



Vernadsky – DCO Project

Workshop

GEOKHI RAS - Moscow
24 – 26 May 2017

Program



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Program for 24 May, 2017
(Speakers and title of their reports)

9.00-9.10 – Opening of the Meeting

9.10-9.25 – **C. Jaupart**. About the DCO Project

9.25-10.00 – **E. Galimov**. Carbon researches in Vernadsky Institute.

Poster session and Coffee break: 10.00 – 11.00

V. Sevastyanov. Oil Potential of Volcanism-Related Hydrothermal systems.

E. Dubinina. Hydrothermal Deep Sea Carbonate deposition at the Lost City field: modeling with O-C-Sr isotope coordinates.

A. Shiryaev. Spectroscopy of micro- and nano-diamonds from primitive chondrites and ureilites: implications to diamond formation and post-growth processes.

S. Shilobreeva. The origin and fate of carbon during the alteration of the oceanic crust.

O. Safonov. Carbon sources in granitoids of granulite complexes.

A. Ivanov. Cavitation and the beginning of life.

Session 1: Geochemistry researches. 11.00 – 13.20

Part 1. Chairwoman - L. Kogarko

11.00-11.25 – **A. Krivtsov**. Evolution of the circumsolar protoplanetary disk as precursor for the Earth - Moon system formation.

11.25-11.50 – **A. Oganov**. High-pressure chemistry of carbon.

11.50-12.15 – **L. Kogarko**. Plume-related alkaline and carbonatite magmatism in the Earth's history. Link to carbonatized and metasomatized mantle.

12.15-12.30 – Coffee break

Part 2: Chairman – N. Bortnikov

12.30-12.55 – L. Aranovich. Salting out effect in deep carbon cycle.

12.55-13.20 – M. Levitan. Abundance of carbonate carbon in the Pleistocene pelagic sediments of the World Ocean.

13.20-14.30 – Break for lunch.

Session 2: Diamond researches. 14.30 – 17.10

Part 1: Chairman – N. Sobolev

14.30-14.50 – K. Garanin. PJSC ALROSA – reality, development and diamond deposits exploration.

14.50-15.10 – N. Sobolev. Inclusions in large gem diamonds of the Siberian craton, Russia.

15.10-15.30 – A. Dnestrovsky. Computational Modeling of Cavitation in Hydrocarbon Fluids and the Experimental Evidence of Diamonds Genesis.

15.30-15.50 – V. Shatsky. Alluvial Diamonds from Northeast of Siberian Craton: Evidence for Formation in Subduction environment.

15.50-16.10 – Coffee break

Part 2: Chairman – V. Garanin

16.10-16.30 – G. Kriulina. Diamond deposits in Russia: new data, genesis and real diamond grade.

16.30-16.50 – V. Reutsky. Experimental studies of carbon isotope fractionation in carbon-metal system at the mantle PT-conditions.

16.50-17.10 – V. Bogoyavlensky. Prospects of oil and gas content of deep horizons of the Arctic and World Ocean sedimentary cover and basement.

17.30 – 19.30 – Welcome party and cocktail dinner

Vernadsky Institute

Program for 25 May, 2017

Morning Session: Tracing the carbon cycle.

Tracking the carbon cycle through isotopes and other elements.

Leader: Bernard Marty

Main issues:

- Carbon-related constraints for global models.
- Identify unexplored or poorly explored connections (ex: relationships between major biological changes and geological activity).
- Which signature for each transport process, at what scale?
- Which scientific structure/platform to share data/views with modelers?
- Isotopes and elements that may be useful for global models of the deep carbon cycle.

9:00-9:30: Introduction. Nicolas Coltice (Université de Lyon, France).

9:30-10:00: Bernard Marty (Ecole Nationale Supérieure de Géologie, Nancy, France). Tracing mantle carbon heterogeneities with noble gases.

10:00-10:30: Andrew Steen (University of Tennessee, USA). Controls on the preservation of organic carbon in deep, cold sediments.

10:30-11:00: Coffee Break

11:00-12:00: Discussion led by Bernard Marty.

Specific points: geodynamic processes that are traced by diamonds; deep carbon fractionation (diamond formation, melting, phase changes); which rock record for the global carbon cycle past and present?

12:00-13:30: Break for lunch

13:30-14:30: Vernadsky Museum Visit no.1

Afternoon Session: Time-scales of global models.

The slow (secular) carbon cycle with a focus on long-term evolution.

Leader: Yuichiro Ueno.

Main issues:

- Identify unexplored or poorly explored connections connections (for example relationships between major biological changes and geological activity).
- Carbon-related constraints for global models.
- Identify the needs for upscale models in the different DCO communities.
- Sharing data/models between the different model communities.
- Directions for time-dependent, or time specific global models: which data, which geochemical tracers, which physics?

14:30-15:00: Raj Dasgupta (Rice University, USA). The Origin and Early Evolution of Carbon on Earth.

15:00-15:30: Katie Cooper (Washington State University, USA). The deep structure of continental lithosphere.

15:30-16:00: E. Galimov (Vernadsky Institute, Russia). Role of the faint luminosity of the Sun in the history of the biosphere.

16:00-16:30: Yuichiro Ueno (Earth-Life Science Institute, Tokyo, Japan).

16:30-17:00: Coffee Break.

17:00-18:00: Discussion/brainstorming led by Yuichiro Ueno.

Specific points: potential consequences of the Moon-forming impact for the early carbon cycle; what do diamonds tell us about the co-evolution of the lithosphere and mantle?; origin of life and the deep carbon cycle; does the Sun have to be involved in models for the early Earth?

Program for 26 May, 2017

Morning Session: Modelling across the scales.

Carbon transport from small scales to the scale of the Earth

Leader: Mark Jellinek.

Main issues:

- Current status of “first principles” models coupling transport processes and their driving forces.
- Identify the needs for upscaling models in the different DCO communities. “Upscaling models” stands for models at increasingly larger scales (i.e. going from individual arc volcanoes to a whole subduction zone and then to the whole planet, for example).
- Identify unexplored or poorly explored connections (for example relationships between major biological changes and geological activity).
- Evaluate the involvement of the geodynamics community and the benefit of being involved in the carbon community
- A global model for the Earth as it works today?

9:00-9:30: Introduction. Nicolas Coltice (Université de Lyon, France).

9:30-10:00: Clint Conrad (Centre for Earth Evolution and Dynamics, Oslo, Norway). The deep carbon cycle and mantle-lithosphere dynamics: looking backward from today.

10:00-10:30: Mark Jellinek (University of British Columbia, Canada). A reverse energy cascade for crustal magma transport and outgassing.

10:30-11:00: Coffee Break.

11:00-12:00: Discussion/brainstorming led by Mark Jellinek.

Specific points: Deep reservoirs of carbon and mantle convection; subduction and degassing of carbon; feedbacks between alteration and convection; metasomatism of the upper mantle and convection; moving from one scale to the other.

12:00-13:30: Break for lunch

13:30-14:30: Vernadsky Museum Visit no.2

Afternoon Session: Global data and global models.

Global datasets for large-scale models of the carbon cycle.

Leader: Carolina Lithgow-Bertelloni.

Main issues:

- Linkage between data and models: which data should be fed into models / in what form, at which scales in space and time.
- How to exploit databases to quantify fluxes and storage at large-scales.
- Community-based tools to exploit databases and generate models.
- Missing databases?
- Structures and ways to promote the use of databases in physical models.
- How can we share data produced through a global Earth model?

14:30-15:00: Carolina Lithgow-Bertelloni (University College, London).

15:00-15:30: Emil Ruff (University of Calgary, Canada). The Census of Deep Life: Diversity and biogeography of microorganisms in the deep subsurface.

15:30-16:00: Sabin Zahirovic (EarthByte, University of Sydney, Australia). Linking models and databases in a deep time and deep Earth community framework.

16:00-16:30: Coffee Break.

16:30-17:30: Discussion led by Carolina Lithgow-Bertelloni.

Specific points: amount and distribution of sediments through time; database for element partitioning and thermodynamics; implementation in global models; biological and geological evolution.

17:30-18:00. Conclusion

Erik Galimov, Nicolas Coltice and Claude Jaupart.