LOFAR4SW: New capability for Space Weather science by radio diagnostic.

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The Low Frequency Array (LOFAR) telescope is one of the world's leading radio astronomical instruments which covers a wide range of low radio frequencies, between 10 and 250 MHz, and has a spatial resolution better than 1 arcsec. The construction of the telescope enables both interferometric imaging as well as observations using the formation of multiple sensitive, narrow beams. The current LOFAR infrastructure, however, allows only to monitor and investigate the Space Weather conditions. A step towards preparing the instrument for full space weather services and providing high-quality data for forecasting is the LOFAR for Space Weather (LOFAR4SW) project. LOFAR4SW is an international Horizon 2020 (H2020) INFRADEV design study, started December 2017 the aim of which is to deliver the full conceptual and technical design for creating a new leading-edge European research facility for space weather science. A fully-implemented LOFAR4SW system will enable a wide range of solar and space weather research topics to be tackled and have unique strengths in several high-impact science areas: tracing the initial launch of a CME; detailed tracking of the solar wind and CMEs through interplanetary space; in-depth studies of micro- structure in the Earth's ionosphere. This facility will uniquely provide the missing link of measurements of the interplanetary magnetic field on global scales - a key parameter in forecasting the severity of geomagnetic storm on Earth. The LOFAR4SW outcomes may play an important role in the space weather monitoring and forecasting and become an solid base for improvement in existing models. The aim of the presentation is to show the science cases on which emphasis will be placed in the designed LOFAR4SW facility.