

MDRS Crew 92

“Crew 92 – the best there is”.

Seven people, five nations, one crew. This sums up the experience of MDRS Crew 92 over the two weeks from March 6th-20th 2010.

Lead by MSA Vice President and research director Dr Jonathan Clarke Crew 92 consisted of Dr Katy Hurlbert (NASA Johnson Space Center) in week one, Dr Carol Stoker (NASA Ames Research Center) in week 2, along with Line Drube (Geophysicist and Astrophysicist from the University of Copenhagen) and three French Air Force Second year cadets - Marie Mikolajczak (Human Factors and Safety Officer), Nicolas le Tallec (Crew Engineer, and the Executive Office), and Lindsay Biset-Bentchikou,

The crew experienced several difficulties, the greatest of which was the weather, we were Hab-bound either from rain, sleet, hail or snow, or their aftermath, for more than half our time here. There were also problems with the grey water pumping system, the quad bikes and the main vehicle, which whose brakes had seized up. Despite (or because of) this, morale remained high and the crew had a lot of laughs through their trials.

One feature of the crew was the rotation of roles. Every two days there was a different Duty Officer, referred to as the “Hab Nag”. This was based on experience gained during MSA’s participation in Expedition One (crew 14) in 2003. The Hab Nag’s role was to get us up in the mornings, cook, chair the meetings, ensure people went to bed, close the Hab up at nights, and ensure that someone was in the Hab at all time, usually themselves. Everyone took our turn as Hab Nag. Another important rotated duty was EVA engineer. The EVA engineer checked the radios, prepared the suits and ATVs, supervised EVA planning, and monitored the communications. The EVA engineer role was rotated through the three French Air Force Cadets.

In defiance of the weather and other difficulties the crew was able to achieve most of our crew goals.

Carol Stoker was able to carry out two Ground Penetrating Radar (GPR) profiles over potential future drilling sites and a test line as part of her Drilling on the Moon and Mars in Human Exploration (DOMMEX) Project. The “Backpack Drill” was evaluated in a range of geological materials and its strengths and weaknesses assessed both in and out of Simulation Mode. Cores were returned from the Summerville and Morrison Formation, both interesting Mars analogue units. Several other sites for future testing of the MARTE drill were documented and a new candidate was identified. Drilling is a critical technology in the unmanned and manned exploration of the Moon and Mars as this study will enable better design choices with respect to operations and technology to be made.

Katy Hurlbert was able to sample water sources in the Hab for analysis, including external and internal tanks, the shower\ kitchen and lab taps, toilet flush tank, and the Green Hab. Katy also carried out a comparison of MDRS with other research facilities. A further round of Hab water sampling (excluding the Green Hab) was carried out on her behalf after she left. We wish Katy could have stayed with us long longer. Her work will help in the better operation and utilisation of MDRS in the future.

Line Drube experienced the greatest problems of all our researchers. Her objectives were to study the magnetic properties of lithologies in the project area and to see what magnetic dust particles collected on target magnets identical to those sent to Mars on the Mars Exploration Rover and Phoenix missions, the latter of which is the subject of her PhD research. This was difficult to achieve when weather limited EVAs to study the magnetic properties and the wet conditions resulted in almost no dust being generated. However, on the last day strong winds led

to blowing sand and dust. No magnetic dust was picked up by the magnets. Line also provides extensive photo-documentation and video-footage.

Our three French Air Force Cadets each had their own studies. Marie kept us busy filling out her human factors questionnaires and filming our activities as part of her non verbal communications investigation, as well as providing video coverage generally. Nicolas put the time confined in the Hab to good use, working on developing the software to improve data collection interfaces. Lindsay like Line, was handicapped in his production of anaglyphs, but none the less produced some striking examples, some using the camera onboard the NASA Ames Max rover. Their studies will help their own education and training and provide data for the development of MDRS-based education.

Jonathan was able to collect some new data on landscape evolution of the MDRS area, facies architecture of the Morrison Formation, the geological context of concretion formation, and an improved understanding of the stratigraphy. Exhumed and inverted channels are common on Mars and the MDRS area. The prime example of these, the one which forms Kissing Camel Ridge, proved to be in the upper Morrison Formation, and not part of the Dakota Formation, as reported by earlier papers. Concretions are locally common on Mars, such as the "blue berries" of Meridiani Planum on Mars, and those in the MDRS area help us better understand how their martian counterparts have formed.

The mission would not have been possible without the help of mission support and the mission director, Artemis Westernberg. Another essential contributor to our mission was DG Lusko who aided us through several technical issues involving vehicles and the Hab heaters.

Thanks also to Bernard Foing of ESA for the EuroGeoMoonMars program that enabled the cadets to take part, and Chris McKay of NASA for allowing us to use the Max rover. We also are grateful to Commandant Arnaud Dene of the French Air Force for supervising the cadets. Steve Hobbs of MSA provided our fantastic mission patch.

Dr Jonathan Clarke