

An Eppley Normal Incident Pyrheliometer (NIP) is calibrated against an Eppley Hickey-Frieden Absolute Cavity Radiometer under a variety of environmental conditions on selected sunny days over a year. For the NIP under study, the standard deviation for all the calibration data is 0.34% or an uncertainty of 0.68% at the 95% confidence level. The absolute uncertainty of the NIP is about 1% when other factors, such as the absolute uncertainty of the cavity radiometer, are included. Correlations with various parameters can reduce the scatter of the calibration measurement by approximately 50%. It is postulated that the meteorological parameters induce systematic offsets that when accounted for could produce more accurate values of beam irradiance. A series of experiments were conducted to evaluate the physical basis of the correlation. Evaluation of the experiments leads to some conclusions and suggestions for future tests