WIND STREAKS FIELDWORK AS A TOOL FOR PLANETARY RESEARCH. A. L. Cohen-Zada[1], [1]Earth and Planetary Image Facility, Department of Geography and Environmental Development, Ben-Gurion University of the Negev, Beer-Sheva, Israel 8410501, avivlee@post.bgu.ac.il.

Introduction: Wind streaks have been widely studied with respect to their spatial distribution, climatic context, and appearance in remotely sensed data [1]. Because wind streaks were first identified and studied on planets other than Earth, they were investigated primarily using remote sensing observations, with the ability to validate planetary results with field data being extremely limited [2, 3]. Field studies of Earth wind streaks are essential if we are to better understand the various reasons for their albedo alterations and formation mechanisms, not only on Earth but also on other planets. However, wind streak field observations are yet scarce compared with those conducted for other aeolian bedforms, with merely six published field investigations in the last forty years [e.g. 4, 5].

In this study, field data from five wind streak at the Mojave Desert are presented: Amboy, Pisgah, Sleeping Beauty, Cowhole and Afton. The objectives are to validate satellite remote sensing data by comparison to ground measurements, to study the surficial properties and geomorphic expression of wind streaks, and to extend the dataset of wind streaks in the scientific literature for future research.

Methods: Field measurements and sampling were taken along transects crossing the wind streaks. Every 20-80m the surface spectral signature was measured using ASD FieldSpec 4 Hi-Res (350-2500 nm) instrument. Samples for laboratory analyses were collected from the surface to a depth of up to ~3 cm using a gardening spade. X-ray powder diffraction (XRD) was used for the identification of crystalline materials. The bulk particle size distribution (PSD) determined using the Mie scattering model and further processed in GRADISTAT (8.0).

Results and discussion: Field spectroscopy values were found to be smaller than the reflectance obtained by satellite observations for all sites. However, the wind streak tone interpretation remained the same, regardless of the data source, meaning that both the streak and surrounding reflectance change with a nearly constant ratio. The wind streak visibility did not gradually decrease with distance from the origin point, as the contrast between a streak and its surroundings for field and satellite data was, in some cases, strongest in the middle or end sections of the streak.

XRD indicated little to no difference in the mineralogical composition of the particulate material collected from the streak and surrounding areas. At all five sites, feldspar is the most common mineral, followed by quartz and traces of clay minerals. The mineral ratio was either maintained through the different transect sections (edge, transition, and center), or only small differences were found in at least one of the edges compared to the streak area. In two sites, Amboy and Pisgah, the lithology of the substrate is responsible for the streaks' visibility rather than the mineralogy of the particulate cover.

PSD shows that wind streaks are comprised of fine to medium sand grains (mode: 138-240 μm) with little clay and silt fractions. Significant difference in grain size between the streak and surrounding areas was observed in four out of five sites, showing finer particles inside the streak. Samples with a very coarse silt texture were collected from either a basaltic surface or beneath a desert pavement cover.

The particle size of bright and dark wind streaks on Earth are comparable with dark wind streaks on Mars [6], and equivalent of Earth' sand dune particles [7]. The lack of fine fractions imply that wind streaks are active aeolian environment, as was also demonstrated by climate models [8]. While the fine material is either swept away or trapped in surface armoring, the coarser fraction is mobilized by the wind in saltation.

Implication: Wind streak field investigations contribute greatly to the understanding of the various wind streak characteristics affecting their appearance in imagery. As wind streaks are widely distributed features on planetary surfaces, and aligned with the modern prevailing winds, they can be valuable tool in assessing planetary surfaces, atmospheres, and their interactions, especially in the context of the future missions to Mars and Titan.

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References: [1] Cohen-Zada A. L. et al. (2016) *Aeolian Research, 20,* 108–125. [2] Geissler P. E. et al. (2008) *JGR-Planets, 113,* E12S31. [3] Sullivan R. et al. (2005) *Nature, 436*, 58–61. [4] Rodriguez J. A. P. et al. (2010) *Geomorphology, 121,* 30-54. [5] Zimbelman J. and Williams S. (1996) *Geomorphology, 17,* 167-185. [6] Greeley R. et al. (2005) *JGR-Planets, 110,* E06002. [7] Pye K. and Tsoar H. (2009) *Aeolian Sand and Sand Dunes*. [8] Cohen-Zada A. L. et al. (2017) *JGR-Planets, 122,* 1119-1137.