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Monitoring of the solar atmosphere through radio imaging in the 18-100 GHz band: recent results and future challenges

In the frame of single-dish radio monitoring of the solar atmosphere with INAF radio telescopes we are developing and exploiting innovative single-dish radio imaging techniques at high-frequencies up to 100 GHz. Since 2018, we have been monitoring the solar atmosphere in the 18-26 GHz frequency range providing weekly images, in perspective covering the entire current solar cycle (SunDish project). We present an overview of the early scientific results and scientific challenges also in view of the new instrumentation available up to 100 GHz.
In particular, a new solar imaging system at high frequency was recently approved as a permanent observatory in Antarctica (Solaris project). It combines the implementation of dedicated and interchangeable high-frequency receivers on existing small single-dish radio telescope systems (2.6m class) available in our laboratories, on the Alps and in polar regions. Operations in Antarctica will offer unique observing conditions (very low sky opacity and long Solar exposures for nearly 20h/day) and unprecedented Solar monitoring in radio W-band (70-120 GHz). This opens for the continuous monitoring of the chromosphere and the identification and spectral analysis of Active Regions before, after and during the occurrence of Solar flares.
The Solaris observatory will be the only Solar facility offering continuous monitoring at 100 GHz, and it will be able to collect and disseminate data in synergy with the existing national and international network of Space Weather facilities.

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