Data:	ATMOSCL. MA. Nr. 3031 / Examination number: 32012	Version: 12.10.2023	Start Year: WiSe 2010
Module Name:	**Climate Change**		
(English):	Klimawandel		
Responsible:	Jackisch, Conrad / JProf		
Lecturer(s):	Jackisch, Conrad / JProf		
Institute(s):	Institute of Drilling Engineering and Fluid Mining		
Duration:	1 Semester(s)		
Competencies:	Students know the components of the climate system with physical and chemical principles (energy balance, water cycle, carbon cycle) and climate models. They understand significant driving and regulating forces of climate change on different temporal and spatial scales in order to evaluate historical climate variability and projections of future developments that are subject to uncertainty. On this basis, they can identify specific challenges, design strategies to mitigate climate change and derive options for action to adapt to climate change. In the exercise, they learn how to access climate data and model projections, interpret and visualise these data and evaluate it using statistical methods and indices. They also acquire skills in dealing with uncertainties.		
Contents:	The lecture is combines general foundations of climate change and examples for specific aspects. The lecture spans the range from the earth system to current model calculations for the development of the climate. Starting from palaeoclimatic developments we work towards current trands in the Antropocene and focus on periods of change and their drivers. We will analyse non-linear interactions and feedbacks on different scales, get to know models and model products, deal with uncertainties, and we will shed light on the border areas of physical reality and socio-economic decision-making. The lecture series underpins and extends this basis with specific examples from certain regions and subject areas. In the exercise, current climate data and climate projections will be analysed. Step by step, we will load, visualise, summarise and interpret data. We will apply methods for analysing changes and extremes, as well as climatological indices. All analyses will be carried out directly on your own computer using Python.		
Literature:	IPCC Reports (https://www.ipcc.ch/) Wiegandt (Hrsg., 2023) 3 Grad mehr Rahmstorf & Schellnhuber (2019) Der Klimawandel – Diagnose, Prognose, Therapie Krauss (2021) The Physics of Climate Change		
Types of Teaching:	S1 (WS): Climate System and Climate Change / Lectures (2 SWS) S1 (WS): Climate Data Analysis / Exercises (2 SWS)		
Pre-requisites:	**Recommendations:** The lecture attempts to balance the general applicability for all (natural science) disciplines with subject-specific depth in environmental system sciences - geoecology. For the exercise, the basic handling of data and a scripting language such as R/Python must at least be known.		
Frequency:	yearly in the winter semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains:		

	AP: Own climate data analysis project with report (as preferrably Jupyter notebook)
Credit Points:	5
Grade:	The Grade is generated from the examination result(s) with the following weights (w): AP: Own climate data analysis project with report (as preferrably Jupyter notebook) [w: 1]
Workload:	The workload is 150h. It is the result of 60h attendance and 90h self-studies.