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# Solar Spectral Irradiance and Solar radius for validating Solar Models used in Atmosphere and Climate Physics.

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For atmosphere and climate models, solar spectral irradiance (SSI) is reconstruted using several proxies when no SSI data exist at the appropriate time. This is especially true for climate studies for the past periods, e.g. the Maunder minimum. Some examples show that the SSI model validation remains an important and difficult task. Using the solar radius open a way to contribute to several objectives: 1) Solar physics: is the solar radius constant or changing with time in particular with solar activity. 2) Its absolute value is a key input for the metrology of the solar system. 3) Solar model validation. There are large uncertainties among solar radius values due to the use of different measurement techniques, instruments calibration, role of the Earth's atmosphere effects for ground–based measurements, role of the space environment for instruments in orbit and their aging when long term studies are foreseen. Basically, the solar radius value depends on the solar atmosphere opacity, which allows solar model validation by comparing model predictions with the observations. We present a new method using an absolute radius reference stable on a time scale much greater than a solar cycle.

## SHORT BIO:

Dr. Gérard Thuillier as Principle Investigator (PI) proposed in 1976 to ESA a triple spectrometer named SOLar SPECtrum (SOLSPEC) for SSI measurements. It was the first investigation aiming to space observations over this large spectral range for solar, atmospheric and climate physics. The SOLSPEC instrument flew on board the Space Shuttle with the SpaceLab I and SpaceLab II mission. SOLSPEC observations were resumed with the ATLAS 1, ATLAS 2, and ATLAS 3 missions. The twin instrument of SOLSPEC was part of the European REtrieval Carrier (EURECA) ESA mission. SOLSPEC was run on board the International Space Station (ISS) allowing an extension of the spectral domain of measurements.

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