Researchers observe solar eclipse's effects on weather

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When the Moon abruptly cuts off sunlight from Earth at a total solar eclipse, our weather reacts to the sudden darkness. A new issue of the *Philosophical Transactions of the Royal Society* of London, the oldest surviving scientific journal, deals with the effects of the March 20, 2015 eclipse. Williams College professor Jay Pasachoff, former Fulbright visitor to Williams College Marcos Peñaloza-Murillo, recent alumna Allison Carter '16, and University of Michigan postdoc Michael Roman have an article in this theme issue of "Phil Trans A" discussing the effect measured. Pasachoff and Carter had been on Svalbard, an Arctic archipelago controlled by Norway, for the eclipse. They had carried sensors for temperature and pressure borrowed from Williams College's Jay Racela of the Center for Environmental Studies. The expedition to Svalbard was supported by a grant to Pasachoff from the Committee for Research and Exploration of the National Geographic Society.

The bulk of the theme issue was about the effect of the partial eclipse that was also visible from the U.K. The dimming of sunlight over the hour or so during the partial eclipse making its effects measurable. On Svalbard, for the total eclipse, the temperature and pressure automatic sensors found only slight effects, though a thermometer hanging from one of the camera tripods recorded a dip in temperature from the 8°F to which the morning temperature had risen down to –7° a few minutes after the center of totality.

Pasachoff and Peñaloza-Murillo, who is professor emeritus at the Universidad de los Andes in Mérida, Venezuela, have published a

previous paper about the effect of a total eclipse on weather, and are planning further observations, again in collaboration with Roman, at the August 21, 2017, total solar eclipse that they will attempt to observe from Salem, Oregon. This time the expedition will again be supported in part by the Committee for Research and Exploration of the National Geographic Society, and Williams College, with Pasachoff as Principal Investigator, has also received a research grant from the Solar Terrestrial Program of the Atmospheric and Geospace Sciences Division of the U.S. National Science Foundation.

Pasachoff has also borrowed temperature and pressure sensors, a datalogger system called HOBO made by Onset Computer Corporation, as part of his observations of the September 1 annular solar eclipse this week. Pasachoff, along with Naomi Pasachoff, Research Associate at Williams College, is observing the eclipse from Isle de la Réunion in the Indian Ocean east of Madagascar. They are joined there by Rob Lucas of the University of Sydney; Michael Kentrianakis, project manager for the Eclipse 2017 Task Force of the American Astronomical Society; Stephen Bedingfield of Canada; and Xavier Jubier of France, who has provided Google Maps of various eclipse paths, accessible through the website eclipses.info that Pasachoff maintains as Chair of the Working Group on Solar Eclipses of the International Astronomical Union. This event is Pasachoff's 64th solar eclipse and the 16th annular solar eclipse.

The theme issue of *Phil Trans A*, titled "Atmospheric effects of solar eclipses stimulated by the 2015 UK eclipse," has been edited by Giles Harrison of the University of Reading and Edward Hanna of the University of Sheffield, both in the UK. The article by Pasachoff, Peñaloza-Murillo, Roman, and Carter is entitled "Terrestrial atmospheric responses on Svalbard to the 20 March 2015 Arctic total solar eclipse under extreme conditions." Pasachoff drafted the article as part of his spring-2016 sabbatical leave in the Planetary Sciences Department of the California Institute of Technology. Another article, "Symbolism and

Discovery: Eclipses in Art," by Ian Blatchford, head of the group that runs the Science Museum, London, draws heavily on and acknowledges work on the overlap of art and astronomy by Pasachoff in collaboration with art-historian Roberta J. M. Olson of the New-York Historical Society.

The theme issue will be officially published on September 28, as volume 374, issue 2077, of *Philosophical Transactions A*, though the papers are already available online. The Phil Trans was established in 1665, making it the longest running scientific journal in the world. "Philosophical" refers to natural philosophy, an old term for what we know call "science."

More information: Atmospheric effects of solar eclipses stimulated by the 2015 UK eclipse. rsta.royalsocietypublishing.or … ated-2015-uk-eclipse

Provided by Williams College