POTENTIAL LANDING SITES FOR THE 2001 LANDER IN THE NOACHIAN HIGHLANDS AND IN VALLES MARINERIS. N. Mangold, F. Costard, P. Masson and J.-P. Peulvast; UMR 8616, Bat. 509, Univ. Paris-Sud, 91405 ORSAY Cedex, France, mangold@geol.u-psud.fr.

Introduction:

The French community will be involved with the Mars Sample Return missions and begins to study potential landing sites. Our team proposes several sites for the 2001 Surveyor mission. Studies of these regions are still in progress. The scientific goal of the two first landing sites is the understanding of the early Mars climate. These two sites are focused on processes related to water like run-off or hydrothermal areas. Such processes include possible biochemical investigations for the potential of primitive life on Mars. The third site is devoted to the complex and diversified geology of Valles Marineris. This selection of landing sites takes into account all the technical parameters described on the Surveyor 2001 web page [1]. We also took into account the availability of Viking High Resolution images and of MOC images when possible.

1st site: Terra Meridiani, SW Schiaparelli.

- *Lat/Long*: 7°S-346°.
- *Elevation*:1/2.5 km.
- *Viking Orbiter Image coverage*:

HR	747a35-60	17 m/pix
LR	618a04	220 m/pix
	655a46	248 m/pix
	369s65	233 m/pix

- *MOC Images*:

4405	4.7 m/pix

- *Thermal Inertia (IRTM):* >4 cgs units.
- *Rock abundance*: 5-10%
- *Stratigraphy [2]*:

NPld	Cratered units with fluvial processes.
HPl3	Interbedded sedimentary-volcanic deposits.

- *Geological setting*:

The studied area consists of run-off valleys inside Noachian terrain at the boundary of an Hesperian plain (Fig. 1). The Noachian terrain could have experienced primitive volcanism because the morphology of some valleys is similar to that of Appollinaris or Hadriarca Patera. In this case fluvial processes may be associated to hydrothermalism.

A first landing site can be proposed at the outlet of valleys where High Resolution Viking Images show fine morphologic details. Such area may have a fluviodeltaic origin. It is furthermore flat and hazard-free providing good safety for landing. The problem is that sedimentary material may have been buried by volcanic lavas. Indeed younger volcanic deposits are possible because the nearby flat plain may have a volcanic origin. Eolian materials can also blanket some areas like the valleys observed on the MOC image.

A second landing site can be proposed in the upstream part of the valleys. If this region did correspond to an old degraded volcanic shield, hydrothermalism would have been possible at the valleys springs. The plateau is relatively flat but hazard-free areas are more difficult to identify for a precise landing site.

2nd site: Lybia Montes

- *Lat/long*: 2°N, 273°.
- *Elevation*: 1/2 km.
- *Viking Orbiter Images coverage*:

HR	137s01-09	15m/pix
LR	876a01	176 m/pix

No MOC images available at the present time.

- *Thermal Inertia (IRTM)*: >4 cgs units.
- *Rock abundance*: 5-10%.
- *Stratigraphy [2]*:

NPld	Cratered units with fluvial processes.
HPl3	Interbedded sedimentary and volcanic deposits.
Nm	Very primitive crust.

- *Geological setting*:

The proposed area consists of a very ancient crust affected by many small valley networks (Fig. 2). Flat plains at the valleys outlet could include sedimentary materials that would be interesting for exobiological investigations. Outcrops of very old crust could be useful for geochemical purposes. The HR Viking images are focused on the valley network corresponding to the left arrow of figure 2. These valleys seem to have their origin on the crater rim located southward. An hydrothermal activity due to the impact heating is possible to explain their formation. The network is highly degraded and consequenting valleys may have very gentle slopes. Landing would then be safe even if it would occur inside the valleys. However the occurrence of eolian material that is not visible on Viking HR Images could be problematic in case of landing on the valley floors.

3rd site: Melas Chasma, Valles Marineris

- *Lat/Long*: 10°S- 73°
- *Elevation*: -1/0 km
- *Viking Orbiter Image coverage*:

HR	915a13-25	60 m/pix
	914a13-25	60 m/pix
	915a53-64	42 m/pix
	914a51-62	44 m/pix
MR	058a81-92	125 m/pix
LR	608a73	232 m/pix

No MOC images available at the present time.

- *Thermal Inertia (IRTM)*: >4 cgs units.
- *Rock abundance*: 5-15%
- *Stratigraphy [3]*:

Avf	Valles Marineris Interior deposits.
Hvl	Layered outcrops of Valles Marineris.

- *Geological setting*:

This site takes place on the flat floor of Melas Chasma. The nature of the deposits is uncertain. Several hypotheses were proposed including eolian, landslide debris, alluvial, lacustrine or volcanic origins [4,5,6]. Lacustrine deposits would improved our knowledge on climate evolution and exobiology. Debris coming from landslides may present a large variety of materials with different age that would be useful for geochemical purposes. Such landing site would help to the understanding of Valles Marineris formation and evolution, and therefore the evolution of the whole Tharsis region.

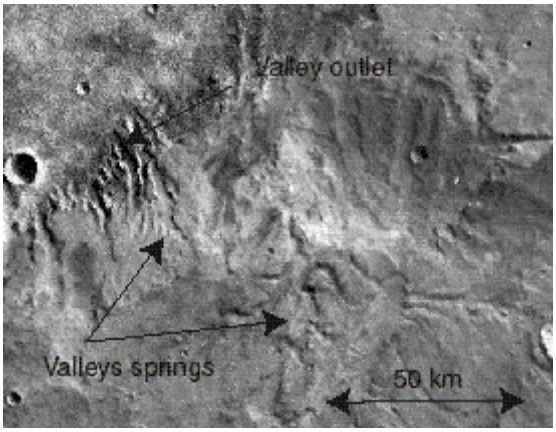

Fig. 1: Terra Meridiani, SW Schiaparelli Basin (7°S, 347).

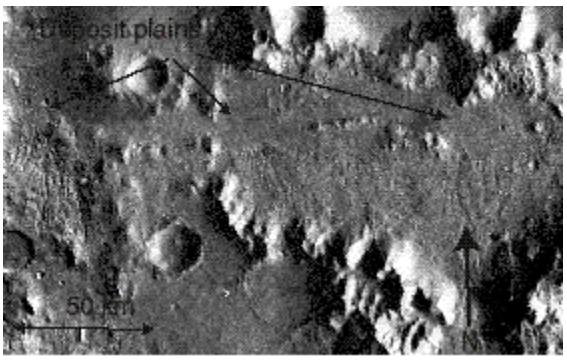

Fig.2: Lybia Montes (2°N, 273).

References:

[1] Mars 01 Landing Site Website, *www.marsweb1.jpl.nasa.gov/site01/mars01www.html* [2] Greeley R. and J. E. Guest (1987). *Geologic map of the eastern equatorial region of Mars, scale 1:15,000,000*. U.S.G.S. Misc. Inv. Series map I-1802-B. [3] Scott D. H. and K. L. Tanaka (1986). *Geologic map of the western equatorial region of Mars, scale 1:15,000,000*. U.S.G.S. Misc. Inv. Series map I-1802-A. [4] Nedell S. S. *et al*. (1987), *Icarus*, 70, 409-441 [5] Lucchita B. K. (1987), *Icarus*, 70, 411-429. [6] Peulvast J.-P. and P. L. Masson (1993), *Earth, Moon and Planets*, 61, 191-217, 1993.