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Balloon Borne Eclipse Observations¹

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High altitude balloon platforms provide opportunities for unique total solar eclipse (TSE) space science and atmospheric observations. Until recently, however, the coordination of such observations has been limited. One source of coordination difficulty has been logistics – changing flight paths, need for large ground teams, need for lightweight technology, dealing with federal and international regulations, and much more. The special opportunity of a TSE sailing right through the US in 2017 provided an irresistible chance to face these logistical hurdles head-on. Aided by NASA and Space Grant networks, our Montana BOREALIS group was able to leverage 60 teams of faculty and students to make unprecedented observations surrounding the August 21, 2017 TSE. In this talk, I will briefly review the challenges, lessons learned, and science results of the 2017 eclipse. Then I will describe our 2019 effort – sending a single team to conduct an atmospheric science campaign in collaboration with the NSF Andes Lidar Observatory in Chile. Finally, I will explain our longer range plans, calling for potential collaborations and observation technique ideas for 2024. In particular, there is a possibility that NASA will conduct a large balloon flight that will intersect the 2024 path of totality, providing a platform for larger payloads. I will describe the case I'm building for flying an InGaAs short-wave infrared (SWIR) capable of observing a bright coronal line not visible from the ground due to atmospheric absorption.

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