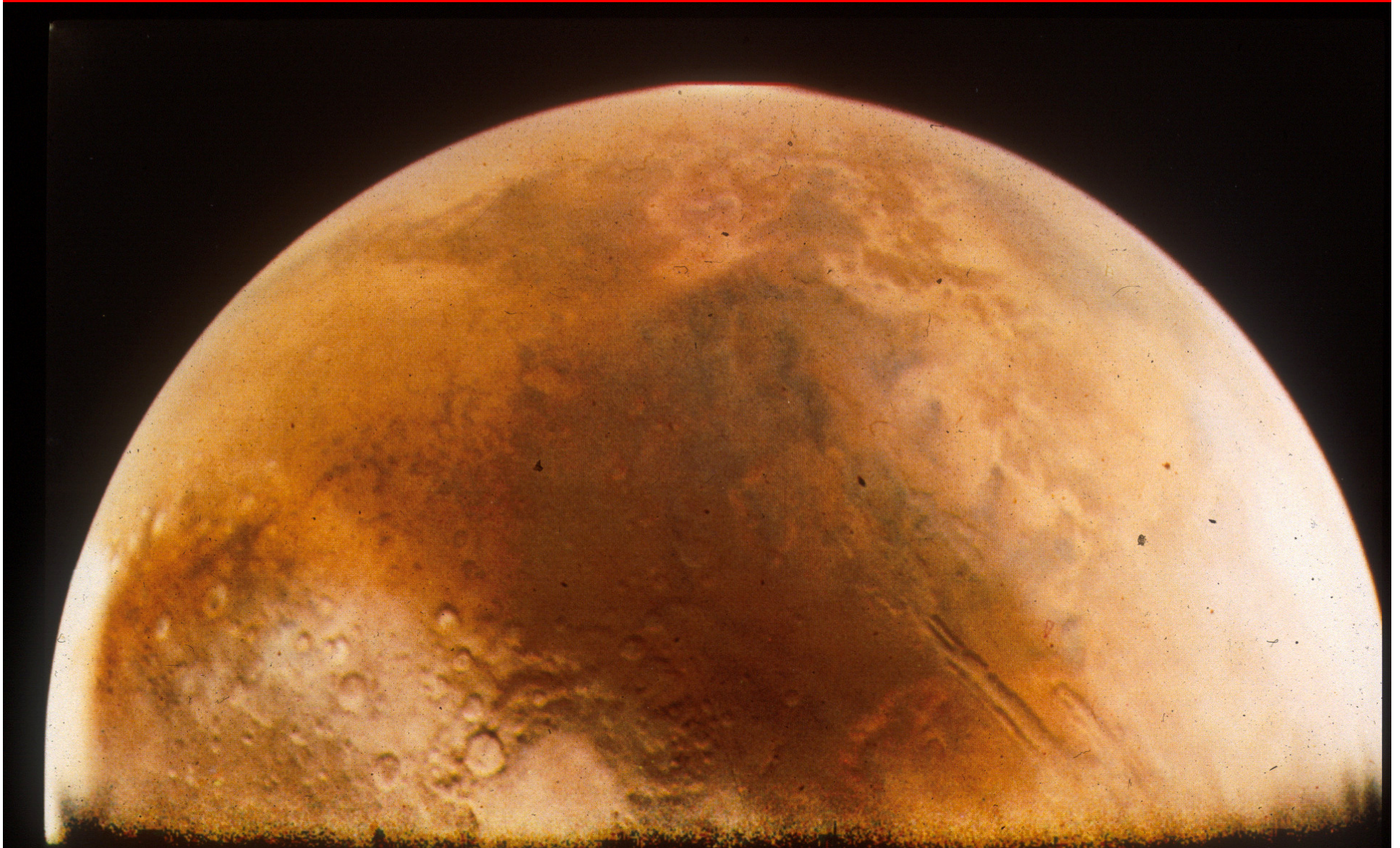


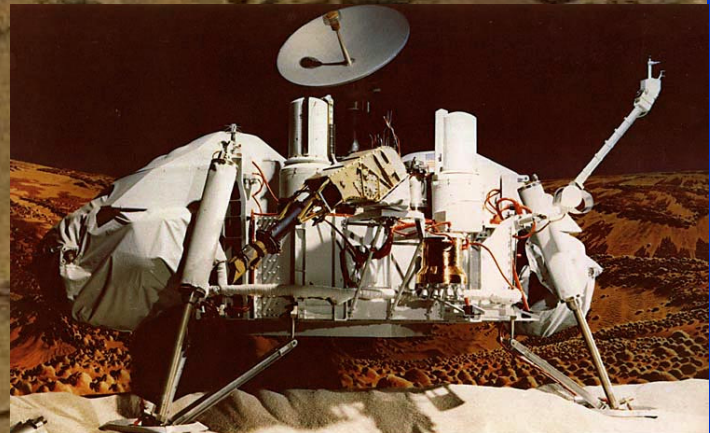


Mars Lives? A Planet Worth Protecting Either Way

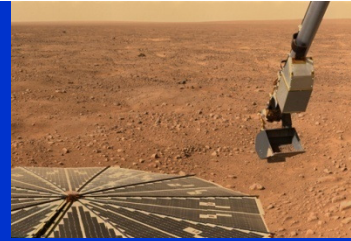
Charles Cockell, Open University, UK
COSPAR Symposium, February 14, 2011



Mars – a Dead Desert?

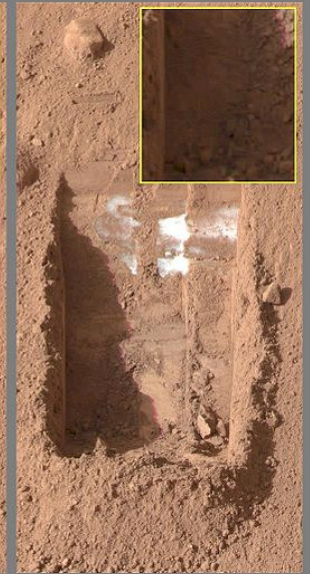


Water on Mars today



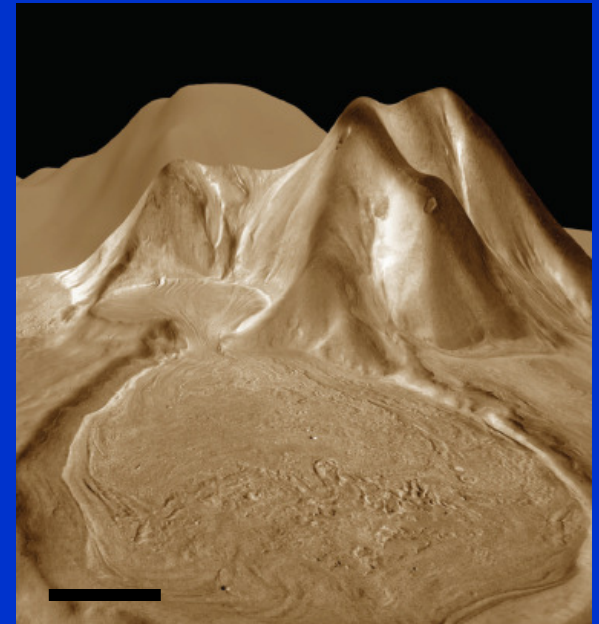
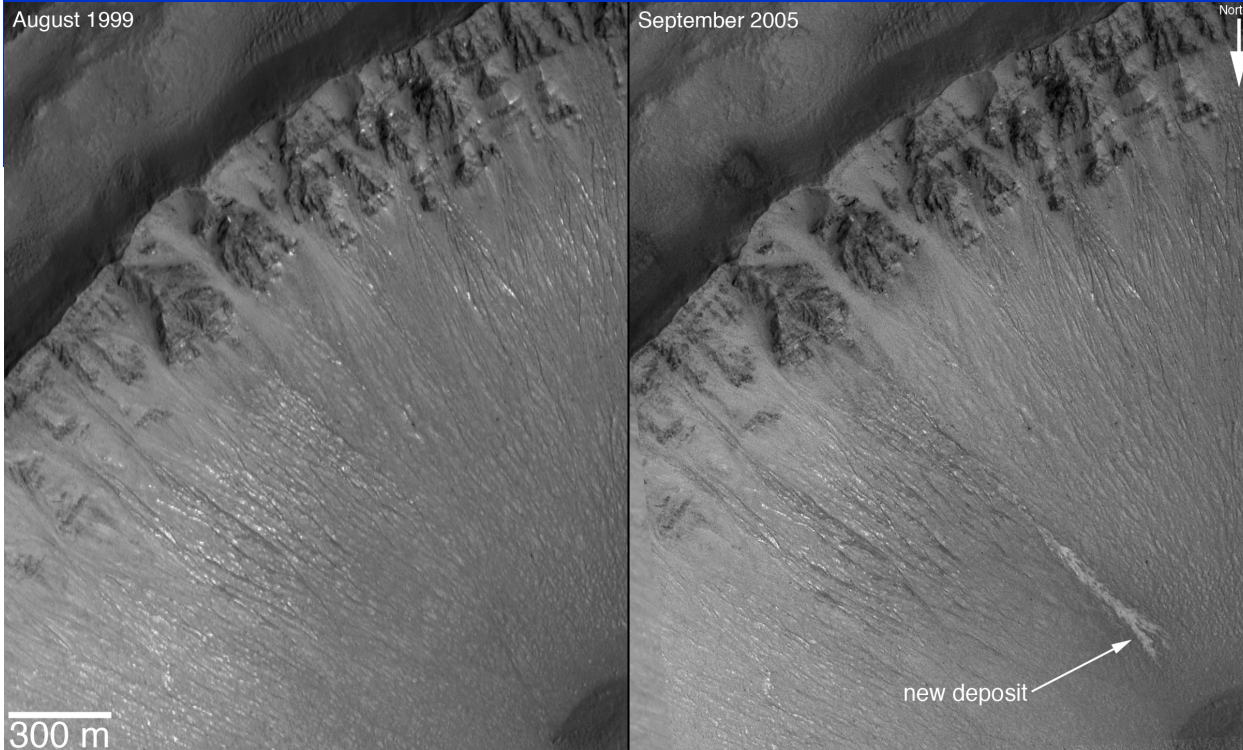
Sol 20

Sol 24

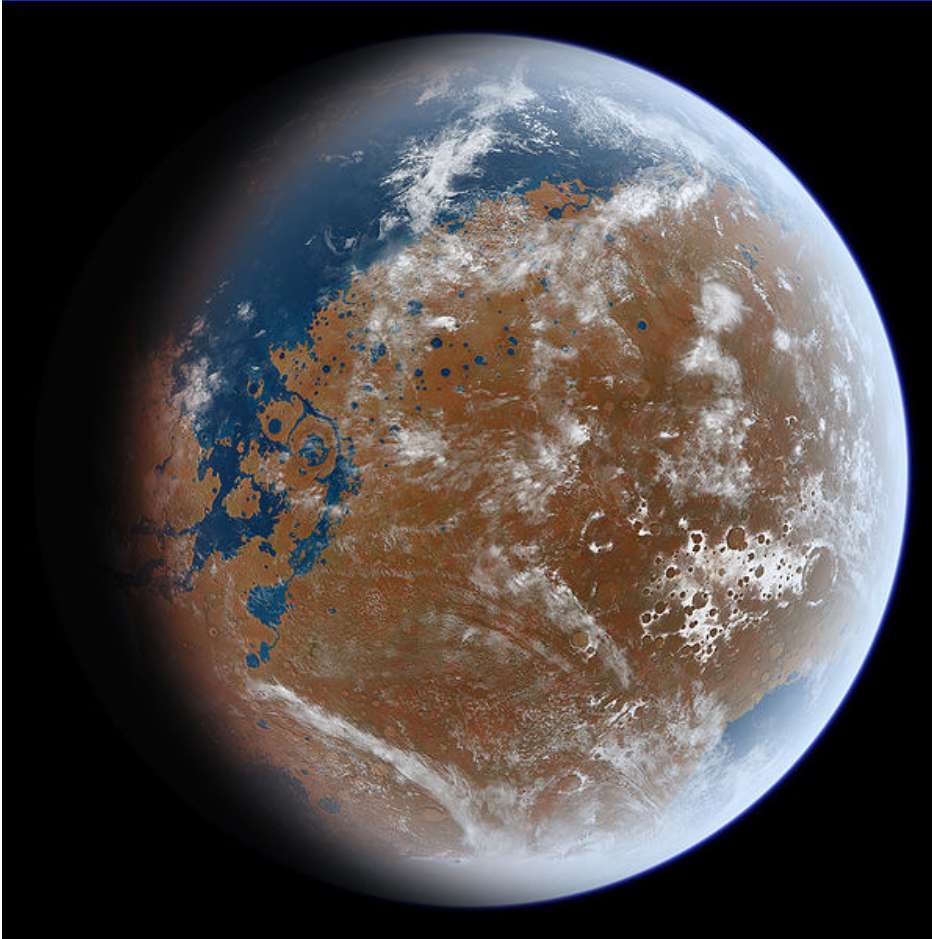


August 1999

September 2005



Life on Mars could either come from an independent origin or be related to life on Earth



Why do we care?

Instrumental reasons

- Insights into life, its architecture and origin
- New products and even pharmaceuticals
- Advances in space exploration technology

Intrinsic Value

- Controversial, but broadly captures the idea that life has some sort of right to live and not merely be subject to valuation based on human uses.

COSPAR

“[Although the existence of life elsewhere in the solar system may be unlikely], the conduct of scientific investigations of possible extraterrestrial life forms, precursors, and remnants must not be jeopardized. In addition, the Earth must be protected from the potential hazard posed by extraterrestrial matter carried by a spacecraft returning from another planet.”

Rummel J et al. (2002) COSPAR's planetary protection policy. A consolidated draft. Adv. Space Res. 30, 1567-1571

Special Regions

Developed by the US National Research Council's Space Studies Board Committee on Preventing the Forward Contamination of Mars (PREVCOM) and Special Regions Science Analysis Group.

A Special Region: Regions on Mars where temperatures $> -25^{\circ}\text{C}$ for a few hours a year and a water activity > 0.5

Physical features on Mars that can be interpreted as meeting these conditions constitute a Mars Special Region.

Potential Special Regions:

Gullies and bright streaks associated with them

Pasted-on terrain

Deep subsurface

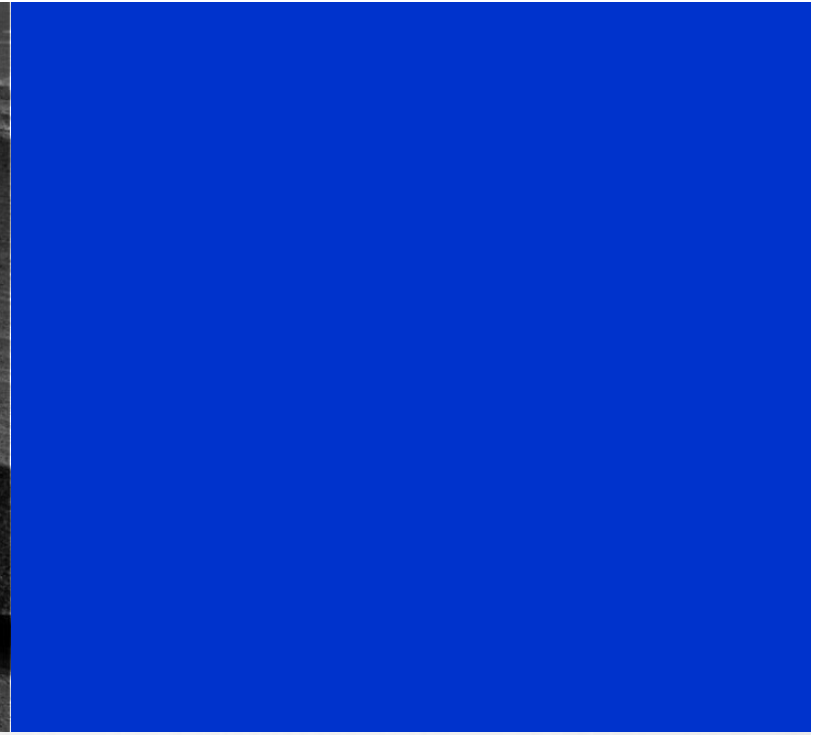
Dark streaks

Others to be determined

If Mars is dead its protection is still suggested by existing treaties:

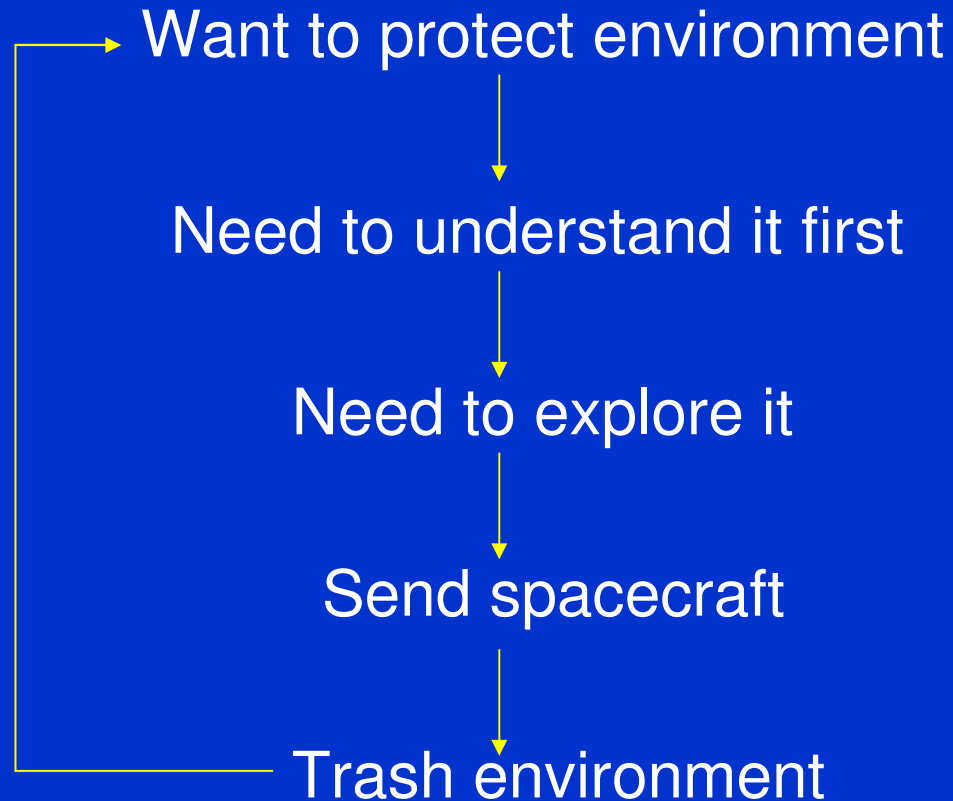
United Nations

Article IX of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies [also known as the UN Space Treaty of 1967] states that: States Parties to the Treaty shall pursue studies of outer space, including the Moon and other celestial bodies, and conduct exploration of them so **as to avoid their harmful contamination** and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter, and where necessary, shall adopt appropriate measures for this purpose. (U-N 1967)



Whether Mars is alive or not...

The Environmentalist's Paradox



Cockell CS, Horneck G. 2006. Planetary Parks - formulating a wilderness policy for other planetary bodies. Space Policy 22, 256-261.

Might protect regions of Mars to escape this paradox

- Consistent with instrumental reasons motivated by the preservation of scientific interest and use

BUT, other reasons include:

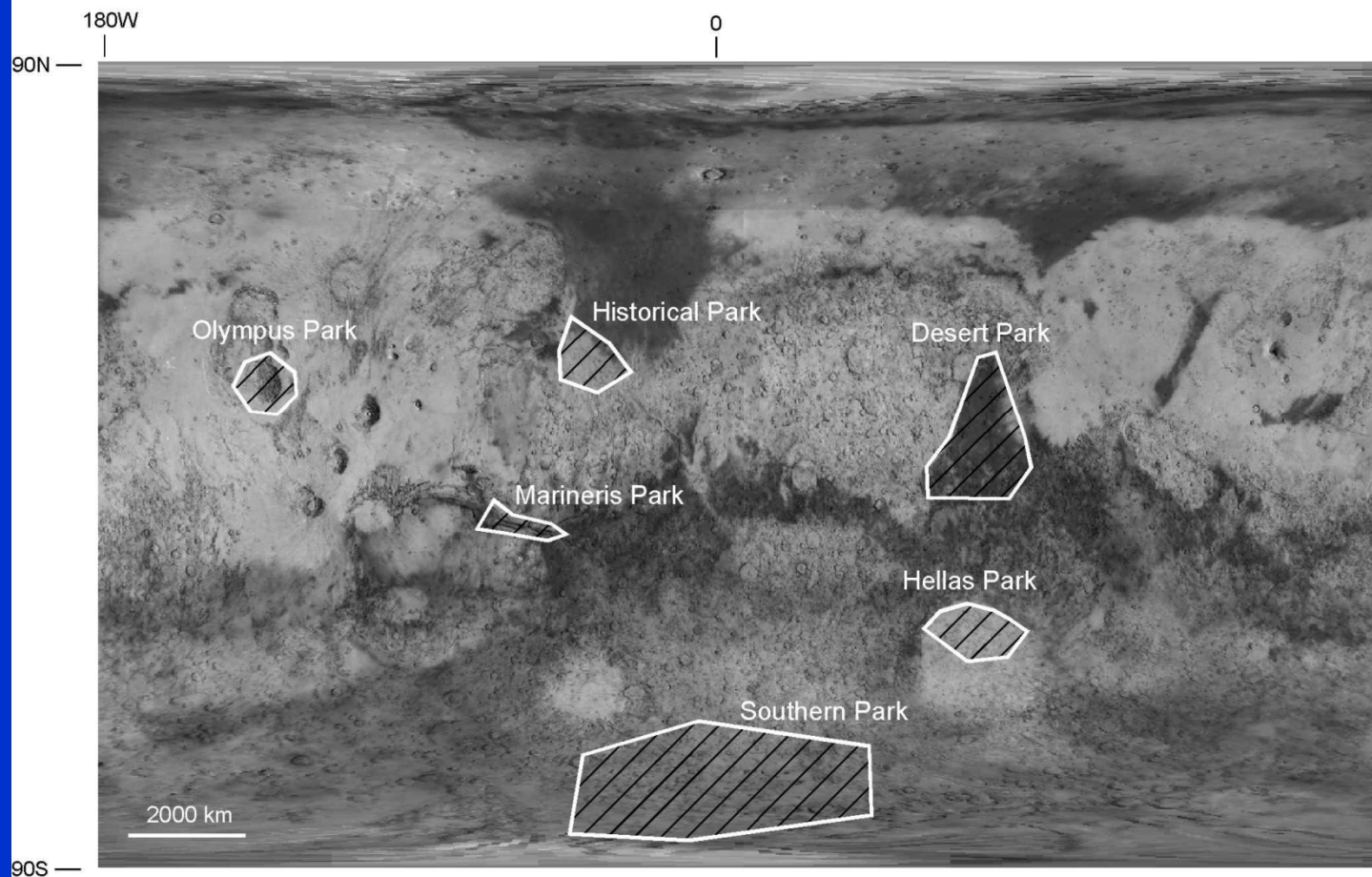
- 2) Preservation of natural beauty
- 3) Preservation for future generations
- 4) Preservation of some regions of historic value

A Planetary Park system for Mars

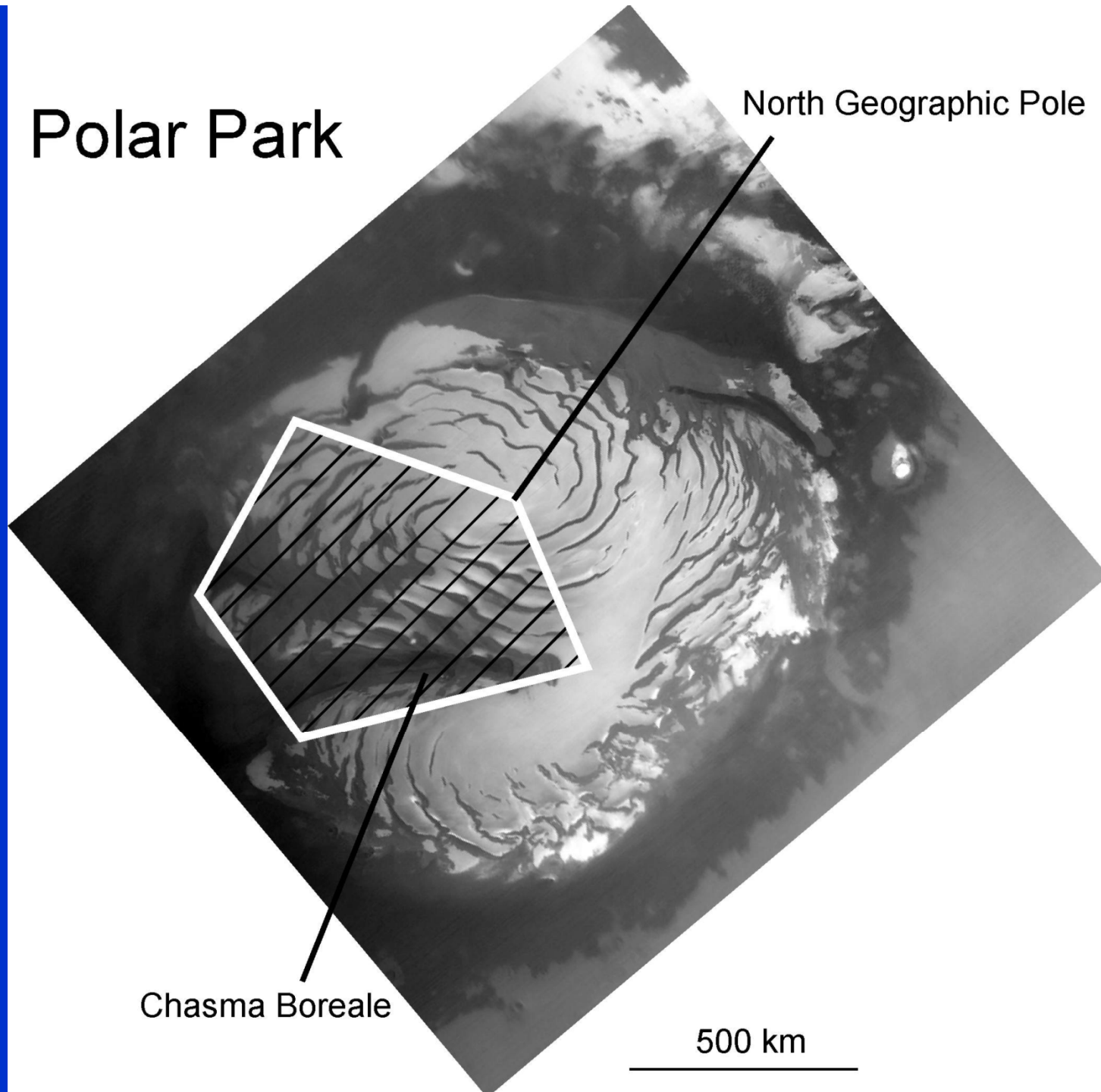
Charles Cockell^{a,*}, Gerda Horneck^b

^aBritish Antarctic Survey, High Cross, Madingley Road, Cambridge CB3 0ET, UK

^bGerman Aerospace Center, Institute of Aerospace Medicine, 51170 Cologne, Germany



Polar Park



Possible Planetary Parks include:

Scientific Interest (S)

Natural Beauty (N)

Future Generations (F)

Historic Interest (H)

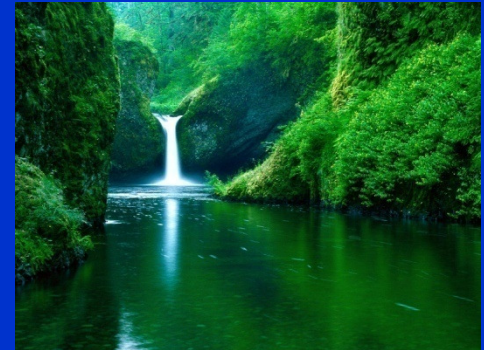
- 1) Olympus Mons – S, N, F
- 2) Valles Marineris – S, N, F
- 3) Polar caps – S, N, F
- 4) Desert regions – S, N, F
- 5) Hellas Basin – S, N, F
- 6) Viking 1 / Pathfinder landing sites – S, H

Planetary Parks - creating 'wilderness' on planetary bodies

What is a wilderness?

Earth wilderness [US Wilderness Act 1964]

'an area of the Earth where its communities of life are untrammelled by man, where man is a visitor who does not remain'.



Planetary Park

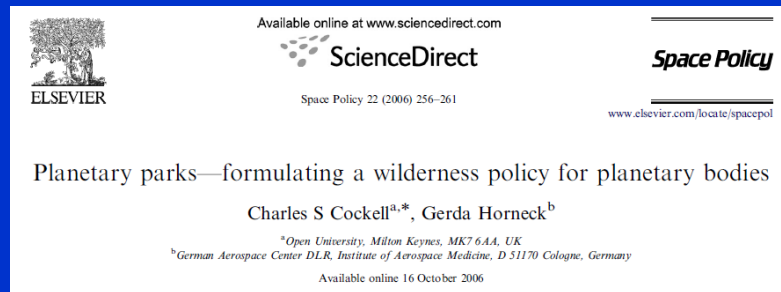
'an area of a planetary surface (with its communities of life if they exist) untrammelled by people, where people are visitors who do not remain'.



Regulations inside Planetary Parks

- 1) No waste to be left (including spacecraft/vehicle parts)
- 2) No landing of robotic spacecraft
- 3) Human exploration only along predefined routes
- 4) Cleaning/sterilization?

Planetary Parks are merely an augmentation of COSPAR regulations, but they do not restrict the entire planetary surface



Planetary Parks - 'Far-fetched'?

MP Nelson defines 29 arguments for wilderness areas. Four of these are independent of life and humans

- 1) 'Necessity argument' – need wilderness for a complete definition of 'culture' and 'civilization'
- 2) 'Intrinsic Value argument' – land has its own intrinsic value to be respected
- 3) 'Future generations argument' – leave it for future generations to appreciate/use
- 4) 'Unknown and Indirect Benefits argument' – we don't know what the land might be able to tell us. Keep representative regions 'off-limits' until we really do understand it.

The formation of a Planetary Park system would allow other regions of Mars to be explored and used for human settlement

Two approaches:

- 1)Continue COSPAR provisions in other non-Park areas.
- 2)Reduce all regulations in non-Park areas. Essentially a 'Lockean' vision of land use whereby productively used land can be turned into private property.

Why a Lockean vision?

- Space is a very extreme environment.
- It will be difficult to motivate space exploration with a 'province of all mankind' argument', i.e. people must get something out of it.
- By enabling people to claim land and develop it they have an incentive for exploring and settling space.
- BUT, two caveats.....



LunarLand.com
Earth's Oldest, Most Recognized Celestial Real Estate Agency

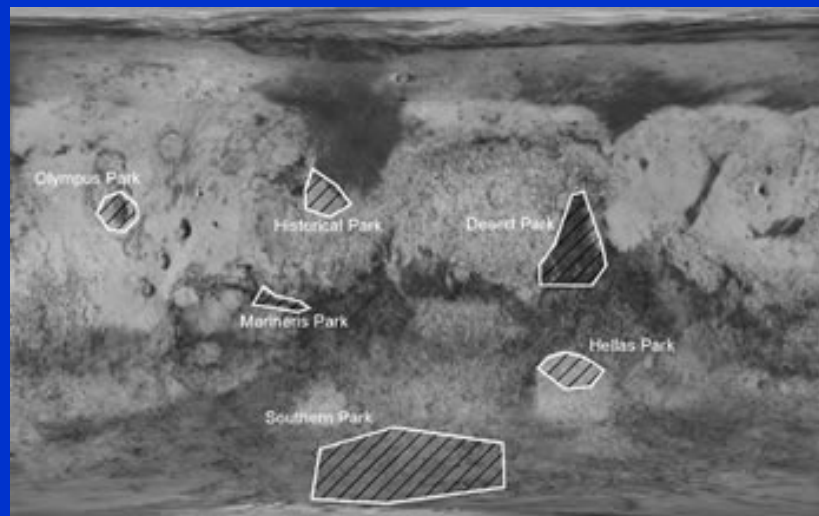


Since 1980
Over 300 million acres sold

First and **ONLY** company to possess a
legal basis and copyright for the sale of
celestial properties.

Beware of other recent phony lunar companies with no claim

- Must do something productive with it
- and must be counterpoised with an environmental ethic for defined land.



Conclusions

- If Mars has life it should be protected as a scientific resource.
- Even if Mars has no life there are compelling reasons to develop approaches to its protection.
- The Environmentalist's Paradox can be solved by recognising some regions worthy of special protection
- Planetary Parks allow us to protect many areas of Mars for different reasons, but under a single set of regulations and under one system.
- Planetary Parks allow us to express both instrumental and intrinsic value arguments for planetary protection.
- They offer a way to allow private exploration on other planetary bodies.