

Text for the README to SOAR

SO/PHI-FDT, second data release. L2 level, first version.

The second data release includes L2 SO/PHI-FDT datasets from 26 December 2022 until 31 December 2023.

All datasets have been processed with the on-ground FDT pipeline, and are corrected for ghost and fringe artefacts. In addition, a polarimetric crosstalk correction that allows a variation of the crosstalk along the image (2D plane), to account for a gradient over the disk, was applied. In spite of these corrections, weak residual signatures of ghost and fringe artefacts, which are most pronounced in Stokes U, remain. In some cases, a ringing around active regions in Stokes Q leads to slightly stronger fringes in the azimuth and in rare cases in the B field magnitude. In B and the LOS velocity maps, a remnant of the filtergraph cavity map affects all datasets.

SO/PHI is the only magnetograph on a deep space mission. The artefacts that affect data until the end of January 2023 are the result of the extreme physical conditions that SO/PHI experiences during high radial S/C velocity. In most cases, the main visible effects are a shift of the spectral line and the appearance of small round artefacts in the filtergraph, particularly visible in the LoS velocity. Although not unforeseen, the detailed way in which orbital conditions affect observations could be quantified only in flight. In the meantime, countermeasures to limit such negative effects have been put in place, and we do not expect to have such strong artefacts in the forthcoming data. The presence of two dust grains in *lcnt* cannot be corrected completely.

For the above reasons, at this point in time only the continuum intensity (observable identifier: *icnt*, computed by the RTE inversion) and the longitudinal magnetic field (observable identifier: *blos*, computed from magnitude and inclination) data are released to SOAR. The criteria for release to SOAR is that the data are of high enough quality to be suitable for scientific exploitation.

The other observables, including the measured continuum as well as the full vector magnetic field data, the LOS velocity maps and the Stokes L2 parameters of the released time range, need to be treated with caution for scientific studies. Therefore, in case of interest, we warmly invite you to get in touch with the PHI team (sophi_support@mps.mpg.de) in order to access the observables currently not released to SOAR.

The datasets uploaded to SOAR are part of the synoptic programs which had been run in Long Term Plannings (LTPs) 10 to 13 (see [here](#) for details on LTPs), as well as during the encompassed Remote Sensing Windows (RSWs) [7 to 9](#) and [10 to 12](#).

An overview of the released data, including quick look thumbnails and information about the quality of each released data set, is available [here](#). We suggest consulting that website before using the data set for scientific applications.

If any publications are produced to which SO/PHI data contribute in any way, we would request you to cite the relevant instrument paper:

Solanki, S. K., del Toro Iniesta, J. C., Woch, J., et al. 2020, A&A, 642, A11, DOI: [10.1051/0004-6361/201935325](https://doi.org/10.1051/0004-6361/201935325);

Please also add the following acknowledgment:

“Solar Orbiter is a space mission of international collaboration between ESA and NASA, operated by ESA. We are grateful to the ESA SOC and MOC teams for their support. The German contribution to SO/PHI is funded by the BMWi through DLR and by MPG central funds. The Spanish contribution is funded by AEI/MCIN/10.13039/501100011033/ and European Union “NextGenerationEU”/PRTR” (RTI2018-096886-C5, PID2021-125325OB-C5, PCI2022-135009-2, PCI2022-135029-2) and ERDF “A way of making Europe”; “Center of Excellence Severo Ochoa” awards to IAA-CSIC (SEV-2017-0709, CEX2021-001131-S); and a Ramón y Cajal fellowship awarded to DOS. The French contribution is funded by CNES.”

We would appreciate receiving a copy of any publication you produce that profits from SO/PHI data.

We would be glad if you can report to us about any problem or issue encountered in using SO/PHI data. This will also help us to improve the data reduction for future releases. Please contact sophi_support@mps.mpg.de.

Further information is given at:

<https://www.mps.mpg.de/solar-physics/solar-orbiter-phi>