Changes in Solar Radiation Outputs

The Weather Information Management System (WIMS) calculates an automated state of the weather to use in the National Fire Danger Rating System (NFDRS). The calculation uses the solar radiation (SR) measurement from the Remote Automated Weather Stations (RAWS). In the fall of 2014, RAWS owners noticed after swapping out the solar radiation sensor, the range of outputs was lower than in the past. This caused the state of the weather in WIMS to produce a value that was not expected.

The discrepancy was brought to the attention of the RAWS Depot, which calibrates the solar radiation sensors. They suspected the differences in solar values was rooted in the calibration process. The replacement sensors were calibrated using a different methodology than had been used in the past. The Depot has verified the current method of calibration and found it to be correct.

The National Wildfire Coordinating Group (NWCG) Fire Danger Subcommittee (FDSC) was concerned at the differences between the previous range of outputs and the current. Would it make a difference to the Nelson dead fuel moistures in the updates to NFDRS in 2016? Would it affect an historic analysis using the solar rad data we have collected for the past 10-15 years?

Larry Bradshaw at the Missoula Fire Lab used hourly solar radiation data to determine the differences to the Nelson 10-hour fuel moistures using FireFamilyPlus v4.1.

Using historic hourly data from Oak Knoll RAWS with higher ranges of solar radiation, he ran three years of hourly data at SR as measured, SR as measured * .9, and SR as measured * .8 and there was very little difference.

Then he checked on the effect of opening up a canopy to more solar radiation (i.e. after thinning). He ran hourly for measured * .7, .6, and .5, also.

This plot shows the average 10-hour dead fuel moisture by month. The light blue bar (left) is SR * 0.50 and the dark blue bar (right) is measured SR. There is not a lot of difference in the fuel moisture range.