

Curriculum Vitae Johan Mellqvist

1. Higher education degree(s)

1990-10 MSc Engineering Physics, Chalmers University of Technology

2. Doctoral degree (year, discipline/subject area, dissertation title, and supervisor).

1999-02 PhD in Physics Feb 26 1999. Dissertation "Application of infrared and UV-visible remote sensing techniques for studying the stratosphere and for estimating anthropogenic emissions". Supervisor: Prof. Arne Rosen

3. • Senior lecturer expertise (year)

2003-05 Senior lecturer in optical remote sensing

4. Current position, period of appointment, share of time spent in research.

2013-08 Permanent position, Professor, 90% research

5. Previous positions and periods of appointment (specify type of position).

1990-10–1999-06 Research engineer Swedish Environmental Research Institute, *applied spectroscopy and remote sensing*

6. Interruptions in research.

1999-03-1999-05 Paternity leave.

7. Awards and special commissions

Winner of the Stockholm harbor Environmental price "Miljöbojen" 2009

Member of CEN standardization committee on fugitive emissions SIS/TK 423

8. Student supervising

Main PhD supervisor:

Dr Jörg Beecken 2015 (*Remote Measurements of Gas and Particulate Matter Emissions from Individual Ships*)

Tekn. Licenciate Manne Kihlman 2004 (*Application of solar FTIR spectroscopy for quantifying gas emissions*)

Tekn. Licenciate Niklas Berg 2011 (*Remote Measurements of Ship Emissions*)

Tekn. Licenciate Jon Angelbratt 2011 (*Trend Analysis and Model Comparison of Ground-Based Solar FTIR Data*)

Tekn. Licenciate John Johansson 2013 (*Optical remote sensing of industrial gas emission fluxes*)

Secondary PhD supervisor:

Dr Claudia, Rivera (2009), Dr Mattias Johansson(2009) and Dr. Yong Yu (2004), Dr Santiago Arrelano (2014) and Vladimior Conde (2015)

Present PhD supervisor:

John Johansson

Supervisor for MSc:

Magnus Ekström (1999), Malin Paulsson (2001), Kote Koteswhar (2007), Johan Berthag (2006), Maryliane Thomar (2008), Lisa Nilsson (2008), Jörg Beecken (2008), Karl Borgenthun (2008), Modris Matesans (2010)

9. **Mentorship of post-doctoral fellows**

Dr Kent Salo, 20120101-20131231

Dr Pontus Andersson 20120801-20131001

Dr Jörg Beecken 20150301-20170301

10. • **Experience of communicating results with stakeholders/end users**

- Board member of Göteborg Atmospheric Science Centre, since 7 years.
- The SOF method, (invented by Johan and a colleague) is considered best available technology to measure fugitive emissions from refineries in a new BREF (Reference document on best available technology for mineral oil refineries and storage). It is also described in the US EPA handbook: Optical Remote Sensing for Measurement and Monitoring of Emissions Flux, December 2011.
- The FTIR measurements at Harestua, which Johan is PI for, are included in the 2010 IMO report "Scientific assessment of ozone depletion" (Table 2-1, page 211),
- Popular science presentation at the seminar series Miljöperspektiv 2007 at GMV och Ekocentrums with the title: "Sjöfartens skitiga svavelutsläpp - så kan fartygens rökgaser renas och mätas".
- Four different presentations at the annual meetings of the coast guard organizations of the north sea, OTSOPA; and Baltic sea, IWGAS. Presentation at Helcom (Helsinki Commission) meeting Copenhagen.
- Winner of the Stockholm harbor Environmental price "Miljöbojen" 2009.
- Presentation for a Chinese trade delegation at Västsvenska handelskammaren 2011, and Swedish American Chamber of Commerce, 2011
- Jörg Beecken and Karl Borgenthun won an Optronics price of Swedoptronics 2009 for best master thesis (Johan was advisor). Note in Göteborgs-Posten 22 november 2009.
- Almost hundred appearances in the national and international press and television during the last years,
- Reviewer of Ozone WMO Ozone Assessment 2014
- Reviewer to the US National Science Foundation

- Frequent scientific reviewer of papers for the journals Atmospheric Chemistry Physics (ACP), Atmospheric Measurements Techniques (AMT), Journal of Geophysical Research-Atmospheres (JGR), and Environmental Science and Technology (EST)
- Chairman of the teachers faculty at the Earth and Space Sciences department since 2007

11. Experience

Johan holds a position as professor in optical remote sensing at Chalmers University. Johan received his master degree in Engineering Physics at Chalmers University in 1990, and after a few years at the Swedish Environmental Research Institute (IVL) he commenced PhD studies, at the physics department at Chalmers/GU with Prof. Arne Rosen as the supervisor. He did a licentiate degree in 1995 based on studying a spectroscopic method (Differential optical Absorption Spectroscopy - DOAS) for detection of molecules (NO_2 , NO , SO_2 , NH_3) by sending light across the flue gas stack. In 1999 he completed his PhD studies (*Application of infrared and UV-visible remote sensing techniques for studying the stratosphere and for estimating anthropogenic emissions*) based on studying the ozone layer in the higher atmosphere by making use of infrared spectroscopic measurements (Fourier Transform Infrared - FTIR) of the sun. In 1999 Johan was employed as senior scientist in an optical remote sensing group at Chalmers University of technology and furthermore became Assoc. professor in May 2003 and professor in August 2013.

During the last 15 years Johan has been principal investigator and project leader for more than 15 projects with budgets up to 20 Mkr, financed by EU, Swedish innovation agency, Swedish environmental protection agency, US air quality agencies and the Swedish refinery industry. Most of this work has been related to applications of infrared absorption spectroscopy. One of them is to study atmospheric species related to ozone depletion and climate change and this concerns the running of a global monitoring station in Norway since 1994 within the global network of NDACC (Network for the Detection of Atmospheric Composition Change). Another application is the use of mobile measurements of the sun for obtaining gaseous fluxes. Such a technique, named the solar occultation flux method (SOF) was developed by Johan and a colleague in 1998 and it is now patented in Sweden, Europe and the US. The technique is considered best available technology (BAT) in Europe for measurements of fugitive VOC emission from refineries. In US it has been widely used by Johan and his group in research projects in both Texas and California aimed at understanding the impact of oil related industries on the

formation of photochemical smog and the environmental impact of natural gas production by hydraulic fracturing (Texas AQS 2006, Flair 2009, AQRP 2011, NASA Discover AQ). The SOF method was recently chosen in an open tender procedure as the preferred method for quantifying fugitive emission studies in California. The SOF technique is presently being standardized, together with other techniques, by the European standardization body CEN in which Johan is the Swedish representative. Other applications using the SOF method includes a feasibility study of measuring ships in 2001, volcanic measurements at Mt Etna in the EU project DORSIVA and megacity measurements in Mexico city and Milano. The SOF technique is presently being used commercially by the company FluxSense AB. Since 2006 Johan has been PI for an extensive project (Identification of gross polluting ships) and EU aimed at developing measurements techniques to monitor emissions of SO, NO_x, CO₂ and particles from ships, from airborne and stationary platforms using both optical and in situ techniques. This project has led to the development of a unique automatic system that is being applied from the ship channel of Göteborg, Great Belt bridge and from a Danish airplane which makes ship surveillance on a regular basis over Danish waters. A major field study of ship emission, for which Johan is PI, will be carried out in LA harbor in the end 2015.