Multi-Wavelength Solar Radio Observations and their use as Solar Proxies for Upper Atmosphere Modeling

Thierry Dudok de Wit[1] *[ddwit@cnrs-orleans.fr], S. Bruinsma*[2]*, and K. Shibasaki*[3]

[1] *The Laboratory of Physics and Chemistry of the Environment and Space (LPC2E), Centre National de la Recherche Scientifique (CNRS) & University of Orléans, France*

[2] *Department of Terrestrial and Planetary Geodesy, Centre National d'Etudes Spatiales (CNES), Toulouse, France*

[3] *Nobeyama Solar Radio Observatory/National Astronomical Observatory of Japan (NAOJ), Nagano, Japan*

The widespread use of the 10.7 cm radio flux as a solar proxy contrasts with the scarce attention given to other centimetric wavelengths. Interestingly, these other wavelengths provide complementary information, allowing the contribution from Bremsstrahlung to be separated from the one due to Gyro-emissions, on solar rotational timescales. This distinction in turn allows us to build new proxies that are better suited for describing the solar spectral variability in specific bands. A major asset of these radio observations is their excellent long-term stability and their long historical records.

We built a single homogeneous dataset of daily solar radio observations since 1957 with no gaps, and with five wavelengths. Here, we show how these observations compare to spectral irradiance measurements from SORCE. Next, we reveal what the distinction between Bremsstrahlung and gyro-emission tells us about the spectral variability. Finally, we show how the modeling of satellite drag (using the DTM model) can be improved by using the radio flux at 30 cm rather than at 10.7 cm.