

Title: Monitoring and Forecasting Precipitation Patterns and Erosion Potential to Enhance Archaeological Preservation and Decision Making

Authors: Dane Coats (Project Lead), Theresa Condo, Brandon Crawford, Leah Kucera, Zachary Sforzo, Keith Weber, Idaho State University GIS TReC (Science Advisor)

Affiliations: NASA DEVELOP National Program, Node: Idaho, Pocatello

Contact Information: Zachary Sforzo, zachsforzo@gmail.com, (970) 376-7156

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Description of the Content:

Increasing yearly monsoonal precipitation severity at Navajo National Monument is exacerbating erosion and arroyo cutting, affecting culturally significant archaeological sites in the area. In order to better understand and mitigate erosional processes, land managers at the National Park Service would benefit from comprehensive rainfall data and maps depicting where erosion hazards are more likely to occur. The Idaho NASA DEVELOP team developed virtual rain gauges called Rainfall Intensity Graphs (RIG) and erosion hazard maps that utilize NASA Earth observations to provide a more complete picture of rainfall measurements in the region. The RIG tool was developed in Google Earth Engine API to apply Global Precipitation Measurement (GPM) Microwave Imager (GMI) and Tropical Rainfall Measuring Mission (TRMM) Precipitation Radar (PR) satellite data. The team synthetically validated rainfall data outputs from TRMM and GPM against one another as well as PRISM daily precipitation data (mm) from 2014 to 2017. In order to validate and calibrate RIG, 2000-2017 TRMM and 2014-2018 GPM precipitation values were compared with the NOAA-NCEI station precipitation data for the closest stations to NAVA (Betatakin, Kayenta, AZ; Beaver Springs, Tsailé, AZ). The data displayed a weak statistical correlation; the p-values from t-tests were greater than 0.05 between satellite-derived data and ground-based weather stations near the study area. However, peaks within the data showed temporal similarities, suggesting differences within the data were representative of regional variability. In future work, rainfall data from RIG can be used as temporal and intensity parameters, which combined with Shuttle Radar Topography Mission (SRTM) -derived hazard maps, can help target locations for erosion mitigation.