IN ISLANDIA, VERITAS: CHARACTERIZATION OF VENUS SURFACE ANALOGS. D. C. Nunes[1], S. E. Smrekar[1], S. Hensley[1], S. Adeli[2], G. Alemanno[2], J. Andrews-Hanna[3], D. Buczkowski[4], B. Campbell[5], G. Cascioli[6], G. Di Achille[7], A. Domac[2], M. D. Dyar[8], S. Garland[2], M. Gilmore[9], C. Hamilton[3], J. W. Head[10], J. Helbert[2], R. Herrick[11], R. Horn[12], L. Iess[13], M. Jaeger[12], L. Jozwiak[4], M. Keller[12], M. Mastrogiuseppe[13], E. Mazarico[6], N. Mueller[2], G. B. M. Pedersen[14], M. Schulte[15], J. Stock[16], J. L. Whitten[5], H. Zebker[17]. [1]Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, U.S.A. (Daniel.Nunes@jpl.nasa.gov); [2]Inst. Planetary Research, DLR, Berlin, Germany; [3]U. Arizona, Tucson, AZ U.S.A.; [4]John Hopkins U./Applied Physics Lab, U.S.A.; [5] National Air and Space Museum, Smithsonian Inst., DC, U.S.A.; [6]NASA Goddard, Greenbelt, MD, U.S.A.; [7]Istituto Nazionale di Astrofisica, Osservatorio Astronomico d'Abruzzo, Teramo, Italy; [8]Mt. Holyoke Coll., South Hadley, MA, U.S.A. and Planetary Science Inst., Tucson, AZ, U.S.A.; [9]Wesleyan U., Middletown, CT, U.S.A.; [10]Brown U., Providence, RI, U.S.A. ; [11]U. Alaska, Fairbanks, AK, U.S.A.; [12]Microwaves and Radar Institute, DLR, Wessling, Germany; [13]Universita di Roma La Sapienza, Roma, Italy; [14]Institute of Earth Sciences, University of Iceland, Reykjavik, Iceland; [15]NASA HQ, Washington D.C., U.S.A; [16]California Institute of Technology, Pasadena, U.S.A.; [17]Stanford U., Stanford, CA, U.S.A.

Introduction: At the intersection of the Atlantic mid-ocean ridge and a mantle hotspot, Iceland hosts a variety of volcanic and tectonic features similar in morphology and rock type to those observed on Venus. In July of 2023, the VERITAS science team and collaborators conducted a multipronged field analog campaign to (*i*) serve as a development and test platform for processing and analysis of Venus and Venus-analog data, and (*ii*) create a library of surface features to inform interpretation of past and upcoming Venus data.

Rationale: Five of the eight VERITAS mission science goals pertain to the surface properties of Venus [1]. Volcanic units at the Reykjanes Peninsula and the highlands region of Askja and Holuhraun of Iceland possess different surface textures, morphologies, and compositions with varying degrees of degradation and sediment cover. This enables study of diverse Venus-like targets: plains volcanism, lobate flows, textures such as pahoehoe to a'a, basaltic to rhyolitic compositions, bedrock vs. airfall and wind-driven sedimentary deposits, rifting, and small-scale grabens.

Campaign: The VERITAS 2023 Iceland campaign was designed with two components. The airborne segment was conducted by DLR. It mapped the surface with X- (VERITAS-like), S- (Magellan- and EnVision-like), and L-band radar using their fully polarimetric F-SAR system [2]. Placement of successive flight lines with sufficient overlap allowed us to attain a range of incidence angles relevant to Magellan, VERITAS, and EnVision (20°-55°) over specific features of interest.

The ground campaign, conducted by science team members and collaborators, characterized surface properties relevant to radar and thermal emissivity data. The team defined 41 5×5 m surface patches for detailed study within some of the locations covered by multiple incidence angles. Tripod-based lidar imaging of each patch yielded digital-elevation models (DEMs) with resolutions of ~1-cm. Drone-borne photogrammetry of patches attained similar resolution and produced contextual DEMs at coarser resolutions but with broader coverage (50 to 100 m). The different areal coverage and resolutions permit radar scattering to be modeled at scales as small as X-band wavelength.

In-situ dielectric properties and moisture content were measured with a dielectric probe at locations where sediment allowed for probe insertion. Over 100 kg of rocks and fines were sampled from the vicinity of each patch for detailed laboratory characterization. Moisture content of the samples range at the time of radar overflight range between 1 and 33 wt%, depending on location. Preliminary permittivity measurements of the sediments after drying are consistent with values found in basaltic compositions but higher than the average density-permittivity rule [3].

In-situ NIR data were also acquired at several patches using a camera system similar to the VEM flight model, with six bands from 860 nm to 1200 nm [4]. These NIR spectra will be used to characterize different basaltic surfaces and alteration products. Due to the fortuitous timing of the campaign and the Litli-Hrútur eruption, nighttime data were also collected to map surface temperature (200-480°C). Bidirectional and hemispherical reflectance spectra are now being collected at DLR for the field samples.

Summary: Armed with both airborne radar and field/laboratory data, the VERITAS team will interpret radar backscatter maps, improve understanding of NIR data, and constrain contributions from the different surface properties. A follow-on campaign is planned for 2026 to extend the library of features and explore surface-change detection.

Acknowledgments: Funding for the Iceland campaign came from NASA to JPL/VERITAS, NASA to Goddard/GIFT, and DLR.

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