



Curtin University

THE INSTITUTE FOR
GEOSCIENCE RESEARCH (TIGeR)

2015 TIGeR CONFERENCE

Key issues in fluid-rock interaction:
From the nano to the macroscale

PROGRAM

Make tomorrow better.

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The aim of this 3-day conference is to promote progress at the leading edge of this topic through presentations and open-forum discussion.

We will focus on key aspects of:

- The mineral-fluid interface
- Mechanisms of reactive fluid flow through low permeability rocks
- Mass transfer and mineralization; timescales
- Fluids, rock strength and deformation mechanisms
- Fluids and geodynamics

The total number of participants will be limited to about 80-100, to facilitate active participation and open discussion. So register early to avoid disappointment.

THE AGENDA

The aim is to have short presentations (20 minutes for keynote speakers, 10 minutes for other talks) focussing on specific issues for later discussion. Afternoon poster sessions will provide further discussion time. The detailed schedule will be sent out after the registration period.

SPEAKERS INCLUDE:

Jay Ague (Yale)
 Håkon Austrheim (Oslo)
 Stephen Cox (ANU, Canberra)
 Katy Evans (Curtin University, Perth)
 Julian Gale (Nanochemistry Research Institute, Curtin University, Perth)
 Sigi Gislason (University of Iceland)
 Kliti Grice (WA Organic & Isotope Geochemistry Centre, Curtin, Perth)
 Bruce Hobbs (CSIRO, Perth)
 Rob Hough (CSIRO, Perth)
 Jon Hronsky (CET, Perth)
 Bjørn Jamtveit (University of Oslo)
 John Mavrogenes, (ANU, Canberra)
 Steven Micklethwaite (CET, Perth)
 Sandra Piazzolo (Macquarie University, Sydney)
 François Renard (Institut des Sciences de la Terre, Grenoble)
 Encarnacion Ruiz-Agudo (University of Granada)
 Rick Sibson (Otago, New Zealand)
 John Wheeler (University of Liverpool)

ORAL PRESENTATIONS

WEDNESDAY 23 SEPTEMBER

9.00 – 10.00 WELCOME, REGISTRATION AND TEA/ COFFEE ICEBREAKER

Andrew Putnis, Director, The Institute for Geoscience Research (TIGeR)
 Andris Stelbovics, Pro-Vice Chancellor, Faculty of Science and Engineering

10.00 – 10.20 + 10 MINUTES DISCUSSION

Julian Gale
 Exploring the Aqueous Interface with Carbonate Minerals using Computer Simulation.

10.30 – 10.40 + 5 MINUTES DISCUSSION

Christine V. Putnis
 Coupled dissolution and precipitation at mineral-fluid interfaces.

10.45 – 11.05 + 10 MINUTES DISCUSSION

Encarnación Ruiz-Agudo
 The control of mineral weathering by dissolution-precipitation processes at the mineral interface.

11.15 – 11.25 + 5 MINUTES DISCUSSION

Lijun Wang
 Monomeric Amelogenin's C-Terminus modulates mineralization dynamics of calcium phosphate.

11.30 – 11.40 + 5 MINUTES DISCUSSION

Weihua Liu
 Can we track ore fluid chemistry from the chemical zonation of minerals? An experimental study of arsenic-bearing apatite.

11.45 – 11.55 + 5 MINUTES DISCUSSION

Joel Brugger
 Textural and compositional complexities resulting from coupled dissolution-reprecipitation reactions in ore systems.

12.00 – 12.10 + 5 MINUTES DISCUSSION

Cristiana Ciobanu
 Why bridge micron- to nanoscale observations in ore minerals?

12.15 – 13.15 LUNCH

13.15 – 14.15 POSTERS

14.15 – 14.35 + 10 MINUTES DISCUSSION

Katy Evans
 Eccentric zoning in pyrite: what does it record?

14.45 – 15.05 + 10 MINUTES DISCUSSION

Jon Hronsky
 Ore Formation – the product of anomalous fluid flux organization

15.15 – 15.25 + 5 MINUTES DISCUSSION

Alison Ord
 Coupled fluid flow, mineral reactions and deformation in hydrothermal mineralising systems.

15.30 – 16.00 COFFEE/TEA BREAK

16.00 – 16.20 + 10 MINUTES DISCUSSION

Holly Stein
 From Fluids – Realizing, Refurbishing, and Refining Resources.

16.30 – 16.40 + 5 MINUTES DISCUSSION

Fang Xia
 The Origin of varied length scale of shape preservation in mineral replacement reactions – Insights from the replacement of pentlandite by violarite.

16.45 – 16.55 + 5 MINUTES DISCUSSION

Mark Pearce
 Carbonate replacement reactions in hydrothermal systems.

17.00 – 18.00 POSTERS

18.00 BARBEQUE : GEOLOGY BUILDING 312

SPONSORS

Major



Supporting



THURSDAY 24 SEPTEMBER

9.00 – 9.10 + 5 MINUTES DISCUSSION

Jing Zhao

The “exsolution” or fluid catalysed unmixing behaviour under hydrothermal conditions.

9.15 – 9.25 + 5 MINUTES DISCUSSION

Joseph White

Nano-particulates, Silicification and Fluid Pressure Transitions - Fluid Flow versus Mineralization, Kiggavik Region, Nunavut, Canada.

9.30 – 9.50 + 10 MINUTES DISCUSSION

John Mavrogenes

Experimental simulation of porphyry copper deposit formation via SO₂-triggered sulfide precipitation from metalliferous brine.

10.00 – 10.20 + 10 MINUTES DISCUSSION

Steven Micklethwaite

Fluid mass transfer and rapid rates of deposit formation contrasted against gold remobilisation and high grade ore shoot formation.

10.30 – 11.00 COFFEE/TEA BREAK

11.00 – 11.20 + 10 MINUTES DISCUSSION

Kliti Grice

Role of organic geochemistry in mineral deposits.

11.30 – 11.40 + 5 MINUTES DISCUSSION

Andrew Putnis

Coupled mass transfer through a fluid phase and volume preservation during the hydration of granulite: An example from the Bergen Arcs, Norway.

11.45 – 11.55 + 5 MINUTES DISCUSSION (BUT THIS IS A 10 MINUTE TALK)

Ian Fitzsimons

Charnockites, chickens and eggs.

12.00 – 13.00 LUNCH

13.00 – 14.00 POSTERS

14.00 – 14.20 + 10 MINUTES DISCUSSION

Jay Ague

Rare Earth Element mobility in the middle to lower crust and subduction zones.

14.30 – 14.40 + 5 MINUTES DISCUSSION

Oliver Plümper

Channelized fluid escape from subduction zones.

14.45 – 15.05 + 10 MINUTES DISCUSSION

Stephen Cox

The dynamics of fluid flow in high fluid flux fault regimes: implications for fluid - rock reaction.

15.15 – 15.25 + 5 MINUTES DISCUSSION

Tom Raimondo

Fluid-controlled rheological responses during intraplate orogeny.

15.30 – 16.00 COFFEE/TEA BREAK

16.00 – 16.20 + 10 MINUTES DISCUSSION

Rick Sibson

Critical stress-overpressure states in seismically active fault zones and their significance for mineralization

16.30 – 16.50 + 10 MINUTES DISCUSSION

Håkon Austrheim

Scapolite, sulfides, seismicity and fluid induced eclogite- and amphibolite facies metamorphism of thickened continental crust.

17.00 – 17.20 + 10 MINUTES DISCUSSION

François Renard

Rock transformations controls shallow creep in active faults.

17.30 – 18.30 POSTERS

18.30 – BUS TO CONFERENCE DINNER

Boatshed Restaurant

www.boatshedrestaurant.com

FRIDAY 25 SEPTEMBER

9.00 – 9.20 + 10 MINUTES DISCUSSION

Bjørn Jamtveit

Disequilibrium metamorphism.

9.30 – 9.50 + 10 MINUTES DISCUSSION

John Wheeler

Dramatic effects of stress on metamorphic reactions.

10.00 – 10.20 + 10 MINUTES DISCUSSION

Bruce Hobbs

Equilibrium in stressed solid/liquid and solid/solid systems.

10.30 – 11.00 COFFEE/TEA BREAK

11.00 – 11.20 + 10 MINUTES DISCUSSION

Sandra Piazzolo

The chemical signature of syn-deformational fluid-rock interaction: Nano - to microscale

11.30 – 11.40 + 5 MINUTES DISCUSSION

Piotr Szymczak

On the formation, growth, and shapes of solution pipes

11.45 – 11.55 + 5 MINUTES DISCUSSION

Brent McInnes

Application of automated mineralogy techniques to understanding fluid-rock interactions in peridotite xenoliths from subduction zones.

12.00 – 12.10 + 5 MINUTES DISCUSSION

Steven Reddy

A shocking transformation: probing Precambrian reidite using state of-the-art micro- to sub-nanometer 3D imaging.

12.15 – 13.15 LUNCH

13.15 – 15.15 POSTERS AND COFFEE BREAK

15.15 – 15.25 + 5 MINUTES DISCUSSION

Xuan-Ce Wang

First direct evidence for hydrous mantle transition originated continental flood basalts.

15.30 – 15.40 + 5 MINUTES DISCUSSION

Weronika Gorczyk

Magma emplacement in 3D.

15.45 – 15.55 + 5 MINUTES DISCUSSION

Aaron Cavosie

Boiled zircons? Vesicular texture in detrital zircons from the Chelmsford Formation, Sudbury impact structure, Canada.

16.00 – 16.20 + 10 MINUTES DISCUSSION

Sigurdur Gislason

The CarbFix project: solubility and mineral storage of gas mixtures in basalt.

16.30 – 16.40 + 5 MINUTES DISCUSSION

David McNamara

Fracture Sealing in Geothermal Reservoirs: Insights from combined EBSD and chemical mapping.

16.45 – 16.55 + 5 MINUTES DISCUSSION

Stéphanie Vialle

Geophysical signature of fluid-rock interactions: Core-flooding experiments of CO₂-rich fluids in carbonate rocks.

17.00 – CLOSE

POSTERS

TIME-SCALES AND PHYSICO-CHEMICAL CONSEQUENCES OF ULTRAMAFIC ROCK CARBONATION

Andreas Beinlich ^{1,2,6}, Timm John ³, Masako Tominaga ⁴, Tomas Magna ⁵ & Bjørn Jamtveit ⁶

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4 Dept of Geology and Geophysics, Texas A&M, USA ;

5 Czech Geological Survey, Czech Republic;

6 PGP, University of Oslo, Norway

METAMORPHIC CONSTRAINTS ON THE FLUID ASSISTED TRANSITION OF GRANULITE TO ECLOGITE ON HOLSNØY IN THE BERGAN ARCS, NORWAY.

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STRESS, FLUID AND METAMORPHISM

Stephen Centrella¹, Håkon Austrheim², Andrew Putnis^{1,3}

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TRACE ELEMENT ZONATION OF ULTRAMAFIC SULPHIDES AND SPINELS FROM ALPINE CORSICA

Rosalind Crossley¹, Katy Evans¹, Noreen Evans^{1,2} & Brad McDonald ^{1,2}

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MICROPOROUS GOLD: COMPARISON OF TEXTURES FROM NATURE AND EXPERIMENTS

Barbara Etschmann ^{1,2,3}, Victor M. Okrugin ^{4,5},

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3 School of Chemical Engineering, The University of Adelaide, 5005, South Australia

4 Institute of Volcanology and Seismology, Russian Academy of Science, Petropavlovsk-Kamchatsky, 683 006, Russia

5 Vitus Bering Kamchatka State University Petropavlovsk-Kamchatsky, 683 006, Russia

6 Institute of Materials Engineering, Australian Nuclear Science & Technology Organisation, Kirrawee DC, New South Wales 2232, Australia

GOLD REMOBILISATION FROM ARSENOPYRITE THROUGH HIGH STRAIN AND METAMORPHISM: CRYSTAL-PLASTICITY VS FLUID-MINERAL REACTIONS

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DECARBONATION OF SUBDUCTING SLABS: INSIGHT FROM PETROLOGICAL-THERMOMECHANICAL MODELING

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THE PRESERVATION OF FRAMBOIDAL PYRITE IN BLUESCHIST

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120 MYR OF EPISODIC MID-CRUSTAL METAMORPHISM AND FLUID-ROCK INTERACTION DURING THE ALICE SPRINGS OROGENY: THE STRANGWAYS RANGE, CENTRAL AUSTRALIA

Daniel Howlett¹, Martin Hand¹, Tom Raimondo².

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GEOLOGIC APPLICATIONS FOR HIGH-RESOLUTION SECONDARY ION MASS SPECTROMETRY (SIMS) TO STUDY FLUID-ROCK INTERACTION

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THE LONG-TERM STRENGTH OF THE LITHOSPHERE AS DETERMINED BY GRAVITY AND TOPOGRAPHY

Jon Kirby & Chris Swain

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FELDSPAR REPLACEMENT REACTIONS IN IOCG SYSTEMS: THE OLYMPIC CU-AU PROVINCE

Alkis Kontonikas-Charos¹, Cristiana L. Ciobanu², Nigel J. Cook², Kathy Ehrig³ and Vadim S. Kamenetsky⁴

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CONTRASTING RECORD OF FLUID HISTORY IN GARNET: EXAMPLES FROM ALPINE CORSICA AND THE BERGEN ARCS

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EXPERIMENTAL STUDY OF CO₂ SEQUESTRATION VIA GOETHITE CARBONATION

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BASE AND PRECIOUS METAL MINERAL INTERACTIONS WITH AQUEOUS AMINO ACIDS UNDER OXIDISING ALKALINE CONDITIONS.

Elsayed Oraby and Jacques Eksteen

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EXPERIMENTAL STUDY OF THE REPLACEMENT OF CALCIUM CARBONATES BY APATITE AND FLUORITE: RATES AND TEXTURES

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THE LOST SAMPLES OF THE GOLDEN MILE: NEW DATA SHEDS LIGHT ON THE DEPTH AND TEMPERATURE OF EMPLACEMENT OF THIS GIANT GOLD DEPOSIT

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BASO₄ CRYSTALLIZATION IN THE PRESENCE OF POLYMERS: EVIDENCE OF BARITE CRYSTALLIZATION VIA NON-CLASSICAL PATHWAYS

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THE CHEMICAL OSCILLATOR: A NEW PERSPECTIVE ON FLUID FLOW AND PERMEABILITY IN THE DUCTILE CRUST

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THE PRESENCE OF SPHALERITE IN PYRITE FRAMBOIDS

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HYDRATION THROUGH MELT-ROCK INTERACTION TRIGGERS LOCAL PARTIAL MELTING IN THE LOWER CRUST: EXAMPLE FROM FIORDLAND, NEW ZEALAND

Catherine Stuart, Sandra Piazoletto and Nathan Daczko

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STRIATION DEVELOPMENT DURING FAULT SLIP DEPENDS ON TEMPERATURE UNDER HYDROTHERMAL CONDITIONS

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REGIONAL-SCALE METASOMATISM IN THE HAMERSLEY BASIN: THE SOURCE OF AUSTRALIA'S IRON ORE?

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