Analyses of linear structures, Pit chains and rifting in Noctis Labyrinthus (Mars) based on Data derived from HRSC and MOLA

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Supervisor: Matteo Massironi
PhD student: EL Yazidi Mayssa
1- General view

Location: western part of Valles Marineris
Coordinates: 6°54’S 267°48’E 101°12’W
Quadrangle: Phoenicis Lacus MC-17
2- Data

- 2 Orthoimages derived from HRSC of h3210_0000_ND2 and h3221_0000_ND2 orbits (12.5 m/pixel)

- DEM from MOLA (~460 m/pixel)
3- Methods and measurements

Fractures population:

- **S1**: Nbr: 142, D => 200m and L => 4 km
- **S2**: Nbr: 396, D => 40m and L => 4 km
- **S3**: Nbr: 23, D => 40m and L => 800 m
3- Methods and measurements

Evolution to the NS direction

Increase of the size
3- Methods and measurements

Displacement-Length Scaling relationship

The values of γ ranges between $10^{-3}$ and $10^{-1}$, in which is higher for faults related to grabens, compared with single faults with the same length. That might be related to the coalescent pit chain mechanism that seems to drive the graben formation and has been previously attributed to volcano-tectonic processes.
3- Methods and measurements

Previous Compared measurements?

Yup!

(Y.Kima and D.Sandersonb, 2004)
3- Methods and measurements


4- Interpretations and conclusions

Cross cutting relationship suggest a bidirectional or radial extension, under an oblate strain field.

The surface interconnection between grabens and Pits chain provide a useful information about regional tectonism probably driven by volcanic activity.
4- Interpretations and conclusions
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(Mège et al, 2003)
4- Interpretations and conclusions

Shear zone represented by left lateral strike slip fault that generate the apparition of transtensional Pull-apart basin in releasing bend.
Future work ?!

• Our results seem to support an earlier extensional stress field and magmatic processes which are likely the main driving processes of grabens evolution and Pit chains.

• Since this work is a part of PLANMAP projects, so we are going to continue our study and a HRSC DEMs are required in order to accomplish the structural analysis of the driving processes in Noctis Labyrinthus.
Thank you for your Attention

matteo.massironi@unipd.it
mayssa.elyazidi@unipd.it