

UK Goes Back to Mars with NASA

July 26 2005

On August 10th 2005 NASA's Mars Reconnaissance Orbiter (MRO) will be launched from Cape Canaveral in Florida beginning its journey to the red planet. For scientists from Oxford, Cardiff and Reading it will be an intense time as it will be their third attempt to get their instrument to Mars onboard a NASA spacecraft.

The main aim of the MRO mission is to seek out the history of water on Mars. This will be accomplished by a suite of six science instruments, 3 engineering experiments and 2 science facility experiments. They will zoom in for extreme close up images of the Martian surface, analyse minerals, look for subsurface water, trace how much dust and water are distributed in the atmosphere and monitor the daily global weather.

UK scientists, from Oxford, Cardiff and Reading Universities are involved in the Mars Climate Sounder (MCS) instrument - essentially a weather satellite for Mars. It will profile the atmosphere of Mars detecting vertical variation in temperature, dust and water vapour concentration.

Professor Fred Taylor from Oxford University, who is a co-investigator on the Mars Climate Sounder, explains about why this mission means so much to his team. "The Mars Climate Sounder is an updated version of a previous instrument (the Pressure Modulator Infrared Radiometer) that flew to Mars on NASA's Mars Observer and Mars Climate Sounder missions in 1992 and 1999 respectively. Both of these missions were lost due to technical problems with the spacecraft, so this is a case of third time lucky, we hope!"

He adds, "The instruments are based on Earth observation instruments developed at Oxford in the 1980's and early 1990's with a significant amount of the hardware being built in the UK at Oxford, in collaboration with Cardiff and Reading Universities. The goal of the experiment is to measure temperature, water vapour and dust in the Martian atmosphere with high resolution and full global coverage over at least one full seasonal cycle (2 Earth years). The data will be analysed using computer models of the Martian climate, developed in a collaboration between Oxford University and Laboratoire de Meteorologie Dynamique (LMD) in Paris over the last 20 years."

By feeding the Mars data into the model, diagnostics, and even forecasts, of the Martian climate will be able to be made - using similar methods to those used in monitoring meteorology on Earth. This information will provide a much more detailed picture of the weather systems on Mars, especially the characteristics of the dust storms, all of which will be critical research for future lander missions.

Once reaching Mars in March 2006 MRO will undergo a 6 month period of "aerobraking" which will slow the spacecraft down in the Martian atmosphere taking it into a lower circular orbit for science data collection. Whilst the science operations are scheduled for 2 years the orbiter will be used for further data communication relay activities - up until December 2010. However, there will be enough propellant onboard to remain operational for a further 5 years in Mars orbit - if required to support future missions.

The UK already has a presence at Mars with UK scientists involved in three of the seven instruments on the European Space Agency's (ESA) Mars Express mission, which has been successfully orbiting Mars since December 2003. Since science operations began a wealth of data has been returned (including signs of a frozen sea and the detection of methane in the Martian atmosphere) along with many amazing images of

Martian surface features. Data from Mars Reconnaissance Orbiter will compliment that from Mars Express - with the former as the name suggests, providing more detailed data for identifying potential future landing sites for robotic and manned missions.

Professor Keith Mason, the incoming Chief Executive of the Particle Physics and Astronomy Research Council (PPARC) said, "Mars continues to be the prime focus for the next phase of planetary exploration both in the US and Europe. Through involvement in ESA's Aurora programme UK space scientists and industrialists will play a key role in future robotic missions including in-situ analysis of the Martian soil". Prof. Mason added, " The scientific returns from each mission continue to increase our knowledge of the Red Planet and it's an exciting prospect that Mars Reconnaissance Orbiter could potentially help relay data from future European missions, confirming the international collaboration of space exploration".

Citation: UK Goes Back to Mars with NASA (2005, July 26) retrieved 26 April 2024 from <https://phys.org/news/2005-07-uk-mars-nasa.html>

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