



Press Release

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SSTL demonstrates innovative method for measuring ocean winds and waves from space

Surrey Satellite Technology Ltd (SSTL) has successfully demonstrated an innovative method of measuring winds and waves from space, using GNSS Reflectometry. This paves the way for a cost effective satellite system supporting the maritime sector and the organisations that rely on this information and it also offers improvements to weather services and climate research.

The measurements were taken from an instrument developed by SSTL, the SGR-ReSI, (Space GNSS Receiver Remote Sensing Instrument) which is flying on-board TechDemoSat-1, a technology demonstration satellite which was launched in July 2014. SSTL's SGR-ReSI collects the signals from GPS and other navigation satellites after they have been reflected off the ocean surface and processes them into images called Delay Doppler Maps, from which ocean roughness and wind speed measurements at the sea surface can be interpreted.

The technique works in a similar way to existing scatterometric radar from satellites, however it eliminates the need for a transmitter and can process up to four reflections from different GPS satellites simultaneously, presenting an opportunity for collecting data more regularly and in a denser grid across the globe. By flying the receivers on a constellation of small satellites GNSS Reflectometry data could be used to map all of the Earth's ocean surface with refreshed data every couple of hours, and this would be of enormous benefit to the maritime industry who depend on wave height and wind speed predictions for optimum ship routing, insurance claims, oil and gas rig operations, undersea cable laying and fishing conditions. Such wind speed and wave height measurements are currently very difficult to make over the open ocean in timely manner and in a dense enough grid to be useful.

Luis Gomes, Director of Earth Observation and Science at SSTL, commented: “We are very excited about the future application of this development which extends the applications of small satellites. For instance, a constellation of 18 SGR-ReSIs could cover most of the world’s oceans every few hours providing a real time wind and wave height service. And these do not need to be dedicated satellites as the SGR-ReSI can be easily accommodated as a hosted payload on small satellites with a different primary mission. Our aim is to deploy such a constellation in the next two years.”

The SGR-ReSI can pick up GPS reflections not only off the ocean, but also off land, snow and ice, opening up other potential new opportunities for remote sensing – for example, measuring the thickness of sea ice, snow depth, soil moisture levels and the classification of vegetative foliage.

SSTL, with support from the European Space Agency, is now working on preparing the ground processing and web interface that will allow users access to the measurements over the internet with a short delay.

More information, including a Delay Doppler Map from GPS satellites and an interpretation of the data is available at[<http://www.sstl.co.uk/Blog/September-2014/Using-SatNav-signals-to-measure-winds-and-waves>

A video which shows the processing and application of the SGR-ReSI data.

is available on YouTube at

https://www.youtube.com/watch?v=YYD7tzH6fP4&list=UUOzHBvWWyqaasy_sPQL7mDw

Notes on the video:

The video shows in about 20 times real time speed the motion of the TechDemoSat-1 satellite over an orbit, indicated by a white cross on the world map. The specular reflections targeted by the SGR-ReSI are shown by yellow spots, and the measurement tracks are shown in yellow. The four Delay Doppler Map channels from the SGR-ReSI are shown at the top right. The spreading horseshoe shape is caused

by reflections being received away from the specular point, and a rougher ocean causes more spreading. When reflections are received from over land and over ice, there is much less spreading. The red band on the map indicates the collection of “raw” unprocessed data, which takes a few minutes to transfer before the processed Delay Doppler Maps resume.

Additional notes:

- Upgrades to the SGR-ReSI will allow it to track Europe’s new GALILEO satellite signals, Russia’s GLONASS and China’s Beidou satellite signals, yielding additional measurements on the ocean surface.
- NASA’s 8-satellite “CYGNSS” mission, due for launch in 2016 will use SSTL’s SGR-ReSI to target tropical cyclones and hurricanes.
- SSTL’s partners at The National Oceanography Centre in Southampton have been given access to the data from the SGR-ReSI and have interpreted the Delay Doppler Maps into ocean roughness and wind speed measurements at the sea surface.
- SSTL received funding to support the development of the SGR-ReSI and ground processing from the UK CEOI, SEEDA, Innovate UK, and the European Space Agency.

About SSTL

Surrey Satellite Technology Limited (SSTL) is the world's leading small satellite company, delivering operational space missions for a range of applications including Earth observation, science and communications. The Company designs, manufactures and operates high performance satellites and ground systems for a fraction of the price normally associated with space missions, with over 500 staff working on turnkey satellite platforms, space-proven satellite subsystems and optical instruments.

Since 1981, SSTL has built and launched 43 satellites – as well as providing training and development programmes, consultancy services, and mission studies for ESA, NASA , international governments and commercial customers, with its innovative approach that is changing the economics of space.



Headquartered in Guildford, UK, SSTL is part of the Airbus Group.

www.sstl.co.uk

Notes to editor:

This press release can be downloaded as a Word or PDF document at the following url: <http://www.sstl.co.uk/news-and-events>

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