

The SATCROSS Measurement Campaign

Application of the NDSA technique to a Ground-to-Ground Radio Link

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Presenting

Arjan Feta

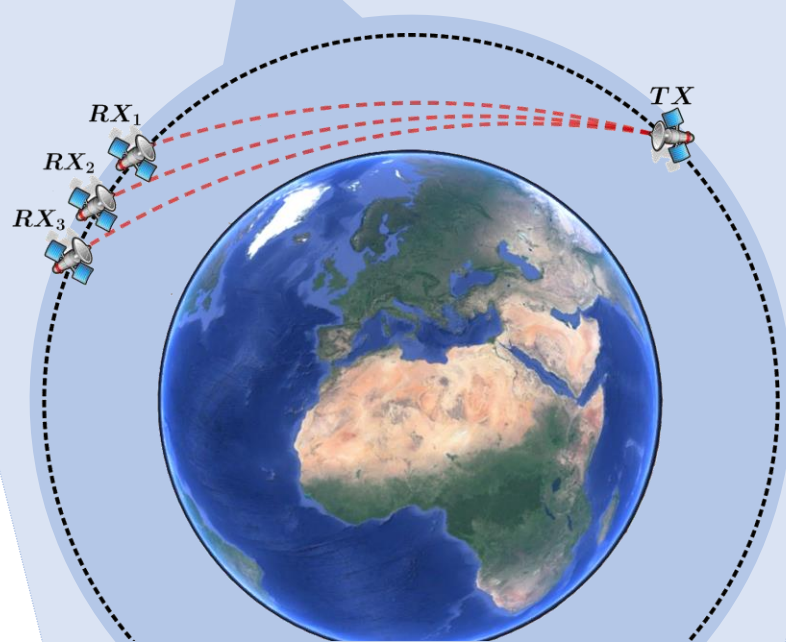
Firenze

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THE NDSA MEASUREMENT TECHNIQUE

NDSA (Normalized Differential Spectral Attenuation) is a differential measurement way for estimating the total content of water vapor integrated water vapor (I WV) along a tropospheric propagation path between Low Earth Orbit (LEO) satellites

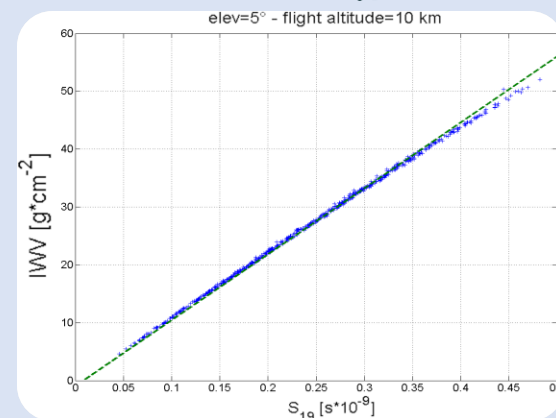


Four co-rotating LEO satellites in a "3 RX – 1 TX" measurement configuration

Spectral sensitivity (S) measurements made in the Ku - K band and in the lowest tropospheric layer (up to 10 km) are directly correlated with the I WV along the path

$$S_{f_c} = \frac{A(f_1) - A(f_2)}{(f_2 - f_1)A(f_1)} = \frac{1}{\Delta f} \left(1 - \frac{P_1}{P_2} \right)$$

$$I WV = a_1 S_{f_c} - a_2$$



Simulation of I WV vs. S at 19 GHz for TX-RX placed on two LEO platforms at 10 km of attitude

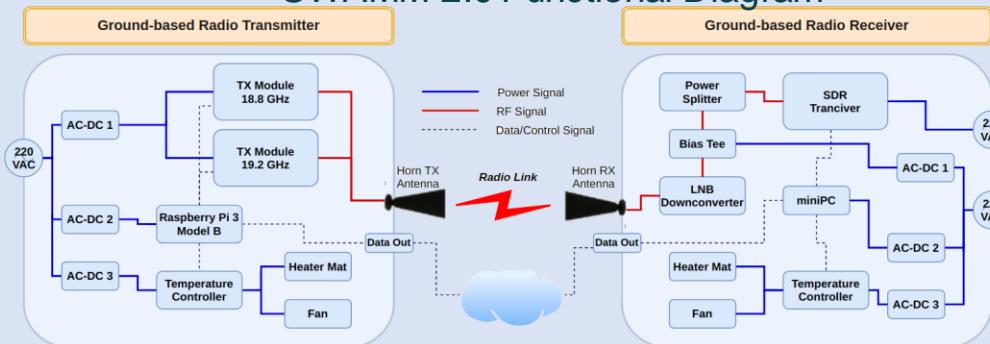
A new ground-to ground prototype realizing an NDSA measurement system.

- $f_1 = 18.8$ GHz;
- $f_2 = 19.2$ GHz;
- Simultaneous reception of both tones
- Measurement time resolution < 50 ms

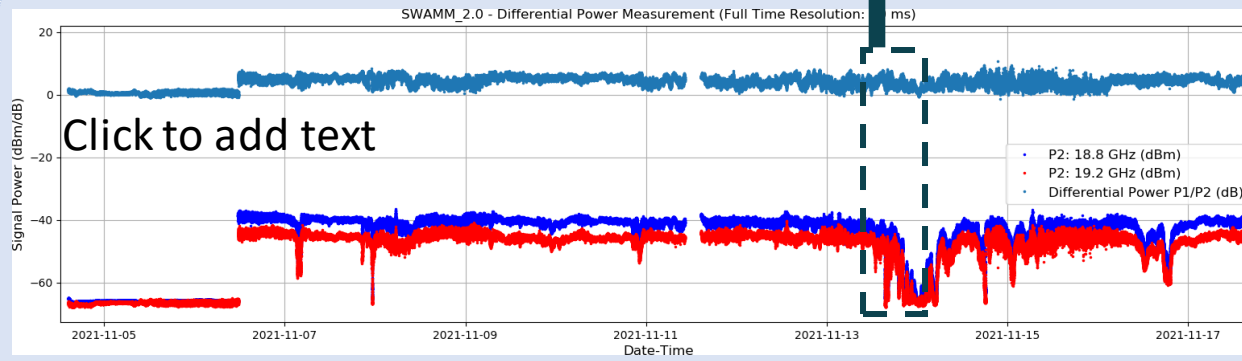
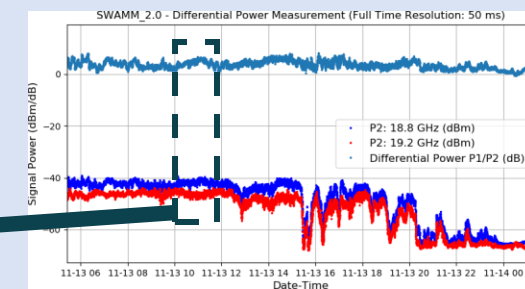
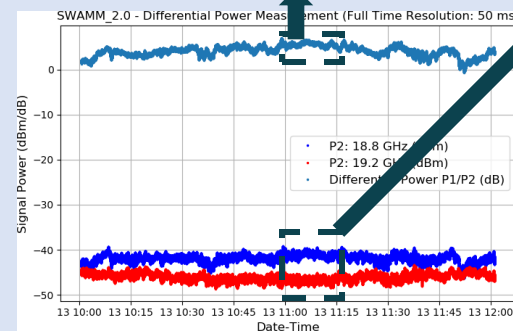
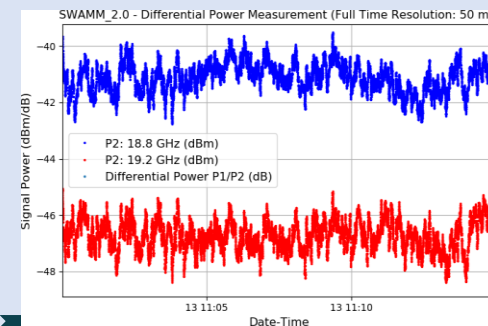
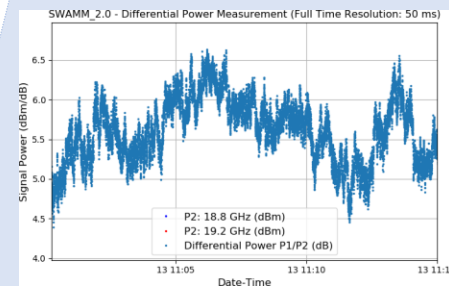
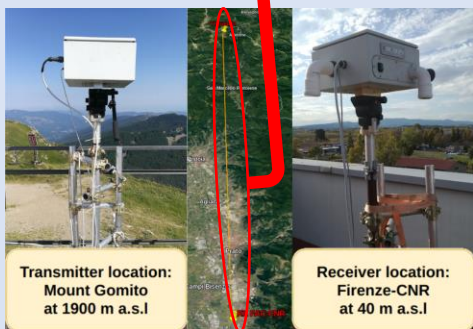
THE SWAMM-2.0 INSTRUMENT

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SWAMM-2.0 Functional Diagram



Altimetric profile of the ground-to-ground link



The measurement campaign started on the end of July and is currently continuing

MEASUREMENT CAMPAIGN AND FIRST RESULTS