

# 2006 Kimberlite Emplacement Workshop



The 2006 Kimberlite Emplacement Workshop, convened by Roger Mitchell and Barbara Scott Smith, was held in Saskatoon, Saskatchewan, Canada, from September 7 to 14, 2006. It was sponsored by the 8<sup>th</sup> International Kimberlite Conference, under the auspices of the International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI). There were approximately 40 participants, representing a wide range of disciplines, including kimberlite petrology and volcanology. Major industry representatives covered specialties ranging from exploration to evaluation and mining. For the several young scientists in attendance, the workshop was an amazing opportunity to listen to experienced kimberlite geologists. Two half-day field trips were included, one to study drill cores of volcanoclastic kimberlite from the Fort à la Corne kimberlites, and a second to the De Beers Joint Venture Fort à la Corne field site, located approximately 200 km northeast of Saskatoon.

The workshop format allowed many viewpoints to be presented and debated, and although consensus was not reached on all topics, key issues relating to kimberlite geology and emplacement were addressed with a more extensive, well-rounded group of scientists than ever before. Animated discussions were very effective in providing a framework for moving forward. The topics discussed included kimberlite models and economic evaluations, a review of classical kimberlite petrology and emplacement ideas, primary kimberlite magma chemistry,

The kimberlite emplacement workshop included two field trips to look at drill core from the Fort à la Corne kimberlites.

volatiles and transport properties, magmatic and phreatomagmatic eruption processes, and new ideas on emplacement processes from analogue experiments and rock mechanics of kimberlite pipes. Tuffisitic kimberlites, juvenile pyroclasts, and issues associated with volcanological models and terminology for kimberlites were also discussed. Case studies were presented from southern Africa, the Canadian Plains, Canada's Slave and Superior cratons, Yakutia (Russia), and Brazil.

The discussions identified issues where there is substantial consensus and several that remain contentious. Key issues that emerged were the following:

- 1 Descriptive nomenclature used in current kimberlite studies needs modification to provide some consistency with volcanological terminology and to avoid making genetic implications at the documentation stage.
- 2 Further studies are being undertaken on the physical and chemical properties of kimberlitic magmas, particularly on the solubilities of CO<sub>2</sub> and H<sub>2</sub>O in relation to ambient chemistry, and how these solubilities affect the magma's near-surface behavior.
- 3 Further studies on the nature and significance of post-emplacement alteration fluids (e.g. deuteric, hydrothermal, meteoric, diagenetic) are crucial to reconstructing emplacement processes. Identification and interpretation of "primary" textures within kimberlite remain a contentious



Participants in the kimberlite emplacement workshop relaxing after a day of talks

topic. What is the extent of secondary alteration? Can this alteration be unraveled to reveal true primary textures?

4 The mechanisms behind the explosive fragmentation of kimberlite magma were discussed extensively, and a consensus was reached that both magmatic and phreatomagmatic processes are possible, and that both may occur within the eruption history of a single pipe. Pipe excavation and emplacement processes are poorly understood, but new experiments and detailed field studies are providing fascinating insights into these issues.

5 Tuffisitic kimberlites emerged as the most contentious topic, with regard to both terminology and the origin of their defining characteristics and features. Experiments related to emplacement processes of these types of massive volcanoclastic kimberlites are being undertaken by the Volcanology and Geological Fluid Dynamics Group based at the University of Bristol and are providing significant new insights.

Significant differences in approach and opinion remain between some groups concerning kimberlite nomenclature and ideas on kimberlite emplacement processes. Moving forward will

require improved cooperation and understanding between volcanologists and kimberlite scientists. This will be best achieved by the traditional kimberlite scientists continuing to engage with the volcanological community and volcanologists continuing to gain first-hand experience of kimberlite deposits. A follow-up workshop of similar design has been proposed following the 9<sup>th</sup> International Kimberlite Conference (9IKC) scheduled for Frankfurt in 2008.

A volume of abstracts has been published, and submission of full manuscripts is scheduled for March 1, 2007, for inclusion in a special publication volume of the *Journal of Volcanology and Geothermal Research*. Please see the following links for the long abstracts presented at the 2006 Kimberlite Emplacement Workshop and for information on the 9IKC: [www.venuewest.com/8IKC/9ikc.htm](http://www.venuewest.com/8IKC/9ikc.htm) and [www.9ikc.com/](http://www.9ikc.com/).

**Margaret Harder**  
(Mineral Services Canada Inc.),  
**Adrian Pittari** (Monash University),  
**Stephen Moss** (University of British Columbia), and  
**Thomas Gernon** (University of Bristol)



**9<sup>th</sup> INTERNATIONAL KIMBERLITE CONFERENCE**  
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- Diamonds and diamond exploration
- Origin and emplacement of kimberlites and related magmas
- Cratons and cratonic roots

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