centre for Ocean Research Kiel

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Organizing Committee

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Prof. Dr. David Marshall (co-chair)
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Running List of Lecturers

1. Prof. Dr. Arne Biastoch
   GEOMAR Helmholtz Centre for Ocean Research Kiel
   Lecture Title: Global and Regional Ocean Modelling
2. Prof. Dr. Peter Brandt
   GEOMAR Helmholtz Centre for Ocean Research Kiel
   Lecture Title: Tropical Oceanography
3. Dr. Marcus Dengler
   GEOMAR Helmholtz Centre for Ocean Research Kiel
   Lecture Title: Ocean Mixing
4. Prof. Dr. William Dewar
   Florida State University, USA
   Lecture Title: Mesoscale Ocean Dynamics
5. Prof. Dr. Torsten Kanzow
   Alfred-Wegener-Institute Helmholtz-Centre for Polar and Marine Research
   Lecture Title: Introduction to Large-Scale Density-Driven Circulation
6. Dr. Birgit Klein
   Federal Maritime and Hydrographic Agency (BSH)
   Lecture Title: Operational Oceanography
7. Prof. David Marshall
   University of Oxford, UK
   Lecture Title: Introduction to Large-Scale Wind-Driven Circulation
8. PD. Dr. Thomas Pohlmann
   Universität Hamburg, Germany
   Introduction to Coastal Dynamics
9. Prof. Dr. Ursel Schauer
   Alfred-Wegener-Institute Helmholtz-Centre for Polar and Marine Research
   Lecture Title: Polar Oceanography
10. Prof. Dr. Reiner Schlitzer
    Alfred-Wegener-Institute Helmholtz-Centre for Polar and Marine Research
    Lecture Title: CO_2 in the Ocean
11. Prof. Dr. Sabrina Speich
    Research University Paris
    Lecture Title: Southern Ocean Circulation
12. Prof. Dr. Martin Visbeck
    GEOMAR Helmholtz Centre for Ocean Research Kiel
    Lecture Title: Global Ocean Observing Systems
13. Prof. Dr. Dieter Wolf-Gladrow
    Alfred-Wegener-Institute Helmholtz-Centre for Polar and Marine Research
    Lecture Title: Ocean Biogeochemistry

Language: English

Approximate number of participants: 12 Lecturers / 50-70 Students (to be confirmed)

Purpose and Scope

Environmental Physics is a rapidly growing research area, focusing on processes within our environment, i.e., in the atmosphere, hydrosphere, cryosphere, geosphere, and biosphere. Physical ocean processes directly affect the global distribution and transports of ocean properties ranging from mass and temperature to the many dissolved substances (for example salt, nutrients, oxygen, CO_2). Ocean processes are of particular relevance for the global and regional climate systems, and they set the stage for marine element cycling and the marine ecosystem as a whole. Oceanographers study the fluxes of energy and matter in the ocean using direct observation, modeling and theory. The relevant scales range from vertical ocean mixing at the micro scale (cm) to mesoscale stirring (km) right up to the planetary scale of the global ocean circulation. From the regional to the local scale, coastal seas host a suite of physical processes relevant for understanding the effects of external pressures due to environmental change (from climate to population growth associated with eutrophication, dredging, and offshore constructions).

A large part of the education and training in ocean physics is done in conjunction with related disciplines, such as meteorology, marine biogeochemistry, or geophysics. A major goal of this summer school is to provide a broader view of the ocean system from a physical perspective, encompassing a large range of scales and their interactions. The participants shall be introduced to the observations and models, theory and statistical methods used by environmental and ocean physicists and to their present understanding of the physical ocean system. The summer school includes not only lectures on ocean physics, but also addresses its interaction with the global climate, marine biogeochemical and ecological systems, as well as overarching topics in marine research. This comprehensive and integrative approach shall provide the participants with the necessary basis to orient themselves in present and future large international research programs (e.g. WCRP - CLIVAR, IGBP - IMBER, IOC - GOOS), many of which specifically address the interfaces and interactions between the ocean physics and other environmental compartments. Moreover, the summer school is expected to advance the interaction and collaboration between young scientists active in this research area.

The summer school is targeted at young scientists such as advanced master students and graduate students but also first year postdocs from all over Europe and beyond. Participants are expected to have at least a basic knowledge of one of the sub-disciplines of environmental physics or marine sciences and they usually will be active in a research field somewhat related to the topic of the summer school. They are furthermore urged to contribute to the summer school by presenting work of their own, generally in the form of posters and active participation in discussion and working sessions.

Target Group

Young Scientists from all fields with an interest in physics who want to increase their knowledge about the ocean can participate. Other than receiving lectures, the students will participate through various activities such as poster sessions, exercises, discussions and a field excursion. There will be a set of “Super Problems” introduced at the beginning of the summer school; the students will work on these problems throughout the summer school and present their results/ solutions at the end. The students will be selected based on their background and aspiration to enhance their career in marine sciences. Applications from a wide range of backgrounds are expected.

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