REYKJANES PENINSULA, ICELAND, AS AN ANALOG SITE FOR VENUS; REMOTE SENSING INVESTIGATION AND PLANNED FIELD WORK TO SUPPORT VERITAS MISSION. S. Adeli[1], A. Domac[1,2], N. Mueller[1], D. Nunes[3], S.P. Garland[1], J. Helbert[1], M.D. Dyar[4,5], E. Hauber[1], G. Alemanno[1], M. Younis[6], M. Gilmore[7], S. Hensley[3], S.E. Smrekar[3], [1]Institute for Planetary Research, DLR, Rutherfordstr. 2, 12489 Berlin, Germany (Solmaz.Adeli@dlr.de), [2]Institut für Geologie, Albert-Ludwigs-Universität Freiburg, Germany, 79104 Freiburg im Breisgau, Germany, [3]Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, 91109, USA. [4]Mt. Holyoke Coll., MA, U.S.A., [5]Planetary Science Inst., U.S.A. [6]Microwaves and Radar Institute, DLR, Wessling, Germany. [7]Dept. of Earth and Environmental Sciences, Wesleyan University, Middletown, CT, 06459, USA.

Introduction: One of the main objectives of the NASA VERITAS and ESA EnVision missions is to characterize the composition and origin of the major geological terrains on Venus. The best dataset of surface composition covering the southern hemisphere of Venus comes from the VIRTIS instrument on board the Venus Express mission, which used a near-infrared sensor [1, 2, 3]. It mapped the Venusian surface through narrow atmospheric windows at 1.02, 1.10 and 1.18 µm [4, 5]. Because the dense CO_2 atmosphere of Venus only allows observations in narrow spectral windows around 1 µm, knowledge of the mineralogy of Venus' surface must be based at that wavelength [6]. Although the VIRTIS data showed that Venus had undergone recent volcanic activity [7], the limited spectral resolution and the dense atmosphere of Venus prevented this instrument from revealing more details. The future VERITAS and EnVision missions will be able to observe the surface of Venus through five atmospheric windows with six bands. These will enable the spectral characteristics of the Venusian surface, as well as the type of lava and likely alteration processes, to be determined in unprecedented detail.

Reykjanes as an analog site: Composition of the lava on Venus and its alteration state are poorly understood. The main goal of this work is to train on realistic Venus analogs and obtain a better understanding of the kind of data VERITAS and later EnVision are going to deliver. To achieve this goal, we will use Iceland, and particularly the Reykjanes peninsula (Fig.1-A and B), as an analog site to Venus. The contact between the very fresh (2022), very recent (2021), and older altered lava flows on the surface, as well as the system of fractures and faults in the area, constitute a prime analog site. In August 2023, the DLR and JPL are planning an airborne radar data collection campaign over the Reykjanes peninsula (Fig.1 and white dashed-lines in Fig.2) [see 8 for more detail], an area already covered in the 2015 FSAR data acquisition campaign by the DLR [9]. The 2023 radar campaign will seek to detect changes on the surface and to expand the area covered. Since 2015, there have been various eruptions from the Fagradalsfjall volcano, offering a

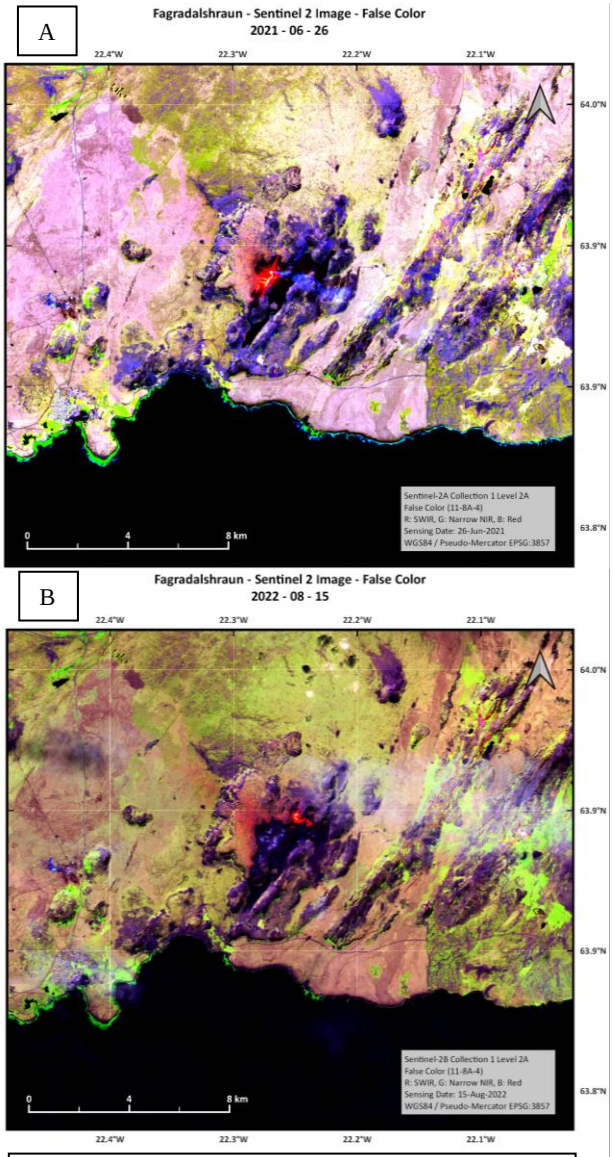

Fig.1-A) A false-color RGB image, showing the very recent 2021 eruption as bright red and the lava field as black. R:SWIR, G:Narrow NIR, B: Red.B) A false-color RGB image of the very fresh lava field and the last eruption in 2022. Similar RGB to (A). Sentinel 2 data.

unique opportunity to investigate surface changes in VEM/VERITAS spectral bands and radar data.

Remote sensing investigation: We are planning for a remote sensing project covering major publicly available satellite-born and air-born datasets of the study area in Reykjanes Peninsula. We are collecting imagery data at various resolutions, radar data in various bands, and NIR-IR spectral data in the range from 800 to 1500 nm, similar to the spectral range of the VEM instrument. All the data are being collected as a QGIS project. A preliminary mapping effort will be undertaken to select sites of interest for sampling and in-situ spectral measurements.

Planned field work: In our planned field study, we will perform in-situ characterizations of lava flows of different types and ages in the Fagradalsfjall area using an in-house built VEM emulator (aka. V-Emulator [see 10 for more detail]). The V-EMulator covers a comparable spectral range to the six mineralogy VEM spectral channels. This set-up has already been used in a field campaign in Vulcano, south of Italy [10].

In addition, we will collect samples for geochemical characterization and for spectral analysis under Venus-like temperature conditions in the PSL-Berlin laboratory [11]. This information will provide detailed spectral information and a deeper understanding of the surface composition of the studied lava flows. By comparing the field and laboratory datasets, we can assess the capabilities of the VEM instrument in distinguishing lava types, compositions and Fe-content. This work will lay a foundation for the detailed interpretation of spectra from Venus and is vital preparation for the scientific goals of the VERITAS and EnVision missions.

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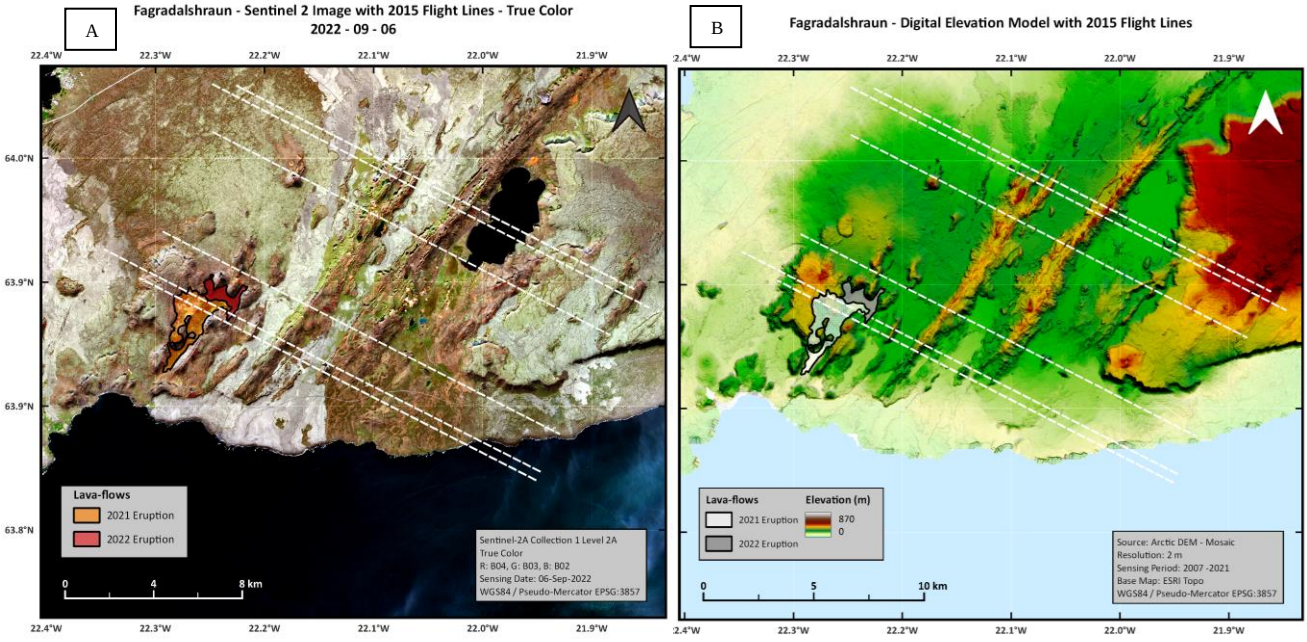

Fig.2-A): a true-color image of the study area. The white lines indicate the 2015 flight lines. The 2021 and 2022 eruptions are mapped. Data from Sentinel 2A. B) Digital Elevation Model (DEM) from the ARCTICDEM project [12].