FLEX FLUORESCENCE WORKSHOP 2023

Registration Opens at 08:30, Bus from Frascati to ESRIN leaves at 08:00		
Day 1 (Big Hall): Tuesday, 19th September 2023		
Opening Session Chairs: Matthias Drusch (ESA), Marin Tudoroiu (ESA)		
08:30 – 09:30	Registration	
09:30 – 10:00	Welcome & Logistics	Matthias Drusch & Marin Tudoroiu
Session 1: FLEX Mission Status		
10:00 – 10:30	FLEX project development status	Ralf Bock, ESA
10:30 – 10:50	Status of the FLEX instrument performance simulator and ground prototype processor development	Marc Bouvet, ESA
10:50 – 11:10	FLEX-E: The End-To-End Mission Performance Simulator for ESA's FLEX photosynthesis mission	Antonio Ruiz- Verdú, IPL-University of Valencia, Spain
11:10 – 11:30	FLEX Scientific Readiness Assessment and Performance Evaluation	Matthias Drusch, ESA
11:30 – 12:00	**COFFEE BREAK**	
Session 2: Fluorescence Retrieval Chairs: Jose Moreno (University of Valencia), Ralf Bock (ESA)		
12:00 – 12:30	Atmospheric correction algorithm development for spectrally-resolved fluorescence estimates from satellite and proximal sensing measurements	Neus Sabater, Finnish Meteorological Institute, Finland
12:30 – 12:50	SIF spectrum retrieval in the framework of the FLEX-L2 Retrieval Module	Sergio Cogliati, University Of Milano-Bicocca, Italy
12:50 – 13:10	Statistical inversion approach for the retrieval of spectrally resolved solar-induced fluorescence	Antti Kukkurainen, Finnish Meteorological Institute, Finland
13:10 – 13:30	The challenging atmospheric correction for FLEX	Richard Santer, Adriloire, France
13:30 – 14:30	**LUNCH**	

	Session 3: Data Product Validation Chairs: Roberto Colombo (UNIMIB), Marin Tudoroiu (ESA)	
14:30 – 15:00	Towards FLEX validation plan. Ground activities within the ESA DEFLOX project	Tommaso Julitta, JB Hyperspectral Devices, Italy
15:00 – 15:20	Tools for the validation of solar-induced chlorophyll fluorescence measured at different scales	Bastian Siegmann, Forschungszentrum Jülich, Germany
15:20 – 15:40	Estimation of systematic differences between OLCI-A and OLCI-B in FLEX configuration during tandem phase in 2018	Lena Jaenicke, Freie Universität Berlin, Germany
15:40 – 16:00	Sampling strategies for the retrieval of real surface reflectance and effective fluorescence products: from top of canopy measurements to the early detection of plant stress	MaPi Cendrero, IPL- University of Valencia, Spain
16:00 – 16:30	**COFFEE BREAK**	
	Session 4: Aquatic / Water Applications Chairs: Roberto Colombo (UNIMIB), Marin Tudoroiu (ESA)	
16:30 – 16:50	"Flex 2018" Cruise: an opportunity to assess phytoplankton chlorophyll fluorescence retrieval at different observative scales	Annalisa Di Cicco, CNR-ISMAR, Italy
16:50 – 17:10	Retrieval of in vivo phytoplankton fluorescence by the combined use of measured and simulated reflectance	Antonio Ruiz-Verdú IPL-University of Valencia, Spain
17:10 – 17:30	Estimation of Aerosol Layer Height from OLCI measurements in the O2A-absorption band over oceans	Lena Jaenicke, Freie Universität Berlin, Germany
17:30 – 18:15	**Discussion Day 1 and Posters introduction**	
18:15 – 19:30	**Poster Session and Ice break**	

Day 2 (Big Hall): Wednesday, 20th September 2023		
Special Joint Session: FLEX Workshop (ESRIN, Italy) & SIF Workshop (China) Chairs: Matthias Drusch (ESA), Marin Tudoroiu (ESA)		
08:30 – 09:00	Needs and potentials for an integrated monitoring of the vegetation state and function	Alessandro Cescatti, JRC, Italy
09:00 – 09:30	Global vegetation photosynthesis from the spatial and temporal variations of chlorophyll fluorescence: The FLEX approach	Jose Moreno, IPL-University of Valencia, Spain
09:30 – 10:00	Satellite Remote sensing of SIF: Progress in China	Liangyun Liu, China
10:00 – 10:30	Measuring, scaling and understanding solar-induced fluorescence from the leaf to the canopy and field scale - overview on our current knowledge to relate actual canopy photosynthesis to leaf-level regulation and stress response	Uwe Rascher, Forschungszentrum Jülich, Germany
10:30 – 11:00	**Discussion**	
10:40 – 11:00	**COFFEE BREAK**	
Session 5a: Long-term data sets – Available Data Products Chairs: Christiaan van der Tol (University of Twente), Claus Zehner (ESA)		
11:30 – 12:00	ESA Climate Change Initiative in support of Terrestrial Carbon science	Clement Albergel, ESA
12:00 – 12:20	TROPOMI SIF Retrieval/Products	Luis Guanter - Universitat Politècnica de València
12:20 – 12:40	An Overview of Current Studies and Future Plans for SIF Research in the GOSAT Series	Hibiki Noda, National Institute for Environmental Studies
12:40 – 13:00	Observation of Solar-Induced Fluorescence from the Orbiting Carbon Observatory 2&3 Missions	Thomas Kurosu, NASA JPL, USA
13:00 – 13:20	Mapping Solar-Induced Fluorescence at High Spatial Resolution using Data from the Imaging Spectrometer DESIS on-board the International Space Station	Stefan Maier, Maitec, Australia
13:20 – 13:30	**GROUP PICTURE**	
13:30 – 14:30	**LUNCH**	
Session 5b: Long-term data sets – SIF as an ECV Chairs: Christiaan van der Tol (University of Twente), Claus Zehner (ESA)		
14:30 – 15:00	How far is Solar Induced Fluorescence from becoming an essential climate variable?	Christiaan Van Der Tol, ITC- University of Twente, The Netherlands

15:00 – 15:20	Reconstruction of a Long-term spatially Contiguous Solar-Induced Fluorescence (LCSIF) over 1982-2021	Jianjing Fang, Columbia University, USA
15:20 – 15:40	Constructing a Harmonized Multidecadal Time Series of Vegetation Chlorophyll Fluorescence	Nicholas Parazoo, NASA JPL, USA
15:40 – 16:00	Q&A	
16:00 – 16:30	**COFFEE BREAK**	
	Session 6: Combining Observation(s) and Model(s) Chairs: Alex Damm (UNIMIB), Marc Bouvet (ESA)	
16:30 – 16:50	Terrestrial Carbon Community Assimilation System	Thomas Kaminski, The Inversion Lab, Germany
16:50 – 17:10	A Two Stream Observation Operator for SIF in Land Surface Models	Tristan Quaife, National Centre for Earth Observation, United Kingdom
17:10 – 17:30	Spatially explicit modeling and scaling of solar induced chlorophyll fluorescence in 3D vegetation canopies using DART	Omar Regaieg, University Of Bonn, Germany
17:30 – 18:30	**Discussion Day 2**	
18:30 – 19:30	**Poster Session and Aperitivo**	

	Day 3 (Big Hall): Thursday, 21st September 2023	
	Session 7: Understanding the Carbon and Water Cycles using SIF Chairs: Uwe Rascher (FZJ), Matthias Drusch (ESA)	
09:00 – 09:30	From Remotely-Sensed SIF to Ecosystem Structure, Function, and Service: Harness Theory and Data	Ying Sun, Cornell University, USA
09:30 – 10:00	SIF as a Window into Photosynthesis	Lianhong Gu, Oak Ridge National Laboratory, USA
10:00 – 10:20	Investigating and modelling the dynamic SIF-GPP relationship	Ruonan Chen, Forschungszentrum Jülich, Germany
10:20 – 10:40	Modelling seasonality of solar-induced chlorophyll fluorescence in coniferous evergreen forests with a terrestrial biosphere model	Tea Thun, Finnish Meteorological Institute, Finland

11:20 – 11:40	High-temporal resolution time series of reflectance and solar-induced fluorescence for the characterization of vegetation dynamics	Micol Rossini, University of Milano-Bicocca, Italy
11:40 – 12:00	**COFFEE BREAK**	
	Session 8a: Ecosystem Research Chairs: Uwe Rascher (FZJ), Matthias Drusch (ESA)	
12:00 – 12:30	Coupling in situ remote sensing observations of solar-induced chlorophyll fluorescence, visible reflectance and pulsed-light-induced chlorophyll fluorescence of the canopy with ecophysiological variables at a forestry research station	Yves Goulas, Laboratory Of Dynamic Meteorology (LMD), France
12:30 – 12:50	TROPOMI-SIF as a proxy of Gross Primary Production in Jute Ecosystem: Initial results from ESA-ISRO Collaborative Study	Karun Choudhary, NRSC-ISRO, India
12:50 – 13:10	Global cloud-free production of four essential vegetation traits in support of the FLEX-S3 tandem mission	Dávid Kovács, University of Valencia, Spain
13:10 – 13:30	Assessing the potential of FLEX-Sentinel-3 tandem for estimating terrestrial carbon fluxes: a hybrid synergistic approach supported by TROPOMI fluorescence retrievals	Pablo Reyes-Muñoz, University of Valencia, Spain
13:30 – 14:30	**LUNCH**	
	Session 8b: Ecosystem research Chairs: Yves Goulas (LMD), Marin Tudoroiu (ESA)	
14:30 – 15:00	Sun-induced chlorophyll fluorescence for advanced assessments of crop status and transpiration response to evolving soil water limitation	Alex Damm, University of Zurich, Switzerland
15:00 – 15:20	Synchronicity of solar induced chlorophyll fluorescence, precipitation and atmospheric dryness In African evergreen tropical forest	Nicholas Parazoo, NASA JPL, USA
15:20 – 15:40	Sun-induced fluorescence as a tool for assessing the climate manipulation impact on gross primary production of peatland vegetation communities	Anshu Rastogi, Poznan University of Life Sciences, Poland
15:40 – 16:00	Chlorophyll Fluorescence Mapping in Inland Wetlands through Machine Learning Techniques	Marcin Kluczek, Institute of Geodesy and Cartography, Poland
16:00 – 17:00	**Discussion Day 3 & Wrap Up**	
17:00	**End of the Workshop**	

Poster Programme		
1.	A FLEX data base for Lhe validation of the L2 product	Richard Santer, Adriloire, France
2.	Validation of the FLEX atmospheric correction	Richard Santer, Adriloire, France
3.	The FLuorescence EXplorer (FLEX) project office	Ireneusz Kleppert, Forschungszentrum Jülich (FZJ), Germany
4.	Preparing for SIF satellite validation: how drone-borne and tower-based SIF measurements can support validating satellite SIF products	Marika Honkanen, Ilmatieteenlaitos, Finland
5.	Reconstruction of the full SIF spectral profile from hyperspectral imagery using emulation	Miguel Morata, University Of Valencia, Spain
6.	Illuminating the Future: Exploring Active and Passive Chlorophyll Fluorescence for Field Phenotyping under Elevated CO2	Oliver Knopf, IBG-2, FZJ, Germany
7.	Imaging very high spatial resolution solar-induced chlorophyll fluorescence (SIF) from an uncrewed aerial vehicle (UAS) in an alfalfa field	Saja Salattna, Juelich Forschungszentrum, Germany
8.	Downscaling of far-red solar-induced fluorescence from canopy to leaf level – A necessary step to derive physiological information about plants from remote sensing data	Bastian Siegmann, Forschungszentrum Jülich, Germany
9.	Minimizing solar angel effects on sun-induced chlorophyll fluorescence with reflectance	Xuhui Lu, University Of Twente, Netherlands
10.	SIF versus GPP. A test case using JB Devices at flux sites	Tommaso Julitta, JB Hyperpsectral Devices, Germany
11.	A Novel Self-Supervised Sun-Induced Fluorescence Retrieval Using Simulated HyPlant and DESIS Data	Jim Buffat, Forschungszentrum Jülich: IBG-2, Germany
12.	Wavelet Decomposition Fluorescence Retrieval	Sergio Roy Martinez, Uzh, Switzerland
13.	Improving a precise method unaffected by atmospheric reabsorption towards the retrieval of full-spectrum SIF	Paul Naethe, JB Hyperspectral Devices, Germany
14.	Exploring reflectance and solar-induced fluorescence (SIF) products from mixed cereal-legume canopies using hybrid retrieval methods	Julie Krämer, Forschungszentrum Jülich, Germany
15.	On the potential of creating a time-series of far-red SIF emission efficiency from satellite data by combining the Sentinel-5P TROPOSIF with the MODIS PAR product	David Herrera, Forschungszentrum Jülich Gmbh, Germany

16.	Retrieval of Solar induced chlorophyll fluorescence under drought conditions	Theresa Sandmann, University of Bonn, Germany
17.	Imaging the spatio-temporal dynamics of red and far-red solar-induced chlorophyll fluorescence (SIF) from Arabidopsis under cold stress	Huaiyue Peng, Forschungszentrum Jülich, Germany
18.	Predicting Gross Primary Production Dynamics during Different Developmental Stages of Winter Wheat Using Reflectance-Based Vegetation Indices and Sun-Induced Fluorescence Products: A Case Study	Vera Krieger, Forschungszentrum Jülich, Germany
19.	Comparing and predicting active and passive chlorophyll fluorescence yield in an oak temperate deciduous forest using random forest model at canopy level	Hamadou BALDE, Sorbonne université/Université Paris-saclay, France
20.	The Band Shape Fitting method to retrieve fluorescence from hyperspectral radiance in the O2 bands measured from tall towers	Christiaan Van Der Tol, ITC- University Of Twente, Netherlands
21.	Disentangling the effect of quenching mechanisms on phytoplankton sun-induced chlorophyll fluorescence: Implications for the assessment of chlorophyll-a concentrations in lakes	Remika Gupana, Eawag / University of Zurich, Switzerland
22.	Machine learning based noise reduction for satellite products: application to solar-induced fluorescence retrievals using simulated and real data	Yasuko Yoshida, NASA Goddard Space Flight Center / SSAI, United States
23.	Analysis of multi-scale hyperspectral data to exploit FLEX/Sentinel-3 Tandem Mission for lake applications	Mariano Bresciani, CNR-IREA, Italy
24.	The asynchrony in vegetation phenology in Africa derived from long-term NDVI and SIF observations	Siqi Shi, Faculty Of Geo-information Science And Earth Observation (itc), University Of Twente, Netherlands
25.	EVALUATION OF FLEX L2RM RETRIEVED SIF SPECTRUM (L2B MODULE) CONSIDERING DIFFERENT LEVELS OF UNCERTAINTIES IN THE ATMOSPHERIC CHARACTERIZATION	Pietro Chierichetti, Università degli Studi di Milano-Bicocca, Italy
26.	Solar Induced Fluorescence detects early drought responses in Brassica crops	Theresa Sandmann, University of Bonn, Germany
27.	Soil moisture and vapour pressure deficit drive variation in TROPOMI fluorescence yield	Simon De Canniere, Forschungszentrum Jülich, Germany
28.	Determination of solar induced fluorescence escape fraction by integration of leaf area index, chlorophyll content and leaf angle measurements in wheat, maize and beans	Antony Oswaldo Castro, Jülich Forschungzentrum, Germany
29.	Detecting drought-induced GPP spatiotemporal variabilities with sun-induced chlorophyll fluorescence during the 2009 drought in China	Wenhui Zhao, China Agricultural University, China

30.	Characterizing fluorescence retrieval uncertainties with a field spectroradiometric system simulator.	Javier Pacheco-Labrador, Max Planck Institute for Biogeochemistry, Germany
31.	FROG: an Unmanned Aerial System for concurrent measurements of solar-induced chlorophyll fluorescence and hyperspectral reflectance	Micol Rossini, University of Milano Bicocca, Italy
32.	Using TROPOSIF in Intensive Agricultural Regions of India	Ben Mudge, University Of Leicester, United Kingdom
33.	Considerations on the use of forest sites for FLEX data validation	Alexander Damm, University of Zurich, Switzerland
34.	Retrieval of early stress-related fluorescence quantum efficiency and xanthophyll absorption from FLEX–FLORIS 500-780 nm using a spectral unmixing strategy: results and challenges	Shari Van Wittenberghe, University Of Valencia, Spain
35.	FluoCat: a cable-suspended multi-sensor system for the vegetation monitoring and remote estimation of the fluorescence quantum yield	MaPi Cendrero-Mateo, Image Processing Laboratory, University of Valencia, Spain
36.	Active and Passive Chlorophyll Fluorescence as Indicators of Wheat Resilience to Drought Stress	Deepthi Konche & Sofia Choza Farias, Forschungszentrum Jülich, Germany
37.	A novel data-driven global model of photosynthesis using solar-induced chlorophyll fluorescence	Russel Doughty, Oklahoma University, USA