Maybe a Second Best Way to Measure TSI

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The Astrophysical Observatory (APO) of the Smithsonian Institution made systematic observations of TSI from 1902 until 1962 from many diverse locations on the Earth. Typical instruments included pyrheliometers, pyranometers, spectrobolometer, and theodolites. Those TSI measurements (referred to back then as the solar constant) were thought to be a potential, important cause of climate change, a sentiment shared by today's climate scientists. Notable, early observers and experimentalists have their names associated with these first measurements, including the likes of Abbot, Aldrich and Clayton inferring that the Sun showed real variations while others — Angstrom, Sterne, and Kimball saw no such proof of solar variability. Imagine the difficulty of measuring the Sun from the ground at different zenith angles and extrapolating to "zero" air mass. Volcanoes world-wide would easily lead to 5% and greater decreases in observed values.

It is also important that today's TSI community recognize the contributions of the APO pioneers. For although their measurements did not determine true solar variability, they did establish the required capabilities for future observing programs. A true measurement would require long-term instrument stability of better than 0.1% over 30 years. It is also noteworthy that their value of TSI (with some long-term averaging) agrees with todays accepted value of 1361 W/m^2 to well within 1%.

(This is not original work but summarizes the 1979 paper of Douglas Hoyt, *The Smithsonian Astrophysical Observatory Solar Constant Program,* in *Reviews of Geophysics and Space Physics,* Vol. 17, No. 3.)