

34th IGC Symposia organized or cosponsored by IAMG Mathematical Geosciences (Symposium 5.6)

Symposia Theme	Symposia Description	Convenors	Contacts
6. Mathematical Geosciences	Applications of geomathematical analysis and modelling in the field of resource exploration. New advances and methodological challenges in the analysis of spatial, time-dependent and compositional geoscience data. Application of geostatistical and geomathematical methodologies and tools to the interpretation of geochemical data, remotely sensed data, rock anisotropy, and climate data	June Hill Ricardo Olea	June.Hill@csiro.au olea@usgs.gov
Session Title	Session Description	Proposed Convenors	
6.01 Data Analysis in the Geosciences	The session will address new advances and challenges in methods for the analysis of geoscientific data, including spatial, time-dependent and compositional data. KEYNOTE SPEAKERS: Dr Helmut Schaeben, Dr Juan Jose Egozcue	Vera Pawlowsky-Glahn Juan J. Egozcue Raimon Tolosana-Delgado	vera.pawlowsky@udg.edu juan.jose.egozcue@upc.edu raimon.tolosana@upc.edu
6.02 Success stories in geocomplexity: Non-linear processes, networks and patterns in geosciences	Non-linear models as a rational foundation for the statistics and modelling of natural systems including earthquakes, floods, landslides and climate change. Mineral deposits often exhibit multifractal characteristics and local singularities. Case history studies of this type are particularly welcome in this session. KEYNOTE SPEAKER: Prof Tom Blenkinsop	Qiuming Cheng Frits Agterberg	qiuming@yorku.ca agterber@NRCan.gc.ca
6.03 Geostatistics for Modeling Complex Geological Systems	This session will focus on novel geostatistical methods that aim to realistically represent complex geological systems in a wide variety of applications, such as oil and gas fields, aquifer modeling, mining deposits etc... . The focus will be on multiple-point geostatistics, process-based and surface-based methods, pattern-based models or advanced variogram-based techniques. Theoretical as well as field application or state-of-the-art reviews are welcome. KEYNOTE SPEAKER: Prof Roussos Dimitrakopolous	Jef Caers Gregoire Mariethoz	jcaers@stanford.edu gregoire.mariethoz@minds.ch
6.04 Soft Computing and Intelligent Methods in Mathematical Geology	This session will include research and application papers on the use of soft computing techniques such as neural networks, genetic algorithms, fuzzy systems and intelligent agents systems for solving geosciences problems of classification, prediction, estimation and control.	Ioannis Kapageridis	ioannis.kapageridis@gmail.com

6.05 Stochastic characterisation of rock masses	The primary focus of the session would be stochastic modelling of fractures and fracture networks in rock masses and the modelling of fracture propagation under natural and induced conditions. It could also include stochastic modelling of any rock property that characterises rock masses. Applications include enhanced geothermal energy systems; characterisation of rock masses for safe underground disposal of hazardous wastes; mining methods (e.g., block caving).The purposes of the applications include design (e.g., of enhanced geothermal reservoirs or of mining methods) and risk assessment.	Peter Dowd	peter.dowd@adelaide.edu.au
6.06 Crystallographic Preferred Orientation and Anisotropy of Rocks	Session to cover: data collection by X-ray, neutron, synchrotron diffraction or electron backscatter diffraction, data analysis to compute an orientation density function and its characteristics. data interpretation in terms of anisotropic properties, deformation, recrystallization KEYNOTE SPEAKER: Dr Steve Reddy	Helmut Schaeben David Mainprice	schaeben@mailserver.tu-freiberg.de David.Mainprice@gm.univ-montp2.fr
6.07 Geomathematics, Geoinformatics and Remote Sensing	The session will invite contributions on geomathematical and geostatistical methods and algorithms, aimed at innovative analysis of remote-sensing observation, and on computational and geoinformatical implementations. Remote sensing data may include satellite, airborne, field, marine and terrestrial observation types, image-type and discrete measurements. Computational and informatic methods may focus on the mathematical or statistical approach, or on graphical, visual, web, mapping, cyber-infrastructure ...any imaginable component or implementation.	Ute Herzfeld	herzfeld@tryfan.Colorado.edu
6.08 Quantitative mineral resources estimation	Emphasis in this session is on probabilistic evaluation of regional or global ore and hydrocarbon resources that have not yet been discovered. For example, GIS-based methods such as Weights-of-Evidence and logistic modeling can be used in regional studies. Both mathematical-statistical and subjective, fuzzy-logic type contributions are welcome. KEYNOTE SPEAKERS: Dr Graeme Bonham-Carter, Dr Eric Grunsky	Qiuming Cheng Frits Agterberg	qiuming@yorku.ca agterber@NRCan.gc.ca
6.09 Geoscience information synthesis for mineral prospectivity mapping	The session covers mathematical-model-based integration of geoscientific datasets in a GIS-environment for delineating prospective target areas for mineral exploration, with presentations on latest developments including exposition of new models and case histories documenting applications of established models.	Alok Porwal John Carranza	aporwal@iitb.ac.in carranza@itc.nl

6.10 Numerical modelling of basins and petroleum system modelling	<p>In recent years the numerical geological modelling improved its capabilities to model more geological processes and with more efficiency. The complexity of this modelling still requires both theoretical and experimental developments. Potential topics are:</p> <ul style="list-style-type: none"> * Basin modelling in different geodynamic contexts; * Modelling plate tectonics as a tool for understanding basin evolution; * Modelling heat flow variability in different tectonic settings; * Basin Characterisation: paleo-environment and sedimentation; * High Pressure-High Temperature: Geomechanics and Petroleum System Modelling; * Source Characterization and Unconventional Resources; * Petroleum System Modelling & Reservoir studies; * Prospect Risk Evaluation & Petroleum System Modelling; * High Definition Basin Modelling: visualisation and numerical issues of "GigaCells" Models. <p>KEYNOTE SPEAKERS: Prof Michael Gurnis, Prof Chris Scotese</p>	Paolo Ruffo Carlo Doglioni	paolo.ruffo@eni.com carlo.doglioni@uniroma1.it
6.11 Spatio-temporal data mining and data analysis	<p>The increasing prevalence and availability of age-coded digital Geoscientific data is creating opportunities to combine data from multiple sources, and study complex spatio-temporal relationships. This unified analysis across spatio-temporal domains and different modes of data is presenting new challenges associated with a higher degree of simulation and analysis complexity, going beyond what traditional scientific tools are offering. In this session we welcome contributions where formal spatio-temporal data analysis is playing an important role.</p>	Thomas Landgrebe Guillaume Duclaux	thomas.landgrebe@sydney.edu.au Guillaume.Duclaux@csiro.au
6.12 New Theories and Methods in Resources Exploration	<p>This session invites paper combining state-of-the art theories and technologies for exploring and assessing both renewable and non-renewable resources presuming exploitation with minimum environmental impact and geosequestration. (Co-sponsored by ISME). KEYNOTE SPEAKERS: Dr Donald Singer, Dr Magaretha Scott, Dr Katsuaki Koike</p>	Katsuaki Koike Margaretha Scott Ryoichi Kouda	koike@kumst.kyoto-u.ac.jp margaretha.scott@deedi.qld.gov.au roy.kouda@aist.go.jp

6.13 Advanced models in sediment dynamics applied to marine geology and climatology	Recent developments of models have opened new doors in balancing erosion, transport and accumulation of sediments on different temporal and spatial scales. The session invites sedimentologists, marine geologists, basin modelers, paleoceanographers, and –climatologists to discuss the state of the art and future potential in numerical modeling of sediments dynamics on the geological scale as a results of tectonic, climatic and oceanographic forcing. In the session we will shed light on theory, numerical models and parameterization not only for historical reconstructions, but - in connection with climate models - also for future projections. KEYNOTE SPEAKER: Dr Cedric Griffiths	Jan Harff James Syvitski Dan Tetzlaff	jan.harff@io-warnemuende.de James.Syvitski@colorado.edu DTetzlaff@houston.oilfield.slb.com
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Modeling, fusion, visualisation, exploration and 3d & 4D modelling (Symposium 5.5)

Symposia Theme	Symposia Description	Convenors	
5. Model fusion, visualisation, exploration and 3D & 4-D modelling	Progress and developments in linking process- and time-dependent models across the environmental science disciplines towards the development of predictive environmental modelling platforms. 2-, 3-, 4- and n-D geoscience information, modelling and immersive visualisation systems; error and uncertainty in such systems; deployment of such systems in geological surveys and agencies.	Laurent Ailleres Holger Kessler Mark Jessell	mark.jessell@gmail.com Laurent.Ailleres@monash.edu hke@bgs.ac.uk

Session Title	Session Description	Proposed Convenors	
5.01 Multi-dimensional modelling and visualisation of solid earth models - 2D, 3D, 4D, nD	In this session the objective is to discuss techniques and systems to aid the visual exploration of solid earth data and models. The scope of this session includes: - 3D visualization of Earth models and structures at various scales and resolutions - 4D visualization of time-varying spatial data - dealing with large datasets interactively in real-time (or near real-time) - visualizing multiple datasets	Helmut Schaeben Nick Smith Holger Kessler John Cannon	schaeben@geo.tu-freiberg.de nick.t.smith@nnl.co.uk, hke@bgs.ac.uk

4 Environmental Geoscience. (Symposium 4.3)

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4.Environmental Geosience	This Theme covers the interconnectedness of geology and related environmental effects and includes the application of geoscientific methods in the measurement and mitigation of environmental issues. Indicative Symposia topics: indicators of environmental change; pollution and ground instability; medical geology (including dust and aerosols; gold and mercury); regional to global geochemical mapping; communicating environmental geoscience. Some other substantial areas of environmental geoscience will be covered under other Themes, particularly global climate science, groundwater/hydrogeology, mining, landscape evolution, and geohazards.	Colin Simpson, Michael Leggosimpsons@grapevine.com.au
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Session Title	Session Description	Proposed Convenors
4.3 Advances in the evaluation and interpretation of geochemical data at the continental scale	<p>Geochemical survey data are typically derived from multiple government surveys using a range of analytical methods and sampling media.</p> <p>The diversity of such data, along with its compositional nature (closure problem), can create difficulties with the integration, evaluation and interpretation over large regions.</p> <p>This session will highlight the advances in the application of statistical methods, including the compositional nature of the data and spatial analysis to provide meaningful interpretation for both geological mapping and environmental monitoring at regional/continental scales.in such systems; deployment of such systems in geological surveys and agencies.</p>	<p>Eric Grunsky, Patric de Caritat</p> <p style="margin-left: 20px;">egrunsky@iamg.org</p> <p style="margin-left: 20px;">Patrice.DeCaritat@ga.gov.au,</p>