

# SO/PHI data request form

(Cruise phase + first science orbit; SO/PHI-Team internal version)

## Studying active regions from flux emergence until flux dispersal

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# Science case (stay on one slide):

Please also state, why is PHI needed; why is the science unique?

The study of the evolution of active regions has been limited in time, both by solar rotation and by the inability to observe the far side solar photosphere from Earth. However, active regions generally have a longer lifetime, from their emergence to the full dispersal of their magnetic flux, than can be observed from Earth or satellites placed in its vicinity. Extending the observation period will improve our understanding of the evolution of active regions. Studies that can be performed include the latitudinal change or the evolution of magnetic flux over the lifetime of an active region. Therefore, we combine SDO/HMI measurements with SO/PHI observations taken during conjunction, with PHI observing the far side of the Sun. The continuous observations of HMI allow us to track any active region, visible from PHI on the Sun's far side during conjunction, in its earlier and later evolution.

We will start the analysis with the conjunction dataset taken in February 2021, which has a variable cadence, the longest being about one day. We propose to continue this study during later orbits by also using synoptics and HRT data when an active region is tracked.

# Requirements/data (use additional slide if needed)

Besides best guess requirements, you may also list minimum requirements on the data

- Type of solar feature: Active region
- HRT or FDT: FDT and/or HRT
- Physical parameters needed (available: B\_LOS, vector B, v\_LOS, I\_c, raw data): vector B, v\_LOS, I\_c; raw data (if telemetry allows)
- Total length of observation: 10 to 15 days to cover a full disk passage of an active region
- Cadence (maximum 1 dataset/min): 6 hours – 4 datasets per day (minimum); higher is preferred
- Pointing needs (disc centre, limb, active region location, particular  $\mu$ ): Disc centre (FDT); active region location (HRT)
- Orbit needs (spatial resolution/co-rotation/angle to Earth/angle to other spacecraft): Around solar far side conjunction
- Total number of datasets: 40 datasets (minimum), depending on cadence and days - As stated in the science case we will start our analysis with the conjunction dataset acquired in February 2021, however, we would like to extend the analysis during later orbits. For the later orbits also synoptics and HRT data of tracked active regions can be used.
- Full frame 2k x 2k or partial frame 1kx1k, 0.5kx0.5: For FDT cropping, to still have the full disk in the FOV, is possible; for HRT the full frame is necessary to obtain the full active region
- Full resolution or 2x2, 4x4 binned data: Full resolution
- noise level (default  $10^{-3}$ ): Default
- Co-observations with other instruments:
- Special requests: We will make use of HMI data to obtain information about the active regions in the time before and after its visibility on the solar far side.