

#### RIDGES IN THE OLD TERRAINS OF MARS

Augustin F. Chicarro (1) and Peter H. Schultz (2).

(1) Lab. Geologie Dynamique Interne, Universite Paris-Sud, France.

(2) Lunar and Planetary Institute, Houston, Texas 77058.

A survey of Viking images has provided a planet-wide distribution of wrinkle-ridges on Mars. Although the "ridged plains" exhibit numerous and obvious wrinkle-ridges, the old cratered terrains of the southern hemisphere contain an impressive array of such structures that has been largely ignored. Accurate mapping of possible compressive structures of the whole planet was undertaken as a basis for further global studies (1). The "Compressive Structures Map of Mars" is an attempt to synthesize these initial results (fig. 1).

Different morphological types and sizes of compressive structures are recognized in the old terrains. Major ridges in the Copernicus area (MC-24) for example, display significant relief ( $> 1$  km) and common trends that cross old and young units. This system is believed to reflect broad-scale compressional regimes that extend to near the present south pole.

Medium-scale networks of ridges throughout the cratered highlands display complex patterns and morphologies (ranging from simple wrinkle ridges to lobate scarps) that reflect broad regional trends superimposed on locally modified stress fields. The existence of small, narrow, non-oriented, intercrater smooth plains ridges seems to indicate highly localized structural control. Such patterns may result from a viscosity contrast between the ridge-bearing materials and the old cratered units, or to different physical responses e.g., decollements in the smooth plains.

A great deal of attention has been directed to the extensional history of Mars revealed by the impressive Valles Marineris system. This systematic mapping of ridge structures, however, reveals the more subtle but planet-wide history of compression, a history that contrasts in extent, style, and distribution with the Moon and Mercury. Further studies should help to determine the relative roles of global shrinking, despinning, and polar wandering (2, 3) in the development of martian ridge systems.

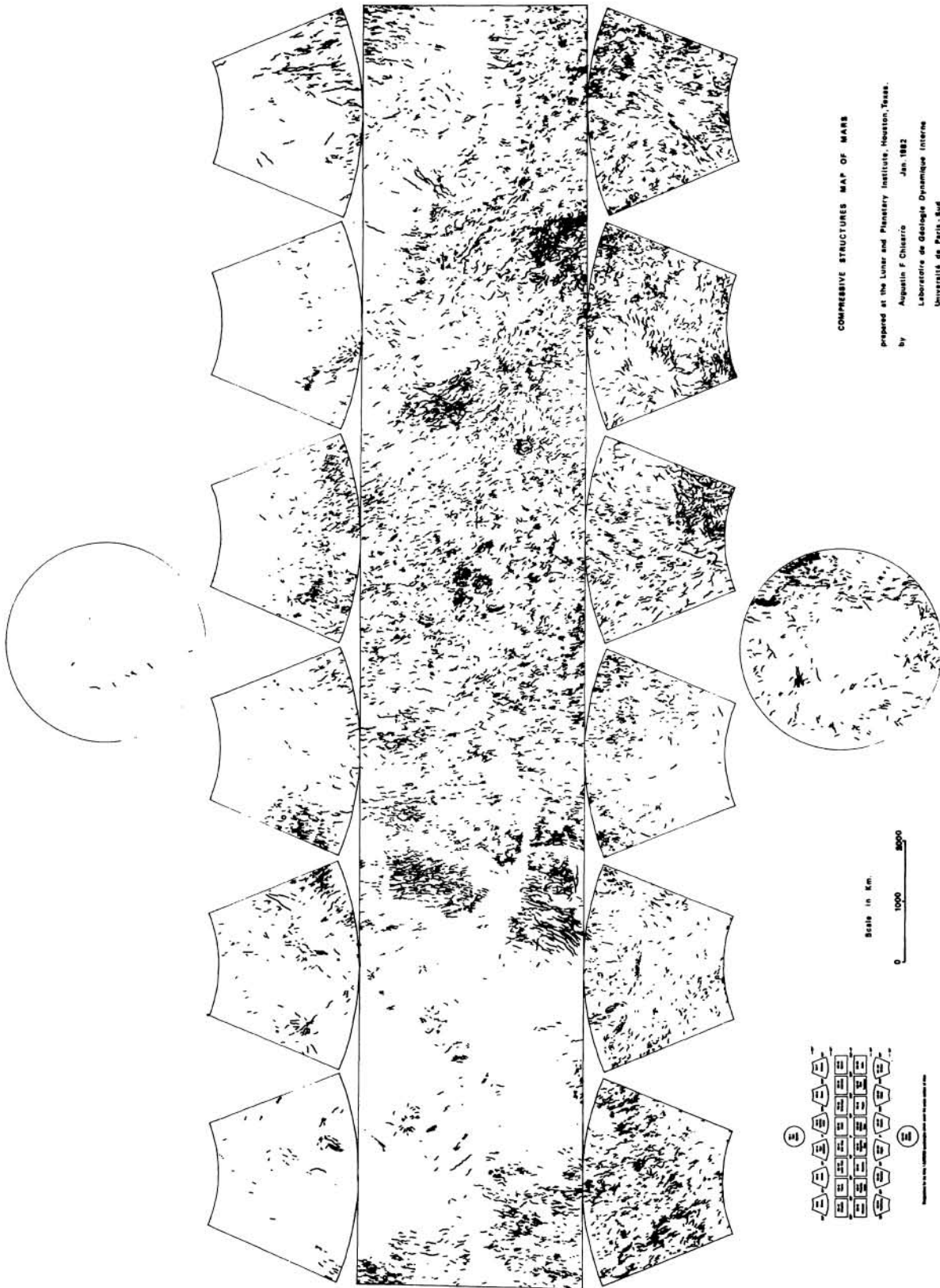
Acknowledgments: This work was prepared during a Visiting Graduate fellow appointment of A.F. Chicarro at the Lunar and Planetary Institute, Houston, Texas, and supported by a NASA grant.

The Lunar and Planetary Institute is operated by the Universities Space Research Association under contract No. NSR 09-051-001 with the National Aeronautics and Space Administration.

#### References

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Chicarro et al.



COMPRESSIVE STRUCTURES MAP OF MARS

prepared at the Lunar and Planetary Institute, Houston, Texas.  
by Augustin F. Chicarro Jan. 1982  
Laboratoire de Géologie Dynamique Interne  
Université de Paris-Sud  
91405 Orsay, France

Scale in km.  
0 1000 2000

E1  
E2  
E3  
E4  
E5  
E6  
E7  
E8  
E9  
E10  
E11  
E12