

## Contents

<b>1. Foreword</b>	<b>3</b>
<b>2. Atmospheric Remote Sensing – Missions and Sensors</b>	<b>5</b>
2.1 SCIAMACHY Phase F Processor Development	5
2.2 SCIAMACHY Operations Support Phase F	10
2.3 The Sentinel-4 Level 2 Project	12
2.4 The Sentinel-5 Precursor Level 2 Project	14
2.5 MERLIN Level 0-1 Data Processing	17
<b>3. Atmospheric Remote Sensing – Methods</b>	<b>19</b>
3.1 Operational Atmospheric Composition SAF Trace Gas Column Products from GOME-2	19
3.2 Atmospheric Methane with SCIAMACHY: First DLR Operational Level 2 Data	21
3.3 Improvement of Total and Tropospheric NO <sub>2</sub> Column Retrieval for GOME-2	23
3.4 Validation of Carbon Monoxide Vertical Column Densities Retrieved from SCIAMACHY Infrared Nadir Observations	25
3.5 Long-term Time Series of Satellite Based Tropical Tropospheric Ozone Columns	27
3.6 Improved OCRA Cloud Fraction Retrieval Over Bright Surfaces	29
3.7 Cloud Top Height and Optical Depth Retrieval using ROCINN	31
3.8 ADM-Aeolus Mie and Rayleigh Algorithm Performance Assessment	33
3.9 Development of Atmosphere-Water Coupled Radiative Transfer	34
3.10 First Retrieval Results of Atmospheric Temperature from ML-CIRRUS Campaign	36
3.11 Py4CATS – Python Tools for Computational Atmospheric Spectroscopy	38
3.12 A Look Into Various Regularization Parameter Selection Methods	40
3.13 The Invariant Imbedding T-Matrix Approach: Revision	42
3.14 A Combination of Rayleigh Scattering and Mach-Zehnder Interferometry to Violate the CHSH-Inequality	43
<b>4. Atmospheric Remote Sensing – Applications</b>	<b>44</b>
4.1 Bromine Oxide in the Polar Atmosphere	45
4.2 GOME-2 Volcanic SO <sub>2</sub> Retrieval	47
4.3 Modeling Air Pollution in Beijing: Emission Reduction versus Meteorological Influence	49
4.4 The ESA-CCI GOME-type Total Ozone Essential Climate Variable	52
4.5 Analysis of MAX-DOAS measurements at UFS	55
4.6 Space-borne Remote Sensing of the Polar Atmosphere	58
4.7 Analysis of the Jacobian Matrices for the Atmospheres of Exoplanets	60
<b>5. Documentation</b>	<b>63</b>
5.1 Books and Book Contributions	63
5.2 Journal Papers	63
5.3 Conference Proceeding Papers and Presentations	64
5.4 Attended Conferences	68
5.5 Academic Degrees	69
<b>Abbreviations and Acronyms</b>	<b>71</b>