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Modelling the solar diameter from light curves taken during solar eclipses

We present in this discussion the technique of light curves to model the solar diameter, one of the key to understand the inner working of the Sun, which is in dynamical equilibrium between its own weight and the pressure of radiation coming from its thermonuclear core. Basically, the light curve during a solar eclipse can be seen as a modulation of the Sun brightness from the disc center to the limb by the figure of the Moon, as a function of the distance between the two bodies. The first main problem of this technique is the exact meaning of the diameter of the Sun, which is basically a ball of hot gases with no well defined surface, the second main problem being the modeling of the absorption and scattering of the solar light by the atmosphere (mainly molecular scattering and aerosols absorption). We illustrate the discussion by results from three measurements campaigns, the first one in the Tuamotu archipelago (French Polynesia) in 2010, the second one in Queensland (North Australia) in 2012, and the third one in Gabon (Equatorial Africa) in 2013.