The Waters of Mars: A Quest Renewed

For nearly a century, water has been a major chapter in the story of Mars, as earthlings know it, ever since Italian astronomer Giovanni Schiaparelli published his map of what he took to be *canali* (channels) on the Martian surface. The idea was rapidly extrapolated into the notion of "canals," evoking visions of intelligently produced irrigation systems and the like. But even with no trace of such structures visible in close-up spacecraft photos, water remains perhaps the essential item in understanding the nature of Mars.

Even after the elaborate, four-spacecraft Viking mission, many of the key questions remain. Did rivers once flow on the now-parched surface? For that matter, how much water is there now? The newest approved mission on the National Aeronautics and Space Administration's planetary schedule is a Mars Geoscience and Climatology Observer (MGCO), to be sent there in 1990. The major category among NASA-funded studies of the planet is about the evolution of its climate and atmosphere (virtually unknowable without a grasp of the role of water). And just conducted at the agency's Ames Research Center in Mountain View, Calif., was an entire two-day "workshop" devoted exclusively to the topic of "Water on Mars."

Woven among the two days of formal presentations and papers was the hope of influencing future studies. On the key matter of the planet's present water reservoir, for example, Stephen W. Squyres of NASA Ames showed Viking photos of a number of surface features whose shapes seem to have been affected by the presence of subsurface ice. There are craters, for example, whose surrounding blankets of ejected material look as though they were originally deposited on ice that turned to steam and lubricated their flow; other features appear "softened" over time by ice trapped in their cracks. "Mapping of these features," Squyres noted, "may therefore provide some of the most unambiguous evidence available for the presence of ground ice...." But to do the job, he said, a spacecraft *must* have a high-resolution imaging system — and present plans for MGCO call for none at all.

Viking Orbiter 1/JPL

The waters of Mars frost 750-km Argyre basin and form haze layers in the atmosphere.

Next April 1, NASA plans to send out an "announcement of opportunity" soliciting proposals for instruments to be included in MGCO's payload. There has been a "strawman payload," but that is only to give interested participants an idea of the range of capabilities envisioned for the spacecraft. And it includes no cameras. Designed to provide a relatively low-cost mission (a fundamental guideline in the proposals of the NASA-chartered Solar System Exploration Committee), MGCO will have a modest data-transmission rate (32 kilobits per second), and spacecraft imaging systems have a reputation for requiring lots of data, sometimes at the expense of other instruments.

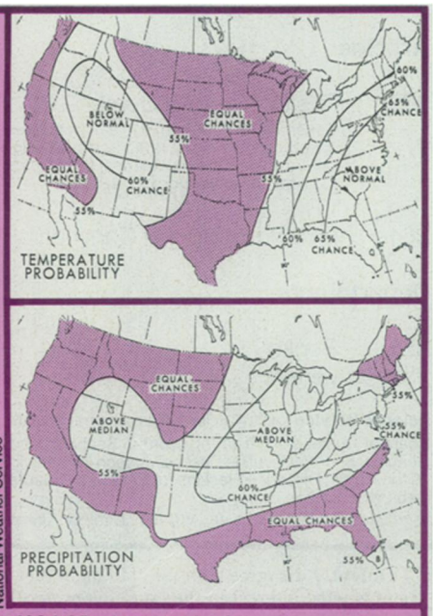
Several research groups, however, are already preparing proposals for camera systems that would require limited amounts of data as well as meeting other MGCO constraints. One, for example, would take as few as a single picture per day, of carefully selected targets, but at a resolution capable of showing features as small as 1 meter across. Another, envisioned by researchers in Germany, would minimize its crowding of the spacecraft's data-rate by transmitting its photos when the rest of MGCO's instruments are not sending. (NASA's plans call for MGCO to send back its results in "downlinks" lasting 16 hours per day; the German plan calls for pictures to be transmitted the rest of the time, for reception by a German tracking station. This could also involve the participation of the European Space Agency, possibly a tempting detail in view of NASA's recent stressing of international involvement in space

Wetter winter predicted for most

The early snowstorm that fell on the Rockies in mid-October may have signaled a wetter-than-normal winter for most of the United States. Donald L. Gilman, chief of the National Weather Service's Prediction Branch in Washington, D.C., predicts a 55 to 60 percent chance of above-normal precipitation for much of the Rocky Mountain area and for a wide band from Texas to New York. The western and southern states don't show enough strong indicating statistics for forecasters to predict precipitation patterns there.

Similarly, the middle third of the country and the West Coast are left out of the temperature forecast — meaning there is an equal chance of colder or warmer weather in those regions — but milder-than-normal temperatures in the East and colder temperatures in parts of the West could make this an unusual winter, compared with recent years. Gilman places a 65 percent chance of above-normal temperatures on the Eastern Seaboard and gives the greatest chance for colder temperatures to the stretch between the Sierra and Rocky mountains.

Every year the National Weather Service charts a three-month outlook before winter officially descends on Dec. 21. Gilman says this year's forecast was shaped by the usual factors, mainly atmospheric pressure patterns in the Northern Hemisphere. Last year the forecast missed predicting the deviant cold that most of the country felt, but overall, the winter outlooks hold true about 65 percent of the time.



National Weather Service

1984-85 winter outlook

Future predictions might be improved with more weather statistics available from other countries. John H. McElroy of the National Oceanic and Atmospheric Administration, the umbrella organization over the National Weather Service, this week announced the formation of an international program to share more meteorologic satellite data and maintenance, and to cooperate in space activities. The program includes participants from Europe, Canada and the United States. — *C. Mlot*