

Radio scintillation studies for prospects of space weather forecasting and analyses (RadioScint)

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Interplanetary scintillation (IPS) originates from variations (“twinkling”) in radio signals received from distant, compact radio sources on the sky due to density changes in the outflowing plasma as the radio waves travel through interplanetary space. IPS allows us to infer the speed and density of the plasma, two key parameters of the inner heliosphere. There are two primary sets of analyses that provide IPS solar wind speed determinations: Single-Station Analysis model (SSA), and multi-station Cross Correlation Function (CCF) analyses. Both operate on amplitude-scintillation data (amplitude changes – Stokes I). Scintillation can also be caused by ionospheric plasma changes; this can be associated with the power spectrum obtained by IPS studies but at a different spectral frequency from IPS. By using several radio telescopes instruments, such as LOFAR UK and one or more of the Polish stations, it is possible to study these changes and disclose ionospheric signatures and anisotropy of irregularities as well as solar wind structures more accurately.