

**3rd International Winter School on
“Analysis of Climate Variability”
15 – 23 March 2022**

co-organized by
Leibniz Institute for Baltic Sea Research Warnemünde (IOW),
the University of Rostock
and the International Baltic Earth Secretariat
at Helmholtz-Zentrum Hereon
under the umbrella of Baltic Earth (baltic.earth)

Course agenda (online via zoom):

Day	Tuesday 15/3	Wednesday 16/3	Thursday 17/3	Friday 18/3	Monday 21/3	Tuesday 22/3	Wednesday 23/3
Speaker/title Morning session 09:00-10:30 (2 x 45 min)	Markus Meier: Course introduction NN: introduction into jupyter notebook for programming Introduction into statistical methods I	Markus Meier: Introduction into statistical methods II	Markus Meier: Introduction into statistical methods V	Markus Meier: Introduction into statistical methods VI	Markus Meier: Introduction into statistical methods VII	Jerome Kaiser: Paleo-environmental reconstructions of the Baltic Sea I	Hagen Radtke: Statistical analysis of inhomogeneous time series I
Break 10:30-11:00							
11:00-12:30 (2 x 45 min)	Short student presentations of their thesis work (5 min. each)	Markus Meier: Introduction into statistical methods III	Hadi Bordbar: Climate variability	Bronwyn Cahill: air-sea interaction	Cyril Dutheil: Applications of EOFs	Jerome Kaiser: Paleo-environmental reconstructions of the Baltic Sea II	Hagen Radtke: Statistical analysis of inhomogeneous time series II
Lunch 12:30-13:30							
Speaker/title Afternoon session: 13:30-15:00 (2 x 45 min)	Cyril Dutheil: Introduction into R and test	Florian Börgel: Exercises with R	Hadi Bordbar: Climate variability	Florian Börgel: Exercises with R (Wavelets)	Cyril Dutheil: Exercises with R (EOFs)	Exercises with R	Hagen Radtke: Exercises with R
Break 15:00-15:30							
15:30-17:00 (2 x 45 min)	Short student presentations of their thesis work (5 min. each)	Markus Meier: Introduction into statistical methods IV	Florian Börgel: Wavelet analysis	Bronwyn Cahill: marine optics in shelf seas	Cyril Dutheil et al: Exercises with R (EOFs)	Markus Meier: Repetition	Examination (45 minutes) and course evaluation
Break 17:00-18:00							
Evening session 18:00-19:30 (2 x 45 min)	Marcus Reckermann: Introduction to Baltic Earth (30 minutes)	Students' group work and exercises	Students' group work and exercises	Students' group work and exercises	Students' group work and exercises	Students' group work and exercises	

Lectures	Hours	Contents
Prof. Dr. Markus Meier	14	Introduction into statistical methods: 1) Baltic Sea climate variability 2) probability, probability density and distribution, 3) covariance matrix, 4) estimation of statistical parameters, 5) time series analysis – basic definitions, 6) stochastic climate models, 7) auto-covariance function, 8) spectrum, 9) cross-covariance function, 10) uncertainties in statistical analysis, 11) test of hypothesis 12) EOFs
Dr. Bronwyn Cahill	4	Air-sea interaction, marine optics
Dr. Cyril Dutheil	2	Statistical analysis methods: EOFs
Dr. Hagen Radtke	4	Statistical analysis methods of inhomogeneous time series
Dr. Jerome Kaiser	4	Reconstruction of the history of the Baltic Sea and climate proxy data
Dr. Florian Börgel	2	Wavelet analysis
Dr. Hadi Bordbar	4	Climate variability
Dr. Marcus Reckermann	2	Introduction to Baltic Earth
Total	36	

Seminar	Hours	Contents
Prof. Dr. Markus Meier	6	Introduction, exam and students' presentations supervised by Prof. Markus Meier and NN

Exercises and tutorials	Hours	Contents
Prof. Dr. Markus Meier, Dr. Florian Börgel, Dr. Cyril Dutheil, Dr. Hagen Radtke	24	Exercises, tutorials, students group work