POTENTIAL MARS BASALTS ANALOGUE IN AZORES ISLAND. Kapui Zs.[1], Kereszturi A.[2], Kovács, I.[1], Zanon V[3] [1]Research Centre for Astronomy and Earth Sciences, Institute for Geology and Geochemistry, Hungary. E-mail: kapui.zsuzsanna@csfk.mta.hu, [2]Research Centre for Astronomy and Earth Sciences, Konkoly Thege Miklos Astronomical Institute, Hungary. [3] Instituto de Investigação em Vulcanologia e Avaliação de Riscos, Universidade dos Açores, Rua Mãe de Deus, 9501-801 Ponta Delgada, Portugal.

Introduction: Potential Mars analogue aspects have been considered in São Miguel Island [1], where mafic lithology, extreme organisms in lava caves [2] and subsurface gas exhalation [3] with geothermal acitivty provide useful geological aspects, which could support the better understanding of planet Mars. This work is a first report on the sample analysis of some basaltic examples there.

During a field trip volcanic samples have been collected from the locations indicated in Figure 1 (sampling licence no. 75/2017/DRA) in September 2017, in connection with the conference titled *Geosciences for Understanding Habitability in the Solar SystTem and Beyond* (Furnas, São Miguel Island, Azores, Portugal, 25–29 September 2017) organized by the COST TD1308 action and supported by the EGU, EuroPlanet, LAP, Belspo, Planet Topers project.

Figure 1. Sampling locations in São Miguel Island.

Methods: All samples have been pulverized down to fine powder grain size first manually and then by motorized achat mortar. The X-Ray Powder Diffraction measurements have been realized through a Rigaku Miniflex-600 X-ray diffractometer, with CuKα radiation equipped with a graphite monochromator at 40 kV and 15 mA. 'Random powder' samples have been scanned with a step size of 0.05° 2 theta and counting time of 1 s per step over a measuring range of 3 to 70° 2 theta.

Mars analogue aspects: the sampled rocks are mostly porphyritic basaltic lavas (Figure 2), few vesicular vitrophyric lapilli, fumarolized rocks and some trachytic lavas. They show a range of weathering and alteration signatures, however, in this study only the freshmost parts have been sampled and analyzed.

Example results: Figure 3 shows the produced X-ray diffractograms. The main identified phases are plagioclase, alkali-feldspar, and in only a single case it was possible to identify the signature of weathering related to the presence of smectite, while mica also appeared.

Figure 2. Example images of some collected hand specimen.

The wide range of volcanic lamdforms in the Azores islands provides the possibility to analyze several magmatic and alteration features. Range of consequences of magma storage [4] and the possible role of candidate hot-sport volcanism [5] provide relevant aspects for Martian volcanism. Basalts have been erupted mostly during the last 30 ka from fissure zones. Fumarolic activity also supports the Mars relevant analysis, and post-volcanic gas and fluid exhalations' provide improve observational possibilites also.

Future work: These analyses of basalts are part of the activity supporting the interpretation of samples drilled by ExoMars rover, using X-ray, infrared and Raman instruments on the Earth, to estimate formation and alteration conditions [6].

References: [1] Zanon, V. 2015 *Chemical, Physical and Temporal Evolution of Magmatic Systems.* Vol. 422, Spec. Pub., eds L. Caricchi & J.D. Blundy, The Geological Society of London. [2] Norhup et al. 2011. *Astrobiology* 11, 601–618. [3] Vivieros et al. 2017. *EGU*, p.19303. [4] Métrich et al. 2014. *Journal of Petrology* 55, 377-393. [5] Zanon and Frezzotti 2013. *Geochemistry, Geophysics, Geosystems* 14, 3494-3514. [6] Kereszturi et a. 2016. *Origins of Life and Evolution of Biospheres* 46, 435-454.

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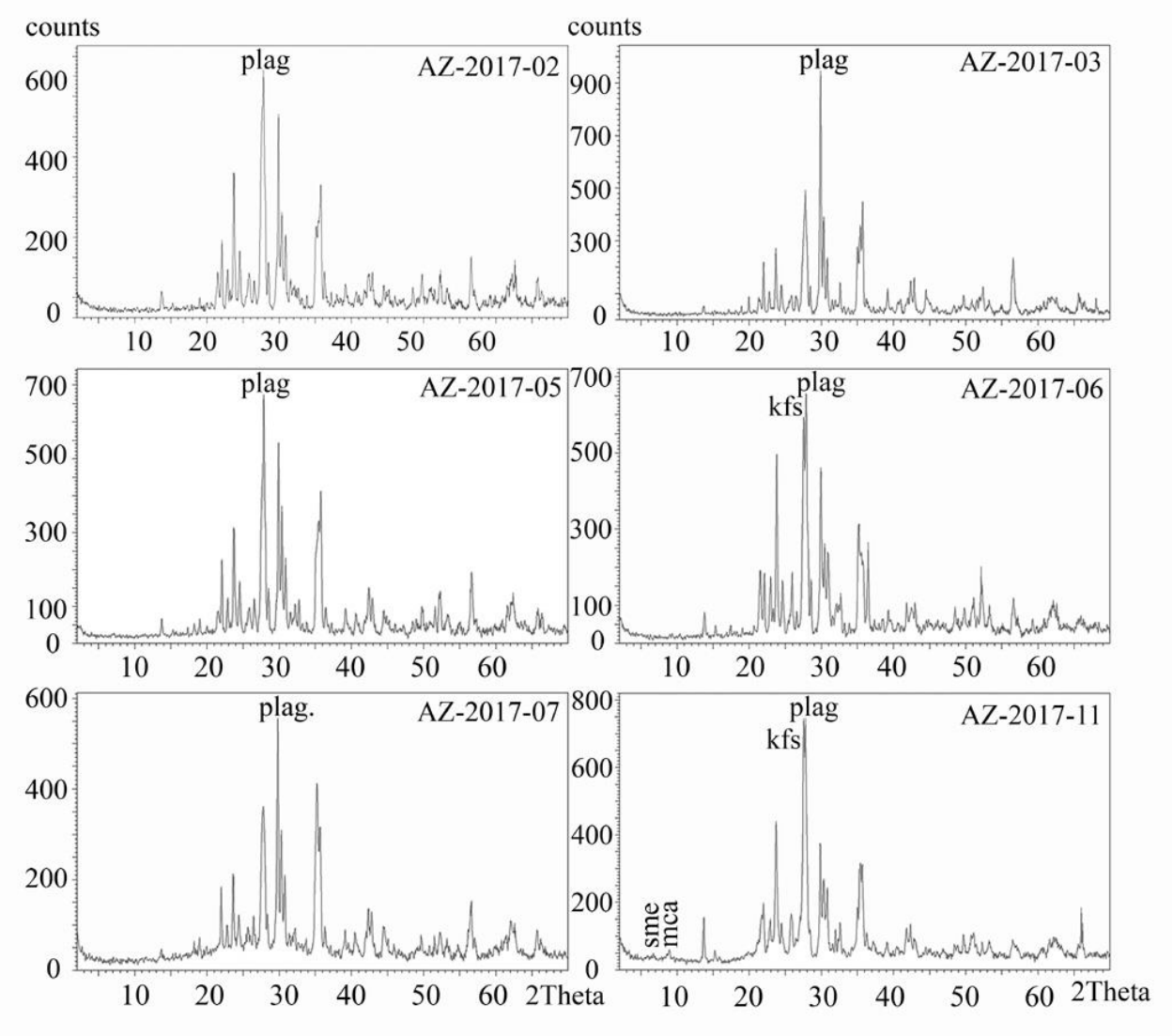

Figure 3. The results of X-ray Power Diffraction (XRPD) analysis of Azores Islands samples.
The following acronyms have been used: plag-plagioclase, kfs-alkali-feldspar, mca-mica, sme-smectite.