**A COMPARISON OF SAND CORRIDORS ON MARS WITH A TERRESTRIAL ANALOG.** M. Cardinale[1], G. Komatsu[1], [1]International Research School of Planetary Sciences, Università D'Annunzio, Viale Pindaro 42, 65127 Pescara, Italy (cardinal@irsps.unich.it).

**Introduction:** Large Dark Dunes (LDD) [1] and Transverse Aeolian Ridges (TARS) [2][3] distributed all around the central peak of the Moreux crater on Mars, are indicators of possible active processes for the formation and evolution of aeolian structures inside the crater. Our early study produced a geomophological map [4] of the Moreux crater highlighting aeolian units, and in this work we performed a detailed analysis on the diverse sand transport systems under the influence of diverse wind regimes. While we conducted these studies, we produced a new digital atlas of dune types in the Badan Jaran Desert located in northern China, for studying the formation and the evolution of aeolian morphologies with possible analog implications.

**Methodology:** THEMIS images provide a necessary coverage for the analyzed zone in the Moreux crater, while CTX and HiRISE datasets [5] allow us to resolve slip-face orientations [6] and others details. In the Badan Jaran Desert, SRTM dataset [7] provides a continuous coverage of the wide sand sea with no gaps. Landsat ETM+ [8] images allow us mapping the diverse dune morphologies. The Martian datasets were processed using the ISIS software and the terrestrial ones using ENVI. Then, we integrated the datasets into two separate Geographical Information System (GIS) projects.

**Aeolian features in the Moreux crater, Mars:** The Moreux crater is a 138 km-diameter impact basin and the dark dunes developing on the basin floor all around the central peak form a complex sand transport system under the influence of a multi-directional wind regime. In the Moreux crater the inferred wind directions on the dune slip faces disagree with the winds predicted by the Global Circulation Model (GCM) [9], and this is probably due to the crater topography which influenced the main wind regime, leading the development of local secondary wind flows. Fig. 2 illustrates two different aeolian systems in the northwestern side of Moreux converging into one, setting a unique sand corridor similar to those in other zones of Mars [10]. On the west side of the Moreux crater floor, dark dunes, classified according Mckee's criteria [11], form a sand transport system that consists of crescentic dunes reflecting an unidirectional wind regime (Fig. 3). The east side of the Moreux crater floor is characterized by lower sand availability compared to the west side but is always marked by unidirectional wind flows that produce the crescentic dunes. The southeastern corner of the crater is characterized by the convergence of unidirectional wind flows that form reversing dunes.

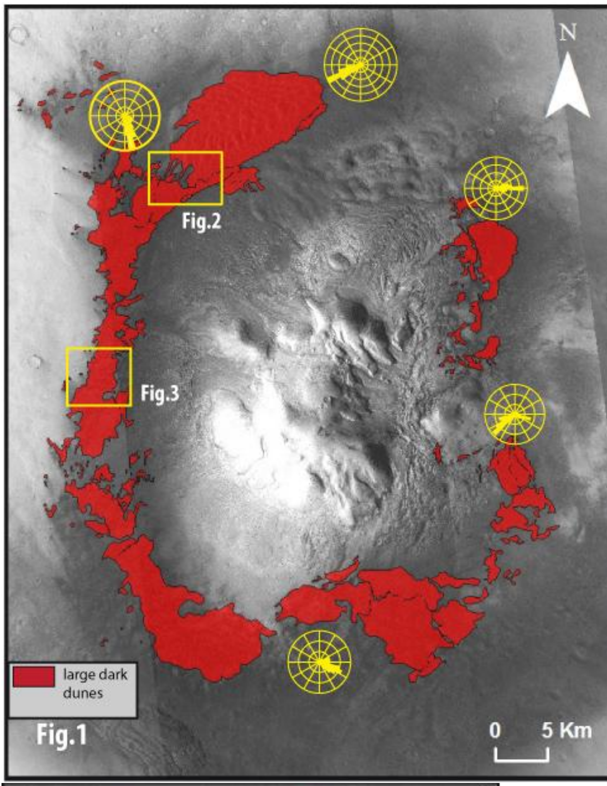
**Dunes in the Badan Jaran Desert, China:** The Badan Jaran Desert is located in northern China, and it is characterized by large sand dunes and lakes within the dune field. We classified compound, reversing and linear dune types according to McKee's criteria [11]. The surface wind circulation over this area is controlled by an unidirectional winter wind regime [12], meanwhile during the summer a low pressure dominates this area and the wind-flows over the surface become weaker leading to the development of multi-directional wind flows [13]. The sand corridor system in the Badan Jaran Desert is a possible terrestrial analog for the features analyzed in the Moreux crater. Fig. 5 illustrates one of the sand transport paths present in this area. It has a trend downhill from northwest to southeast and several dunes are observed. In this sand corridor, the dunes are mainly barchans and transverse reflecting an unidirectional wind regime over the surface in this area. At the end of this transport path, weaker winds and a more sand availability form transverse dunes as illustrated in the Fig. 6.

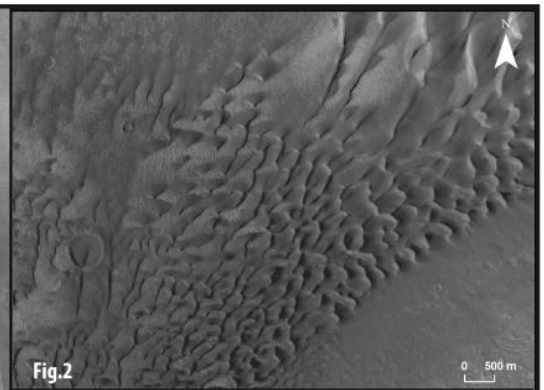
**Conclusions:** We had previously noticed that aeolian features in the Moreux crater formed according to a changing and multi-directional wind regime [4]. Our study on these dunes indicates that crater's topographic condition influences the circulation of winds and generates secondary wind flows inside the crater, which is not predicted by the GCM. Similar migratory patterns of sand corridors have been noticed in the Moreux crater and in the Badan Jaran Desert, and they are reasonable analogs. We will compare the Moreux aeolian features with the data from a meso-scale wind model to understand the local dynamics of aeolian processes and to understand the nature and the evolution of the observed dune fields. For the terrestrial dunes fields, we will analyze the data from Landsat MSS, TM and ETM+ for quantifying the migration rate in the sand corridors identified in the Badan Jaran Desert.

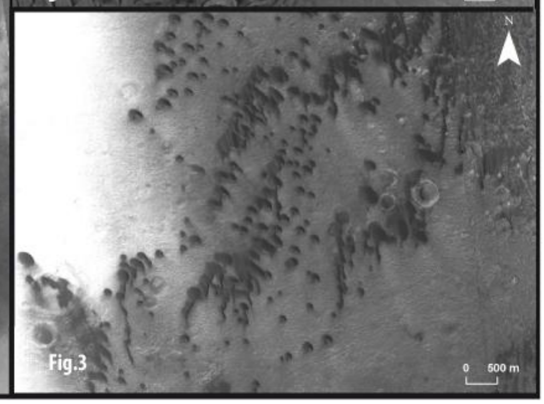
**Fig. 1**: CTX images showing dune fields (in red) in the Moreux crater, Mars. Rose-diagrams represent wind directions inferred from dune slip-face orientations in a downwind direction.

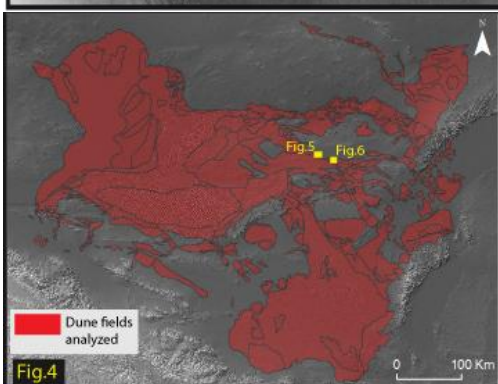
**Fig. 2:** CTX image P03_002098_2220_XI showing dunes with different wind orientations.

**Fig. 3:** A close-up of crescentic dunes. CTX image, P03_002098_2220_XI_42N315W.



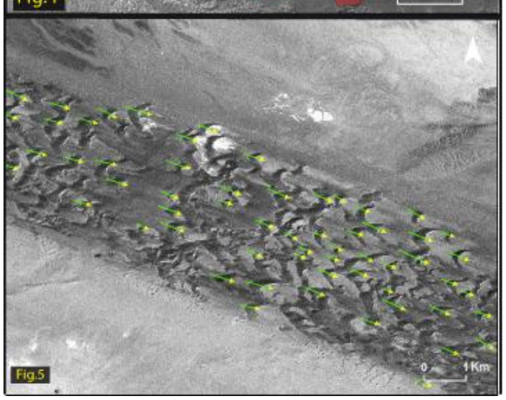




**Fig. 4:** The analyzed dune fields are indicated (in red) over a shaded SRTM dataset. The Badan Jaran Desert, China.

**Fig. 5:** Landsat ETM+ band 80 showing barchan dunes with the inferred wind directions (green/yellow arrows).

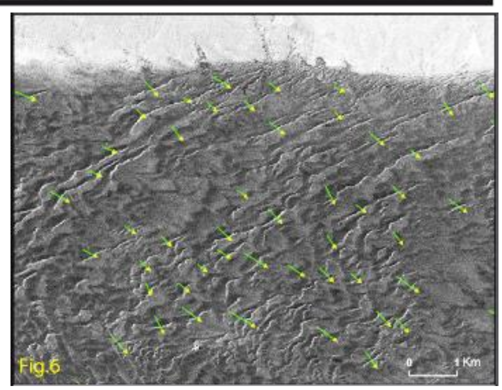



**Fig.6:** A close up of transverse dunes with the inferred wind directions (green/yellow arrows). Landsat ETM+ band 80 image.

**References:** [1] Hayward R. L. et al. (2007) *JGR*, *112*, E11007, doi:10.1029/2007JE002943. [2] Balme M. et al. (2008) *Geomorphology*, *101*, 703–720. [3] Zimbelman J. R. (2010) *Geomorphology*, *121*, 22–29. [4] Cardinale M. et al. (2010) 2nd International Planetary Dunes Workshop. Abstract #2017. [5] McEwen A. S. et al. (2007) *JGR*, *112*, E05S02, doi:10.1029/2005JE002605. [6] Fenton L. K. et al. (2005) *JGR*, *110*, E06005, doi:10.1029/2004JE002309. [7] U.S.G.S. (2004) Shuttle Radar Topography Mission, 1 Arc Second scene SRTM_u03_n056e004, University of Maryland. [8] NASA Landsat Program (2003) Landsat ETM+scene, p129r031_7t20000713, SLC-Off, USGS, Sioux Falls, 10/26/2003. [9] Haberle R. M. et al. (1999) *JGR*, *104(E4)*, 8957–8974. [10] Silvestro S. et al. (2010) *Geomorphology*, *121*, 84–97, doi: 10.1029/2010GL044743. [11] McKee E. D. (1979) In: A Study of Global Sand Seas, E. D. McKee (ed.), *U.S.G.S.*, *Prof. Pap.*, *1052*, 3–17. [12] Dong Z. et al. (2004) *Geomorphology*, *60*, 191–203. [13] Breed et al. (1979) In: A Study of Global Sand Seas, E. D. McKee (ed.), *U.S.G.S.*, *Prof. Pap.*, *1052*, 305–397.