JARNTIMARRA 1 SCOUTING EXPEDITION

STEPS TOWARDS MARS THROUGH THE AUSTRALIAN OUTBACK

MEDIA KIT

AUSSIE SPACE SCIENCE IN THE RED CENTRE

The Jarntimarra 1 Scouting Expedition or JNT-1 will be a 14 day working field excursion conducted by Mars Society Australia (MSA) through the arid and ancient terrain of the Red Centre, from the Northern Flinders Ranges in South Australia to Alice Springs in the Northern Territory. The expedition, leaving Adelaide on 27 October and returning there on 9 November, will enable a specialised team of scientists including geologists and astrobiologists to inspect **Martian analogue sites**, evaluate and compare them, and compile data and images for entry into the Jarntimarra database.

What is a Mars analogue site and how can they be used?

Martian analogue sites are simply sites on Earth that possess characteristics similar to environments on Mars They are analogous to Mars, but obviously don't reproduce every environmental characteristic. Research analogue sites on Earth allow testing of a range of hardware items, technology, strategies and human factors which could be used in putting together future human missions to Mars, without leaving the planet. It's cheaper and more efficient to do it this way.

Questions which need to be addressed before we can send humans to Mars include:

- How will crews explore the surface?
- How will they interact with each other, their equipment, the environment and mission controllers in the face of such remoteness?

Analogue research will be the key to answering many of these questions

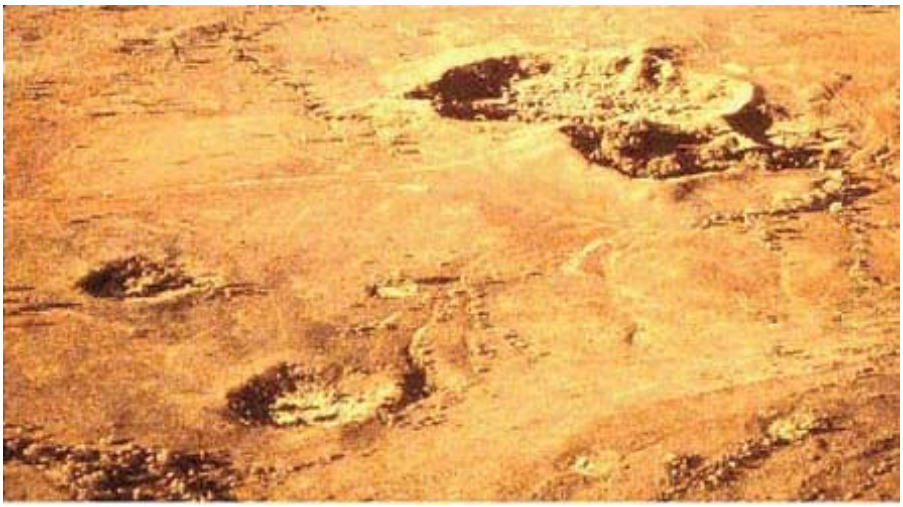
Analogue sites could be used by researchers wanting to prove the functionality, durability and usability of space technology and hardware. *Free-ranging* mission simulations using a suite of realistic analogue hardware and logistics (e.g. communications) could also be used as dress-rehearsals for Mars missions.

Analogue research is therefore all about increasing understanding of and working in the Martian environment by carrying out studies here on Earth!

The Mars Society in the U.S. currently carries out analogue research from a facility on Devon Island in the Canadian Arctic.

Is Australia home to many potential Mars analogue sites?

For years visitors to the Red Centre of Australia have marvelled at its likeness to Mars, and recent motion pictures have used location footage around areas such as Coober Pedy to portray the Red Planet. This visual analogy is strengthened by past and present studies of particular locations that take the similarity a step further. Features have been identified that bear close resemblance to those observed or anticipated on Mars.



While Mars has the largest volcanoes, mountains and canyons found in the Solar System, its surface on average is predominantly flat, rock strewn desert peppered with impact craters retaining a record of early formation more than 3.8 billion years ago. Geomorphologic similarity, particularly between the northern lowland plains and central Australian deserts has been the subject of a number of studies.

One geological target will be meteorite craters, which are an abundant feature on Mars. Older rock units are generally overlain by younger deposits. If there was a time in Martian history when the climate was warmer and wetter, any remaining evidence is probably covered by more recent layers, and thus cannot be seen from the surface. This makes impact craters useful to study because they can provide a cross-section through sediment layers to the underlying material. Other features seen on Mars include dune and alluvial flood plain systems. Using aerial photographs and remotely sensed data as a basis for further investigation, the science team will guide the expedition to areas of interest for closer study.

All of this field simulation entails a good deal of surface exploration, and probably subsurface drilling. Much of the Red Centre has rarely seen human footprints. This provides a fertile hunting ground for a range of scientific activities to capitalise on field time. These include studies in the disciplines of geology, palaeontology, and atmospheric science. With just enough isolation to enforce appropriate Mars-like constraints, yet within relatively ready reach of infrastructure and services, Central Australia provides one of the best free-range Mars analogue field stages in the world. Analogue crews could roam freely across vast swathes of the Red Centre.

A key focus of the expedition will be to find areas with as many **Mars-like attributes** as possible, for use in future analogue research.

FREQUENTLY ASKED QUESTIONS AND ANSWERS

What is Project Jarntimarra?

Project *Jarntimarra* (meaning "star" in the Aboriginal Warlpiri language of central Australia) involves setting up a comprehensive database of Australian localities of interest for Mars analogue research. Version I of the database is available for use by the general public and researchers alike, free of charge from the MSA Website (http://www.marssociety.org.au).

The purpose of the database is to:

1. Provide a list of localities of interest for Mars analogue activities.
2. Provide comprehensive information for these localities, to help Mars researchers assess the value of these to their activities and facilitate their use for analogue research.
3. Demonstrate pro-active leadership by MSA and strengthen its scientific credentials with a view to establishing closer links with organisations planning Mars missions, such as NASA.
4. Provide a basis for locality selection for MSA field operations.

Who is running Project Jarntimarra?

Project Jarntimarra is one of a suite of five projects forming the Technical Programme of MSA, otherwise known as Operation Red Centre (ORC).

What are the objectives of JNT 1?

The objectives (in order of priority) are to:

- Demonstrate a commitment by MSA to establishment of Mars-Oz (an analogue research facility) in Australia.
- Identify a locality suitable for initial placement of Mars-Oz and the ORC02 field campaign.
- Build contacts and local knowledge in the chosen location to facilitate ORC02.
- Mobilise a core group of Australian scientists as part of an ongoing effort by MSA to facilitate communication and build bridges amongst the local Mars research community.
- Survey localities in central Australia for entry in the Jarntimarra database, collecting images and recording observations and measurements (and where appropriate taking samples for characterisation) with a view to future field exercises.
- Build contacts and local knowledge around these various localities to facilitate future field activities
- Demonstrate field activity to members, increasing retention and adding value to MSA membership.
- Raise the public profile of MSA and alert the scientific community to our objectives.

Who is joining the expedition?

A biography of each member of the science party is included at the back of this press kit.

Where is the expedition going?

The primary waypoints are as follows:

Primary Waypoints	Outline
1	Adelaide. A convoy of four 4WD vehicles containing the support party, equipped with radios, GPS, food, camping and emergency equipment will arrive from Nhill in Victoria to pick up members of the science party, some flown in from various cities. An additional 1-2 vehicles may join the convoy with press, photographers and MSA members. First overnight stop is Woomera, site of rocket launches.
2	Coober Pedy. The group will visit The Breakaways, Painted Desert and Moon Plain areas. The area is very prospective in terms of fossiliferous rock and as a free ranging Mars simulation locality.
3	Oodnadatta and Dalhousie. On the way, Pedirka provides some of the roughest, stoniest, barest country seen. The Witjira National Park surrounding Dalhousie provides additional stony landscapes.
4	Simpson Desert. This is a challenging leg through dunes and alluvial flood plains of interest, providing a glimpse of the western side of the Simpson Desert.
5	Henbury Craters.
6	Sturt Stony Desert. The group will connect with the Birdsville Track around 100 km south of Birdsville, viewing bare claypans, dry lakes, dune systems, stony plains, the Mingerannie Gap, and sand hills. Artesian bores will be examined and possibly sampled. This is a highly prospective area for free ranging analogue field work.
7	Innamincka. The trip to Innamincka will allow viewing of the Cobbler Desert and areas around the town that may be suitable for future analogue activities.
8	Arkaroola. Prof Malcolm Walter will join the expedition for 2-3 days and will provide a site tour of Mt Painter. Doug Sprigg will fly some members of the science party on an aerial survey of the region and the remaining time will be spent identifying a suitable location for Mars-Oz and ORC02. The group will participate in astronomy sessions in the evenings at the Arkaroola observatory and the science party will give presentations on their Mars research interests.

Where can I get a copy of the itinerary?

A copy will be available on the MSA Website (http://www.marssociety.org.au).

What are the opportunities for media involvement in Project Jarntimarra?

There will be media events promoting JNT-1 in Adelaide, Arkaroola in the Flinders Ranges and the NT outback in Alice Springs.

For more information or to get on the MSA press release mailing list, email PR Director Jennifer Laing at pr@marssociety.org.au

Who is the major sponsor of JNT-1?

Project Jarntimarra is being sponsored by U.K. aerospace company Starchaser Industries, which began life as an experimental rocket test programme set up by founder Steve Bennett in 1992. Eleven out of twelve of their rocket launches have been successful, and the Starchaser team have officially entered the X-Prize competition in 1997 to build and launch a privately funded vehicle capable of lifting a crew of 3 to 100 kilometres altitude and returning them safely to Earth.

For more information, see the Starchaser Website (http://www.starchaser.co.uk).

Is NASA involved in JNT-1?

Two of the participants in JNT-1 work for NASA – Dr Carol Stoker and Dr Larry Lemke. However they are taking part in JNT-1 in their capacity as private individuals, rather than as NASA representatives.

What is the Mars Society Australia and how can I join them?

Initially Australians could only join the Mars Society by joining the US organisation, which is done via the US website. At the first Annual General Meeting held in March 1999 a separate category of Australian financial membership was established to make membership cheaper and simpler for Australians. A simplified version of the US Mars Society Rules were adopted and a national executive steering committee was formed.

MSA became incorporated in October 2001 and has approximately 100 members located throughout the country. Membership forms can be found on the MSA Website (http://www.marssociety.org.au).

What is the Mars Society and how did it start?

In 1997, widespread support for human exploration of Mars crystallised at a convention in Boulder, Colorado into *The Mars Society*. This new non-profit organisation brought together space scientists and engineers, professionals and enthusiasts committed to encouraging and facilitating increased exploration and future human colonisation of Mars.

Led by President, Dr Robert Zubrin, the Society quickly raised around US$1 million in donations, grants and sponsorship to begin the first of several phases of escalating technical activities. The first phase, Earth bound analogue research, is intended to build a knowledge base to improve planning of the first human missions.

Why should we send humans to Mars?

The successful landing of astronauts on the Moon, Project Apollo, regarded by many as the seminal technical achievement of mankind, also heralded the beginning of a thirty year malaise at the new frontier. Rather than build on those first steps and press home the

benefits awaiting a human presence beyond Low Earth Orbit (LEO), the United States space programme was swept up in the development of the Space Shuttle and the International Space Station.

Yet the children of Apollo would not forget. As Australian-born astronaut Andy Thomas said in a recent interview, "[A manned mission to] Mars is going to be one of the great human undertakings, it's going to be on a par with the moon landings."

Mars could have life. Sending humans to Mars could put beyond doubt the question of whether or not we are alone in the Universe. We have found organisms called *extremophiles* thriving in the most extraordinary places on Earth, indeed we have found nanometer sized entities (*nanobes*) kilometres within the crust that appear to be alive yet defy conventional biological definition. It is even possible that life on Earth originated from such depths, or even that life originated on Mars and was carried here by impact debris like some celestial taxi ride. Debate rages as to whether asteroids found on Earth such as ALH84001, of known Martian origin, contain evidence of this cross-pollination.

What is more, Mars has water, frozen mainly at its poles. And where there is water, there can conceivably be life. Some scientists believe great oceans of liquid water once existed on Mars for long enough to allow the evolution of cellular organisms. If they are right, we should be able to find evidence of this extant life in a Martian fossil record.

Recent spacecraft such as Pathfinder have provided further insights, but raised many more questions. We see familiar geological features but paradoxically are at a loss to explain their origin. Channels have been carved by great outflows, but was the agent water or something else? Outbursts from ridges have recently come to our attention thanks to Mars Global Surveyor, but what created these? What secrets lie in the geologic record of the Red Planet?

With so many important questions, why then send robots to do a human's work? Only intuitive, dextrous, adaptable human crews can satisfy our curiosity and provide us with real benefits here on Earth by living, working and exploring Mars.

What is Australia's role in all this?

The MSA Technical Programme is providing Australians with opportunities to participate in the greatest exploration initiative of our lifetime. MSA also aims to partner with local firms to facilitate the development, testing and marketing of niche technologies with untapped applications for future Mars missions. This scheme will focus on areas in which Australia already excels, for example renewable energy, waste regeneration, satellite communications methods, and mineral exploration, to name but a few.

Australia has no space programme, nor any real space commitment compared with many similar nations. This is despite an abundance of comparative advantages. MSA is working with its international partners to undertake a comprehensive, world-first Mars analogue research programme. By-products will include even greater international and national media coverage, and a clear demonstration that Australia can get into space without ever leaving the ground. We can play a significant role in the journey to Mars.

Where can I find out more about the Mars Society Australia Technical Programme?

From the MSA Website (http://www.marssociety.org.au).

What is Operation Red Centre?

Operation Red Centre (ORC) is the flagship of MSA's Technical Programme. The human journey to Mars starts here, on the oldest continent, where we will undertake comparative research and test surface exploration strategies and technologies in Mars analogue locations. Our vision is to position Australia for a role in establishing a human presence on Mars.

The five projects forming Operation Red Centre are:

- Jarntimarra.
- Mars Oz.
- Marsupial.
- SAFMARS
- MarsSkin.

In the southern spring of 2002, all these projects (Marsupial, Mars-Oz, SAFMARS and Mars Skin) will come together for the first major Australian Mars analogue field exercise – Operation Red Centre 2002 (ORC02).

What is Project Mars Oz?

The international Mars Society has established a research station on Devon Island in the Canadian Arctic. It's designed to be 'flight-like', similar to the kind of planetary entry, descent and landing habitats used in leading humans-to-Mars mission proposals. These allow realistic simulations to help test mission planning. Three additional stations are proposed to be built around the world.

An Australian Mars Research Station (Mars Oz) would allow local and international researchers to help answer critical questions related to human Mars missions and will raise awareness of the opportunities awaiting us at the Red Planet.

Will there be an analogue research station in the Outback (Mars Oz) at some stage?

We hope so! However, before this happens, we need various things in place such as:

1. Additional funding (sponsorships/research grants/donations) of at least AU$500,000.
2. A science plan to outline in detail what useful science will be done at the facility.
3. People to manage the project on the ground for periods of weeks or months at a time, depending on usage.

Will astronauts train at Mars Oz?

There are no concrete plans for this at the moment.

What is Project Marsupial?

MSA was one of three teams (including the University of Toronto/MIT and the University of Michigan) provided with seed funding by the Mars Society to develop a Mars pressurised rover simulation platform. As part of Project Marsupial, MSA will create a family of all terrain exploration vehicles, intended to assist with the design of future Mars rovers. The Human Operations Prototype (HOP) is the first vehicle in the series and is currently being built in Brisbane. It will incorporate and test a novel dust containment mechanism, amongst other design features.

What is Project SAFMARS?

This project is developing portable ground stations allowing message-based communications between remote field crews and an online mission control. The **S**tore and **F**orward **M**ars **A**nalogue **R**esearch System or **SAFMARS** will test protocols and technologies analogous to the kind of lightweight microsatellite system planned for use on Mars to provide low level communications and service remote autonomous science stations.

What is Project Mars Skin?

Mars Skin is developing a series of suits analogous to the innovative Mechanical Counter Pressure (MCP) suit demonstrated for NASA in the 1960's. Surprisingly little interest has been shown in this concept over the past three decades, although in recent years Honeywell have received limited NASA funding to re-visit the concept (unfortunately continued funding seems doubtful). The MCP employs elastic garments rather than internal suit gas pressure offering the wearer greater flexibility and dexterity, reduced energy expenditure and reduced life support requirements while working in a near-vacuum environment. MSA believes there is merit in the MCP concept and plans to lead a resurgence of interest in their use on Mars by developing and testing analogue and real MCP suits and technology.

Where can I get further information about MSA or JNT-1?

Look at the MSA Website (http://www.marssociety.org.au) or contact:

Jennifer Laing
PR Director
Mars Society Australia

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BIOGRAPHY OF PARTICIPANTS (SCIENCE PARTY) – JNT-1

Dr Carol Stoker, Research Scientist, NASA Ames Research Center, USA

Dr. Carol Stoker is a planetary scientist in the Space Sciences Division at NASA Ames Research Center, Moffett Field, CA. She received her Ph.D in AstroGeophysics from the University of Colorado in 1983. At NASA since 1985, she has done theoretical and experimental research on a variety of problems related to the origin, evolution, and search for life in the solar system. She is actively involved in planning for robotic and human exploration of Mars. Since 1990, Carol has led a NASA Ames project to develop telepresence and virtual reality technology for mission operations and scientific visualization to enhance control of mobile rovers on the surfaces of other planets. This work has focused on using telepresence-controlled scientific exploration vehicles to perform field studies of space-analogue environments on the Earth. She was a participating scientist on the Mars Pathfinder project where she provided a three-dimensional interactive virtual reality model of the Pathfinder landing site as an enhancement to science operations. Carol previously worked with the Voyager imaging team for the twelve year mission of exploration of the outer solar system where she studied the atmospheres of the outer planets. She edited Strategies for Mars: A Guide to Human Exploration (1996) and has been a member of crews working on Mars analogue activities on Devon Island, most recently in summer 2001.

Dr Larry Lemke, Research Engineer, NASA Ames Research Center, USA

Prior to completing degrees in aeronautics and astronautics from Stanford University, Larry completed degrees in physics and in psychology. He is an engineer with the NASA Astrobiology and Spacer Research Directorate at NASA Ames Research Center in California. Larry is currently the Special Assistant for Strategic Planning, responsible for defining, acquiring and managing advanced space and astrobiology missions, with emphasis on Mars exploration. Previously, Larry was Chief of the Advanced Projects Branch of the Space Projects Division, responsible for supervising professional staff carrying out the Center’s programme of advanced space missions. Projects included planetary science, life science, Earth orbital and hypersonic flight missions. Also, he has been individually responsible for conceiving and leading advanced space missions studies within the Space Projects Division. Larry has also been a member of crews working on Mars analogue activities on Devon Island, most recently in summer 2001.

Professor Malcolm Walter, Director, Australian Centre for Astrobiology & Macquarie University

Malcolm Walter is Adjunct Professor of geology at Macquarie University in Sydney, Director of the Australian Centre for Astrobiology based at that university, and Director of M. R. Walter Pty Ltd. He has worked for 35 years on the geological evidence of early life on Earth, including the earliest convincing evidence of life. Since 1989 he has been funded by NASA in their "exobiology" and "astrobiology" programs, focussing on microbial life in high temperature ecosystems, and the search for life on Mars. During 1999 his book "The Search for Life on Mars" was published by Allen & Unwin. Professor Walter has published more than 100 articles and several other books. He also works as an oil exploration consultant and a consultant to museums, and is currently curator of a special Centenary of Federation Space Exploration Exhibition.

Dr Vic Gostin, Associate Professor, School of Geology and Geophysics, University of Adelaide

A graduate of Melbourne University, and a Ph.D. from ANU, Canberra, Dr Gostin has been actively interested in geology and astronomy since his high school days. He has lectured in geology at Adelaide University for 31 years. He has wide research interests including sedimentology, environmental geology, planetary geology (especially of Mars), meteorites and meteorite impacts. In 1985 he identified a unique layer in the ancient rocks of the Flinders Ranges formed by a giant meteorite impact splatter. This extensive layer was derived from Australia's largest meteorite impact at Lake Acraman (Gawler Ranges), and this exciting discovery turned his attention to the study of meteorites, the effects of giant impacts, and to planetary geology. As a result he has been honoured by having an asteroid named after him. Dr Gostin has recently compiled a book dealing with Australian environmental geoscience.

Dr Jonathan Clarke, Researcher, CRC for Landscape, Environment and Mineral Exploration, Australian National University

Dr Clarke is a geologist with experience in the mineral and petroleum industry, academia, and in government surveys. He has worked in every state of Australia. mostly in the arid interior. In addition he has practiced geology in New Zealand, the Philippines, and the Atacama desert of northern Chile, one of the most Mars-like areas on earth. Dr Clarke presently works for the CRC for landscape, Environment, and Mineral Exploration (LEME), studying the history and evolution of the Australian landscape. Current research interests include: history of aridity in the Atacama desert, the distribution of biogenic opal in the regolith, the palaeogeography of the Nullarbor sea during the Eocene, and the evolution of the landscape of the SE Yilgarn in WA and SW Gawler craton in SA.

Dr Graham Mann, Senior Lecturer, School of Information Technology, BITL, Murdoch University

Dr Mann is an engineer, specialising in robotics and human-machine interactions. After taking a psychology degree and doing research in psychophysiology at the University of WA's Biofeedback Laboratory, he moved to the University of NSW, to study for a Master's degree in cognitive science, and later a PhD in artificial intelligence. Dr Mann has designed and built a number of innovative robots, including a walking biped and a domestic floor-cleaning machine.

Jason Hoogland, Doctoral Student, Centre for Hypersonics, University of Queensland

Jason is a PhD student in Mechanical Engineering at the University of Queensland. His Doctoral thesis is investigating the aerothermodynamic influence of pyrolysis injection on ablative super orbital entry heat shield flowfields. This involves simulation using scaled models in the new X3 expansion tube at the Centre for Hypersonics, one of the worlds fastest "wind tunnels". Prior to this he worked as a Graduate Engineer with Robe River Mining Company, based in Perth. This involved R&D on vibrational removal of fines from lump iron ore, and design and management support for a AU$9 million Lump Rescreening Plant. Jason has a BE (Mech, Hons) from the University of Western Australia and a BSc (physics) from the University of Melbourne. He developed the Mars Society Australia technical programme, and is MSA Technical Director. Jason is also active in the Institution of Engineers, Australia.

James Waldie, Masters Student, School of Aerospace Engineering, RMIT University

James Waldie has just finished a stint as Research Scholar at the University of California San Diego's Space Physiology Laboratory. He was looking at how to make spacesuits more comfortable in space, yet still able to counteract the negative effects on the body of living in microgravity, such as bone loss and fluid shifts. James' work has attracted interest from across the globe, and could eventually have important commercial application, particularly if predictions of a growth in space tourism come to fruition. He will be bringing along some gloves of a new NASA/Honeywell mechanical counter-pressure (MCP) suit which exerts external pressure to the body via a tight elastic compression garment rather than gas pressurisation as currently used in spacesuits. The new glove is more dexterous and James hopes to be able to use the gloves with common sampling/scientific tools to demonstrate this advance.

Matilda Thomas, Research Assistant, Australian Centre for Astrobiology & Macquarie University

Matilda is a research assistant with the Australian Centre for Astrobiology (ACA) which was recently affiliated with the NASA Astrobiology Institute based in the US. In 2000 she completed an honours degree in geology at Macquarie University on the hyperspectral analysis of ancient hydrothermal deposits, making her Australia's first astrobiology graduate. This work involved collaboration with CSIRO's Mineral Mapping Technology Group and examined the application of hyperspectral mapping techniques. She compared the ancient hydrothermal deposit at Mount Painter, her field study area in the rugged Northern Flinders Ranges of South Australia, with possible Martian analogues. Matilda has also worked as a research assistant in the field of satellite communications and remote sensing for the Space Exploration Exhibition. Matilda has extensive experience as a caver and rock-climber in Australia and New Zealand.