D4G 2022 Workshop Programme

(status: June, 9, 2022)

Programme overview

Sunday 12th June 2022		
17:00 - 19:00	Registration	Wickert/Asgarimehr
Monday 13th June 2022		
08:00	Registration	
09:00	**Welcome Address**	S. Buiter (GFZ Scientific Executive Director)
09:15	**Welcome and Remarks by the Organizers**	K.Wilgan
09:30	**Keynote: Machine Learning Techniques for Ground-based and Space-borne GNSS Remote Sensing Applications: Lessons Learned and Progress Made**	Y. Jade Morton
10:00	**Review of GNSS Remote Sensing**	J.Wickert
10:15	**Recent state and prospects of ML in GNSS Reflectometry**	M.Asgarimehr
10:30	Group photo Coffee Break	
11:30	**S1: Machine Learning for GNSS Remote Sensing**	B. Soja, C. Arnold
13:00	Lunch Break	
14:15	**S1.2: Machine Learning for GNSS Remote Sensing**	A. Camps, M.Asgarimehr
15:30	Coffee Break	
16:00	**Poster session**	
17:30	**Icebreaker**	
Tuesday 14th June 2022		
09:00	**S2: GNSS Remote Sensing data fusion with other observations**	P. Jales, M. Hoque
10:30	Coffee Break	
11:00	**S2.2: GNSS Remote Sensing data fusion with other observations**	M. Semmling, J. Cartwright
12:30	Lunch Break	
14:00	**S3: Modeling and forecasts based on GNSS Remote Sensing including natural hazards**	G.Guerova, K. Wilgan
15:30	Coffee Break	
16:00	**S3.2: Modeling and forecasts based on GNSS Remote Sensing including natural hazards**	Y. Shprits, G. Moeller

17:30	Departure to evening tours	
19:00	Boat tour with dinner	
Wednesday 15th June 2022		
09:00	**S4: Assimilation of GNSS Remote Sensing data into geophysical models**	W. Rohm, F. Zus
10:30	Coffee Break	
11:00	**S5: Mathematical methods for the analysis of GNSS Remote Sensing data**	D. Bilitza, L. Scherliess
13:00	Lunch Break	
14:00	**Wrap-up**	
14:30	**Tutorials**	
17:30	End of Workshop	

Detailed D4G 2022 Workshop Timetable:

Monday, June 13, 2022

08:00-09:00 Registration: GFZ Potsdam, Telegrafenberg, House H

Please note: The Registration & Information Desk is open **Sunday, June 12 2022**, from 17:00-19:00 in case you are in earlier. We thus encourage you to register during this time, avoiding a potentially more hectic time in the morning.

09:00-09:15	**Welcome Address**	S. Buiter (GFZ Scientific Executive Director)
09:15-09:30	**Welcome and Remarks by the Organizers**	K. Wilgan
09:30-10:00	**Keynote speech**	Y. Jade Morton
10:00-10.15	**Review of GNSS Remote Sensing**	J.Wickert
10:15-10:30	**Recent state and prospects of ML in GNSS Reflectometry**	M.Asgarimehr

Workshop Sessions

11:30-13:00

S1: Machine Learning for GNSS Remote Sensing
Chairs: Benedikt Soja, Caroline Arnold

11:30-12:00	Randa Natras	Interpretable Machine Learning for Ionosphere Forecasting with Uncertainty Quantification	
12:00-12:15	Karolina Kume	Modelling global vertical total electron content with neural networks	
12:15-12:30	Arthur Amaral Ferreira	Artificial neural network based prediction of Large Scale Travelling Ionospheric Disturbances	
12:30-12:45	Artem Smirnov	Neural network-based modelling of the topside ionosphere using Vary-Chapman function with a linear scale height decay	
12:45-13:00	Matthias Aichinger-Rosenberger	Prediction of Alpine Foehn from time series of GNSS troposphere products using machine learning	
13:00-14:15	Lunch Break		

14:15-15:30

S1.2: Machine Learning for GNSS Remote Sensing
Chairs: Adriano Camps, Milad Asgarimehr

14:15:14:30	Zohreh Adavi	Determination of Hourly GNSS Precipitable Water Vapour using Machine Learning in the Eastern Part of Austria	
14:30-14:45	Narin Gavilikilane	A Physics-informed neural network approach in CYGNSS soil moisture retrieval	
14:45-15:00	Caroline Arnold	Deep learning for extreme wind speed prediction with CyGNSSnet	
15:00-15:15	Stylianos Kossieris	Unsupervised Machine Learning for GNSS Reflectometry Inland Water Body Detection	
15:15-15:30	Daixin Zhao	Exploring Transformer Networks for GNSS-R Data	
15.30-16:00	Coffee break		

16:00-17:30 Poster session

17:30-21:00 Icebreaker, option for visiting the great refractor and Einstein tower at the Science Park *Albert Einstein* on Telegrafenberg hill

Tuesday, June 14, 2022

9:00-10.30

S2: GNSS Remote Sensing data fusion with other observations

Chairs: Philip Jales, Mainul Hoque

09:00-09:30	Adriano Camps	Geophysical parameter retrievals using combined GNSS-R, microwave radiometry and VNIR observations with the FSSCat mission: A Neural Network Approach	
09:30-09:45	Vahid Freeman	Fusion of Spire GNSS-R, CYGNSS, and SMAP soil moisture data products	
09:45-10:00	Tianqi Xiao	Deep learning in spaceborne GNSS-R: Correcting the geophysical effects on wind speed products	
10:00-10:15	Maximilian Semmling	Data Fusion to estimate sea-ice permittivity: a GNSS processor for 1-year MOSAiC data	
10:15-10:30	Jessica Cartwright	Data fusion of dual geometry GNSS-Reflectometry measurements over the cryosphere from Spire's nanosatellite constellation	
10:30-11:00	Coffee Break		

11.00-12:30

S2.2: GNSS Remote Sensing data fusion with other observations

Chairs: Maximilian Semmling, Jessica Cartwright

11:00-11:30	Philip Jales	Spire GNSS-R data products and observations for surface characterisation	
11:30-11:45	Mario Moreno	Atmospheric effects resolved in airborne GNSS reflectometry by data fusion processing	
11:45-12:00	Wenyuan Zhang	The Fusion of GNSS with FY-4A Satellite Observations to Atmospheric Water Vapor	

		Tomography Using an Improved Node-based Parameterization Method	
12:00-12:15	Volker Vilken	The Evil Waveform and Ionospheric Characterization Monitoring Network (MoNEWIC) Project	
12:30-14:00	Lunch break		

14:00-15:30

S3: Modeling and forecasts based on GNSS Remote Sensing including natural hazards

Chairs: Guergana Guerova, Karina Wilgan

14:00-14:30	Mainul Hoque	A new electron density model for assisting remote sensing of Earth system observations	
14:30-14:45	Lucie Rolland	GNSS-TEC remote sensing of earthquakes, tsunami and volcano eruptions: modeling and observations	
14:45-15:00	Edhah Munaibari	Tsunami-induced ionospheric signatures database from GNSS-TEC observations	
15:00-15:15	Marjolijn Adolfs	Nighttime Winter Anomaly feature reproduced by predictions from a neural network-based TEC model	
15:15-15:30	Matthew Hammond	Retrieval of Precipitation from Spaceborne GNSS-Reflectometry	online
15:30-16:00	Coffee Break		

16:00-17:30

S3.2: Modeling and forecasts based on GNSS Remote Sensing including natural hazards

Chairs: Yuri Shprits, Gregor Moeller

16:00-16:15	Guergana Guerova	Real time GNSS storm nowcasting demonstrator for Bulgaria	
16:15-16:30	Witold Rohm	GNSS-Based Machine Learning Storm Nowcasting	
16:30-16:45	Vincenzo Mazzarella	Leveraging GNSS tropospheric delays to nowcast severe weather events by assimilation into WRF and by machine learning techniques: the hailstorm of 13 July 2021 on Milano Malpensa airport	

16:45-17:00	Hugues Brenot	Multi-GNSS tomography and comparison with ICON-D2 forecasts for the flood in Europe in July 2021	
17:00-17:15	Laura Crocetti	Machine learning algorithms for global modelling of Zenith Wet Delay based on GNSS measurements and meteorological data	
17:15-17:30	Mutaz Wajeh Qafisheh	Establishing an early GNSS warning system using the random forest classifier	online

19:00-22:00 Boat tour and dinner

Wednesday, June 15, 2022

9:00-10:30

S4: Assimilation of GNSS Remote Sensing data into geophysical models

Chairs: Witold Rohm, Florian Zus

09:00-09:30	Dieter Bilitza	IRI and GNSS Data Assimilation – A Brief Review	
09:30-09:45	Sean Elvidge	Assimilation of high-rate GNSS Observations into a Global Upper Atmosphere Model	
09:45-10:15	Ludger Scherliess	Thermospheric Neutral Winds Obtained from COSMIC Radio Occultation Measurements	
10:15-10:30	Hui Christophersen	Assimilation of GNSS Zenith Total Delay in NAVGEM	
10:30-11:00	Coffee Break		

11:00-12:30

S5: Mathematical methods for the analysis of GNSS Remote Sensing data

Chairs: Dieter Bilitza, Ludger Scherliess

11:00-11:15	Dong L. Wu	New Insights on Residual Ionospheric Effects (RIEs) from High-Top MetOp-A and Spire GNSS-RO Profiles	
11:15-11:30	Paul David	Performance Indicator Application Development To Address The Impact Of Space Weather On GNSS	
11:30-11:45	Yuanxin Pan	Automatic selection of crowdsourcing smartphone GNSS data for atmosphere sounding	
11:45-12:00	Nikolaos Antonoglou	Soil moisture retrieved from multi-constellation and multi-frequency GNSS signals	
12:00-12:15	Minfeng Song	Observation-driven Spaceborne GNSS-R Altimetry Model for Slope Surface	
12:15-12:30	Roland Hohensinn	Sensitivity of Long-term GNSS to Vertical Land Motion: Effects of Geophysical Loading Corrections	online
12:30-12:45	Mostafa Hoseini	The Signatures of Ocean Surface Currents on GNSS-Reflectometry Observations	online
12:45-13:00	Hamza Issa	Airborne GNSS Signals Segmentation for Water Body Detection	online
13:00-14:00	Lunch break		

14:00-14:30 Wrap-up

14:30-17:30 Tutorials

Caroline Arnold: Machine Learning for Remote Sensing (House H)

Florian Zus: Introduction to data assimilation (A42 /131)

Remarks

All talks have 12 minutes presentation time and 3 min for discussion (total 15 min). Highlighted talks (marked with light grey color) have 25 min presentation time and 5 min for discussion (total 30 min).

We kindly ask to keep the time slot.

Posters (will be displayed June 13-15, 2022)

16:00-17:30 Poster session, June 13, 2022

1	Karol Dawidowicz	Offsets in the EPN station position components resulting from antenna/radome changes: PCC type-dependent model analyses	
2	Florian Zus	On the variational assimilation of GNSS zenith total delays and tropospheric gradients	
3	Estera Trzcina	TOMOREF operator for assimilation of the GNSS tomography wet refractivity fields in the WRF DA system	
4	Christina Arras	Could AI contribute to improve the quality of detection ionospheric irregularities in radio occultation profiles?	
5	Nai-Yu Wang	Potential SmallSat GNSS-Reflectometry Flood Inundation Mapping Applications	
6	Jan Michael Becker	Sea level monitoring with GNSS reflectometry based on non-parametric modelling	
7	Gregor Moeller	Tomographic fusion strategies for the reconstruction of small-scale structures in the lower atmosphere	
9	Matthieu Talpe	A supervised learning approach to refining tropospheric delay estimates for grazing-angle altimetry retrievals	
10	Sebastian Knappe	GREF - The German Integrated Geodetic Reference Network	
11	Ole Roggenbuck	Determination of the significant wave height at the FINO2 station using GNSS reflectometry	
12	Karolina Kume	Modelling global vertical total electron content with neural networks	
13	Stamatia Panagiotopoulou	The use of UAV imagery equipped with multispectral camera for Precision Agriculture applications	
14	Timothy Kodikara	Understanding the Systematic Errors of CHAMP Accelerometer-Derived Neutral Mass Density Data Using Data Assimilation	

Remarks
Posters shall be in **A0 portrait** format:

- height 1189 mm / 46.81 inches
- width 841 mm / 33.11 inches.

Poster boards are 1.38 m (54.3 inches) tall by 1.00 m (39.4 inches) wide. Supplies for mounting posters to boards will be available.

All posters are hung up for the entire workshop duration.

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