

# **Workshop on Greenland's diamond potential, 7–9 November 2005, in Copenhagen**

Proceedings

Sven Monrad Jensen & Karsten Secher (eds)

(1 CD-Rom included)



GEOLOGICAL SURVEY OF DENMARK AND GREENLAND  
MINISTRY OF THE ENVIRONMENT



**GEUS**

**Workshop on Greenland's diamond potential,  
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# Workshop on Greenland's diamond potential

## Proceedings

The Geological Survey of Denmark and Greenland (GEUS) and the Greenland Bureau of Minerals and Petroleum (BMP) hosted an international workshop in Copenhagen, 7–9 November 2005.

The workshop covered issues relating to ongoing diamond exploration and research on kimberlites, lamprophyres and the diamond potential of West Greenland. Subjects such as the lithospheric mantle in southern West Greenland, petrogenesis of kimberlite, geotectonic and structural setting, and exploration techniques as well as results were addressed.

Forty participants representing international university and survey research teams, collaborators and diamond exploring companies attended the workshop. Data from recent investigations and exploration for diamonds in West Greenland and other Archaean cratonic regions in the Northern Hemisphere, especially those in glaciated terrain, were in focus. At the same time the variety of Greenland rock types known to be relevant to diamonds were displayed.

This report volume includes the talks, presented as PowerPoint presentations and arranged alphabetically in an auto run mode with a build in PowerPoint viewer on the attached CD-Rom. Only talks accepted for publication by the authors are included.

Before the workshop GEUS issued a collection of extended abstracts as a public report, which is available from GEUS:

*Secher, K & Nielsen, M.N (eds): Workshop on Greenland's diamond potential, 7–9 November 2005, in Copenhagen. Extended abstracts. Danmarks og Grønlands Geologiske Undersøgelse Rapport 2005/68, 123 pp.*

## Contents of CD-Rom

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Old and/or thick lithosphere beneath NW and E Greenland
2. Bonow, J.M. & Japsen, P. in collaboration with Green, P.F., Chalmers, J.A. & Lidmar-Bergström, K.  
Consequences of Phanerozoic episodes of burial and exhumation for erosional patterns in West Greenland
3. Dahl-Jensen, T., Darbyshire, F. & Larsen, T.B.  
Crust and mantle information in Greenland from earthquakes
4. Funder, S.  
Tracking glacially transported kimberlite erratics in Greenland
5. Heaman, L.M.  
Patterns of kimberlite emplacement – the importance of robust geochronology
6. Helmstaedt, H.H.  
Geotectonic settings of diamond-producing cratons with implications for the diamond potential of southwest Greenland
7. Hutchison, M.T.  
Diamondiferous kimberlites from the Garnet Lake area, west Greenland: exploration methodologies and petrochemistry
8. Jensen, S.M., Sand, K.K. & Steenfelt, A.  
Regional distribution and chemistry of indicator minerals from in situ rocks and surficial deposits in the Maniitsoq and Sarfartoq regions
9. Kjarsgaard, B.A.  
The Diamond Potential of West Greenland: some Global Insights
10. Larsen, L.M. & Garrit, D.  
Mapping of the lithosphere beneath the Archaean craton and Proterozoic mobile belt in West Greenland
11. Lehtonen M., Marmo, J. & Nissinen, A.  
Indicator mineral signatures in basal till surrounding the Lahtojoki and Seitaperä kimberlites, eastern Finland
12. Nielsen, T.F.D. & Jebens, M.  
Kimberlites and ultramafic lamprophyres in West Greenland: regional constraints

13. Nielsen, T.F.D., Jensen, S.M. & Secher, K.  
The Majuagaa calcite-kimberlite dyke
14. O'Brien, H., Peltonen P. & Lehtonen, M.  
The North Atlantic alkaline rocks – probes for testing continuity of subcontinental lithospheric mantle
15. Pearson, D.G., Webb, M., Nowell, G.M., Sand, K.K., Luguët, A. & Jensen, S.M.  
Age, depth and composition of the W. Greenland lithospheric mantle root and implications for diamond prospecting
16. Peltonen, P., O'Brien, H., Lehtonen, M. & Brüggmann, G.  
Mantle stratigraphy of the Karelian craton – implications for diamond prospecting
17. Pesonen, L.J., O'Brien, H., Piispa, E., Mertanen, S. & Peltonen, P.  
Kimberlites and lamproites in continental reconstructions – implications for diamond prospecting
18. Plado, J. & Pesonen, L.J.  
Magnetic signatures of circular geological features with special emphasis on kimberlite prospecting
19. Rasmussen, T.M.  
Application of geophysical methods to diamond exploration in Greenland – experiences and data review
20. Steenfelt, A., Jensen, S.M. & Sand, K.K.  
Distribution of kimberlite indicator minerals in till within the Neoproterozoic Sarfartoq-Maniitsoq province of kimberlite and ultramafic lamprophyres, southern West Greenland
21. Tappe, S., Foley, S.F., Kjarsgaard, B.A., Heaman, L.M., Jenner, G.A., Stracke, A. & Romer, R.L.  
Ultramafic lamprophyres and carbonatites of Labrador and New Quebec: towards a genetic model for Neoproterozoic rift-related alkaline magmatism in the North Atlantic region
22. Tukiainen, T. & Thorning, L.  
Detection of kimberlitic rocks using airborne hyperspectral data from southern West Greenland

## Workshop programme

### Monday, 7 November: *Lithosphere properties and geotectonic settings critical to diamond-producing cratons*

Chairman, L. M. Larsen

09.00 *Coffee and Intro/welcome by K. Sørensen, Vice Director, GEUS*

09.30 **Helmstaedt, H.H.** Geotectonic settings of diamond-producing cratons with implications for the diamond potential of southwest Greenland

10.00 **Pesonen, L.J., O'Brien, H., Piispa, E., Mertanen, S. & Peltonen, P.** Kimberlites and lamproites in continental reconstructions – implications for diamond prospecting

10.30 *Coffee*

11.00 **O'Brien, H., Peltonen, P. & Lehtonen, M.** The North Atlantic alkaline rocks – probes for testing continuity of subcontinental lithospheric mantle

11.30 **Peltonen, P., O'Brien, H., Lehtonen, M. & Brüggmann, G.** Mantle stratigraphy of the Karelian craton – implications for diamond prospecting

12.00 Discussion

12.30 *Lunch*

Chairman, H. Helmstaedt

13.30 **Dahl-Jensen, T., Darbyshire, F. & Larsen, T.B.** Crust and mantle information in Greenland from earthquakes

14.00 **Larsen, L.M. & Garrit, D.** Mapping of the lithosphere beneath the Archaean craton and Proterozoic mobile belt in West Greenland

14.30 **Pearson, D.G., Webb, M., Nowell, G.M., Sand, K.K., Luguët, A. & Jensen, S.M.** Age, depth and composition of the W. Greenland lithospheric mantle root and implications for diamond prospecting

15.00 *Coffee*

15.30 **Bernstein, S.** Old and/or thick lithosphere beneath NW and E Greenland

16.00 Discussion

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**Tuesday, 8 November: *Diamond-favourable magma composition and intrusion forms; timing and spatial distribution***

Chairman, S.M. Jensen

- 09.00 **Kjarsgaard, B.A.** The Diamond Potential of West Greenland: some Global Insights
- 09.30 **Heaman, L.M.** Patterns of kimberlite emplacement – the importance of robust geochronology
- 10.00 **Tappe, S., Foley, S.F., Kjarsgaard, B.A., Heaman, L.M., Jenner, G.A., Stracke, A. & Romer, R.L.** Ultramafic Lamprophyres and carbonatites of Labrador and New Quebec: towards a genetic model for Neoproterozoic rift-related alkaline magmatism in the North Atlantic region

10.30 *Coffee*

- 11.00 **Jensen, S.M., Nielsen, T.F.D. & Jebens, M.** Regional distribution and classification of kimberlite and ultramafic lamprophyres in West Greenland: important for the diamond potential
- 11.30 **Plado, J. & Pesonen, L.J.** Magnetic signatures of circular geological features with special emphasis on kimberlite prospecting
- 12.00 Discussion

12.30 *Lunch*

Chairman, A. Steenfelt

- 13.30 **Nielsen, T.F.D., Jensen, S.M. & Secher, K.** The Majuagaa calcite-kimberlite dyke
- 14.00 **Bonow, J.M., Japsen, P., Green, P.F., Chalmers, J.A. & Lidmar-Bergström, K.** Consequences of Phanerozoic episodes of burial and exhumation for erosional patterns in West Greenland
- 14.30 **Funder, S.** Tracking glacially transported kimberlite erratics in Greenland

15.00 *Coffee*

- 15.30 **Secher, K. & Nielsen, T.F.D.** Petrographical Atlas/ Sample shack
- 19.00 Workshop dinner



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**Wednesday, 9 November: *Exploration: Indicator minerals, geochemistry, geophysical methods and case histories***

Chairman, L. Thorning

- 09.00 **Nowicki, T.E. & Gurney, J.J.** Assessment of diamond potential using kimberlitic indicator minerals: key principals and applications
- 09.30 **Lehtonen, M., Marmo, J. & Nissinen, A.** Indicator mineral signatures in basal till surrounding the Lahtojoki and Seitaperä kimberlites, eastern Finland
- 10.00 **Steenfelt, A., Jensen, S.M. & Sand, K.K.** Distribution of kimberlite indicator minerals in till within the Neoproterozoic Sarfartoq-Maniitsoq province of kimberlite and ultramafic lamprophyres, southern West Greenland

10.30 *Coffee*

- 11.00 **Jensen, S.M., Sand, K.K. & Steenfelt, A.** Regional distribution and chemistry of indicator minerals from *in situ* rocks and surficial deposits in the Maniitsoq and Sarfartoq regions
- 11.30 **Hutchison, M.T.** Diamondiferous kimberlites from the Garnet Lake area, west Greenland: exploration methodologies and petrochemistry
- 12.00 Discussion

12.30 *Lunch*

Chairman, H.K. Schönwandt

- 13.30 **Tukiainen, T. & Thorning, L.** Detection of kimberlitic rocks using airborne hyperspectral data from southern West Greenland
- 14.00 **Rasmussen, T.M.** Application of geophysical methods to diamond exploration in Greenland – experiences and data review
- 14.30 **Schönwandt, H.K.** Round up and closing remarks
- 15.00 End of workshop

## List of participants

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