

SSERVI Australia 2016 Workshop

Welcome to Curtin University St Georges Terrace, Perth



We aim in these three days to get to know the current projects and the community working in planetary and related research in Australia, in order to increase national and international collaboration and raise the profile of the planetary sciences.

“The true spirit of this endeavour is that exploration enables science and science enables exploration”

Dr Michael Wargo (1951-2013),
Former NASA Chief Exploration Scientist

Wednesday 9 November 2016

14:00 **Outreach Event with Ashdale College:** *Nerding Out with NASA*
Helen Maynard-Casely, Jonti Horner, Eleanor Sansom & Phil Bland

16:00 **Workshop Launch**
All workshop attendees

Thursday 10 November 2016

8:30		Tea & Coffee (30 minutes)
9:00	The Search for Life	Phil Bland and Renae Sayers SSERVI Australia Director's Welcome
9:15		Jonti Horner <i>Exoplanets, Habitability, and MINERVA-Australis</i> How will we choose the best targets for the search for life elsewhere? From the Solar system to infinity – via USQ's new exoplanet observatory!
9:45		Rafik Bourne <i>Ring Transit Simulation Model Abstract</i> Current mathematical models utilise geometric approximations for ring transits. We propose a novel approach, 2-D ring/planet images occluding 2-D rendered limb darkened stellar disks.
10:00		Aaron Cavosie, Morgan Cox, Stephanie Montalvo, Timmons Erickson, Nick Timms, Steve Reddy <i>Astrobiology applications of shocked zircon</i> Impacts influenced how early habitable conditions were established. Identifying shocked zircon from the Moon and early Earth thus informs models for the origin of life.
10:15		Aditya Chopra, Charles H. Lineweaver, John Baross <i>The universality of biospheres</i> What can early life on Earth tell us about the features of metabolisms and ecosystems that may emerge on other wet rocky planets in the universe?
10:30	Alastair Tait <i>The microbial habitability of chondrites on Earth and Mars</i> Terrestrial microbes inhabit chondrites by altering the chemistry of the meteorite. This alteration records biosignatures, which if on Mars could eliminate ambiguity in life detection.	
10:45		Morning Tea (30 minutes)
11:15	Instrumentation	Helen Maynard-Casely, Norman Booth, Leo Anderberg <i>What you see and what you get – tying spectra to physical properties</i> We have developed the capability of collecting Near-IR data at the same time as neutron and synchrotron x-ray diffraction within a range of environments (low temperature at atmosphere).
11:45		Carla Raymond <i>Applications of Neutron Tomography</i> Neutron tomography is a non-invasive and non-destructive imaging technique. It can be used to study rocks, fossils, artefacts and meteorites.
12:00		Sam Matthews <i>Tracking relative reservoir mass utilising satellite gravity and gradiometry</i> Advances in satellite gravity/gradient data from the GRACE/GOCE missions has made the remote tracking of sequestered CO2 and extracted oil/gas a reality.
12:15		Harrison Jones <i>Applied Geophysics for Groundwater Studies on Mars: An Earth-bound case study</i> This study aims to ascertain the usefulness of various geophysical techniques in the search and delineation of groundwater on Mars.
12:30		Martin Towner <i>Desert Fireball Network data - what happens to it and where does it go?</i> How do we automatically find fireballs in still images? what happens to all the imagery from the DFN? What else is it useful for?
12:45	Omar Elkhaliq, Luke Smith & Tasman Gillfeather-Clark <i>Low cost and light weight geophysical equipment with drone mounted applications and beyond</i> Our masters thesis projects commencing 2017 all focusing on developing a variety of sensors for drone deployment.	
13:00		Lunch (1 hour)
14:00	Meteorites 1	Fred Jourdan, T. Kennedy, G. Benedix, C. Mayers <i>40Ar/39Ar thermochronology of unbrecciated eucrites: clues to the crustal formation of Vesta</i> Analyzed plagioclase and pyroxene (\pm groundmass) separates of Unbrecciated eucrites with 40Ar/39Ar technique. Data suggest cooling rate $\sim 16^\circ\text{C}/\text{Ma}$ for lower crust of Vesta since time peak metamorphism at ca. 4555 Ma.
14:30		Trudi Kennedy <i>Thermal history of 4 Vesta recorded in brecciated eucrites</i> Investigation of the thermal/impact histories of nine HED meteorites: two monomict eucrites, five polymict eucrites and two, quench-textured, eucrite melt rocks.
14:45		Tim Johnson, Gretchen Benedix & Phil Bland <i>Metamorphism of ordinary chondrites – a phase equilibria modelling perspective</i> New thermodynamic models calibrated for phases in terrestrial mantle peridotite permit quantitative investigation of metamorphism in chondrites.
15:00		Shannon McConachie, P.L. King, L. Kinsley, and L. Loisel <i>The Effect of Low Temperatures on the Mid-Infrared Spectra of Organic Compounds Present in Carbonaceous Chondrites</i> Meteoritic organic compounds and mixtures were investigated in the mid-IR down to -150°C under vacuum and compared to room temperature spectra used for characterizing asteroids.
15:15		Jean-Antoine Gazi <i>Evolution of small planetary bodies: A view from carbonaceous chondrite</i> Neutron computed tomography relates macroscopic properties of chondrites to their microscopic components, resulting in a new chondrule classification and simplified model for the formation of CM and CV chondrites.
15:30		Afternoon Tea (30 minutes)
16:00	Fireballs	Phil Bland, and the Desert Fireball Network Team <i>The Desert Fireball Network, and planned expansion to a Global Fireball Observatory</i> An update on the status of the Desert Fireball Network, and how - with partner institutions throughout Australia and overseas - we'll expand the project over the next 2 years.
16:30		Eleanor Sansom, Mark Rutten, Phil Bland <i>Modelling fireballs in 3D</i> Observations of fireballs from dedicated networks have been used to model meteoroid properties since the 60s, but has never before been done in 3D.
16:45		Robert Howie, Jonathan Paxman, Phil Bland, Martin Towner, Martin Cupak, Eleanor Sansom, Hadrien Devillepoix, and Trent Jansen-Sturgeon <i>Remote Observatory Design for the Desert Fireball Network</i> An overview of the DFN remote fireball observatory hardware focussing on the design challenges posed by remote autonomous operation.
17:00		Trent Jansen-Sturgeon <i>Space Surveillance and Tracking</i> A brief overview of meteoroid and satellite orbital determination using the Desert Fireball Network, including a closer look into the Hayabusa Spacecraft re-entry.
17:15		Martin Cupak, Martin C Towner, Robert M Howie <i>DFN Expansion</i> Our goal is to minimise the human time spent with operation, but still have a good confidence that out there is a well performing network.
17:30		End of Day One

Friday 11 November 2016

8:30		Tea & Coffee (30 minutes)
9:00	Planet-scale Processes	Craig O'Neill <i>Global-scale, tectonic simulations of an evolving post-magma ocean Earth through the Hadean</i> We find that mantle upwellings induced by large impacts are capable of driving transient subduction events. Impact-driven tectonism may reconcile evidence from zircon populations implying tectonic activity, with short-lived isotope constraints, which suggest the Hadean to Eoarchaean was largely stagnant.
9:30		Jonathon Wasiliev , Siqi Zhang and Craig O'Neill <i>Activating the Lower Mantle: Viscosity by Numerical Analysis</i> Numerically derived constraints on lower mantle Activation Parameters are found, which consequently assist in the modelling of a wide range of planetary interiors and regimes.
9:45		Andrew Tomkins , Lara Bowlt, Matthew Genge, Sasha Wilson, Helen Brand, Jeremy Wykes <i>Fossil micrometeorites: Echo of an ancient air</i> Some fossil micrometeorites melted as they entered our atmosphere allowing them to react with, and thus chemically sample, a narrow band of the upper atmosphere.
10:00		Chris Corcoran <i>Relationships between crystal plastic deformation and variations in trace element geochemistry in upper mantle minerals</i> New analytical techniques such as atom probe tomography allow us to investigate how these processes operate on the atomic scale.
10:15		Chris Norman , Jonathan Paxman, Tele Tan, Gretchen Benedix, Phil Bland <i>Unraveling the surface chronology of Mars</i> Automatic crater detection algorithms aid in determining planetary surface age. We apply convolutional neural networks and Google TensorFlow to automatically count craters on Mars.
10:30		Morning Tea (30 minutes)
11:00	Impacts	Marc Norman <i>Impact history of the Moon revealed by lunar samples</i> Ages and compositions of lunar melt rocks and glasses provide unique information about impact history over the last 4 billion years.
11:30		Morgan Cox , Aaron J Cavosie <i>The hunt for shocked zircons in the Jack Hills</i> 21,000 zircons were handpicked and analysed using a Scanning Electron Microscope (SEM) with the purpose of seeking out shock micro-structures within the grains.
11:45		Timmons Erickson <i>Shock deformation features in the accessory phase Monazite</i> Monazite preserves diagnostic shock features and can date impact events. Shock deformation microstructures and their effects on the U-Th-Pb systematics will be presented.
12:00		Nick Timms <i>Thermobarometry of impactites using phase heritage</i> 'Phase heritage' involves inferring former presence of high pressure and temperature minerals via crystallographic microstructures from phase transformations, recording hottest impact melt temperatures on Earth.
12:15		Lucy Forman , P. A. Bland, N. E. Timms, L. Daly, G. K. Benedix & P. W. Trimby <i>Unravelling the evidence of asteroid compaction from a CV chondrite</i> Crystallographic textures from the Allende meteorite have revealed evidence of early asteroid compaction. We conclude the parent body of Allende was compacted via impacts.
12:30	Stephanie Kovach <i>The pros and cons of Nanomin analysis</i> Fine grained, heterogenous, crystalline planetary materials are difficult to image using conventional techniques. The FEI Teneo LoVac FEG-SEM with dual Bruker Series 6 EDS detector (Nanomim) offers a solution to this problem.	
12:45		Lunch (1 hour)
13:45	The Moon	Steve Reddy <i>A review of progress towards characterizing early Earth's impact history through ancient, shocked, detrital zircon</i> Review of advances in understanding the deformation and geochemical modification of zircon and how this knowledge could be used to test the terrestrial record of the Late Heavy Bombardment model using ancient terrestrial zircon grains now preserved in sedimentary rocks.
14:15		Alexander Nemchin , Martin Whitehouse, Marc Norman, Joshua Snape, Jeremy Bellucci & Marion Grange <i>Pb-Pb systematics of lunar rocks: differentiation, magmatic and impact history of the Moon</i> Recently developed SIMS Pb-Pb analytical procedures allow precise chronological studies of large range of lunar rocks and addressing questions of origin of the Moon and its magmatic and impact history.
14:30		Robert Pidgeon , R. Merle, M. Grange, A. A. Nemchin and M. J. Whitehouse <i>Annealing of radiation damage in zircons from Apollo 14 impact breccia 14311: Implications for the thermal history of the breccia</i> We present new age information on the late stage thermal history of a breccia sampling the Fra Mauro Formation at the Apollo 14 landing site.
14:45		Katarina Miljkovic <i>Understanding the lunar crust and mantle through impact basins</i> Composition of lunar crust and mantle as seen by remote sensing and numerical modelling of impact basins. Exposure of deep-seated materials within basin's inner ring.
15:00		Siqi Zhang , Craig O'Neill <i>Lunar post-magma-ocean overturn and crustal evolution</i> We use numerical models to explore the dynamics of lunar post-magma-ocean overturn, the mantle evolution afterwards, and its link with lunar crustal evolution.
15:30	Will Featherstone <i>Gravity modelling of the terrestrial planets: 280 new lunar basins before GRAIL</i> We used forward modelling (Newton's law) to produce high-resolution gravity field models for Mars and the Moon. Band-pass filtering of the Moon's gravity identified 280 new basins.	
15:45		Afternoon Tea (30 minutes)
16:15	Meteorites 2	Gretchen Benedix , V. E. Hamilton, and S. M. Reddy. <i>μ-FTIR Spectroscopy and Electron Backscatter Diffraction of olivine and pyroxene in Martian Shergottite RBT 04262</i> Use of μ -FTIR and EBSD allows extraction of Martian specific mineral spectra to better reveal the surface geology of Mars.
16:30		Luke Daly , P. A. Bland, L. V. Forman, S. M. Reddy, W. D. A. Rickard, D. W. Saxey, A. La Fontaine, L. Yang, P. W. Trimby, J. Cairney, S. Ringer and B. F. Schaefer <i>Atom probe tomography revealing pre-solar refractory metal nuggets</i> Evaluation of isotopic data from atom probe tomography studies of refractory metal nuggets in primitive meteorites reveal pre-solar isotopic signatures.
16:45		Phil Bland and the OSIRIS-REx Team <i>The OSIRIS-Rex Mission – Sample Return from a Carbonaceous Asteroid</i> OSIRIS-REx will return the most pristine extra-terrestrial material that we've ever had access to. This talk will outline the mission, and Australian involvement.
17:00		SSERVI Australia Strategy Discussion
17:45		BBQ Sundowner - Wrap up of Workshop and Prizes Announced

Notes

Attendees

Aaron Cavosie
Aditya Chopra
Alastair Tait
Alex Bevan
Alexander Nemchin
Andrew Putnis
Andy Tomkins
Anthony Finn
Carla Raymond
Chris Corcoran
Chris Norman
Chris Spencer
Colleen McMahon
Craig O'Neill
Denis Fougerouse
Eleanor Sansom
Fred Jourdan
Gretchen Benedix
Hadrien Devillepoix
Harrison Jones
Helen Maynard-Casely
Jean-Antoine Gazi
Jonathon Wasiliev
Jonti Horner
Katarina Miljkovic
Lucy Forman
Luke Daly
Luke Smith
Marc Norman
Martin Cupak
Martin Towner
Mingjian Cao
Morgan Cox
Nick Timms
Nicole Nevill
Omar Elkhaliqi
Phil Bland
Rafik Bourne
Renaë Sayers
Rick Verberne
Robert Howie
Robert Pidgeon
Sam Bain
Sam Matthews
Shannon McConachie
Shujuan Jiao
Siqi Zhang
Stephanie D. Montalvo
Stephanie Kovach
Steven Reddy
Tasman Gillfeather-Clark
Tim Johnson
Timmons Erickson
Trent Jansen-Sturgeon
Trudi Kennedy
Victoria Cousins
Will Featherstone
Yajing Mao
Zacchary Hoskins

Our Workshop venue is located at 139 St Georges Terrace, Perth. Curtin University acknowledges the traditional owners of the land on which SSERVI Australia meet, the Wadjuk people of the Nyungar Nation.

Please keep all devices on silent, but feel free to share photos and notes from the workshop **#OzPlanet16 #SSERVI @SSERVIaustralia**

WIFI: All Guests please use "Curtin Guest" network | Username: CSGT@curtin.edu.au | Password: 01KdiIP8

