



## Preface: A tribute to Rodolphe Zander

Emmanuel Mahieu<sup>1</sup>, Paul C. Simon<sup>2</sup>, and Kathy A. Thompson<sup>3</sup>

<sup>1</sup>Institute of Astrophysics and Geophysics, University of Liège, Liège, Belgium

<sup>2</sup>Royal Belgian Institute for Space Aeronomy (BIRA-IASB), Brussels, Belgium

<sup>3</sup>Science Systems and Applications, Inc. (SSAI), Lanham, MD, USA

*Correspondence to:* Emmanuel Mahieu (emmanuel.mahieu@uliege.be)

Published: 22 March 2018

This Special Issue on The Network for the Detection of Atmospheric Composition Change (NDACC) is dedicated to the memory of Professor Rodolphe (Rudy) Zander in recognition of his influential work in atmospheric sciences, and the fundamental role he played in the inception of the Network for the Detection of Stratospheric Change (NDSC, now NDACC) in 1991, as well as its development over the course of more than 20 years. Rudy passed away on 22 October 2015, at the age of 77.

Rudy was an outstanding scientist who made a huge contribution to the characterization and understanding of the composition and evolution of the Earth's atmosphere, and of the anthropogenic perturbations affecting it, by analyzing high-resolution infrared solar spectra recorded from different platforms.

Rudy graduated with “la plus grande distinction” from the University of Liège (Belgium) with a PhD in Physics in November 1968. His thesis was dedicated to the study of infrared solar spectra recorded with stratospheric balloons and contributed to the study of water vapour above 25 km altitude. Professor Marcel Migeotte was his supervisor.

In 1964–1965, during his thesis work, he was a visiting scientist at the Johns Hopkins University of Astrophysics and Physical Meteorology, in Baltimore, MD. Working under Professor John Strong, Rudy familiarized himself with the techniques used for observing the Earth's atmosphere with stratospheric gondolas.

One year after receiving his PhD, Rudy was appointed Senior Scientist at the University of Liège (Belgium). In 1998, he was nominated to an academic position, teaching a course on “Physics and Chemistry of the Earth's Atmosphere”.

He led the University of Liège infrared group (Groupe Infra-Rouge de Physique Atmosphérique et Solaire, GIRPAS) until his retirement in 2003.



**Figure 1.** Rudy Zander in September 2007.

During his scientific career, Rudy wrote over 160 papers on atmospheric research pertaining to man's impact on the atmosphere. He received several awards, including:

- The Louis Melsens prize of the Royal Belgian Academy of Sciences, Letters and Arts (1976)
- The Agathon de Potter prize, from the Royal Belgian Academy of Sciences, Letters and Arts (1988)

- The National Aeronautics and Space Administration (NASA) Group Achievement Award for his contribution to the development and success of the ATMOS missions onboard the Space Shuttle (1995)

Highlights of his scientific research work include:

1. *Stratospheric balloons, using the University of Liège gondola* – For more than 20 years, Rudy organized and coordinated 27 flights of the University of Liège gondolas, from locations including Palestine, Texas, and Fort Sumner, New Mexico. In 1975, he was the first to detect and report the presence of hydrogen fluoride in the upper stratosphere, an undeniable evidence that the man-made CFCs were transported there, and ultimately photolysed to free fluorine and chlorine atoms.
2. *Space-based instruments, notably ATMOS (Atmospheric Trace Molecule Spectroscopy Experiment) onboard the U.S. Space Shuttle* – He was strongly involved in the ATMOS project developed by NASA for the Space Shuttle. As co-investigator and an active member of the scientific committee, he contributed to the definition of the scientific objectives of this pioneering mission, took part in real-time validation of the measurements taken by the ATMOS FTS instrument during its four successive flights on the Space Shuttle between 1985 and 1994, analyzed the spectra, and published the results in the scientific literature.
3. *Ground-based observations from the International Scientific Station at the Jungfraujoch, in the Swiss Alps* – Rudy analyzed infrared solar spectra recorded at this site, first with a grating infrared spectrometer, and then with FTIR instruments.

Rudy also was a key participant in the inception and extension of NDSC (now NDACC). He joined the Steering Committee in 1991 at the official inception of the Network. In 1995, Rudy was unanimously elected as the new Vice-Chairman of the NDSC Steering Committee. This designation was changed to Co-Chair at the 1999 meeting, to acknowledge the significant contributions that Rudy was making in this role.

Rudy was instrumental in the growth of NDSC in Europe; he was a very active co-investigator of several EU projects during the 1990s. In 2000, Rudy proposed a standardized form for the annual NDSC meeting. This form is an important source of information, and one that still is used for every NDACC meeting.

In 2002, Rudy stepped down as NDSC Steering Committee Co-Chair, in concert with his retirement from the University of Liège. Because of his significant contributions to NDSC, and the consensus that his expertise remained valuable, the Steering Committee unanimously elected Rudy as a Peer and *Ex Officio* Representative.

He was a member of several scientific committees and societies, including the American Geophysical Union, the International Radiation Commission, and the Belgian Committee of Geodesy and Geophysics. He also was Associate Editor for the *Journal of Geophysical Research* and *Journal of Quantitative Spectroscopy and Radiative Transfer*.

Rudy was well recognized by the international scientific community. His kind and modest personality was combined with intellectual rigour, great clarity of expression, and broad scientific interests. Rudy was a brilliant scientist and a valued colleague, and he will be sorely missed by all who knew and/or worked with him, especially by the NDACC scientific community.

Rudy published many important papers during his career. The following papers are a small representation of his extensive publication list:

- Zander, R.: Présence de HF dans la stratosphère supérieure, C. R. Acad. Sc. Paris, 281, 213–214, 1975. [The first report on the detection of HF in the stratosphere]
- Zander, R.: Recent observations of HF and HCl in the upper stratosphere, Geophys. Res. Lett., 8, 413–416, doi:10.1029/GL008i004p00413, 1981.
- Zander, R., Rinsland, C. P., Farmer, C. B., and Norton, R. H.: Infrared spectroscopic measurements of halogenated source gases in the stratosphere with the ATMOS instrument, J. Geophys. Res., 92, 9836, doi:10.1029/JD092iD08p09836, 1987.
- Zander, R., Demoulin, P., Ehhalt, D. H., Schmidt, U., and Rinsland, C. P.: Secular increase of the total vertical column abundance of carbon monoxide above central Europe since 1950, J. Geophys. Res., 94, 11021, doi:10.1029/JD094iD08p11021, 1989.
- Zander, R., Gunson, M. R., Farmer, C. B., Rinsland, C. P., Irion, F. W., and Mahieu, E.: The 1985 chlorine and fluorine inventories in the stratosphere based on ATMOS observations at 30° north latitude, J. Atmos. Chem., 15, 171–186, doi:10.1007/BF00053758, 1992.
- Zander, R., Mahieu, E., Demoulin, P., Duchatelet, P., Roland, G., Servais, C., De Mazière, M., Reimann, S., and Rinsland, C. P.: Our changing atmosphere: Evidence based on long-term infrared solar observations at the Jungfraujoch since 1950, Sci. Total Environ., 391, 184–195, doi:10.1016/j.scitotenv.2007.10.018, 2008.

A complete list of Rudy's publications is available from the University of Liège electronic repository: <http://orbi.ulg.ac.be/browse?type=authorul&rpp=20&value=Zander,+Rodolphe+p001142>.