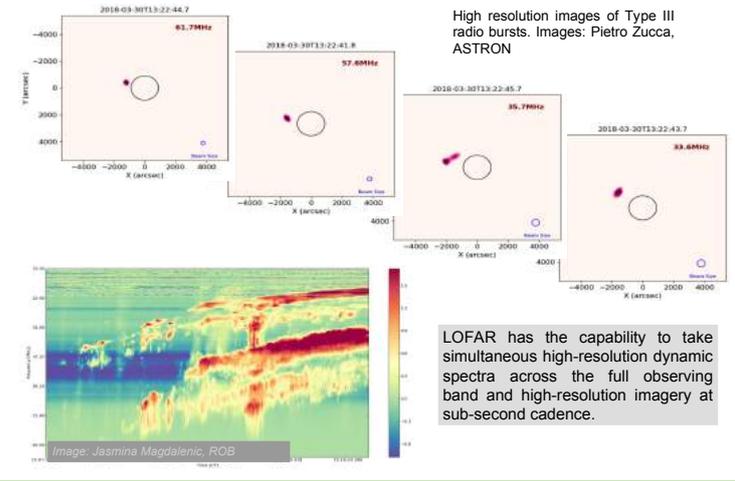
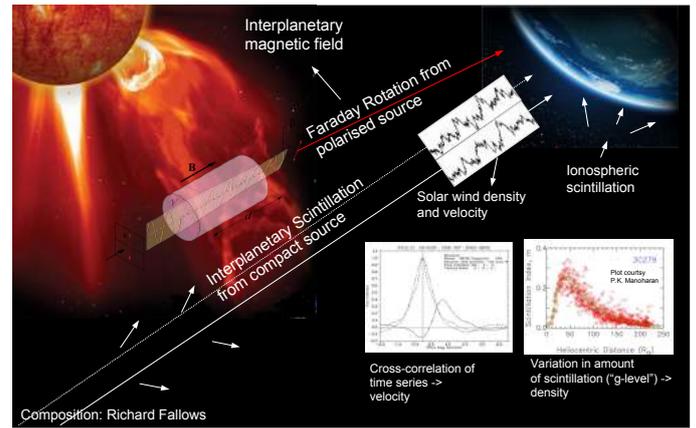


LOFAR4SpaceWeather is an EC-funded Horizon2020 Design Study, led by ASTRON, to design an upgrade to LOFAR, Europe’s largest and most flexible radio telescope, to enable space weather monitoring observations to be run completely in parallel with radio astronomy.

Solar radio bursts



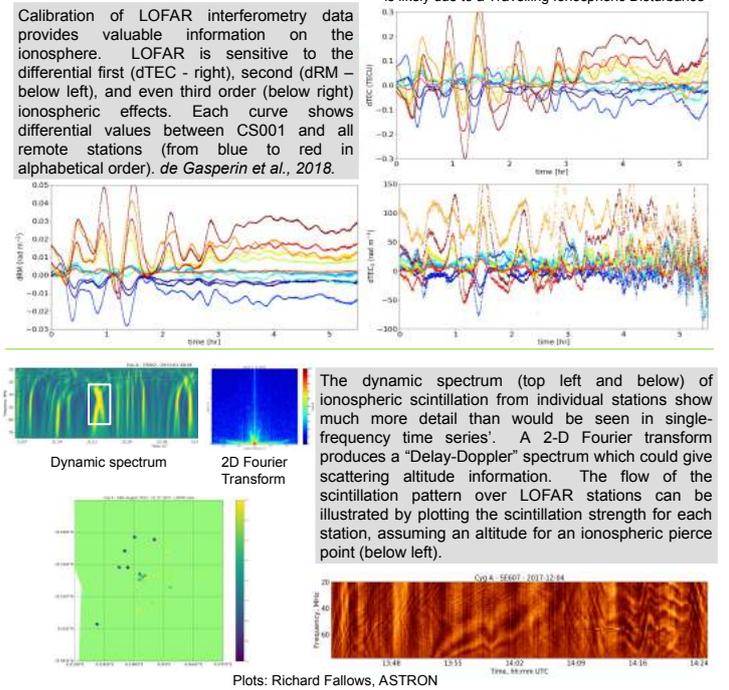
Solar wind and interplanetary magnetic field



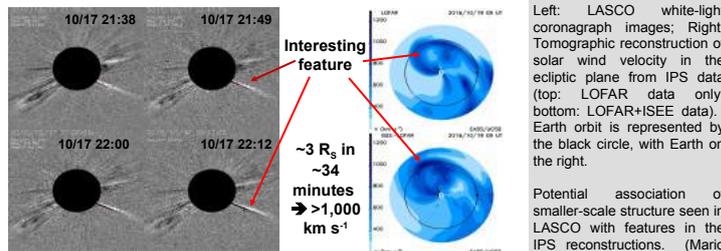
Scintillation of compact radio sources used to probe solar wind velocity and density. Multiple stations enable more-accurate cross-correlation analysis.

Faraday rotation of polarised signal, from pulsars or Galactic foreground, offers prospect of interplanetary magnetic field measurement.

Ionosphere



Stations worldwide are necessary to continually monitor the solar wind. Current dedicated observatories exist in India, Japan, Mexico and Russia. The European longitudes of LOFAR provide useful additional coverage. Taking many observations daily allows a tomographic reconstruction to be performed to reveal the 3-D structure of the solar wind in density and velocity.



IPS tomography from the combination of data from worldwide observatories shows much promise in establishing more-complete and more-accurate reconstructions globally of the inner heliosphere, particularly for smaller-scale feature detections.

A fully-implemented LOFAR4SW will be one of Europe’s most comprehensive space weather observatories generating unique CME data for the space weather research community with great potential to improve advanced warning of space weather events affecting crucial infrastructure.