Summary of Obstructions to Pyranometers
ARS Micronet

A Quality Assurance Supplement from the Oklahoma Mesonet

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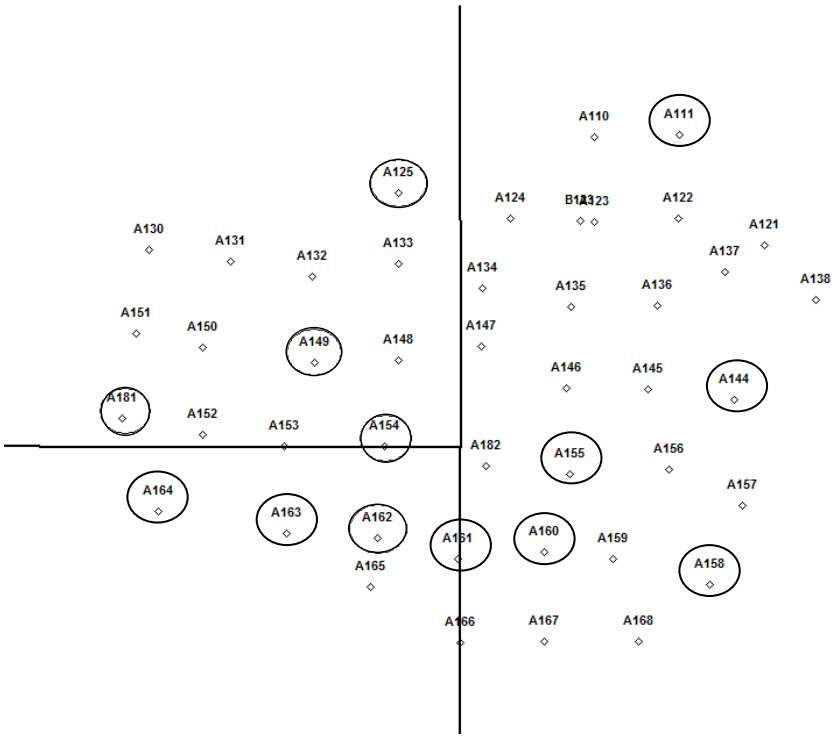
Introduction

This report documents the known obstructions to pyranometers in the ARS Micronet. These obstructions affect daily total solar radiation values, as well as instantaneous radiation data. The instantaneous observations most commonly impacted are those which occur during the early morning and late evening hours.

While performing monthly quality assurance at the Oklahoma Mesonet, several ARS stations were identified as having suspicious solar radiation observations. Further analysis revealed that a total of 13 ARS stations report low solar radiation values due to siting obstructions.

The intent of this report is to make the users of ARS solar radiation data aware of these issues. The map below shows the locations of the 13 stations.



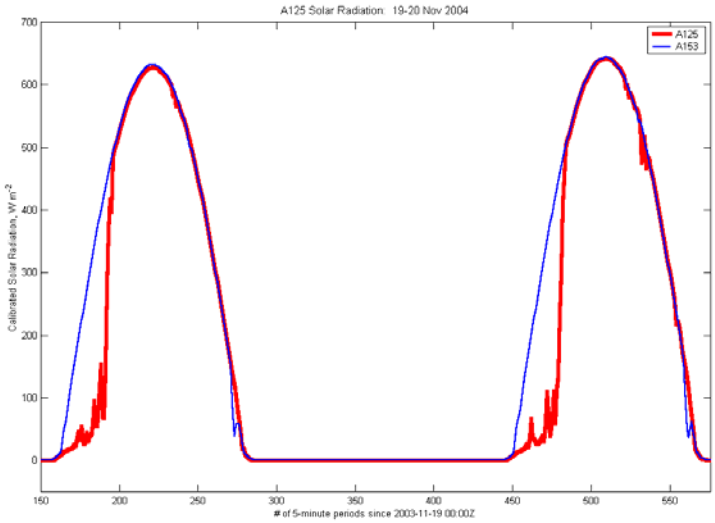
Data Analysis

Each of the 13 ARS station's solar radiation data was analyzed in detail. This report includes time series plots for the first 5 stations and panoramic pictures for all 13 stations.

The time series plots that follow show solar radiation on two consecutive clear days (19-20 Nov 2003). The data from each obstructed station is compared to that from A153 (a site with unobstructed solar radiation observations).

A125

Solar radiation observations from A125 exhibit a low bias for the first few hours of daylight.



The panoramic pictures below show obstructions on the eastern horizon at A125 that result in low measured values of radiation during sunrise.


NORTH


NORTHEAST


EAST


SOUTHEAST


SOUTH

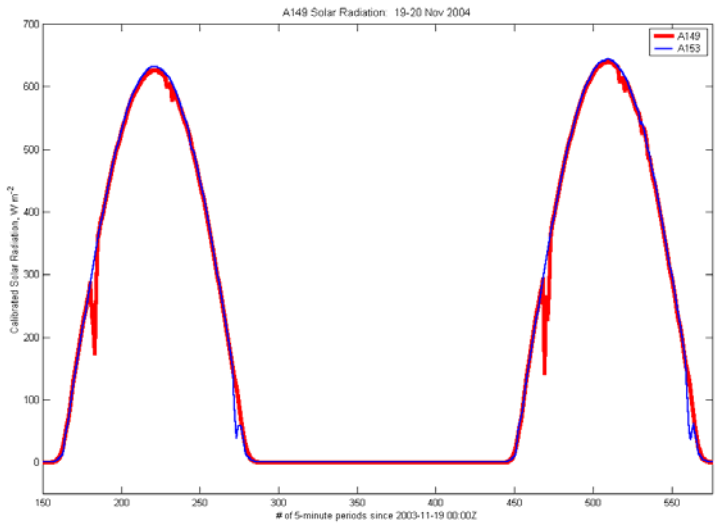

SOUTHWEST


WEST


NORTHWEST

A149

Solar radiation observations from A149 exhibit a low bias for a short period of time around mid-morning.



The panoramic pictures below show a transmission tower on the eastern horizon at A149 that results in a spike of low measured values of radiation each morning.


NORTH


NORTHEAST


EAST


SOUTHEAST


SOUTH

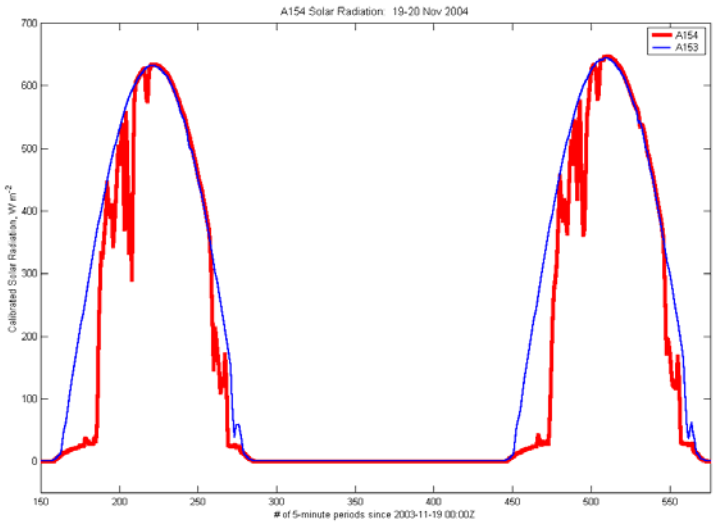

SOUTHWEST


WEST


NORTHWEST

A154

Solar radiation observations from A154 exhibit a low bias during sunrise, late morning and sunset.



The panoramic pictures below show obstructions on the eastern and western horizons at A154 that result in low measured values of radiation.


NORTH


NORTHEAST


EAST


SOUTHEAST


SOUTH

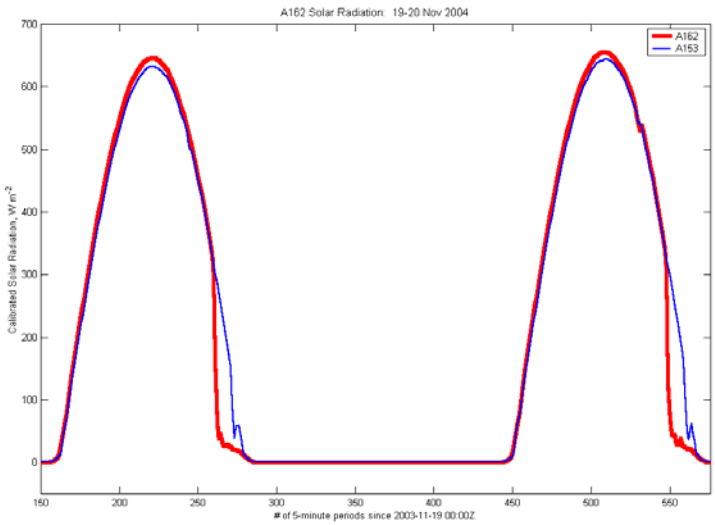

SOUTHWEST


WEST


NORTHWEST

A162

Solar radiation observations from A162 exhibit a low bias during sunset.



The panoramic pictures below show obstructions on the western horizon at A162 that result in low measured values of solar radiation during sunset.


NORTH


NORTHEAST

Photo
Not Available
EAST


SOUTHEAST


SOUTH

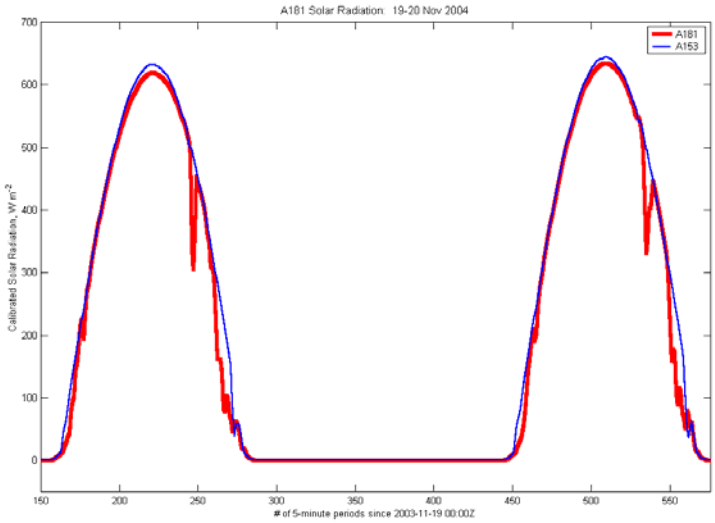

SOUTHWEST


WEST


NORTHWEST

A181

Solar radiation observations from A181 exhibit a low bias during sunrise and a much larger low bias during late afternoon and sunset.



The panoramic pictures below show obstructions on both the eastern and western horizons at A181 that result in low measured values of solar radiation during sunrise, late afternoon and sunset.


NORTH


NORTHEAST


EAST


SOUTHEAST


SOUTH


SOUTHWEST


WEST


NORTHWEST

A111

The panoramic pictures below show obstructions on the eastern and western horizon at A111 that result in low measured values of solar radiation during sunrise, morning, late morning and late afternoon.


NORTH


NORTHEAST


EAST


SOUTHEAST


SOUTH


SOUTHWEST


WEST


NORTHWEST

A144

The panoramic pictures below show obstructions to the east at A144 that result in low measured values of solar radiation during sunrise.


NORTH


NORTHEAST


EAST


SOUTHEAST


SOUTH


SOUTHWEST


WEST


NORTHWEST

A155

The panoramic pictures below show obstructions on the western horizon at A155 that result in low measured values of solar radiation during sunset.


NORTH


NORTHEAST


EAST


SOUTHEAST


SOUTH


SOUTHWEST


WEST


NORTHWEST

A158

The panoramic pictures below show obstructions on the eastern and western horizons at A158 that result in low measured values of solar radiation during late morning, late afternoon and sunset.


NORTH


NORTHEAST

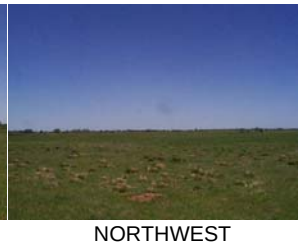

EAST


SOUTHEAST


SOUTH


SOUTHWEST


WEST


NORTHWEST

A160

The panoramic pictures below show transmission lines and poles on the eastern horizon at A160 that result in low measured values of solar radiation during morning.


NORTH


NORTHEAST


EAST


SOUTHEAST


SOUTH


SOUTHWEST


WEST


NORTHWEST

A161

The panoramic pictures below show obstructions on the eastern and western horizon at A161 that result in low measured values of solar radiation during late afternoon and sunset.


NORTH


NORTHEAST


EAST


SOUTHEAST


SOUTH


SOUTHWEST


WEST


NORTHWEST

A163

The panoramic pictures below show obstructions on the eastern horizon at A163 that result in low measured values of solar radiation during sunrise.


NORTH


NORTHEAST


EAST


SOUTHEAST


SOUTH


SOUTHWEST


WEST


NORTHWEST

A164

The panoramic pictures below show obstructions on the western horizon at A164 that result in low measured values of solar radiation during late afternoon and sunset.


NORTH


NORTHEAST


EAST


SOUTHEAST


SOUTH


SOUTHWEST


WEST


NORTHWEST

Summary

The following table depicts the months and time of day when solar radiation data are affected by obstructions across the ARS Micronet.

R = Sunrise
M = Morning
LM = Late Morning
LA = Late Afternoon
S = Sunset

Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
A111	M	M			LA					R		LM
A125	R	R								R	R	R
A144			R	R	R							
A149	R										R	
A154	R	R	LM							R	M	R
A155		S	S							S		
A158			S	LA			LM	LM/LA	LA	ALL		
A160	M											M
A161			LA	LA	LA			LA	S			
A162	S	S	S	S	S	S	S	S		S	S	S
A163					R		R	R				
A164		LA				S	S	S				
A181	LA		R	R	R		R	R/S	R/S	R	S	LA