A REVIEW OF TERRESTRIAL ANALOGS FOR THE MOON. W.B. Garry[1], D.H. Needham[1], K.E. Young[1], P.L. Whelley[1], J.E. Bleacher[1], [1]NASA Goddard Space Flight Center, Greenbelt, MD 20771, brent.garry@nasa.gov

Introduction: Terrestrial analogs have long been used to help us better understand the subtle and complex geology of the lunar surface. The Apollo astronauts took field trips and conducted training exercises at several geologic locations considered analogs for the Moon [1,2] and many of these sites will provide a foundation for the review of this topic. Recent high-resolution data sets from multiple lunar missions have allowed us to analyze lunar features in much greater detail. The advantage of these new data sets is that we can now compare the lunar surface to terrestrial features at similar scales and resolutions. Here, we propose a review of *terrestrial analogs* as a topic within *New Views of the Moon 2*.

Old and New Views of Terrestrial Analogs: The purpose of this review will be to describe terrestrial geologic analogs that have been used to study lunar geologic processes including: volcanism, impact cratering, structural, and surface processes. Returning to these classic sites on Earth, given new data from the Moon, continues to provide insights into lunar geology. Furthermore, new analog sites are providing fresh perspectives.

Volcanism. Analogs of lunar volcanic processes have been widely used throughout the literature. Long lava flows in the lunar mare have been compared to terrestrial flood basalts. For example, the flow field in Mare Imbrium has been compared to the Columbia River Basalts (CRB), USA [3]. However, a new understanding of the formation of the CRB [4] and analyses of the recent lunar data have led to investigations of different terrestrial flows (e.g. Askja volcano in Iceland) [5] as analogs. Lunar sinuous rilles have been compared to lava channels and lava tubes in Hawai'i [6,7,8] and Lava Beds National Monument in California [9]. More recent studies have considered lava tubes that formed from breach scoria cone (e.g. Bandera crater, New Mexico) as an analog for Vallis Schröteri [10] and Kīlauea Iki and the Roza member of the CRB have been compared to observations of Lunar Reconnaissance Orbiter Camera (LROC) images of Rima Prinz [11]. The numerous cones and domes on the Moon have long drawn comparisons to terrestrial cinder cones and low-shields [12] including SP crater in Arizona [13]. New details revealed from LROC images and terrain models [14] allow more rigorous comparisons of flow features with field observations of terrestrial analogs. Plains-style volcanism has been identified in Mare Orientale and surrounding lacus [15]. Entire field guides have been devoted to plains volcanism in Idaho and their comparison to lunar features [16]. Recent investigations continue the study of these small shields in Craters of the Moon National Monument (Idaho) comparing high resolution topographic data and field observations to LROC images and terrain models [17]. Enigmatic volcanic features, like Ina, have been compared to domes and drain out features in Iceland [18]. Recent field investigations of inflated lava flows in New Mexico and Hawai'i were compared to LROC data to explain the formation of Ina [19]. The discovery of pits on the lunar surface [20] have reinvigorated studies of various types of pits on Earth, including lava-rise pits [21] and collapse pits in lava tubes.

Impact craters. Terrestrial impact structures, most notably Meteor Crater [22,23], are used to understand lunar impact processes. The Sudbury impact structure in Canada [24] and the Ries impact crater in Germany [25,26] are considered analogs for understanding melt deposits and the structure of impact basins. The Mistastin Lake impact structure in Canada [27] has been studied as a lunar analog due to its impact into an anorthosite-rich target. In a cross comparison, terrestrial lava flows serve as analogs to explain the flow processes of impact melt flows on the Moon [28].

Summary: This section will include the following subtopics: 1) Background of terrestrial analog studies conducted before and during the Apollo era; 2) Detailed case-studies of select sites considered key analogs for lunar geologic processes; 3) Review of recent studies that compare new lunar data sets to terrestrial analogs; and 4) Discussion about the limitations for making direct comparisons.

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