SpaceInn

Exploitation of Space Data for Innovative Helio- and Asteroseismology

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Deliverable D4.2

Magnetic activity proxy of GOLF and VIRGO

Photospheric solar activity index

The photospheric solar activity index, Sph (Mathur, Salabert et al. 2014), is calculated from the photometric observations collected by the Variability of Solar Irradiance and Gravity Oscillations (VIRGO, Fröhlich et al. 1995) instrument onboard the Solar and Heliospheric Observatory (SoHO) spacecraft launched on December 2, 1995 (Domingo et al. 1995). A similar activity index, Svel, can be obtained from the radial velocity observations collected by the Global Oscillations at Low Frequency instrument (GOLF, Gabriel et al. 1995) onboard SoHO.

The VIRGO instrument is composed of three Sun photometers (SPM) at 402nm (blue channel), 500nm (green channel), and 862nm (red channel). The VIRGO/SPM photometric observations were calibrated as described in Jiménez et al. (2002) but using a high-pass filter with a cut-off at 60 days and then processed using the KADACS Kepler pipeline as described in Garcia et al. (2011).
The response functions of the photometric VIRGO observations are shown to peak between ±10km of the base of the photosphere (Fligge et al. 1998). The GOLF instrument measures the Doppler wavelength shift in the D1 and D2 Fraunhofer sodium lines at 589.6 and 589.0 nm respectively.

The GOLF Doppler velocity time series have been obtained following the procedure explained in García et al. 2005 but using a high-pass filter with a cut-off at 70 days.

The data sets are available on the SpaceInn website:

http://www.spaceinn.eu/data-access/photospheric-solar-activity-index-virgospm-sph/

The available files contain four columns as following:

- Column 1: Sub-series number
- Column 2: Date in days of the middle point of each sub-series. Note that the first point of the VIRGO and GOLF observations is on 11 April, 1996.
- Column 3: VIRGO photometric index (Sph in ppm) or GOLF radial velocity index (Svel in m/s)
- Column 4: Duty cycle in % of each sub-series

Available data sets:

- Photospheric solar activity index: VIRGO/SPM Sph
- Solar activity index: GOLF Svel

References:

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