THE PASCAL DISCOVERY MISSION: A MARS CLIMATE NETWORK MISSION. R.M. Haberle[1], D.C. Catling[2], E. Chassefiere[3], F. Forget[3], F. Hourdin[3], C.B. Leovy[4], J. Magalhaes[5], J. Mihalov[1], J.P. Pommereau[6], J.R. Murphy[7], T. Schofield[8], P. Smith[9], R. Twiggs[10], [1]NASA/Ames Research Center, Moffett Field, CA, [1]SETI Institute, Mt. View, CA, [2]Laboratoire de Meteorologie du CNRS, Paris, [4]University of Washington, Seattle, WA, [5]San Jose State University, San Jose, CA, [6]Service de 'Aeronomie, IPSL, Paris, [7]New Mexico State University, Las Cruces, NM, [8]JPL, Pasadena, CA, [9]University of Arizona, Tuscon, AZ, [10]Stanford University, Palo Alto, CA

The climate of Mars is a major focus of Mars exploration. With the loss of MCO, however, it remains uncertain how it will be achieved. We argue that a truly dedicated climate mission to Mars should have both orbital and landed components, and that these should operate simultaneously for at least 1 Mars year if not longer.

Pascal is Discovery mission that emphasizes the landed component. Its principal goal is to establish a network of 24 small weather stations on the surface of Mars that will operate for 2 Mars years, with an extended mission option for an additional 8 Mars years bringing the total mission lifetime up to 10 Mars years. The stations will collect hourly measurements of pressure, temperature, and optical depth. After delivering the probes to Mars, Pascal's carrier spacecraft will go into an elliptical orbit which will serve as a relay for the landers, and a platform for synoptic imaging. These simultaneous measurements from the surface and from orbit will allow us to characterize the planet's general circulation and its interaction with the dust, water, and CO_2 cycles.

During entry, descent, and landing, each of Pascal's 24 probes will also measure the temperature structure of the atmosphere and acquire images of the surface. These data will allow us to determine the global structure of the atmosphere between 15 and 130 km, and characterize the local terrain to help interpret the landed data. The descent images are part of Pascal's outreach program, as the probe camera system will be developed by faculty-supervised student project. The intent is to generate enthusiasm for the Pascal mission by directly involving students.

Pascal will be launched on a Delta II-7925 in August of 2005. A type I trajectory will deliver Pascal to Mars in January of 2006. On approach, the three-axis stabilized carrier spacecraft will spring deploy the Pascal probes in 4 separate salvo's of 6 each. Global coverage is achieved with small time-of-arrival adjustments in between each salvo. Pascal's probes utilize an aeroshell, parachute, and crushable material for entry, descent and landing. On the surface, their long life and global coverage is enabled by a Micro Thermal Power Source with demonstrated heritage. After all probes are released, the carrier spacecraft will execute a small burn for insertion into an elliptical orbit.

The long lifetime of the Pascal network was chosen in part to maximize the chances that orbital sounding, like that planned with MCO, would occur at some point during the mission. If Pascal is selected for launch in '05, this could occur if MCO-like science is reflown in the '05 opportunity or, if it is reflown in '03, the mission is extended to overlap with Pascal. The combination of temperature sounding from orbit, and surface pressure mapping from the surface will allow a direct determination of the full 3-D wind field for the first time.