Remote Sensing using Navigation Signals

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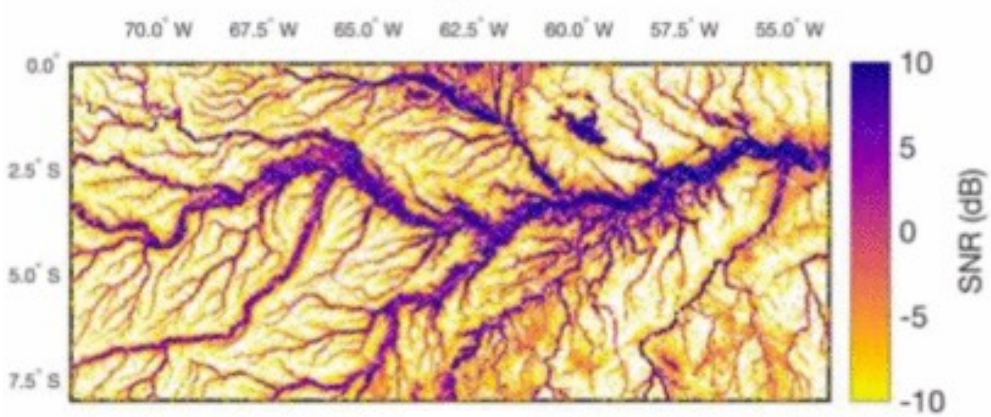
- Soil moisture, ocean wind speed and sea and land ice cover/thickness are all important factors in the climate system.

- Traditionally these things are measured using large, expensive and power-hungry active radar instruments.



An image of Amazon basin waterways derived from reflected navigation satellite signals from NASA's CYGNSS mission. Credit: *Courtesy C.Chew, UCAR*

However, it is possible to make these measurements by re-using the signals reflected from the Earth's surface from navigation satellites such as GPS and Galileo, using small, low-cost but specialised receivers which can be deployed on any satellite, even the smallest.

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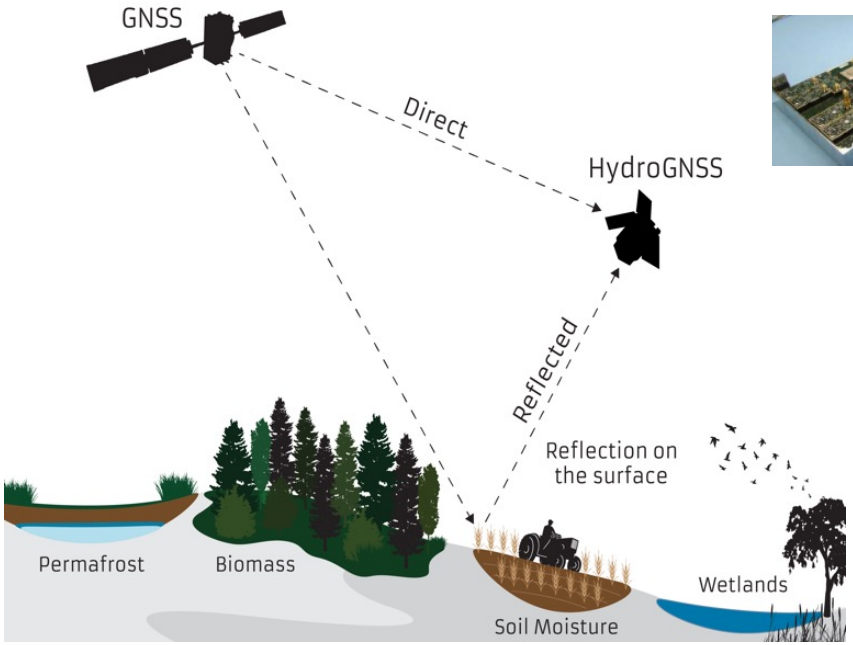
Remote Sensing using Navigation Signals: Technology



- SSTL, with support from CEOI and UKSA, has developed a small, low-cost satellite receiver that can detect and receive reflected signals from navigation satellites. It has been deployed on NASA's CYGNSS mission.
- Although originally targeting ocean roughness and windspeed measurements, these missions showed that the instrument was receiving useful signals from permafrost, biomass, soil moisture, wetlands and ice, giving rise to a proposal for the HydroGNSS mission.
- These signals can be processed to produce accurate measurements of key climate variables.

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Remote Sensing using Navigation Signals: HydroGNSS

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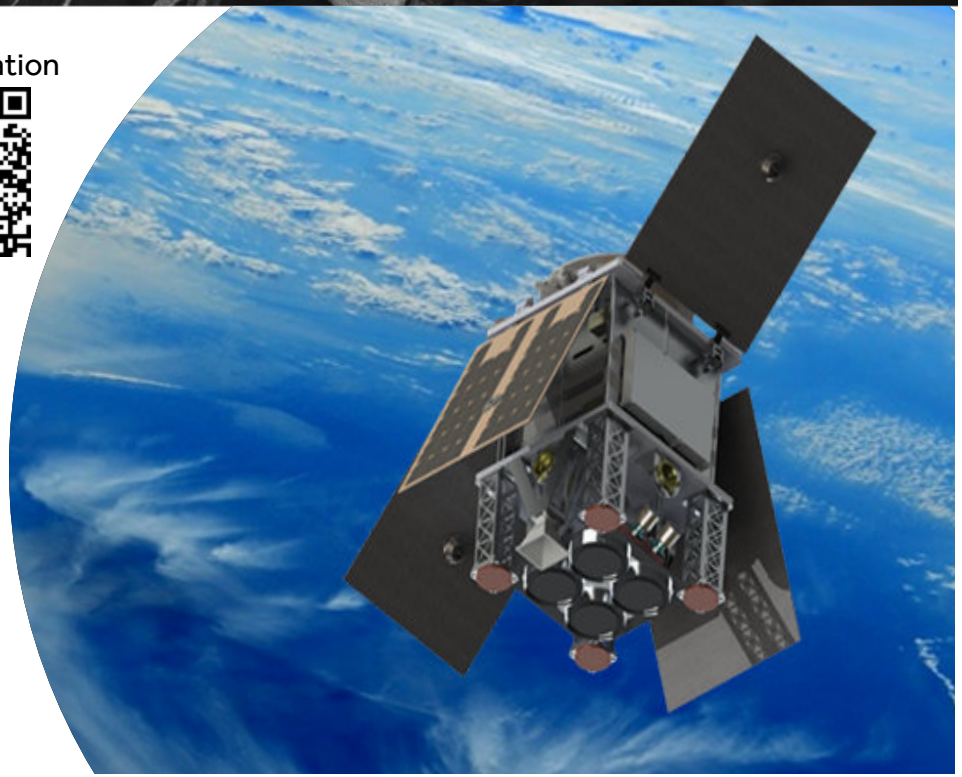
HydroGNSS is an ESA Scout mission using a 55kg satellite that will be built and operated by SSTL.

It will take measurements of key hydrological climate variables, including soil moisture, freeze/thaw state over permafrost, inundation and wetlands, and above ground biomass, using reflected navigation signals.

Initially a single satellite will be flown, but the small size and relatively low cost would make a constellation affordable giving greater coverage, and greater scientific and societal benefit.

More information



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