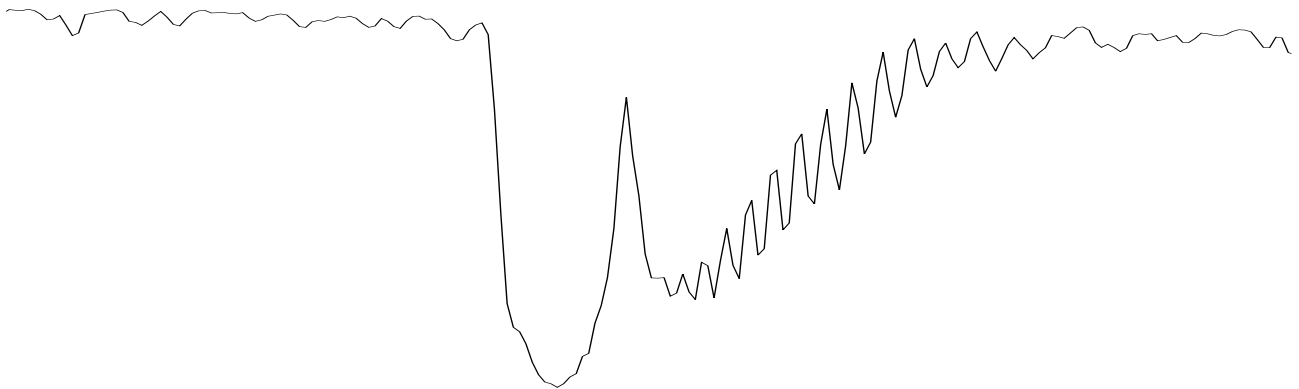




**Programme of the 2nd Workshop on
"Remote sensing in oxygen absorption bands"
29 – 31 May 2024, KNMI, De Bilt, The Netherlands**

Version date: 22 May 2024



Day 1: Wednesday 29 May 2024

12:00 - 13:30 Registration *with coffee / tea / sandwich*

13:30 - 13:35 Welcome by Maarten van Aalst (Director-General KNMI)

13:35 - 13:40 Logistics

*Presentations are 15 minutes
+ 5 minutes for discussion*

Session 1a *Chair:* Piet Stammes

13:40 - 14:00 Cloud top height retrieval from O₂ A-band measurements:
from early airborne to MERIS applications
Jürgen Fischer (Free University Berlin)

14:00 - 14:20 15-year O₂ A band dataset with TANSO-FTS
onboard GOSAT
Akihiko Kuze (Japan Aerospace Exploration Agency – JAXA)

14:20 - 14:40 Calculating the vertical column density of O₄ during
daytime from surface values of pressure, temperature and
relative humidity
Thomas Wagner (MPI Chemie, Mainz)

14:40 - 15:00 Estimation of aerosol layer height from OLCI measurements
in the O₂A-Absorption band over oceans
Rene Preusker (Free University Berlin)

15:00 - 15:20 On-going EUMETSAT developments based on the use of
O₂ absorption - Aerosol Layer Height (ALH) & Cloud Top
Pressure (CTP) from Copernicus Sentinel-3/OLCI and
EPS-SG/METimage sensors
Julien Chimot (EUMETSAT)

15:20 - 15:40 *Break*

Session 1b *Chair:* Nicolas Ferlay

15:40 - 16:00 Overview of the FRESCO cloud retrieval algorithm for
satellite spectrometers
Piet Stammes (KNMI)

16:00 - 16:20 Molecular oxygen in HITRAN2024
Iouli Gordon (Center for Astrophysics | Harvard & Smithsonian)

16:20 - 16:40 Intensities of all rovibrational electric quadrupole absorption
lines in O₂(X³Σ_g⁻) calculated using a new quadrupole moment
curve for O₂
Maciej Gancewski (Nicolaus Copernicus University, Toruń)

16:40 - 17:00 Cloud and aerosol information content in pathlength moments
of sunlight from O₂ absorption measurements
Anthony Davis (JPL, California Institute of Technology)

17:00 - 17:20 Discussion

17:20 - 19:00 **Icebreaker**

Day 2: Thursday 30 May 2024**Session 2a** *Chair:* Jürgen Fischer

- 09:00 - 09:20 Cloud geometrical thickness's radiation pathlength account and retrieval using oxygen A band satellite measurements: past POLDER/PARASOL experience & future 3MI/EPS-SG
Nicolas Ferlay (LOA, University of Lille)
- 09:20 - 09:40 An original method to store and use LBL data in transmission form – Part I. Theory
Frederic Andre (LOA, University of Lille)
- 09:40 - 10:00 An original method to store and use LBL data in transmission form – Part II. Application to radiative transfer in the O₂ A-Band
Antoine Rimboud (LOA, University of Lille)
- 10:00 - 10:20 Cloud retrievals from the TROPOMI UV/VIS/NIR measurements with aerosol signature
Athina Argyrouli (Technical University of Munich)
- 10:20 - 10:40 Cloud retrieval for the CO₂M NO₂ algorithm using the O₂-O₂ absorption band
Benjamin Leune (KNMI)
- 10:40 - 11:00 *Break*

Session 2b *Chair:* Alexander Marshak

- 11:00 - 11:20 Cloud top pressure retrieval from Sentinel-3 OLCI O₂ A-band measurements
Rene Preusker (Free University Berlin)
- 11:20 - 11:40 Comparison between RTTOV and DISAMAR for GOME-2
Jerome Vidot (CNRM/Meteo-France/CNRS)
- 11:40 - 12:00 Cloud property retrieval based on DISAMAR: using Oxygen absorption band data from TROPOMI on Sentinel 5P
Xiaoyun Zhang (KNMI)
- 12:00 - 12:20 Retrieval of aerosol layer height from Sentinel-3/OLCI observations
Gijsbert Tilstra (KNMI)
- 12:20 - 12:30 Discussion
- 12:30 - 13:15 *Lunch*
- 13:15 - 13:45 *Balloon launch*
- 13:45 - 14:00 *Group picture*

Day 2: Thursday 30 May 2024**Session 3a** *Chair:* Ping Wang

- 14:00 - 14:20 Retrieving XCO₂, aerosols, and surface pressure from the CO₂M mission
Sha Lu (SRON)
- 14:20 - 14:40 Latest developments in Aerosol Layer Height retrievals from TROPOMI O₂-A band measurements
Martin de Graaf (KNMI)
- 14:40 - 15:00 Effect of using fixed input parameters on the retrieval of cloud properties in the oxygen bands: Case study with synthetic EPIC/DSCOV_R measurements
Víctor Molina García (German Aerospace Center – DLR)
- 15:00 - 15:20 Proposal for intercomparison of radiative transfer simulations of the atmospheric O₂ A- and B-bands
Piet Stammes (KNMI)
- 15:20 - 15:40 *Break*

Session 3b *Chair:* Rene Preusker

- 15:40 - 16:00 Impact on the accuracy of aerosol and cloud properties derived from the oxygen bands by ignoring rotational Raman scattering
Luca Lelli (German Aerospace Center – DLR)
- 16:00 - 16:20 Geometrical thickness of single-layer liquid cloud retrieved from OCO-2 hyperspectral oxygen A-band over both land and ocean
Siwei Li (Wuhan University)
- 16:20 - 16:40 Line-shape parameters and their temperature dependency for the air-broadened oxygen B-band lines
Szymon Wojtewicz (Nicolaus Copernicus University, Toruń)
- 16:40 - 17:00 Aerosol characterization using oxygen A-band measurements with application to CO₂ retrievals
Vijay Natraj (JPL, California Institute of Technology)
- 17:00 - 17:20 Discussion
- 19:00 - ... **Dinner**

Day 3: Friday 31 May 2024**Session 4a** *Chair:* Akihiko Kuze

- 09:00 - 09:20 Aerosol Optical Centroid Height (AOCH) retrieval from oxygen absorption bands: recent advances and next steps
Jun Wang (University of Iowa)
- 09:20 - 09:40 Cloud altitudes and optical thicknesses retrieved by O2A-band spectropolarimetry of Earthshine
Michael Sterzik (European Southern Observatory)
- 09:40 - 10:00 Pressure broadening and shift of the 118 GHz line and the P1 P1 A-band line in O₂ perturbed by N₂ from *ab initio* calculations
Maciej Gancewski (Nicolaus Copernicus University, Toruń)
- 10:00 - 10:20 Harmonized OMI and TROPOMI cloud datasets using the O₂-O₂ absorption band at 477nm
Huan Yu (BIRA-IASB)
- 10:20 - 10:40 Assessing the effects due to the sub-pixel heterogeneity in the O₂ absorbing band of TROPOMI like measurements
Laurent C.-Labonnote (LOA, University of Lille)
- 10:40 - 11:00 *Break*

Session 4b *Chair:* Thomas Wagner

- 11:00 - 11:20 Deep space observations of oxygen absorption bands
Alexander Marshak (NASA / GSFC)
- 11:20 - 11:40 Uncertainty of GEMS AEH products caused by AOD and surface reflectance
Sang Seo Park (UNIST)
- 11:40 - 12:00 Determination of oxygen dimer cross-sections for different temperatures under ambient conditions from long-term long-path DOAS observations in the Antarctic
Bianca Lauster (MPI Chemistry, Mainz)
- 12:00 - 12:20 Cloud top pressure retrievals from the O₂ A-band for the NASA PACE OCI sensor
Andrew Sayer (UMBC at NASA / GSFC)
- 12:20 - 12:30 Discussion
- 12:30 - 13:30 *Lunch*

Reception on the occasion of Piet Stammes' retirement

- 13:30 - 15:00 Talks by KNMI and international colleagues
- 15:00 - 17:00 *Party*

Retirement of Piet Stammes

After having worked at KNMI for 33 years and been part of the international atmospheric radiation and satellite remote sensing community, Piet Stammes is retiring.

From the start in 1991 Piet became involved in the development of the satellite instruments GOME and SCIAMACHY, and later OMI. His knowledge about radiative transfer in planetary atmospheres could be made useful for measuring the Earth's atmosphere from space. Together with a growing group of colleagues at KNMI, he contributed to monitoring the global atmosphere from space: ozone layer, air pollution, and greenhouse gases. This culminated into TROPOMI, the "golden standard" in measuring atmospheric composition.

Sunlight, clouds, aerosols, and satellites formed the mainline of Piet's work at KNMI. Now he will enjoy the sunflowers in his allotment garden, do the research he likes, and follow KNMI from the sideline.

You are all invited at his farewell party.



Poster presentations

- Poster #1 Retrieving SIF from tall towers with the O₂-Band Shape Fitting method
Christiaan Van der Tol (University of Twente)
- Poster #2 Description of the prototype aerosol and cloud retrieval algorithm for TANSO-3/GOSAT-GW
Hyunkwang Lim (NIES)