GNSS+R 2019

IEEE Specialist Meeting on Reflectometry using GNSS and other Signals of Opportunity

20 – 22 May, 2019 - Benevento, Italy

Technical Program

Sunday, May 19 – University Main Building	
	Registration
19:00 - 21:00	Welcome Reception

Day 1- Palazzo Paolo V	
8:20 - end of day	Registration
8:40 - 9:00	Opening Session

Oral Sessions

Day 1, Morning - Palazzo Paolo V 9:00 - 12:00		
	Satellite Missions (I) *Chairs: Christopher Ruf, Jens Wickert*	
9:00	NASA CYGNSS Science Data Characterization and Applications	Chris Ruf
9:20	Towards a GNSS Reflectometry Service from UK TDS-1 Satellite	Martin Unwin
9:40	Design and Planning for the First Spire GNSS-R Missions of 2019	Dallas Masters
10:00	The Flexible Microwave Payload-1: a combined GNSS-Reflectometer and L-band Radiometer for the Cat-4 Cubesat Mission	Lara Fernandez Capon
	10:20 - 10:40 Coffee Break	
	Satellite Missions (II) *Chairs: Adriano Camps, Manuel Martin-Neira*	
10:40	The Flexible Microwave Payload-2: A SDR-based GNSS-R instrument for CubeSats	Joan Francesc Muñoz Martin
11:00	PRETTY: Cubesat for precise altimetry using navigation satellites	Jens Wickert
11:20	SigNals Of Opportunity P-band Investigation (SNOOPI): In-Space Validation of Reflectometry from 240-380 MHz	Jim Garrison
11:40	Kepler observing Earth - A reflectometry concept for ocean altimetry	Maximilian Semmling
	12:00 - 13:20 Lunch + Modeling Technical Committee and IAG Sub-Commission 4.6 "GNSS-R"	

Day 1, Afternoon - Palazzo Paolo V 13:20 - 18:30		
	Calibration and Validation *Chairs: Scott Gleason, Martin Unwin*	
13:20	Characterization of GPS EIRP and CYGNSS Ocean Level 1 Calibration Update	Scott Gleason
13:40	Assessing the impact of the GPS Flex Power mode on CYGNSS Normalized Bi-Static Radar Cross Section	Jeonghwan Park
14:00	Effects of specular point inaccuracies on delay-Doppler maps shape over ocean	Giuseppe Grieco
14:20	Deployment of a Ground-Based Beacon System for On-Orbit Calibration of the CYGNSS Satellites	Andrew O'Brien
14:40	Validation of the NOC C-BRE v1.0 GNSS-R wind speed retrieval algorithm	Matthew Hammond
	15:00 - 15:20 Coffee Break	

	Modeling *Chairs: Joel Johnson, Valery Zavorotny*	
15:20	Simulations of spaceborne GNSS-R signal over land	Nazzareno Pierdicca
15:40	On the Nature of GNSS-R Land Surface Specular Scattering	Joel Johnson
16:00	Electromagnetic Scattering Model for GNSS-R Land Applications Including Effects of Multiple Elevations in Random Rough Surfaces	Leung Tsang
16:20	Bistatic scattering from sea surfaces at non-near-specular direction via the Polarimetric Two-Scale Model for maritime surveillance with GNSS-R	Antonio Iodice
16:40	Spatial Coherence of GNSS-R Signals: A Numerical Investigation	Davide Comite

17:00 - 18:30 Poster & InLabs

Day 2, Morning - Palazzo Paolo V
8:40 - 12:20

	Ocean *Chairs: James Garrison, Christine Gommenginger*	
8:40	Approaches of incorporating wave model information into CYGNSS wind speed retrieval	Valery Zavorotny
9:00	First Look at NOAA CyGNSS winds in the Tropical Cyclone Environment	Faozi Said
9:20	Retrieval of Mean Square Slopes from CYGNSS Data	Maria Paola Clarizia
9:40	Detection of Convective Activity using CYGNSS Wind Speed Measurements	Alexandra Bringer
10:00	Wind Speed estimation from CYGNSS using Artificial Neural Networks	Jennifer Reynolds

10:20 - 10:40 Coffee Break

	Sea Surface Altimetry *Chairs: Weiqiang Li, Robert S. Nerem*	
10:40	Spaceborne Carrier Phase Altimetry Using GNSS Reflected Signals At Grazing Angles Of Observation Over Open Sea Water	Estel Cardellach
11:00	Improved Ocean Altimetry Methods with CYGNSS Observations in Indonesia	Andrew O'Brien
11:20	Towards precise synoptic altimetry by means of GNSS-R	Fran Fabra
11:40	Assessment of a CYGNSS Ocean Altimetry Product Using a Full DDM Approach	Eric Loria
12:00	An overview of tropospheric delays in ground-based GNSS reflectometry	Thalia Nikolaidou
12:20	Multidoppler GNSS-R ocean altimetry with TDS-1	Manuel Martin-Neira

12:40 - 14:00 Lunch + GRSS IFT-Technical Committe, GRSS

Day 2, Afternoon - Palazzo Paolo V
14:00 - 17:30

	Land (I) *Chairs: Andrew O'Brien, Rashmi Shah*	
14:00	Retrieval of Soil Moisture and Forest Biomass using CYGNSS Data and Artificial Neural Networks	Emanuele Santi
14:20	How much closer can GNSS-R hydrology retrievals from CYGNSS get us to "the truth"?	Clara Chew
14:40	Dependence of CYGNSS Reflectivity on Vegetation Water Content and Surface Roughness	Rashmi Shah
15:00	Examination of GNSS-R phase measurements over wetlands using CYGNSS	Eric Loria

15:20 - 15:40 Coffee Break

	Land (II) *Chairs: Clara Chew, Felipe G. Nievinski*	
15:40	Sensitivity of CyGNSS to Above Ground Biomass and Canopy Height over Tropical Forests	Hugo Carreno-Luengo
16:00	GNSS derived soil moisture from the global IGS permanent network	Nikolaos Antonoglou
16:20	GNSS reflectometry for the retrieval of forest biomass	Emanuele Santi

16:40 - 17:30 Poster & InLabs

18:30 - 23:00 Evening Dinner

Day 3, Morning - Palazzo Paolo V
8:40 - 12:40

	Signal Processing *Chairs: Maria Paola Clarizia, Fran Fabra*	
8:40	An Outlier Detection Approach for GNSS-SNR Analysis	Tomke Lambertus
9:00	Cycle Ambiguity Resolution in GNSS-R Carrier Phase Altimetry	Manuel Martin-Neira
9:20	Super Resolution in GNSS coherent scattering	Maurizio di Bisceglie
9:40	Likelihood Map Waveform Tracking Performance for GNSS-R Ocean Altimetry	Santiago Ozafrain
10:00	Passive radar enabled by GNSS signals of opportunity for maritime surveillance applications	Debora Pastina
10:20	Blind Sea Clutter Suppression for Spaceborne GNSS-R Target Detection	Joon Wayn Cheong

10:40 - 11:00 Coffee Break

	Cryosphere *Chairs: Estel Cardellach, Jessica Cartwright*	
11:00	First Results of Grazing Angle Reflections from Sea Ice and Ocean Surfaces Collected by the Spire Cubesat Constellation	Dallas Masters
11:20	Sea-ice transition detection using incoherent integration and deconvolution	Benjamin Southwell
11:40	Estimation of Soil Moisture and Sea Ice Concentration: A GNSS Reflectometry Concept	Maximilian Semmling
12:00	Experimental Results of Snow and Soil Moisture Measurement using P-Band Signals of Opportunity	Rashmi Shah

12:20 - 13:30 Lunch

Day 3, Afternoon - Palazzo Paolo V
13:30 - 16:30

	Data Assimilation *Chairs: Giuseppe Grieco, Maximilian Semmling*	
13:30	Assimilation of CYGNSS Delay-Doppler Maps by a Two-Dimensional Variational Analysis Method	Feixiong Huang
13:50	Forecast Impact Experiments To Optimize Utilization of CYGNSS Wind Observations of Tropical Cyclone Michael (2018) Using the Operational HWRF	Bachir Annane
14:10	Global Assessments of CYGNSS Data Impacts on Weather Forecasting and Ocean Surface Wind Analyses	Mark Leidner

14:40 - 16:20 Discussion Panel: Meeting Science Requirements

14:35	Introductory notes	Estel Cardellach
14:40	Keynote speakers	John Eyre – *UK Met Office*
15:00		Dallas Masters – *SPIRE Global*
15:20	Round Table	Manuel Martin-Neira – *ESA Estec*, Christopher Ruf – *University of Michigan,* Bachir Annane – *NOAA*, John Eyre – *UK Met Office*, Dallas Masters – *SPIRE Global*

16:20 - 16:30 - Closing

16:50 - 18:15 Bus to Napoli

Poster Sessions

Day 1 - 17:00-18:30
Day 2 - 16:40-17:30

P1 - Ocean	
A Forward Modelling Approach to Improve Storm Feature Characterization Using Spaceborne GNSS-R Systems	Mohammad Al-Khaldi
Ocean Wind speed retrieval from Spaceborne GNSS-R technique by TDS-1 DDM	Yanling Chen
Motivation for dense coastal ground-based GNSS-R networks	Joakim Strandberg
Sensitivity of GNSS-R delay-Doppler maps to wind direction with a deconvolution approach	Generoso Giangregorio
Impact of sea surface temperature on GNSS-R observations over mesoscale ocean eddies; preliminary results from CYGNSS	Mostafa Hoseini
Analyses of the Anomalous Artefacts in TDS-1 Delay Doppler Maps	Changjiang Hu
Processing of Raw GNSS Reflectometry Data from TDS-1 in a Backscattering Configuration	Lucinda King
Development of Standards for GNSS-Reflectometry	Maria Paola Clarizia
P2 - Land	
Soil moisture estimation using CYGNSS constellation	Mehrez Zribi
GNSS-based remote sensing: Innovative observation of key hydrological parameters in the Central Andes	Nikolaos Antonoglou
Developing and validating forward models of CYGNSS delay-Doppler maps for soil moisture applications	James Campbell
Forward and inverse modeling of SNR-based GNSS reflectometry for soil moisture retrieval in Luxembourg and South Africa	Sajad Tabibi
A machine learning aided method for GNSS-R performance analysis	Patrizia Savi
An initial evaluation of the TechDemoSat-1 potentialities for freeze-thaw monitoring via GNSS-Reflectometry	Nazzareno Pierdicca
An Experimental Assessment of Rough Topography on Spaceborne Delay Doppler Maps	Hugo Carreno-Luengo
P3 - Sea Surface Altimetry	
Investigating the Altimetric Sensitivity of Grazing Elevation Data - A Case Study at Kongsfjorden, Svalbard	Maximilian Semmling
Assessing Spaceborne GNSS-R Ocean Altimetry Precision using CYGNSS Data	Weiqiang Li
P4 - Cryosphere	
Sea ice detection using GNSS-R data from TechDemoSat-1	Jessica Cartwright
GNSS Reflectometry for Sea Ice Detection Using Differential Delay Waveform from UK TechDemoSat-1 Data	Kegen Yu
P5 - Modelling and Signal Processing	
Comparison of BPSK and BOC Modulations in GNSS Reflectometry	Jyh-Ching Juang
Advanced GNSS-R signals processing with GPUs	Oriol Cervello
Iterative regularization methods for NCRS field reconstruction from GNSS-R measurements	Matteo Alparone
Ionospheric Effects in GNSS-R: Impact and Model Limitations	Adriano Camps
A direct approach to calculate quantitative dielectric constant for GNSS-R	Junchan Lee
Recent advances and prospects in spaceborne GNSS-R: Can machine learning help in data modeling and analysis?	Milad Asgarimehr
A new technique to quantify the dominant sources of error in GNSS-R sea level measurements	David Purnell
Simulation of spaceborne GNSS-R delay-Doppler Maps of the sea surface with ship targets	Alessio Di Simone
Non-uniform Delay-Doppler Mappings and its application in wind speed retrieval	Junming Xia

P6 - Calibration and Validation	
Humidity Observation by Reflectometer Technique for Agriculture (HORTA): Monitoring Soil Moisture with CubeSats	Giorgio Rossi
Impact of specular point inaccuracies on satellite GNSS Reflectometry observables over the ocean	Giuseppe Grieco
On the Use of SMAP-Reflections to Enhance the Retrieval of Geophysical Parameters	Nereida Rodriguez-Alvarez

P7 - Ground Airborne Experiments	
Experimental evidences of satellite cross-talk in interferometric GNSS-R during the first field campaign of the Microwave Interferometric Reflectometer	Raul Onrubia
A GNSS-R multirotor UAV platform for soil moisture detection and altimetry	Georges Stienne

P8 - Instrument Technology	
Real-time reconfigurable GNSS-R for space applications	Junchan Lee
Deployable L-Band Helix Antenna for a GNSS-R Receiver onboard a 1U CubeSat	Lara Fernandez Capon
Open-source hardware options for SNR-based GPS/GNSS reflectometry Proof-of-concept and initial validation	Manuella Fagundes
Towards a vertical sensor array for sub-hourly sea level retrieval in SNR-based GNSS reflectometry	Felipe Nievinski

InLab Sessions

Day 1 - 17:50-18:30	
A generic simulator of spaceborne GNSS-R for land applications	Hyuk Park
Simulation of GNSS+R scenarios with the open-source wavpy	Fran Fabra

Day 2 - 16:40-17:30	
The Soil And Vegetation Reflectometry Simulator (SAVERS)	Nazzareno Pierdicca
Real-time Radio Frequency Interference Detection and Mitigation with the Front-End GNSS Interference eXcisor (FENIX)	Adrian Perez
Implementation of a testbed for GNSS-R payload performance evaluation	Adrian Perez