†An evaluation of the performance of the proposed instrumentation for the U.S. solar and aerosol optical depth network

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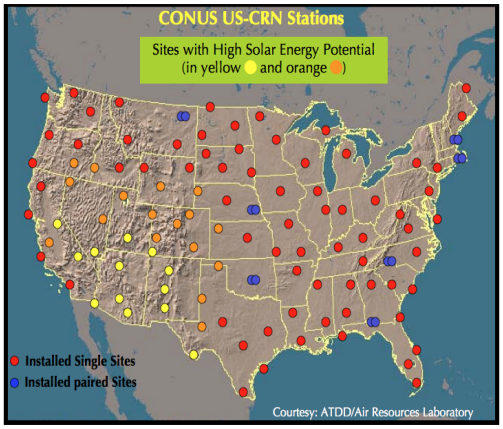
#1

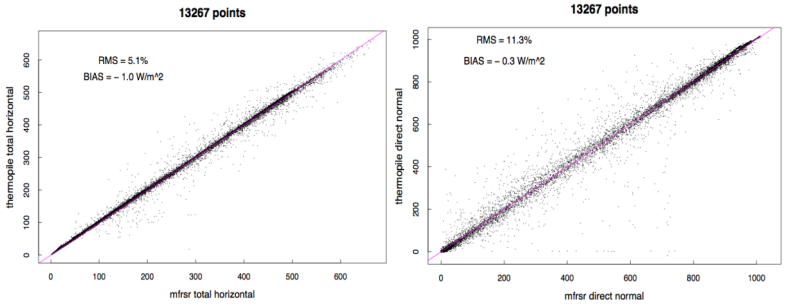


At the 2010 AMS meeting in Atlanta, the *107* CONUS CRN sites were proposed as candidates for installing high-quality solar radiation and aerosol optical depth measurements to support solar renewable energy development in the U.S.

The problem is how to equip 107 CRN sites (#1) to measure solar radiation. The $30-$50K equipment solution that uses 1st class instruments is illustrated in #2. An alternative that gets seven times the data for half the cost is illustrated in #3; it is an MFRSR with a new thermopile sensor for broadband.

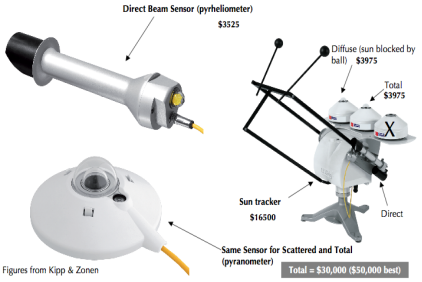
However, there may be an accuracy penalty for the fundamental solar irradiance measurements in using #3 versus #2. Slides #4 are scatter plots of one minute averaged data from 23 days in Dec 2010 showing total horizontal irradiance on the left and direct normal on the right. Note, there is little bias. Scatter is caused by cloud motion

#4



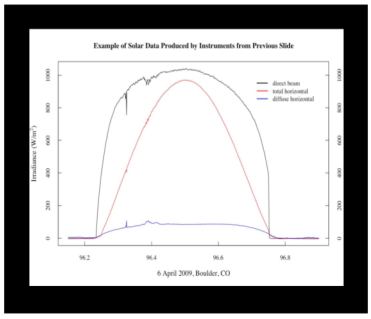
#2

First-Class Solar Instruments Used to Measure Direct Beam, Scattered Solar, and Total Solar Irradiance at All Solar Wavelengths



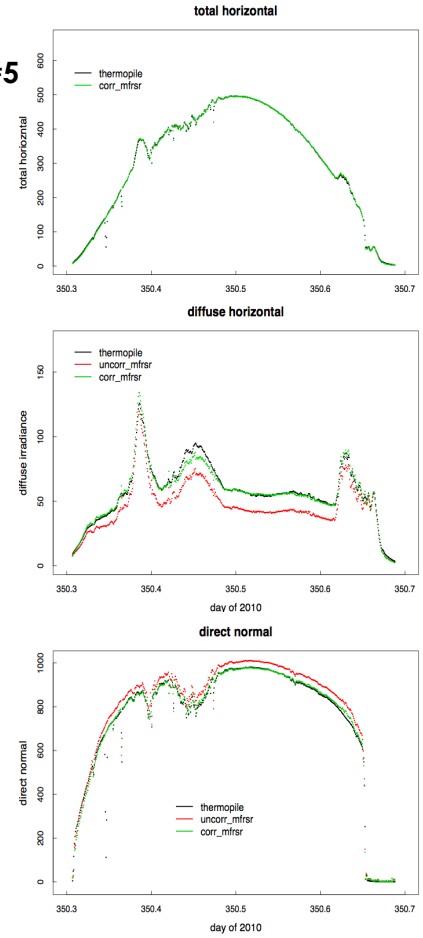
First-class instruments for measuring direct beam, total horizontal and diffuse horizontal irradiance plus the tracker for direct beam and diffuse measurements are illustrated in this figure along with last year's prices.

This is all the information that one obtains with this equipment.

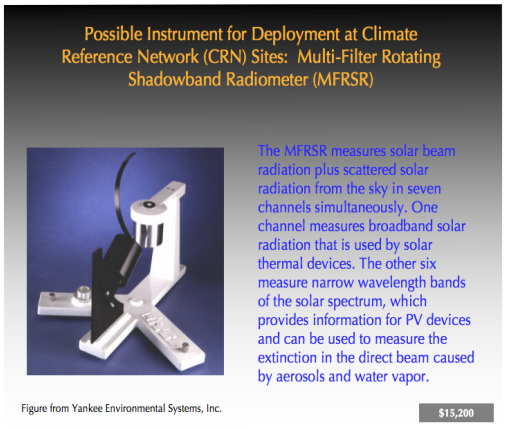


The three figures (#5) below illustrate the total and diffuse horizontal plus direct normal irradiance agreement between thermopile and MFRSR broadband

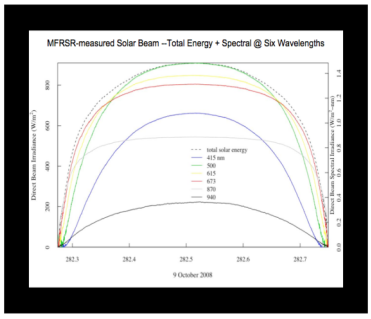
#5



#3



This is 1/3rd of the information that one obtains with the equipment on the left.



An alternative instrument to use is about one-half the price and measures aerosol optical depth, as well. This new unit uses a thermopile sensor. This work is an assessment of the accuracy of the broadband radiation measurements versus first-class instruments such as those in **#2** above.

†***Presented at the 91st annual meeting of the American Meteorological Society, Seattle, Washington***