



# Association of Applied Geochemists

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## A SUCCESSFUL IAGS CONFERENCE!



The 27<sup>th</sup> International Applied Geochemistry Symposium (IAGS) was held on 20–24 April 2015 in Tucson, (Arizona, USA) and was a great success, with excellent technical presentations, well attended short courses, and unique field trips. The cochairs (Erick Weiland, Sarah Lincoln, and Rob Bowell) sincerely thank the sponsors and exhibitors who participated and made this event possible, despite the current tight financial environment. Attendees included 192 professionals, 32 students, and 25 guests, from 23 countries, with USA (119), Canada (75), and Australia (27) accounting for over 80%. Other countries represented were UK (8), China (7), Chile (5), Croatia (5), South Africa (5), Peru (3), Brazil (2), Costa Rica, Ecuador, Finland, France, Germany, Greece, Ireland, Israel, New Zealand, Pakistan, Portugal, Russia, and Sweden.

Two field trips were held, one in the Grand Canyon (led by Matt Leybourne, with Wayne Ranney highlighting the canyon's geology and history), and the other a visit to select Colorado mines and mills (led by David Bird and Rob Bowell). Five short courses and one student workshop, coordinated by Graham Closs and Owen Lavin, were also offered: Application of Indicator Mineral Methods to Exploration (McClenaghan and Layton-Matthews); Metal Mobility in Hydrothermal and Supergene Environments (Chavez and Peterson); Adding Value in Exploration and Remediation with Isotope Geochemistry (Kyser and Leybourne); Application of Field Portable X-Ray Fluorescence in Exploration and Mining (Hall); Interpretation of Geochemical Survey Data (Grunsky); and a Student Publishing Workshop (Leybourne).

The conference adhered to the IAGS format of four days of technical content broken up by a free Wednesday; there were 12 keynote presentations, 20 technical sessions covering 72 technical presentations, and 62 poster presentations. Keynote speakers were: Steve Reynolds (Arizona State University), Peter Bradshaw (First Point Minerals Corp.), Tony Christie (GNS Science), David Seneshen (Amplified Geochemical Imaging), Kathleen Smith (US Geological Survey), Bruno Lemièr (BRGM), Peter Winterburn (University of British Columbia), Lynda Williams (Arizona State University), Charlie Alpers (US Geological Survey), Cliff Stanley (Arcadia University), Pertti Sarala (Geological Society of Finland GTK), Wang Xueqiu (IUGS/IAGC), Eric Grunsky (Geological Survey of Canada), and Wolfrum Schuh (Freeport-McMoran). The technical sessions covered a wide geochemical breadth from exploration, isotopes, environmental, analysis, government

surveys, biogeochemistry, deeply buried deposits, to hydrogeochemistry. Two medical geology technical sessions and a keynote were presented and we thank Laura Ruhl for introducing these sessions to the IAGS.

Two student cash prizes were awarded: best oral presentation to Antonio Celis from Vancouver (British Columbia, Canada), and the best poster to Stacie Jones from Kingston (Ontario, Canada). Second place in each category went to Steven Kramar from Wolfville (Nova Scotia, Canada), and Yadi Wang from Tucson (Arizona, USA).

At the well-attended IAGS dinner, Colin Dunn and Ravi Anand were awarded the Association of Applied Geochemists (AAG) Gold Medal for outstanding achievement in exploration geochemistry, and Beth McClenaghan received the AAG Silver Medal for outstanding service to the AAG.

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## RECENT ARTICLE PUBLISHED IN EXPLORE

*R.G. Garrett (2015) A Comparison of Shewhart, Thompson and Howarth, and Youden Plots – Advantages and Disadvantages. Explore 167 (June 2015)*

A review is presented of graphical and statistical tools available in the R Open Source package 'rgr' to support QA/QC tasks for applied geochemical survey data, with examples drawn from Geological Survey of Canada data. With data provided by the user, a variety QA/QC plots may be prepared for visual inspection and estimates made of analytical precision. Analytical duplicate analyses are presented as Shewhart plots to recognize if data have fallen out of the provided tolerance statistics. Alternately, these same data may be presented as Thompson and Howarth plots and tested to determine if they fall within a predefined population precision supplied as a relative standard deviation. Control reference data may be presented as Shewhart plots, with user-defined tolerance levels, to determine if there has been analytical drift. Youden plots are used to compare determinations on the same samples by different analytical procedures, analyses of material drawn from the same geographic site, e.g. field duplicates, or even analytical duplicates. As geochemical analytical data are of a closed compositional form, i.e. they sum to a constant, the Youden plots are prepared with logarithmic scaling. This is appropriate for trace and minor element data up to the 10 wt% level. The plots are presented with a 1:1 line to aid the recognition of bias between the analyses. Optionally, the orthogonal regression line (reduced major axis) may be added, this is the appropriate regression model as the two data sets are independent of one another. The intercept and slope coefficients of the orthogonal regression are estimated and tested against (0,1); if they are not significantly different the data can be accepted as equivalent. An alternate display is introduced where the ratio of the two analyses, being ideally one if the data are equivalent, is plotted against their mean. This is effectively a paired t-test of the logarithmically transformed data, the ratio is tested to determine if is significantly different from one, and classical and robust estimates of the precision made at the 95% confidence level. Optionally a cumulative probability plot of the ratios may be displayed to check that the variability about unity is normally distributed and identify any outliers.

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## A call for laboratory support...

The Association of Applied Geochemists (AAG) invites analytical laboratories to participate in pairing their analytical facilities with student projects to develop emerging geochemists and their science. The AAG Education Committee is seeking analytical laboratories to offer in-kind support to students in terms of analysis, while receiving acknowledgement on AAG's website and in the Association's EXPLORE newsletter.

**"Today's students are  
tomorrow's clients"**

If your laboratory is interested in learning more about this program, please contact the Chair of AAG's Education Committee at [education@appliedgeochemists.org](mailto:education@appliedgeochemists.org)