

**TSI and Ly- $\alpha$  Reconstruction Back to 1915 Based on Sunspot Area from RGO, Ca-II Data from Mt. Willson and the 4-Component Proxy Model Calibrated 1978-2015**  
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The 4-component proxy model uses the photometric sunspot index (PSI), determined from sunspot area, position and contrast on the disk, the Mg II index and separated into a short- and long-term component and the open magnetic field (OPF) during each minimum of activity. This model with PSI, Mg II long- and short-term and OPF explains 84% of the variance of TSI and with Mg II long- and short-term and OPF 95% of Ly- $\alpha$  during the period 1978-2015. Its calibration can be used to go back in time with PSI, determined from the Greenwich data back to 1874, the Mg II index, converted from Ca-K (deduced from Ca images observed at Mount Wilson since 1915) and the open magnetic field, available back to about 1880 from e.g. the aa index. The results show that the minima of TSI are much more varying than those of Ly- $\alpha$  by a factor of 2-3. The reason for this difference is the origin of the radiation coming for TSI from the photosphere and for Ly- $\alpha$  from the chromosphere. The magnetic field of the former may not be well represented by Mg II index and/or depend also on other effects, whereas for the latter the Mg II index is representing the magnetic field in the chromosphere.