Blame it on the Moon: How vegetation responded to the 2017 solar eclipse.

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Background and Objectives:

- The solar eclipse of 2017 imposed a rare opportunity to quantify stress on photochemical mechanisms produced by solar occlusion.
- Quantify reduction of carbon assimilation and photochemical parameter responses throughout Big Sagebrush (*Artemisia tridentata*) communities in western United States.

Methodologies

- Study site between northwestern WY (*) at 2300 m
- The solar eclipse: August 21, 2017, starting 09:18 MST and ending at 12:03 MST; Totality began at 10:38 MST lasting 2 minutes and 18 seconds (gold)
- Leaf-level gas exchange via LI6400xt infrared gas analyzer with fluorometer head. Sampling occurring every 30 seconds throughout the eclipse.
- Leaf-level chlorophyll fluorescence measurements on six sagebrush conducted using hand-held fluorometer (FluorPen) before, after totality, and post eclipse.

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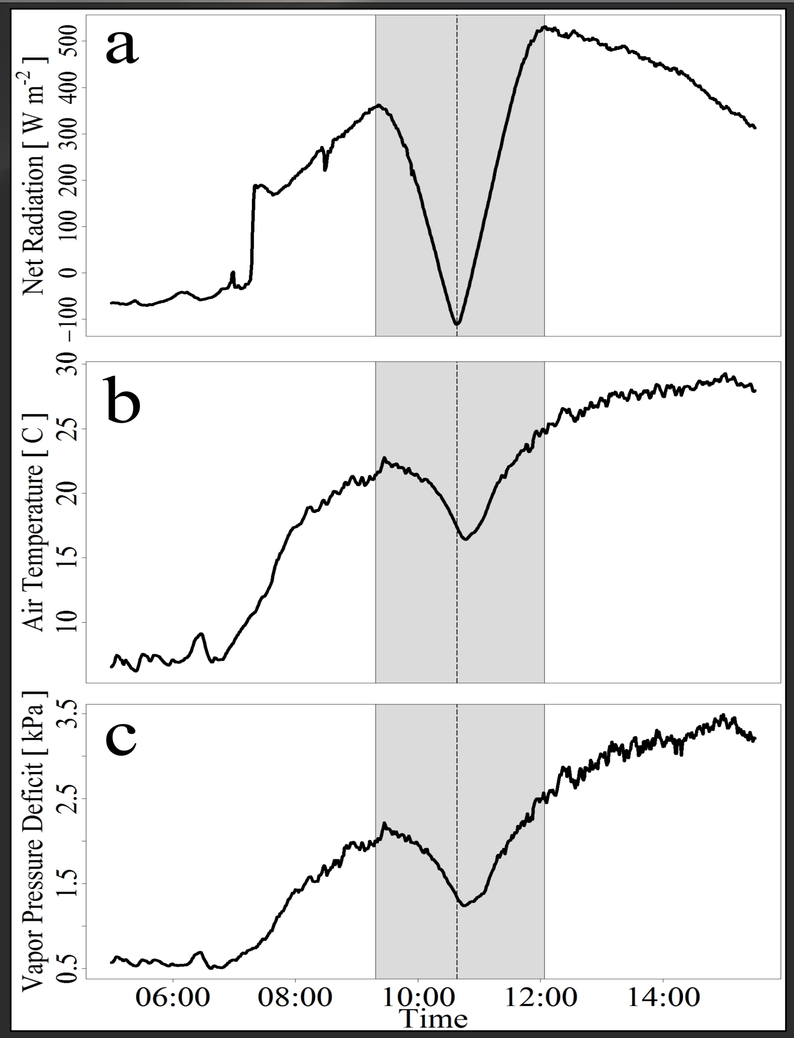

Figure 1: Changes in net radiation (a), air temperature (T_a; b), and vapor pressure deficit (VPD; c) during solar eclipse (gray) and totality (dotted). Both T_a and VPD lagged totality by 9 min.

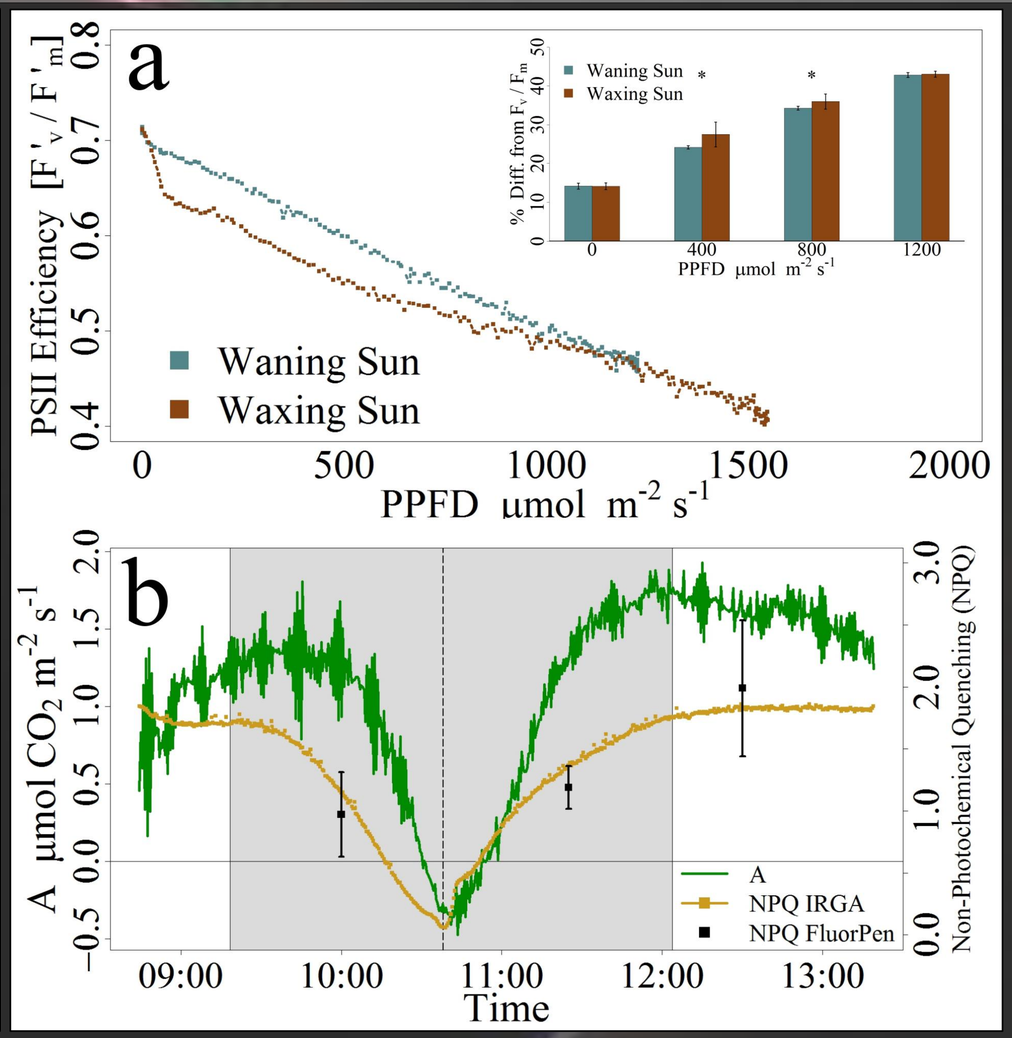

Figure 2: Efficiency of PSII (a). Photosynthetic rate (green), non-photochemical quenching (NPQ) from IRGA (orange) and FluorPen (black) before, during (grey), and after the eclipse (b).

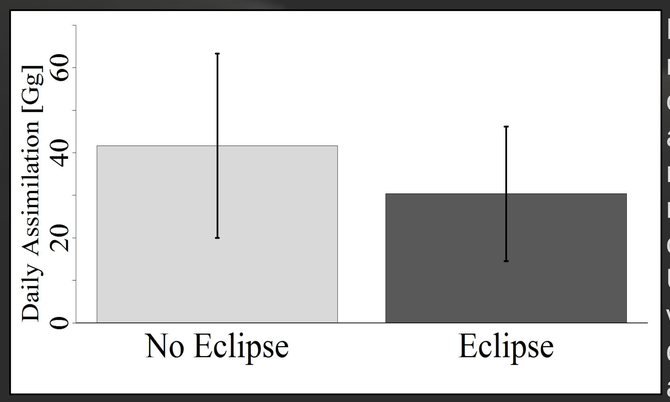

Figure 3: A 27% reduction from observed daily assimilation versus modeled assimilation rates for sagebrush communities (map). Uncertainty from variations of stand density and leaf area.

Conclusions:

A 27% reduction in daily carbon assimilation due to the eclipse compared to modeled assimilation.

The solar eclipse induced short-term perturbations of photochemical parameters (i.e. PSII efficiency and NPQ), though rapidly recovered under high light.