The dynamics of small-scale magnetic fields in the solar atmosphere over a solar cycle

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The solar atmosphere is a complex system involving several timescales simultaneously. While at small scales the physical processes at the base of the interplay between plasma and magnetic fields have timescales as short as minutes or a few seconds, global scales dominated by the internal dynamo evolve on much longer times of the order of years and more. Therefore, the investigation of the coupling between small and global scales would require long and uninterrupted high-resolution observations covering the same timescales typical of the solar dynamo and the solar activity cycle (approx. 22 years). This is something which is not possible with a single space mission. Nevertheless, the investigation of the effects of the solar cycle on the small-scale dynamics as the potential to reveal important clues on the way the Sun controls the heliosphere and the energy injected into it.

The proposed project is to combine multi-mission data from past and currect missions such as i.e. SOHO, HINODE, IRIS, SDO, and Solar Orbiter, to study the dynamics of the small-scale magnetic fields over long timescales spanning one solar activity cycle, and using a combination of standard and big data approaches to the analysis of the observations.