

# 2018 Australian Space Research Conference

## Monday September 24

08:00-09:00 **Registration**

09:00-09:30 Opening and welcome to ASRC

### Plenary Session I

09:30-10:00 Dr Megan Clark, Australian Space Agency

10:00-10:30 Prof Stuart Phinn, University of Queensland

10:30-11:00 ***Morning Tea***

### National Context

11:00-11:15 Prof Frederick Menk, Australian Academy of Science

11:15-11:30 Trent Kershaw, Geoscience Australia

11:30-11:45 Julia Mitchell, FrontierSI

11:45-12:00 Dr David Lingard, Defence Science and Technology Group

12:00-12:15 Dr Michael Terkildsen, Bureau of Meteorology Space Weather Service

12:15-12:30 Prof Russell Boyce, University of New South Wales

12:30-13:00 Dr. David Williams, CSIRO

13:00-14:00 ***Lunch***

### Monday - Stream 1

#### Earth Observations and Space Physics I

14:00-14:15 Dr John Le Marshall, Bureau of Meteorology

14:15-14:30 Dr Eriita G. Jones, University of South Australia

14:30-14:45 Prof Iain Reid, ATRAD Pty Ltd and University of Adelaide

14:45-15:00 Aidan O'Brien, Saber Astronautics

15:00-15:15 Prof Iver Cairns, University of Sydney

15:15-15:30 Dr Alina Donea, Monash University

15:30-16:00 ***Afternoon Tea***

16:30-18:30 ***Poster Session/Cocktail function***

19:00-20:30 **MSA "David Cooper" memorial lecture by I**

### **Monday - Stream 2**

#### **Space Engineering I**

14:00-14:15 Matthew Richardson, University of Tokyo

14:15-14:30 Sholto Forbes-Spyratos, University of Queensland

14:30-14:45 Fabian Zander, University of Southern Queensland

14:45-15:00 Damian Curran, University of Queensland

15:00-15:15 Nick Mclean, Gilmour Space

15:15-15:30 Robert Brand, Thunderstruck Aerospace

15:30-16:00 ***Afternoon Tea***

16:30-18:30 ***Poster Session/Cocktail function***

19:00-20:30 **MSA "David Cooper" memorial lecture by I**

### **Monday - Stream 3**

#### **Aerospace Medicine and Life Sciences I**

14:00-14:15 David Keenan, HDR

14:15-14:30 Vienna Tran, University of Adelaide

14:30-14:45 Natalie Rens, Spaceport AI

14:45-15:00 Julie Hides, Griffith University

15:00-15:15 Dr Jonathan Clarke, Mars Society Australia

15:15-15:30 Prof. Brian J. O'Brien, University of Western Australia

15:30-16:00 ***Afternoon Tea***

16:30-18:30 ***Poster Session/Cocktail function***

19:00-20:30 **MSA "David Cooper" memorial lecture by I**

## Tuesday September 25

08:00-09:00

**Registration**

### Plenary Session II

09:00-09:30

Dr Gordon Cable, Australasian Society of  
Aerospace Medicine

09:30-10:00

Dr Mark Cheung, Lockheed Martin Solar and  
Astrophysics Laboratory, Stanford University

10:00-10:30

Prof Melissa de Zwart, University of Adelaide

10:30-11:00

***Morning Tea***

### Tuesday - Stream 1

#### GNSS

11:00-11:20

Matt Higgins, President IGNSS Society

11:20-11:40

Yanming Feng, Queensland University of  
Technology

11:40-12:00

Robert Norman, RMIT University

12:00-12:20

Kirco Arsov, Australian Bureau of  
Meteorology, Space Weather Services

12:20-12:40

Eamonn Glennon, University of New South  
Wales

12:40-13:00

Zahra Bouya, Australian Bureau of  
Meteorology, Space Weather Services

13:00-14:00

***Lunch***

#### Space Physics II

14:00-14:15

Timothy Kodikara, RMIT University

14:15-14:30

Joshua Williams, University of Newcastle

14:30-14:45

Liam Warden, University of Newcastle

14:45-15:00

Changyong He, RMIT University

15:00-15:15

Andong Hu, RMIT University

15:15-16:00

***Afternoon Tea***

#### Aerospace Medicine, Life Sciences, Astrobiology and Planets

16:00-16:15

Dr Tim Squire, Canberra Hospital &  
University of Notre Dame Australia

16:15-16:30

Meg O'Connell, Queensland University

16:30-16:45	Dr Shane Usher, University of Melbourne
16:45-17:00	Dr Aditya Chopra, Australian National University
17:00-17:15	Christopher Tylor, University of Southern Queensland
17:15-17:30	Dr Lucyna Kedziora-Chudczer, University of New South Wales
17:30-17:45	Prof Jonti Horner, University of Southern Queensland

***Gala Dinner. Presentation by Prof Brian O'Brien.***

## **Tuesday - Stream 2**

### **Space Missions I**

11:00-11:30	Andreas Antoniadis, Saber Astronautics
11:30-11:50	Dr Kimberley Clayfield, CSIRO Astronomy and Space Science
11:50-12:10	James Harpur, University of Sydney
12:10-12:30	Iver Cairns, ARC Training Centre for CubeSats, UAVs, and Their Applications,
12:30-12:50	Chris Peck, Defence Science Technology Group

12:50-14:00 ***Lunch***

### **Space Business and Industry**

14:00-14:20	Prof Phil Bland, Curtin University
14:20-14:40	Greg Madsen, Lockheed Martin
14:40-15:00	Mark Ramsey, Sitael Australia
15:00-15:20	Timothy O'Sullivan, Defence Export Controls, Department of Defence
15:20-15:40	Jannene Kyytsonen, University of Technology Sydney

15:30-16:00 ***Afternoon Tea***

### **Space Engineering II**

16:00-16:15	Dr Hideaki Ogawa, RMIT University
16:15-16:30	Prof. Iver Cairns, The ARC Training Centre for CubeSats, UAVs and Their Applications
16:30-16:45	Joshua Kahn, University of New South Wales

16:45-17:00 Alexander Ryan, University of New South  
Wales

17:00-17:15 Peter Anastasiou, Inovor Technologies

17:15-17:30 Dominic Albertson, University of Sydney

17:30-17:45 Julian Guinane, University of Sydney

***Gala Dinner. Presentation by Prof Brian  
O'Brien.***

## Tuesday - Stream 3

### Space Law

- 11:00-11:15 Dr Elias Aboutanios, ACSER, UNSW Sydney
- 11:15-11:30 Stacey Henderson, University of Adelaide
- 11:30-11:45 Duncan Blake, University of Adelaide

### Space Law Professional Development Series

- 11:45-12:00 Stacey Henderson, University of Adelaide
- 12:00-12:15 Bora Kaplan, Sydney Bar
- 12:15-12:30 Melissa deZwart and Dr Stacey Henderson, University of Adelaide
- 12:30-12:45 Timothy O'Sullivan, Defence Export Control Office
- 12:45-13:00 Dr Maria A Pozza, GQ Law - New Zealand

13:00-14:00 ***Lunch***

### Space Law Professional Development Series II

- 12:30-12:45 Joel Lisk, University of Adelaide
- 14:15-14:30 Duncan Blake, University of Adelaide
- 14:30-14:45 Bora Kaplan, Sydney Bar and Tunc Kaplan, Western Sydney University
- 14:45-15:00 Tyson Lange, Clayton Utz
- 15:00-15:15 Karina Galliford, International Aerospace Law & Policy Group
- 15:15-15:30 Tunc Kaplan, Western Sydney University

15:30-16:00 ***Afternoon Tea***

### Space Law Professional Development Workshop

- 16:00-17:00 Duncan Blake, International Aerospace Law and Policy Group

***Gala Dinner. Presentation by Prof Brian O'Brien.***

**Wednesday September 26**

08:00-09:00      **Registration**

**Plenary Session III**

09:00-09:30      Danielle Shean, Victorian Space Science  
Education Centre

09:30-10:00      Katarina Miljkovic, Curtin University

10:00-10:30      Adam Gilmour, Gilmour Space Technologies

10:30-11:00      ***Morning Tea***

**Wednesday - Stream 1**

**Education, Culture and History**

11:00-11:20      Kerrie Dougherty, University of New South  
Wales

11:20-11:40      David Platz, University of Southern  
Queensland

11:40-12:00      James O'Connor, University of Southern  
Queensland

12:00-12:20      Carla Guedes, University of New South  
Wales

12:20-12:40      Robert Fuller, University of New South  
Wales

12:40-13:00      Kerrie Dougherty, University of New South  
Wales

13:00-14:00      ***Lunch***

**Space Physics III**

14:00-14:15      Dr Brett Carter, RMIT University

14:15-14:30      Dr Julie Currie, RMIT University

14:30-14:45      Prof Frederick Menk, University of  
Newcastle

14:45-15:00      Dr David Netherway, Defence Science and  
Technology

15:00-15:15      Dr Michael Turley, Defence Science and  
Technology

15:15-15:30      Dr Kenneth Lynn, Ionospheric Systems  
Research

15:30-16:00      ***Afternoon Tea***

**Town Hall Discussion**

16:00-17:00      **Australia's future space science program - pr**

***Close***

## Wednesday - Stream 2

### Space Engineering III

11:00-11:15	Joon Wayn Cheong, University of New South Wales
11:15-11:30	Natalie Stevens, DST Group
11:30-11:45	Hao Duong, DST Group
11:45-12:00	Garland Hu, DST Group
12:00-12:15	Paul Alvino, DST Group
12:15-12:30	Gavin Conibeer, University of New South Wales
12:30-12:45	David Gozzard, Australian National University
12:45-13:00	Robert Eldridge, University of Queensland

13:00-14:00 ***Lunch***

### Space Entrepreneurs

14:00-14:15	Noor Taofiqul Huq, Spiral Blue
14:15-14:30	William Crowe, High Earth Orbit Robotics
14:30-14:45	Conrad Pires, Picosat Systems
14:45-15:00	Benjamin Koschnick, Spectral Aerospace
15:00-15:15	Bryce Prior, Leo Aerospace
15:15-15:30	John Weir, University of Southern Queensland

15:30-16:00 ***Afternoon Tea***

### Town Hall Discussion

16:00-17:00	<b>Australia's future space science program - pr</b>  <b><i>Close</i></b>
-------------	---

## Wednesday - Stream 3

### Mars



11:00-11:30	Mitchell Schulte, NASA Headquarters
11:30-11:45	Robert Brand, Mars Society of Australia
11:45-12:00	Eriita Jones, University of South Australia
12:00-12:15	Jeremy Bailey, University of New South Wales Sydney
12:15-12:30	Graziella Caprarelli, Hypatia Scientifica Pty Ltd
12:30-12:45	Devyani Devidas Gujar, SRMIST Institute of science and technology, India
12:45-13:00	Steven Hobbs, Mars Society of Australian and UNSW

13:00-14:00 ***Lunch***

### **Space Missions II**

14:00-14:20	Trevor Ireland, Australian National University
14:20-14:40	Simon Barraclough, University of New South Wales Canberra
14:40-15:00	Stevie Nuss-Soeharto, RMIT University
15:00-15:20	Brett Carter, RMIT University

15:30-16:00 ***Afternoon Tea***

### **Town Hall Discussion**

16:00-17:00	<b>Australia's future space science program - pr</b>  <b><i>Close</i></b>
-------------	---

### **Poster Session: Monday 16:00 - 18:00**

Brett Addison, University of Southern Queensland

Stephen Bathgate, University of Sydney

Nahid Kermani, University of NSW

Bradley Carter, University of Southern Queensland

Shuai Chen, Nanjing University of Science and Technology

Dr Julie Currie, RMIT University

Dag Evensberget, University of Southern Queensland

Kenneth Gillan, DigitalGlobe

Yanming Feng, Queensland University of  
Technology

Steven Hobbs, Mars Society Australia

Jonathan Horner, University of Southern  
Queensland

Jonathan Nalder, FirstonMars.net

Behrooz Karamiqucham, University of NSW

Vasily Lobzin, Bureau of Meteorology

Shaun Moss

Edwin G. W. Peters, UNSW Canberra Space

Danielle Shean, Victorian Space Science  
Education Centre

Nam Nghiep Tran, University of Adelaide

Baptiste TROTABAS, 1995

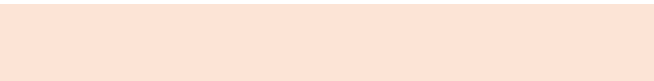
Ivan Voropaev, Wave Power Engineering

Kehe Wang, Bureau of Meteorology

## Research Conference Program

"Australia's Strategic Priorities in Space"

Linking Upstream and Downstream Using Australia's Earth Observation Capabilities



National Committee for Space and Radio Science update

Digital Earth Australia - From Satellites to Insights

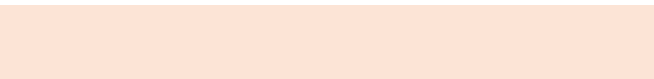
FrontierSI and SBAS Test-bed Project Update

Update on the Space Science and Technology Strategy for Australian Defence

Australian Bureau of Meteorology Aviation Space Weather Services

UNSW Canberra Space Program

CSIRO's Space Activities and the CSIRO Space Roadmap



New Generation Earth Observations from Space - Current and Future Benefits and Opportunities

A Recipe For Improving the Automated Detection of Vineyards From Space.

Ground based observations of the near space environment

Autonomous recreation of missing data in space weather sensors

Beam Speeds and Source Longitudes for Type III Solar Radio Bursts from Magnetic Mapping Analyses  
Modelling Magnetic-Polarities of Active Regions Using Helioseismic Data: impact into space weather



**Dr Mitch Schulte, Mars Program Scientist, NASA**

Integrated System-level Modelling of a Reusable  
LH2/LOx-fed Expander-bleed Cycle Rocket Engine  
Mission Design and Simulation of a Rocket-Scramjet-  
Rocket Launch System  
Rocket Manufacturing in South-East Queensland

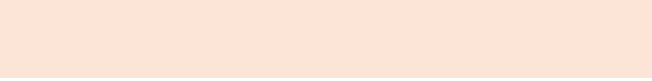
Numerical Investigation of a Fixed-Geometry  
Scramjet Inlet across an Accelerating Trajectory for  
Hybrid Rockets

The Jump2 Launch System



**Dr Mitch Schulte, Mars Program Scientist, NASA**

Designing the The Human Health and Performance  
(HHP) Laboratory  
How does the spacecraft environment increase host  
susceptibility to infectious diseases?  
Towards an intelligent biometric device for holistic  
astronaut health  
Changes in trunk muscle size in response to  
microgravity: possible implications for low back pain  
A survey of medical questions facing crewed Mars  
missions  
Risk Management Of Dust On The Moon: 2018  
Updated Measurement-Based Case Studies

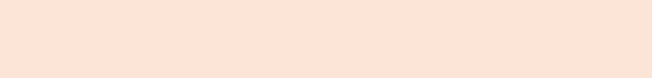


**Dr Mitch Schulte, Mars Program Scientist, NASA**

## Australia's Contribution to Space Life Sciences

Physics and Diagnostics of the Solar Drivers of Space Weather

Commercialisation of space: innovation versus domestic legislation?



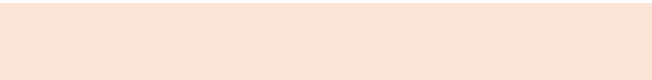
Recent Developments and Future Trends in Satellite Positioning – Increasing Ubiquity and Increasing Risk

Determination of GNSS positioning integrity and timeless requirements for connected and automated  
Ionospheric features causing anomalous GNSS radio occultation results

Geomagnetic storm impact on GNSS performance; case study Australia

FPGA Based GPS Receivers Designed for Cubesats - Applications & Performance

Method for estimating foF2 from GPS/TEC



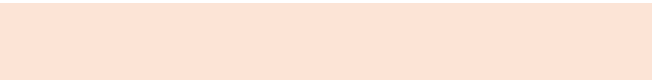
Numerical Investigation of the Density-Temperature Synchrony in the Thermosphere

The modulation of EMIC waves in the inner magnetosphere

Ultra-Low Frequency wave correlations between Van Allen E-B measurements and conjunct ground

Impact of the equatorial mass anomaly and midnight density maximum on the low Earth orbit dynamics

Using an Artificial Neural Network (ANN) to Model Global hmF2, NmF2 and VSH Based on Long-Term



Mars radiation exposure risks - The shielding effect of a graphene space suit and a storm shelter during  
Strategies for reducing Astronaut Radiation Exposure

Radiation Shielding: Novel use of scattering phenomena

What can AI tell us about life in the universe?

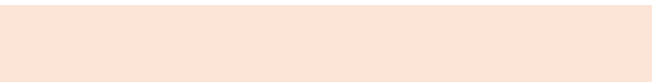
The Implications of the Orbital Dynamics of Jupiter's Satellite System on the Habitability of Exomoons  
Effects of Hazes and Clouds on Exoplanetary Spectra

MINERVA-Australis: An Update



Australian Space Weather Satellite: A Proposal for a National Collaborative Spacecraft Mission.  
CSIRO's Small Satellite Initiatives

The 'Training Centre for CubeSats, UAVs and Their Applications', and its first satellite, CUAVA-1  
Status of INSPIRE-2 and Evidence for Space Weather Effects  
Buccaneer Risk Mitigation Mission – DST Lessons Learned



FireOPAL: Toward a Low-Cost, Global, Coordinate Network of Optical Sensors for Space Situational  
FireOPAL: Technical Performance and First Results

Australian Space Missions: Thinking Bigger

Export controls and the Australian space research sector  
A Space Narrative

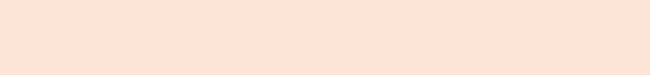


Analysis of Effects of Magnet Configurations for Downscaled Cusped Field Thruster via Surrogate  
Spectral investigations of the Charge Exchange Thruster  
Structural Analysis of Varying Joints used for a Hexagonal Solar Sail Concept via FEM

Particle-in-Cell Analysis of Ion Detachment from  
Ambipolar Propulsion Devices with Differing Magnetic  
Development of a CubeSat Star Tracker

A Study into the Effects of Stray Light Pollution in  
Wide-Field-of-View Star Trackers

Assessing the Viability of a Smartphone-Based Wide  
Field of View Stellar Gyroscope



On the Liability Requirements of The Australian Space Legislation

Exploring a legal framework for the colonisation of Mars

Between a Rock and an Asteroid: Australia's Legal Position in respect of Off-Earth Mining

International legal framework for space activities

National legal framework for space activities

Protection of intellectual property for space activities

Export control laws

Space Law: Lessons for Australia and New Zealand

Comparative regulatory approaches and competing for global sales opportunities

Regulation of military and government procurement in relation to space activities in Australia

Legal/business structures for space activities in Australia

Contracting for space activities in Australia

Space applications: hybrid aerospace vehicles

Space applications: active debris management

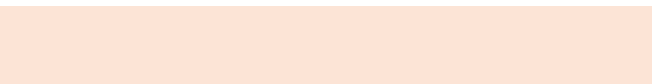
Subordinate Rules under new Space Activities (Launches and Returns) Act 2018



Space Science: Empowering STEM learning

Exploring Mars with InSight

A New Space paradigm for Australia



The Role of Museums and Science Centres in  
Informal STEM Education

The Online College of Advanced STEM:

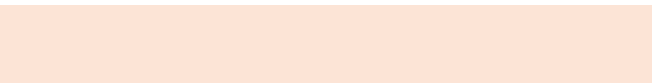
Delivering Astronomy, Astrophysics, Data Science

Why would Australia need astronauts?

Exploring Cultural Competence for Astronomers

Songlines and Dreaming Tracks in the Night Sky

From the Weapons Research Establishment to the  
Australian Space Office: Precursors to the Australian



On the characterisation of the day-to-day occurrence  
of Equatorial Plasma Bubbles using the Rayleigh-

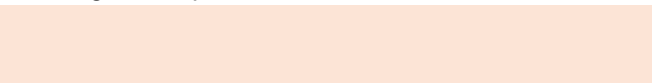
The Effect of Sporadic E on Prediction of Equatorial  
Plasma Bubbles

HF radar observations of periodic ionospheric  
irregularities at middle latitudes

Modelling the Received Power of Multipath HF  
Signals Propagated via the Ionosphere

Performance Bounds on HF Backscatter Leading  
Edge Inversion

Morning and afternoon peaks in electron density near  
the magnetic equator contrasted with a similar



Progress and Update of UNSW-EC0: Australia's First  
Cubesat Trio in Orbit

Buccaneer Risk Mitigation Mission – Ground Station

Power Budget Analysis and Verification

On-orbit performance of the Namuru GPS Receiver,  
and other results from the SHARC mission.

On-orbit dynamics of the deployable high frequency  
antenna on the Buccaneer Risk Mitigation Mission

Integrated Patch Antennas and Solar Cells for  
Cubesats – Optimising solar cell efficiency and

Integrated optical phased arrays for spacecraft  
communications and sensing

Rapid Prototyping in Instrumented Hypervelocity  
Testing

Spiral Blue - Stopping maritime piracy from space

Nanosatellites in High Earth Orbit

SAR: The right information at the right time

Spectral Aerospace: Hyperspectral Satellite Remote  
Sensing Solutions

Leo Aerospace: A balloon launch startup

Characterisation of Near Earth Asteroids - An  
Asteroid Mining Perspective

program - priorities and strategies

The Mars 2020 Rover Mission

The MEDIAN Mars Mission Using Impactors – The Search for Life

A Neural Network's Search For Polar Spring-time Fans On Mars.

Polarization of Mars during the 2018 Dust Storm

Geological interpretation of ground penetrating radar reflector in the subsurface of Lunae Planum, Mars.

A Novel Integrable System for Martian Approach, Mapping and Energy Extraction

Mobility Trials and Testing of Micro and Nano-Scale Rovers for Planetary Science Applications.

Hayabusa 2 at Ryugu

M1 Readiness for Launch: UNSW Canberra – Royal Australian Air Force Space Situational Awareness

Possible Near-Term Mission Architecture to Measure Lunar Polar Regolith Water Content

RMIT University's Robotic Optical Observatory (ROO) Telescope for Space Situational Awareness Research

## Program - priorities and strategies

Probing the Origins of Hot Jupiters & Spin-Orbit Misaligned Exoplanets

A thruster using magnetic reconnection to create a high-speed plasma jet for spacecraft propulsion

The Effect of Splitter Plate(s) Attached with Square Cylinder in Turbulent Flow

Mt Kent Observatory: A Queensland Facility for Astronomical and Space Sciences

Applying a Master-slave Filter to Vector Tracking GNSS Receiver for Robust

On the identification and removal of ground scatter in SuperDARN radar data

The solar wind in time from young stellar proxies

Space, Spatial, Machine Learning for Business Benefit

GNSS-driven Accurate Time Synchronization for VANET

Eyes on the Ground: Trialling Remote Sensors for Small Planetary Rovers.

Preliminary Astrocladistical analysis of the Jovian Trojan swarms

First Kids on Mars - Future-ready skills program

Near-Infrared atmospheric modelling of Jupiter's Southern Equatorial Belt (SEB) observed with AAT/IRIS2

Solar Wind Predictions Based on SDO/AIA and DSCOVR Data

Arcadia: the First Settlement on Mars

A GPU based doppler and code search for the reception of satellite signals

STEM and the realm of hands-on constructivism

New Space for Chemical Discoveries

Design of a Deployable Lightweight Nanosatellite Antenna

Satellite propulsion system

The Accuracy of Space Weather Services

Automatically Scaled foF2 Data