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Brief career summary

My research career has to a major extent consisted of applying geophysics and scientific drilling to better understand the structure and composition of the continental crust. At the beginning, in the late 1980s, I was fortunate enough, as a PhD student, to be involved in the Siljan Ring Deep Drilling project in central Sweden. The discovery that mafic dolerite sills generate the observed high amplitude reflections observed on the surface seismic data has been important for studies of the source of crustal reflectivity, impact mechanics, and raised questions about dolerite intrusion mechanisms. This combination of geophysics and scientific drilling has been a cornerstone in many of the subsequent research areas that I have been involved in, including:

- The EUROPROBE Uralides project with the acquisition of over 400 km of high quality seismic reflection data, as well as borehole data, allowing us to image the crust from about 500 m down to Moho depths over a major orogenic belt. (1992-1998).
- SKB site characterization at Forsmark and the Äspö/Simpevarp/Laxemar areas using both reflection seismic data and borehole data. Localization of the future repository for spent nuclear fuel at Forsmark is to a significant extent based on the seismic surveys. (1993-present)
- Mineral exploration projects driven by the need for structural information of the crust that only reflection seismic methods can provide at depth. Projects have been in Canada, Australia, Finland, Sweden and Zambia, as well as participation in the European wide EU SMART Exploration project. I was also active in the EIT Raw Materials KIC with two new major projects concerning exploration and drilling (2016-2021).
- The Ketzin CO₂ storage project in Germany was the first onshore CO₂ storage project in Europe and my group was responsible for the seismic acquisition and monitoring of injected CO₂ in the underground using time-lapse 3D seismic methods. (2004-2016)
- Reprocessing and reinterpretation of vintage seismic data acquired by Oljeprospektering AB (OPAB) in the 1970s in the Baltic Sea and on Gotland, including integration with borehole data. These efforts have led to a better understanding of the structure of the Swedish part of the Baltic Basin and form the basis for potential future CO₂ and energy storage projects within Sweden. (2009-present)
- The Collisional Orogeny in the Scandinavian Caledonides (COSC) project involves a combination of geological mapping, geophysical surveying and scientific drilling to answer fundamental questions on the structure and the evolution of this mountain belt which would have been on a similar scale as today's Himalayan belt when it formed over 400 million years ago. (2010-present)

The integration of scientific drilling into my research has forced me to widen my horizons far beyond geophysics. Drilling projects are generally too expensive to allow focus on only one field of science. Geochemistry, geology, hydrogeology, rock mechanics and microbiology are examples of research fields that I have had to acquaint myself with when participating or leading a drilling project.

My research has required the use of significant infrastructure since my PhD days and I have been successful in securing funding for extensive reflection seismic instrumentation since 2003 and I was instrumental in the successful application with Lund University for funding of the Swedish National Drilling Infrastructure, "Riksriggen". I have also contributed to the scientific community through my efforts in the European Geosciences Union (EGU), being president of the Energy, Resources & Environment (ERE) division from 2012-2016, and vice-president of the division (2017-2018). I was also a member of the VR KFI committee for "Earth and its nearest environment" 2005-2008. Furthermore, I have been active in moving Swedish participation in the European Plate Observing System (EPOS) forward to joining an ERIC, as well as leading the Swedish Scientific Drilling Program (SSDP). I have also been Head of the Department of Earth Sciences at Uppsala University.

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1. University degrees

M.Sc., 1983, University of Washington, Seattle WA USA, School of Oceanography, Marine Geology and Geophysics Division, Thesis title: Mantle convection near a spreading center

B.A., 1978, Brown University, Providence RI USA, Dept. of Geology

2. Doctoral degree

Ph.D., April, 1990, Uppsala University, Uppsala Sweden, Dept. of Geophysics, Section for Solid Earth Physics, Thesis title: Seismic attenuation, shear wave anisotropy and some aspects of fracturing in the crystalline rock of the Siljan Ring area, central Sweden, Advisor: Laust B. Pedersen

3. Post-doc Experience

1/91-3/92, **Senior Research Fellow**, Curtin University, Perth, Australia

4. Associate Professor Title (Docent) - 1994

5. Current Position

7/02-present, **Professor (Prefekt: 2016-07-01 to 2019-06-30)**, Department of Earth Sciences, Uppsala University, Sweden: Research in seismic modeling, crustal scale seismics, shallow reflection seismics, teaching of geophysics, and student supervision up to Ph.D. Level. Major projects include seismic surveying in the Ural mountains, CO₂ storage research at the Ketzin project, extensive seismic studies related to nuclear waste disposal. Seismics applied to mineral deposits, including studies over VMS deposits in northern Sweden, Kiruna iron ore mine, Millenium uranium mine in Canada. Project leader for the COSC drilling project (www.ssd.se/projects/cosc).

6. Previous Positions

4/94-6/02, **Associate Professor**, Department of Earth Sciences, Uppsala University, Sweden: Research in seismic modeling, crustal scale seismics, shallow reflection seismics, teaching of geophysics, and student supervision up to Ph.D. Level.

4/92-3/94, **Assistant Professor**, Department of Geophysics, Uppsala University, Sweden: Research and organization in EUROPROBE projects, specifically seismic processing and interpretation from the Urals, finite difference computer modeling on parallel computer and scale physical modeling of seismic wave propagation in anisotropic media, shallow reflection seismics, and student supervision up to Ph.D. Level.

1/91-3/92, **Senior Research Fellow**, Curtin University of Technology, Perth Australia, Project leader for the industry sponsored Seismic/Lithology Project, job consisted of leading a research team of 3 people in amplitude versus offset (AVO) analyses and modeling of industry acquired seismic and well log data, finite difference modeling of wave propagation in anisotropic media, and student supervision up to Ph.D. level

1/90-12/90, **Consulting Geophysicist**, Uppsala Sweden, running of own consulting company which provides geophysical advice and geoscience project management services to Vattenfall (The Swedish State Power Board), Swedish Nuclear Fuel Waste management Co. (SKB), and Dala Djupgas Prospektering AB

6/86-12/89, **Geophysicist**, Vattenfall, Sweden: Responsible for geophysics for Vattenfall's deep gas projects, organization of seismic surveys, integration of geoscientific data, reporting and presentation of results.

7/80-6/81, **Well-site geologist**, Continental Laboratories, Billings, Montana: On-site evaluation of cuttings and gas logs, contact with drilling management, recommendations for formation testing.

7a. Past PhD students (main adviser)

L Frenje: 3D modeling and seismic data analysis (PhD 2000); **M Friberg**: Tectonics of the Middle Urals (PhD 2000); **Niklas Juhojuntti**: Deep crustal studies of Scandinavia (PhD 2001); **B Bergman**: High-resolution seismic methods applied to till covered hard rock environments (PhD 2005); **J Rodriguez**: Extracting 3D information from 2D crooked line seismic data on hardrock environments (PhD 2006); **C Schmelzbach**: Seismic-Reflection and Seismic-Refraction Imaging of the South Portuguese Zone Fold-and-Thrust Belt (PhD 2007); **A Kashubin**: Seismic Studies of Paleozoic Orogens in SW Iberia and the Middle Urals (PhD 2008); **S Yordkayhun**: 2D and 3D Seismic Surveying at the CO₂SINK Project Site, Ketzin, Germany: The Potential for Imaging the Shallow Subsurface (PhD 2008); **H Kazemeini**: Seismic applications to CO₂ sequestration at Ketzin, Germany (PhD 2009); **N Ivanova**: Geophysical evidence bearing on the origin of the Arctic Basin (PhD 2010); **C Yang**: Time-lapse Analysis of Borehole and Surface Seismic Data, and Reservoir Characterization of the Ketzin CO₂ Storage Site, Germany (PhD 2012); **F Zhang**: Quantifying the seismic response of crystalline rocks via seismic waveform tomography (PhD 2013); **A Ivanova**: Geological structure and

time-lapse studies of CO₂ injection at the Ketzin site, Germany (PhD 2013); **E Lundberg**: High resolution reflection seismic imaging of crystalline bedrock (PhD 2014); **M Dehghannejad**: Reflection seismic studies of the Skellefte ore district (PhD 2014); **F Brojerdi**: Seismic studies at the Forsmark nuclear waste storage site (PhD 2015); **O Ahmadi**: Application of seismic methods for mining and mineral exploration (PhD 2015); **P Hedin**: Integration of seismic data with other geoscientific data at potential SDDP deep drilling sites (PhD 2015); **D Sopher**: Seismic methods applied to CO₂ storage (PhD 2016); **F Huang**: 3D time-lapse analysis of seismic reflection data to characterize the reservoir at the Ketzin CO₂ storage pilot site (PhD 2016); **H Muhamad**: Geophysical studies of the Siljan Ring impact crater (PhD 2017); **T Levendal**: A geophysical investigation of carbonate build-ups in the Baltic Basin using reflection seismic data (PhD 2019); **R Beckel**: Active and passive seismic methods for investigating dipping faults in the hardrock environment: an example from the glacially-triggered Burträsk fault (PhD 2022)

7b. Current PhD students (main adviser)

Y Pan: Seismic studies of the Baltic Sea area (PhD 2023)

7c. Post-docs/researchers

P Ayarza, 1998-2000; **N Juhojuntti**, 2008-2009; **A Kashubin**, 2009-2010; **N Enescu**, 2009-2011; **M Ivandic**, 2011-2015; **F Zhang**, 2013-2017; **M Garcia**, 2013-2019; **P Hedin**, 2016-2018; **D Ghosal**, 2016-2017; **D Sopher** 2016-2018, **S Salas Romero**, 2019-2020

Awards and merits

Adjunct professor - Curtin University of Technology, 1999-present; Guest Professor - Jilin University, 2015-present; EGU president of the Earth Resources Environment Division, 2013-2017; Member Royal Swedish Academy of Sciences - KVA (www.kva.se), 2014-present; Lilly och Sven Thureus Award, 2016; EGU PC Chair of Inter- and Transdisciplinary Sessions, 2020-2022

Committees

International Lithosphere Project (ILP): 2004-2007; Swedish Research Council (VR) infrastructure (KFI): 2005-2008; Programme committee member - Seismology, EGU: 2007-2014; Swedish Scientific Drilling Program – Program coordinator: 2007-present; KVA Energy committee: 2015-2018; KVA Crafoord Prize committee: 2017-2018

Professional Organizations

Member SEG, AGU, EGU, EAGE, GFF

Professional Responsibilities

Associate European Editor (1997-1999) – Tectonics; Associate Editor (1998-2006) – Journal of Applied Geophysics; Associate Editor (2001-2002) – AGU book on the Uralides; Editorial Board (2009-2015) – Solid Earth Journal; Guest Editor (2014-2018) – Energy Procedia ERE volumes

Thesis opponent (PhD)

Anders Kiær, NTNU Trondheim, 12/2015; Sissel Grude, NTNU Trondheim, 10/2014; Uni Petersen, Faroe Islands University, 10/2014; Sabine Latzel, ETH Zurich, 9/2010; Christoffer Nielsen, University of Copenhagen, 9/2008; Fatkhan, Curtin University of Technology, 2/2003; Roman Spitzer, ETH Zurich, 2/2001; Pekka Heikinnen, University of Helsinki, 12/1998; Morten Wendall Pedersen, Aarhus University, 5/1998; Lone Klinkby, Aarhus University, 5/1998; Charles Line, Cambridge University, 1/1997; Jan-Erik Lie, University of Oslo, 1/1996; Kim Mavern, University of Copenhagen, 3/1995; Patrick Okoye, Curtin University of Technology, 2/1995

Thesis committee member at Uppsala University (PhD)

Julianne Hubert, 2012; Tuna Eken, 2009; Niklas Linde, 2005; Hossein Shomali, 2001; Leif Persson, 2000; Johannes Schmidt, 2000; Manhal Sirat, 1999; Sigurdur Th. Rögnvalsson, 1994

Thesis committee member at other universities (PhD)

Felix Hlousek (Freiberg), 2016; Juan Alcude (Barcelona), 2014; Peter Bergmann (Kiel), 2013

Administrative duties

Department Head (2016-2019), Department board member (2011-2016), Leader seismic research meetings (1995-present); Organization of weekly geophysics seminar (1996-2002), UU Electoral College member (2020-2023)

Publications

See scholar.google.se/citations?user=GqTT0iMAAAAJ&hl=en