SURREY

CHANGING THE ECONOMICS OF SPACE

# Ocean wind GNSS-R service, ORORO & CGRAIL Concepts

Martin Unwin, SSTL

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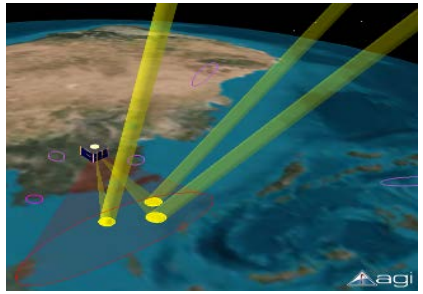
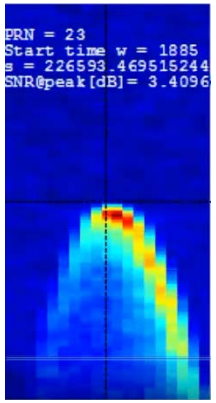
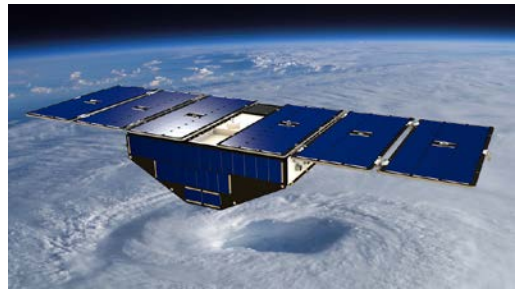
# TDS-1 & GNSS Reflectometry

- GNSS Reflectometry uses reflected GNSS signals to measure geophysical parameters
- UK TechDemoSat-1 (TDS-1) launched 2014
  - Carrying SGR-ReSI Instrument, sponsored by CEOI and ESA
  - Collects GPS Delay Doppler Maps (DDMs) over ocean, land and ice surfaces
  - SSTL's partner NOC derived inversion into ocean wind speed
- SSTL's instrument provided as payload to NASA CYGNSS mission
- Two posters
  - TDS-1 Ocean Wind Demonstration / ORORO
  - CGRAIL – Coherent GNSS-R concept





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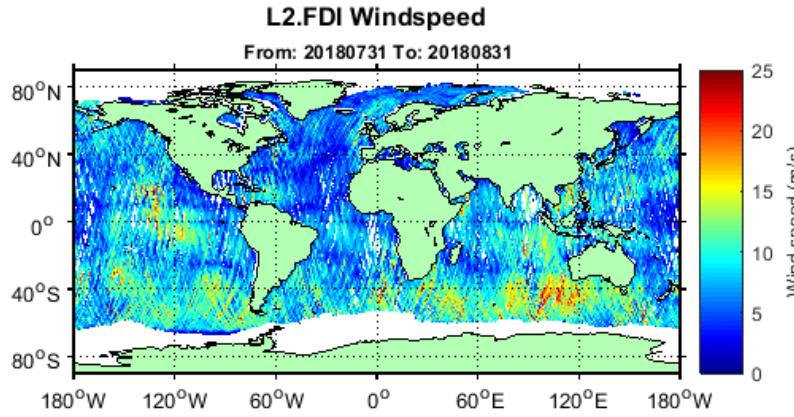
# TDS-1 Data via MERRByS

- ESA-funding allowed SSTL & NOC to pilot data service
- DDMs and ocean winds provided to user via website

  www.merrbys.co.uk
- More than 180 password holders
- In 2017, TDS-1 life extended
- Now gathering data 24/7



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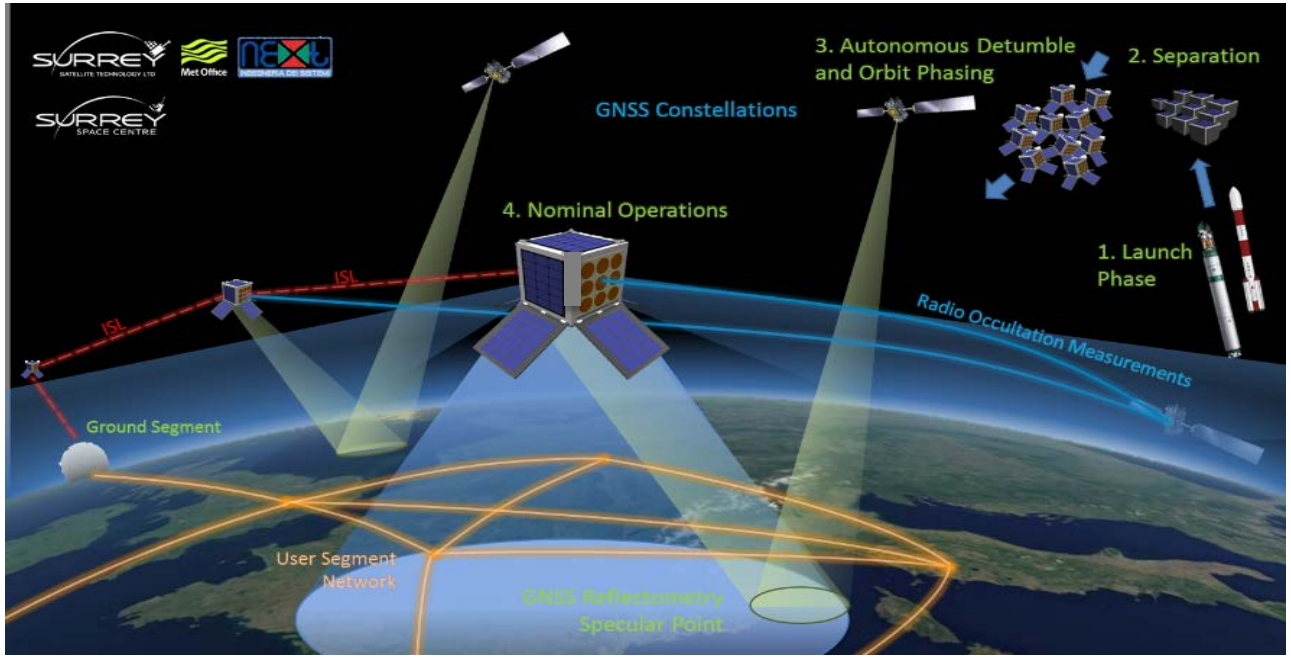
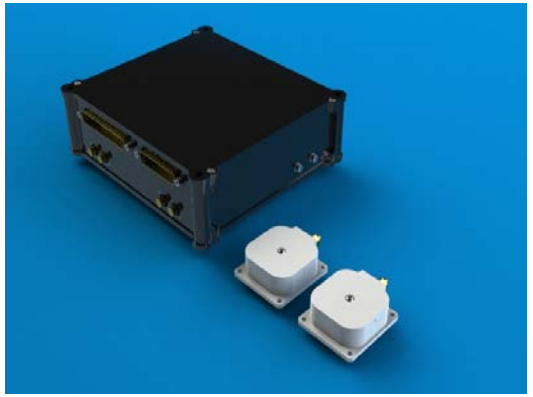
# ORORO – Ocean Reflectometry & Radio Occultation

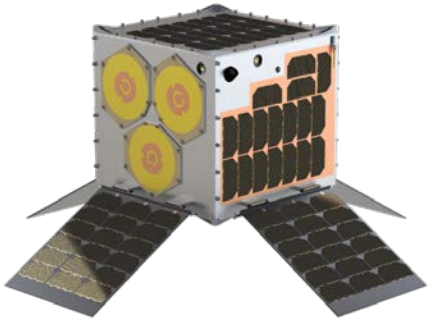
- Combined complementary weather measurements into single GNSS remote sensing instrument
- Constellation of small satellites




Upgrade of GNSS Reflectometry instrument



Dedicated small satellite



- Study indicated high impact on NWP from larger number of RO measurements.

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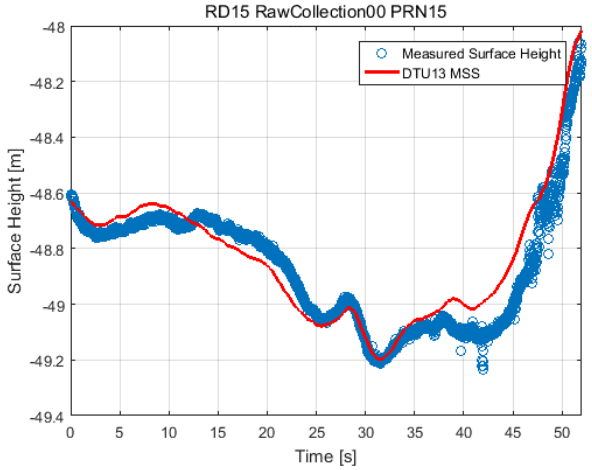
# CGRAIL – Coherent GNSS Altimetry Ice & Land

- TDS-1 is collecting GNSS-R incoherently due to rough ocean
- Indications are that very strong coherent signals reflect off ice and land
- IEEC coherently processed river ice reflections, agreed with SSH to ***3 cm***
  - Ice thickness may be measurable
- CYGNSS reflections off rivers penetrate forest canopy, gets additional information to SMAP
  - Also high resolution soil moisture
- CGRAIL – small satellite demonstrator for coherent GNSS measurement
  - Explore potential of measurements

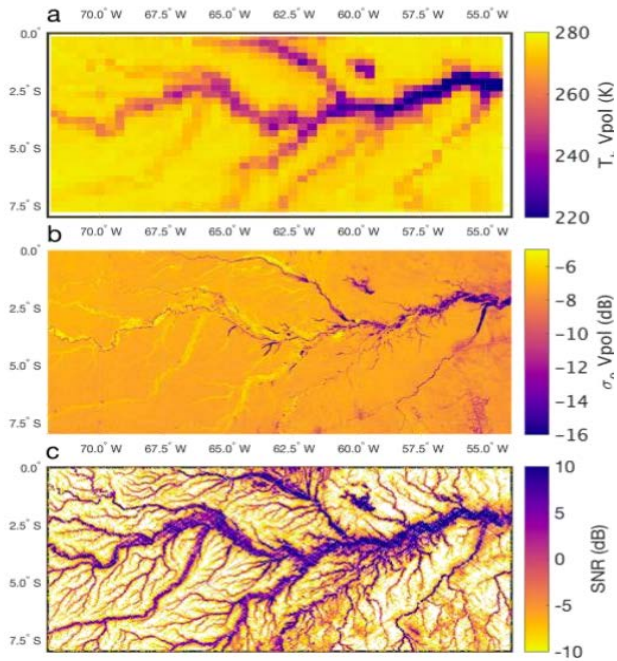
*(courtesy Estel Cardellach, IEEC)*




SMAP Passive

SMAP Active

CYGNSS SNR




*(Amazon basin, courtesy Clara Chew, UCAR)*

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# Thank You!

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Tycho House, 20 Stephenson Road, Surrey Research Park, Guildford, Surrey, GU2 7YE, United Kingdom
**Tel**: +44(0)1483803803 | **Fax**: +44(0)1483803804 | **Email**: info@sstl.co.uk | **Web**: www.sstl.co.uk