



Earth System Science – Bridging the gaps between disciplines; Perspectives from a multi-disciplinary Helmholtz Research School

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Post-graduate education in Germany has changed a lot over the past decades. Formerly, PhD students generally did not have the option to attend formal classes and lectures and were expected to conduct their independent research, including occasionally teaching courses for students. Since the introduction of bachelor and masters studies with the Bologna Process in the late 90th, the higher education in Europe has been harmonized, leading to more structured and focused studies at the expense of a broad and universal disciplinary education. At this same time, special fields such as Earth System Science became more interdisciplinary. In consequence, universities and research institutes have established so-called research schools and/or graduate schools, offering specific courses and training alongside the doctorate.

Especially, Earth System Science has developed from an interesting concept in Earth Sciences education to a fully integrative Science focussed on understanding the complex system Earth. This evolution is partially due to the radical and far reaching anthropogenic changes and the general feeling of helplessness with regards to the possible consequences and future impacts on the Earth System. The Helmholtz “Earth System Science Research School” (ESSReS) is a small unit of PhD students co-organized by three educational and research institutions in the city state Bremen: University of Bremen (Institute for Environmental Physics, IUP), Jacobs University (School of Engineering and Science (JU)), and Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research in Bremerhaven (AWI).

ESSReS aims at the integration of research at the interface of Geology, Biology, Physics, Geophysics, Mathematics and Informatics. It is therefore multi- and interdisciplinary in every aspect. The training, curriculum, and PhD research subjects are closely located at the interfaces between the participating disciplines. This is guaranteed by interdisciplinary supervision of the PhD project. The long-term goal of ESSReS is not only to enhance exchange and interaction between these disciplines, but to enforce a newly integrated concept, where separation between disciplines becomes more and more obsolete. Now, at the end of two three-years terms of PhD student education it can be stated that ESSReS provide a solid base for a new generation of excellent scientists in Earth and Environmental Sciences.