Postgraduate 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 classes for students. Since the introduction of bachelor and master studies with the Bologna Process in the late 90s, 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.

The structural and educational concept

**HPD committee meetings**

**Career and leadership training**

**Progress Assessment Form**

5 finished, mean duration 3 years 3 months (3.1 years to 3.5 years)

30 days of basic and expert research stay abroad

1 changed topic after 18 months, left

Clearly structured research and education plan

The educational program

Introductory lectures by senior scientists from the participating institutes (topics from Remote Sensing to the Living Ocean). Two cruises with research vessels (RC Uthorn, RV Heincke) were offered.

Expert courses were designed to give a more detailed insight into the research fields of the participating institutes. The content is focused on "Remote Sensing of the Atmosphere and Cryosphere", "Paleoarchive: From proxies to climate data" and "Bioarchives, a source of climate reconstructions".

Computational skills courses were offered to teach several computational skills needed for a productive workflow.

Transferable skills courses were offered in cooperation with the Imperial College London. Three courses from "Research skills development" via "Presentation and communication skills" to "Career and leadership" were offered.

Excursions Various excursions within ESSReS were offered to the PhD students on-site training, practical application and social event.

Highest and lowest part of Northern Germany

Annual retreat in autumn of each year to ensure a regular exchange between the PhD students and the supervisors/senior scientists of the three institutions.

Recruitment

Online application process for 12 (9) PhD stipend positions during two successive periods of three years each, following the educational programme as a cohort. The classes were filled with applicants of the collaborating institutions to reach maximum size of 22-24 PhDs.

**ESSReS**

- 32 days of basic and expert courses with mean duration of 2-4 weeks
- 8-10 international lectures per term each at 2-3 events

**ESSReS 9th-10th**

- Research skills development
- Presentation and Communication
- Career and leadership training
- Group mentoring and individual coaching
- Mobility seminars
- Winter/spring schools
- Summer school
- Annual retreat, PhD conference
- PhDs, supervisors, peers
- Conference budget
- Summer school
- Excursions
- 4 research sites in third countries: Copenhagen, Bremen, Tokyo, Beijing

**ESSReS 10th-11th**

- 32 days of basic and expert courses with mean duration of 2-5 weeks
- 8-10 international lectures per term each at 2-3 events

**ESSReS 11th-12th**

- Research skills development
- Presentation and Communication
- Career and leadership training
- Group mentoring and individual coaching
- Mobility seminars
- Winter/spring schools
- Summer school
- Annual retreat, retreat conference
- PhDs, supervisors, peers
- Conference budget
- Summer school
- Excursions
- 4 research sites in third countries: Copenhagen, Bremen, Tokyo, Beijing

Annual PhDs in the ESSReS class from the first ESSReS cohort

First cohort (22 PhDs):

- 17 finished, mean duration 3 years (3.5 to 5.5 years)
- Career: 10 Science (PostDoc, Assistant Professor), 3 Industry, 1 Teacher, 3 unknown
- 1 changed topic after 18 months, left ESSReS
- 4 of 22 PhDs did not finish their PhD (18%), two of them still working on it
- Including 2.5 month PhD programme

Second cohort (23 PhDs) in the completing phase:

- 5 finished, mean duration 3 years (3.1 to 3.5 years)
- Career: 5 Science (PostDoc)
- 1 changed topic after 2 years to become a teacher
- 1 of 23 PhDs did not finish, changed topic
- Including 2.5 month PhD programme

Supervision concept

- Regular PhD committee meetings
- PhD proposal after 6 months
- Progress Assessment Form
- Conference attendance, presentations
- Research stay abroad
- Clearly structured research and education plan

Was ESSReS successful?

First cohort (22 PhDs):

- 17 finished, mean duration 3 years (3 to 5.5 years)
- Career: 10 Science (PostDoc, Assistant Professor), 3 Industry, 1 Teacher, 3 unknown

Second cohort (23 PhDs): 32235

- 5 finished, mean duration 3 years (3.1 to 3.5 years)
- Career: 5 Science (PostDoc)
- 1 changed topic after 2 years to become a teacher

- 1 of 23 PhDs did not finish, changed topic
- Including 2.5 month PhD programme

Support

- Provides competitive grants for - conference attendance - collaborative research with international partners
- Personal training, coaching, child care, etc.