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Multi-view magnetic synoptic maps with SO/PHI and SDO/HMI

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With the first Solar Orbiter (SO) data being available from the cruise phase, it is now possible to simultaneously observe the Sun from additional vantage points off the Earth-Sun line. One of its instruments, the Polarimetric and Heliospheric Imager (PHI), is the first spectro-polarimeter to operate outside of this line of sight. This opens the opportunity for joint observational campaigns with similar instruments such as the Heliospheric and Magnetic Imager (HMI) on-board the Solar Dynamics Observatory (SDO). We utilise these new observational possibilities to produce combined magnetic synoptic maps from line-of-sight magnetograms of the PHI and HMI instruments. Building on the existing software infrastructure for HMI synoptic maps, we extended its current functionality to include PHI data and correct for the different and varying relative orbital and observational characteristics of the two spacecraft. The results are joint magnetic synoptic maps, that can be produced significantly faster than the approximately 27 days of one solar rotation and therefore are less likely to suffer from the evolution of the magnetic field over the observation period. Once Solar Orbiter leaves the ecliptic plane, we will also plan to include observations of the polar magnetic field into our synoptic maps, which will give an unprecedented insight into the magnetic field of the Sun. In this work, we discuss solutions to the challenges that arise from the substantially different operational environments of the two instruments and give an outlook for the future capabilities of this novel data product.

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