

bioc385-01a

METAL CONTAMINANTS – METALS IN THE OCEAN

Lecture Timing (<i>suitable for all SEA-EU Universities</i>):	24. October to 22. December, 2023 every Tuesday and Friday, except for 31.10 (public holiday, Schleswig Holstein, Germany) and 28.11 & 1.12.2023.
Lecture hours:	30 hours, 15 blocks of 2h (lecture followed by a case study/seminar), 15:30-17:30h.
Coordination:	Prof Sylvia Sander (<i>GEOMAR, Germany</i>) Dr Rebecca Zitoun (<i>GEOMAR, Germany</i>)
Technical support:	Sarima Vahrenkamp (<i>Kiel University, Germany</i>)

#	Date	Format	Topic	Lecturer/s
1	Tuesday, 24.10.23	Lecture	Introduction of marine biogeochemical cycles of metals <ul style="list-style-type: none"> ○ Importance of metals ○ Natural and anthropogenic sources and sinks ○ Speciation, solubility, reactivity, transport, and fate 	Dr. Rebecca Zitoun (<i>GEOMAR, Germany</i>)
		Seminar/ Case study	GEOTRACES: Exploring the seven seas multiple metals at a time	Dr Kathleen Gosnell (<i>GEOMAR, Germany</i>)
2	Friday, 27.10.23	Lecture	Sample Collection Techniques and Technologies <ul style="list-style-type: none"> ○ Trace metal clean working procedures ○ Discrete surface water samplers (SLM sampler, Niskins) ○ Discrete deep-water samplers (CTD, ROV (IGT, KIPS, Major) Bottom Water Samplers) ○ In-situ samplers 	Dr. Rebecca Zitoun (<i>GEOMAR, Germany</i>)
		Seminar/ Case study	Application of voltammetric and passive sampling techniques (DGT) for determination and speciation of trace metals in estuaries	Dr Dario Omanovic (<i>Ruđer Bošković Institute, Croatia</i>)
	31.10.2023	No lecture		National Holiday – Schleswig Holstein
3	Friday, 03.11.23	Lecture	Introduction to analytical methods of metal contaminants in the marine environment <ul style="list-style-type: none"> ○ Trace metal clean analysis / sample handling ○ ICP-MS ○ DGT ○ Voltammetry ○ DMA ○ Etc 	Dr. Sophie Paul (<i>GEOMAR, Germany</i>)
		Seminar/ Case study	Trace metal clean sampling techniques - using in-situ technologies	Dr Agathe Laes (<i>IFREMER, France</i>)

4	Tuesday, 07.11.23	Lecture	Introduction to environmental toxicology <ul style="list-style-type: none"> ○ bioavailability and bioaccumulation ○ detoxification types and mechanisms ○ biotic and ecosystem responses 	Dr Lorena Peric <i>(Ruđer Bošković Institute, Croatia)</i>
		Seminar/ Case study	Mercury biogeochemistry and trophic transfer models in blue foods from the Northeast Atlantic Ocean	Dr Michael Bank <i>(Norwegian Institute of Marine Research, Norway)</i>
5	Friday, 10.11.23	Lecture	Introduction to experiments (bioassays, mesocosms) <ul style="list-style-type: none"> ○ analytical techniques/methods to assess bioavailability, bioaccumulation ○ biotic and ecosystem responses of metal contaminants in the marine environment 	Dr. Kathleen Gosnell <i>(GEOMAR, Germany)</i>
		Seminar/ Case study	A review of coastal groundwater science: drivers, tools, and effects	Dr Peter Swarzenski <i>(United States Geological Survey, USA)</i>
6	Tuesday, 14.11.23	Lecture	Introduction to current natural metal contaminant issues <ul style="list-style-type: none"> ○ acid rain ○ floods ○ dust ○ volcanoes ○ etc 	Dr. Rebecca Zitoun <i>(GEOMAR, Germany)</i>
		Seminar/ Case study	Heard Island volcanic iron in the Southern Ocean	Dr Thomas Holmes <i>(Institute of Marine and Antarctic Studies, Australia)</i>
7	Friday, 17.11.23	Lecture	Introduction to current anthropogenic metal contaminant issues and solutions (1) <ul style="list-style-type: none"> ○ Acid mine drainage ○ Deep-sea mining ○ Wastewater ○ Risk Assessment and Management. 	Prof. Sylvia Sander <i>(GEOMAR, Germany)</i>
		Seminar/ Case study	Metal contamination and ecotoxicity during deep-sea mining	Dr Sophie Paul <i>(GEOMAR, Germany)</i>
8	Tuesday, 21.11.23	Lecture	Introduction to current anthropogenic metal contaminant issues and solutions (2) <ul style="list-style-type: none"> ○ Plastics ○ Coastal infrastructure ○ Aquaculture ○ Use of biocides in ships paint? ○ Risk Assessment and Management. 	Prof. Sylvia Sander <i>(GEOMAR, Germany)</i>
		Seminar/ Case study	Potential relationships of the physiological state of farmed bivalves and metals in their tissues	Dr Lorena Peric <i>(Ruđer Bošković Institute, Croatia)</i>

9	Friday, 24.11.23	Lecture	Effect of climate change on contaminants and pollutants in the ocean with specific focus on heavy metals	Prof Vannesa Hatje (Federal University of Bahia, Brazil)
		Seminar/ Case study	Examples of biological response on the combined effect of climate change drivers and metal contaminants exposure	Prof. Sylvia Sander (GEOMAR, Germany)
	28.11.23 01.12.23	No lecture		
10	Tuesday, 05.12.23	Lecture	Effect of ocean solutions and activities on metals in the ocean (1) <ul style="list-style-type: none"> ○ ocean alkalinity enhancement ○ ocean fertilization, etc 	Prof. Sylvia Sander (GEOMAR, Germany)
		Seminar/ Case study	Volcanic eruptions as a source of fertilizing and harmful metals – possible insights for ocean alkalinity enhancement research	Assoc. Prof Linn Hoffmann (University of Otago, New Zealand)
11	Friday, 08.12.23	Lecture	Effect of ocean solutions and activities on metals in the ocean (2) <ul style="list-style-type: none"> ○ ocean alkalinity enhancement ○ ocean fertilization, etc. 	Prof. Sylvia Sander (GEOMAR, Germany)
		Seminar/ Case study	Seaweeds and microalgae - Promising tools for heavy metal remediation?	Dr Jan Muschiol (GEOMAR, Germany)
12	Tuesday, 12.12.23	Lecture	Mining the ocean floor: the legal framework	Prof Nele Matz-Lück (Christian-Albrecht University, Germany)
		Seminar/Case study	International Seabed Authority	Dr Pradeep Singh (Research Institute for Sustainability, Germany)
13	Friday, 15.12.23	Lecture	Sargassum Struggles: Algae between ocean cleaners and polluters in the anthropocene.	Jun.-Prof Laura Otto (University of Würzburg, Germany)
		Seminar	The story of the Minimata convention and how science informs global decisions	Gamini Manuweera (consultant, prev. UNEP, USA)
14	Tuesday, 19.12.23	Presentations	Oral presentations by students of selected papers and/or topics	Prof. Sylvia Sander, Dr. Rebecca Zitoun
		Discussions	Group discussion	(GEOMAR, Germany)
15	Friday, 22.12.23	Presentations	Oral presentations by students of selected papers and/or topics	Prof. Sylvia Sander, Dr. Rebecca Zitoun
		Discussions	Group discussion	(GEOMAR, Germany)