

Teaching Scales in the Climate System: An example of interdisciplinary teaching and learning

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Climate change is commonly regarded as one of 21st century's grand challenges that needs to be addressed by conducting integrated research combining natural and social sciences. To meet this need, how to best train future climate researchers should be reconsidered. Here, we present our experience from a team-taught semester-long course with students of the international master program "Integrated Climate System Sciences" (ICSS) at the University of Hamburg, Germany. Ten lecturers with different backgrounds in physical, mathematical, biogeochemical and social sciences accompanied by a researcher trained in didactics prepared and regularly participated in a course which consisted of weekly classes.

The foundation of the course was the use of the concept of 'scales' – climate varying on different temporal and spatial scales – by developing a joint definition of 'scales in the climate system' that is applicable in the natural sciences and in the social sciences. By applying this interdisciplinary definition of 'scales' to phenomena from all components of the climate system and the socio-economic dimensions, we aimed for an integrated description of the climate system. Following the concept of research-driven teaching and learning and using a variety of teaching techniques, the students designed their own scale diagram to illustrate climate-related phenomena in different disciplines. The highlight of the course was the presentation of individually developed scale diagrams by every student with all lecturers present.

Based on the already conducted course, we currently re-design the course concept to be teachable by a similarly large group of lecturers but with alternating presence in class. With further refinement and also a currently ongoing documentation of the teaching material, we will continue to use the concept of 'scales' as a vehicle for teaching an integrated view of the climate system.