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Searching for geological surface changes around the InSight landing site (Mars) from HiRISE satellite images.

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The NASA InSight mission to Mars successfully landed on November 26th, 2018 in Elysium Planitia. One of its goal is to characterize the seismic activity of Mars, which can be triggered by three main types of sources: tectonic, meteoritic, and atmospheric (e.g. turbulence). Reiss and Lorenz (2016) reported numerous tracks in the close vicinity of the InSight landing site, denoting surface changes caused by the passage of dust devils in Elysium Planitia. Large-Eddy Simulations also indicated that large pressure drops caused by dust-devil-like convective vortices are expected to be ubiquitous at the InSight landing site (Spiga et al. 2018). In this study we validate our methodology on high resolution satellite images (HiRISE) that have been acquired before the landing of InSight (May and July 2014) and analyze a preliminary set of images acquired after the landing (e.g., December 6th and 11th, 2018). We will explore how the formation of new dust devil tracks can be evidenced in sets of successive HiRISE images acquired a couple of sols apart. Tracks are characterized by dark linear traces ranging from a few meters to more than ten meters wide and oriented in the ambient wind direction, that can be directly compared to wind direction recorded by the InSight lander's meteorological package. Detailed analyses are performed in order to determine the distribution of azimuths, sizes, and distances from the lander, of each dust devil passage identified on the HiRISE images. All the information will be useful to better link dust devils with their signatures recorded by the pressure and seismic measurements carried out by the APSS and SEIS instruments on board InSight. Moreover, forthcoming HiRISE observations will be used to further characterize ongoing dust devil activity and improve the statistics of those events. The set of HiRISE images collected during the InSight mission can also be employed to detect potential new meteoritic impact that could act as seismic sources.