

INAR

INSTITUTE FOR ATMOSPHERIC AND
EARTH SYSTEM RESEARCH

Science-oriented university education at INAR

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*Yliopistojen tehtävänä on edistää vapaata tutkimusta
sekä tieteellistä ja taiteellista sivistystä,
antaa tutkimukseen perustuvaa ylintä opetusta
sekä kasvattaa opiskelijoita palvelemaan
isänmaata ja ihmiskuntaa.*

Yliopistolaki 24.7.2009/558, 2§

*The task of the universities is to promote
free research and scientific and artistic education,
to give the highest education based on research,
and raise students to serve the fatherland
and mankind.*

University law 24.7.2009/558, 2§

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Outline

- Study programmes
- Centres of excellence
- Intensive research-oriented courses
- Online education

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MSc in atmospheric sciences

Physical Sciences

Chemistry

Forest Sciences

Environmental
Sciences

Geosciences

Science Teacher



BSc programmes
3 years, 180 ECTS

Other BSc
programmes in UH,
Finland and abroad:
annual call in
December-January

Master's programme in atmospheric sciences
2 years, 120 ECTS

6 study tracks

Aerosol Physics

Atmospheric
Chemistry and
Analysis

Biogeochemical
Cycles

Geophysics of
the
Hydrosphere

Remote Sensing

Meteorology

PhD programs (~50%), research & development and expert tasks (~50%)

The only degree
programme in Finland
giving the meteorologist
qualification

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PhD in Atmospheric Sciences

- Doctoral Programme in Atmospheric Sciences (ATM-DP)
- Essentially the same research areas as in ATM-MP
- Target time for doctoral studies 4 years, including 30 ECTS of course studies and a doctoral thesis (usually a collection of 4-5 published papers and a summary)
- Annual call for letters of intent for students to get in contact with a supervisor
- 4 application periods per year for students with contact to a supervisor

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FCoE and NCoE

- Since year 2000, INAR has coordinated or been a partner in three Finnish centres of excellence (FCoE) and six Nordic centres of excellence (NCoE)
- FCoE and NCoE are national/regional funding mechanisms providing quite a lot of freedom to choose research topics and the research arrangements
- INAR's approach to research arrangements has been to include PhD students as true members of the research community and to give them a lot of responsibility in FCoE/NCoE research

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The Nordic research funding framework

The co-operation between the Nordic countries is the world's oldest regional partnership. It involves Denmark, Finland, Iceland, Norway, Sweden, the Faroe Islands, Greenland and Åland.



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The decision-making and funding bodies

- Strategic level: Nordic Council – 87 elected members (from national parliaments)
- Executive level: Nordic Council of Ministers – minister-level annual meetings to decide about collaboration and some funding principles
- Funding for collaborative Nordic projects mainly in culture, education and science
 - Total annual collaborative budget ~1 BDKK corresponding to ~140 MEUR
- Offices/bureaus/programmes distributing funding:
 - **NordForsk (research)** <https://www.nordforsk.org/>
 - Nordplus programme (education)
 - Nordisk Kulturfond (culture)
 - Nordic Innovation (innovation and business)
 - Nordic Energy Research (energy research and policy development)

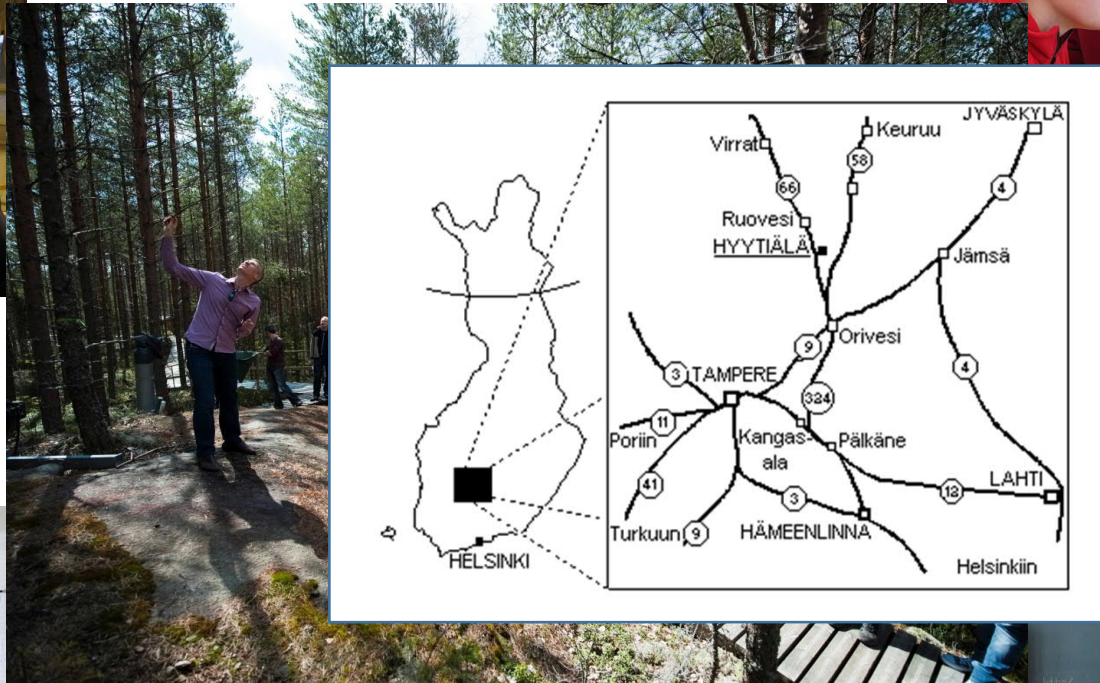
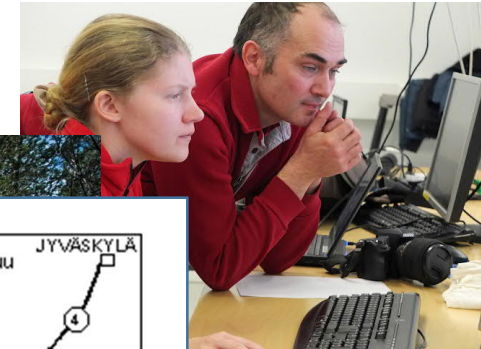
Integration of PhD students to the group is important

- Regular, topical guidance group meetings in each organization
- Individual face-to-face meetings with the supervisor
- Peer-support
- PhD students contribute annually in FCoE meeting (3 days) that is joint for the whole FCoE to network and find links over discipline boundaries
- Integration via social activities (running club, floor-ball morning, social Thursday in a pub, movie club, annual recreation day)
- PhD students are encouraged to participate in international activities (campaigns, expeditions, workshops etc.)
- Integration to the FCoE is also enhanced by joint ventures, such as big data that many are working with, making the working community open and less competitive

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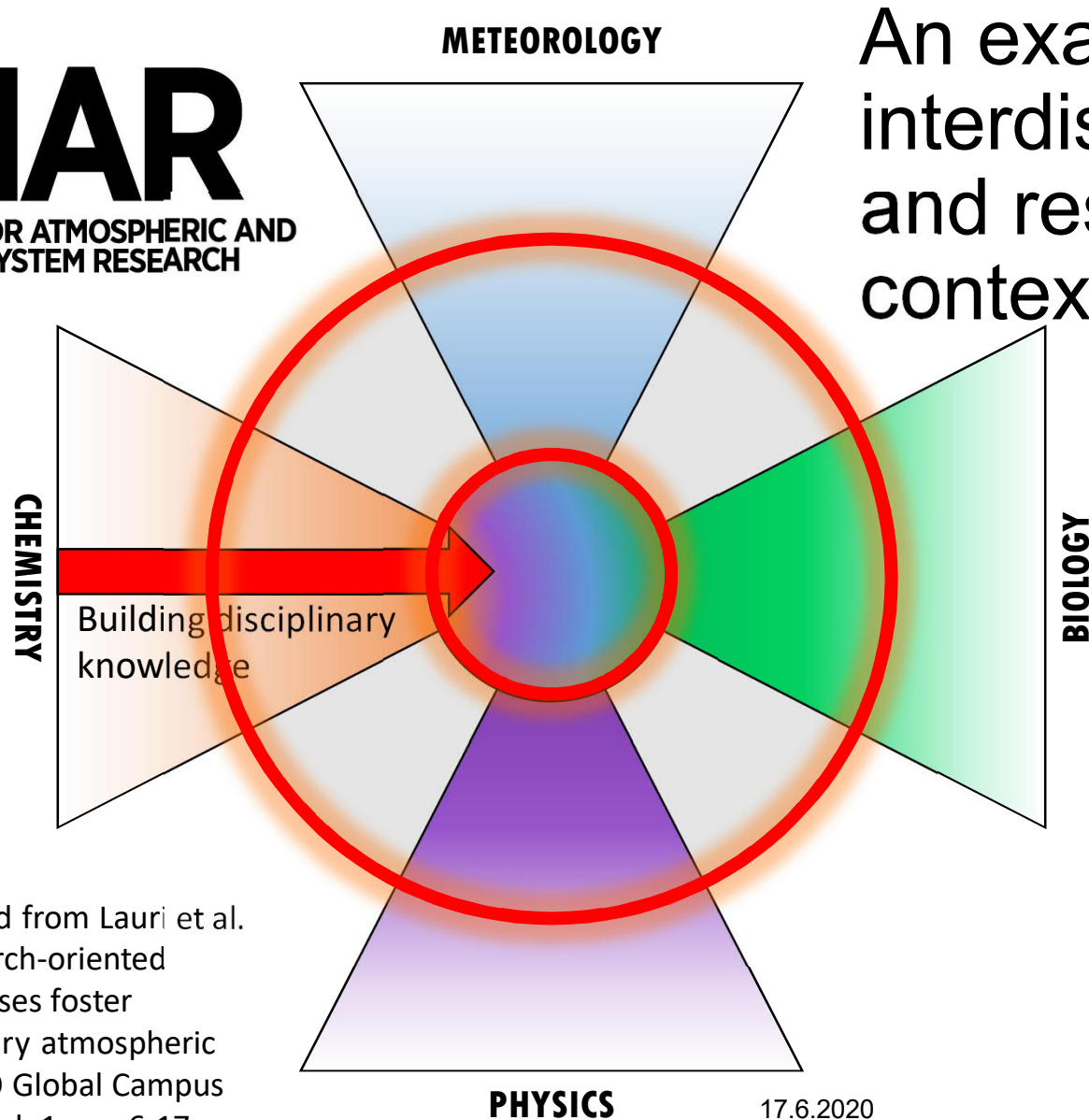
Intensive research-oriented courses



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Learning on an intensive course

- Hyytiälä winter/autumn school (twice per year)
 - (Advanced) Analysis of Atmosphere-surface Interactions and Feedbacks
- 2017 winter school: a pre-course and an after-course survey to find out about students' assessment of their learning
 - Ruuskanen et al.: An Exploratory Study of the Learning of Transferable Skills in a Research-Oriented Intensive Course in Atmospheric Sciences. Sustainability 10:1385 (2018).
- Conclusions:
 - Students enjoyed multidisciplinary environment for learning
 - Students felt that they had learnt important skills during the course, most importantly data analysis
 - Real scientific questions and use of real data motivated the students a lot
- Note: there are several other research-oriented intensive courses available at INAR and by PEEEX
 - See <https://www.atm.helsinki.fi/peex/index.php/education>



An example of interdisciplinary learning and research in a course context

- Building disciplinary knowledge by relying on what is learnt earlier (each triangle)
- Peer and horizontal learning between students and teacher(s) (outer circle)
- Building new knowledge requiring interdisciplinary approach (inner circle)

Figure adopted from Lauri et al. (2020): Research-oriented intensive courses foster multidisciplinary atmospheric science. WMO Global Campus Innovations, vol. 1, pp. 6-17.

Online education MOOCs

- All disciplines needed to solve grand challenges
- Massive Open Online Courses (MOOC) provide an accessible tool for the international audience
- E.g. Lehtonen et al., 2018: A pedagogy of interconnectedness for encountering climate change as a wicked sustainability problem, *Journal of Cleaner Production*, 199, 860-867

Online education MOOCs

- Between 2016 and 2020, about ten new Massive Open Online Courses (MOOCs) in atmospheric and climate sciences and sustainability
- All material **freely available**, also for teachers all over the world
- ECTS credits given only for those who participate the U. Helsinki course, others get a certificate
- See <https://blogs.helsinki.fi/climateuniversity/>

Online education
MOOCs

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