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Open magnetic flux in the heliosphere, as determined from spacecraft measurements over several solar cycles.

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The number of magnetic field lines carried out by the solar wind is an important indicator of both the solar cycle and the magnetic state of the heliosphere. The magnetic flux associated to those field lines is termed "open", the density of which is determined from the radial component of the magnetic field vector, measured onboard space probes in the heliospehere. We argue that fluctuations of the magnetic field around the average Parker field direction may lead to misleading results in the determination of the open magnetic flux. A new method is proposed to eliminate the effect of the fluctuations. By comparing Ulysses and OMNI data, our analysis shows that the open magnetic flux density, normalized to 1 AU is practically independent of heliographic location, i.e. of heliographic latitude and longitude, as well as of radial distance from the Sun. This result encourage us determine the open flux in the heliosphere during the course of several solar cycles, from the times when reliable interplanetary magnetic field measurements are available. The long time scale variations of the open magnetic flux are studied and discussed from the 1960s to present. The results are compared to the open magnetic flux of the Sun, determined from the solar magnetograms, by applying model calculations.