Properties of the Sunspot Number and 10.7 cm Solar Flux Activity Indices, Their Interrelationship and Unusual Behaviour Since the Year 2000

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When gauging the role of the Sun as a driver for terrestrial phenomena and the impacts of its variability, we generally define the behaviour of the Sun in terms of a set of "activity indices". These quantities include counts of sunspots, magnetic flux values, the intensity or width of specific spectral lines, and the strength of solar radio emissions at various wavelengths. They are produced by a range of physical processes and originate different parts of the Sun. However, they have the great advantage of ease of measurement and forming long, internally-consistent time-series. Of these indices the two most used are the International Sunspot Number, covering more than 300 years, and the 10.7 cm solar radio flux (F10.7), which has been measured regularly since 1947. There have been many intercomparisons between the different activity indices, partly to improve our understanding of the processes of solar activity, but in addition to use them as proxies for each other and other solar quantities.

During the decay of Cycle 23, the relationship between F10.7 and sunspot number started to change in a manner not seen before. We are conducting a statistical analysis of the F10.7 and International Sunspot Number time series both within the individual data sets and in their interrelationship. In this talk we will examine the International Sunspot Number and 10.7 cm solar radio flux indices individually and also the relationship between them, and also what this might be telling us about solar behaviour.