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**Flotillas could outperform single space probes**

18:29 19 October 2005  
NewScientist.com news service  
Maggie McKee

Flotillas of relatively simple space probes should be used to explore the solar system instead of single, high-tech rovers and orbiters, argues a team of researchers in the US. But others say the new approach would limit mission flexibility by carrying fewer instruments capable of responding to unexpected observations.

Landers such as the Spirit and Opportunity rovers now on Mars, and orbiters such as Mars Odyssey, have made impressive discoveries, say a team of scientists led by Wolfgang Fink, a physicist at the California Institute of Technology (Caltech) in Pasadena, US.

But they point out that the rovers had to land on flat terrain to maximise their chance of surviving impact, whereas broken terrain is often the most geologically interesting. Furthermore, they can study only a small fraction of the surface and must be steered remotely by a large team of scientists and engineers.

Orbiters can cover the entire planet, but they cannot focus in on interesting features, they say. Finally, both types of mission can be lost completely if their spacecraft crash or are crippled.

So in an article to be published in *Planetary and Space Science*, Fink and his colleagues propose a "paradigm shift" that relies on armadas of relatively simple orbiters and landers. These would cover a large area of particular interest on a planet or moon, would operate autonomously and could each be lost without endangering the entire mission.

**Oddball targets**

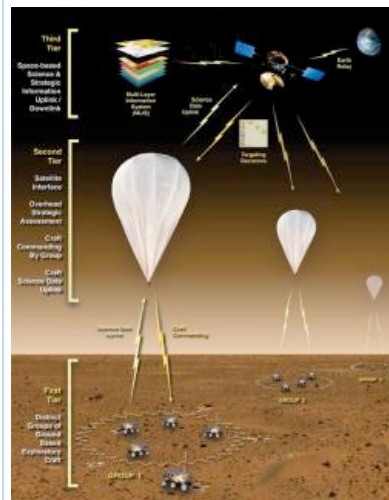
In their system, the missions would be organised into space-, air- and ground-level "tiers". So on bodies with an atmosphere, an orbiter would identify intriguing targets on the surface and then deploy a blimp to get a closer look. The blimp could in turn release simple rovers or dozens of sensors that could parachute down or penetrate the surface like darts.

The concept is driven by how geologists perform science on Earth, Fink told **New Scientist**. "They need mobility – they need to be able to cover large areas of terrain." Colleague James Dohm, a planetary geologist at the University of Arizona in Tucson, US, agrees. "It would be good to have aerial reconnaissance and then be able to hone in on an oddball rock."

The sensors sent down to the surface might each be as small as a coin and contain only a detector for heat or moisture. That would allow the missions to answer specific questions, such as whether water occasionally trickles down the sides of the Red Planet's "grand canyon", Valles Marineris, says Dohm.

**Expect the unexpected**

Having simpler probes may be useful "if you have a particular exploration objective in mind", says Raymond Arvidson, a Mars rover team member at Washington University in St Louis, Missouri, US. But what the objective actually is might not be clear until you are on the ground, he points out, adding that the rovers have consistently surprised scientists with their detections of



[Enlarge image](#)

In the proposed system, missions are organised into space, air and ground-level "tiers" (Graphic: Fink et al)

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Arvidson also says it may be more difficult than expected to set up an autonomous system that can navigate the steep canyon walls on Mars. "The idea that you can explore very complex, topographically rough terrain – that's still pretty tough," he told **New Scientist**.

Fink's team plans to test out their concept on Earth within a year with a 6-metre-long blimp carrying cameras, a laptop and other equipment, including small rovers.


Journal reference: *Planetary and Space Science* (DOI: 10.1016/j.pss.2005.07.013)

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