DEEP CARBON OBSERVATORY

SECOND INTERNATIONAL SCIENCE MEETING

26–28 March 2015

Deutsches Museum
Munich, Germany
PROGRAM COMMITTEE

Craig Manning, Program Committee Chair
DCO Executive Committee and DCO Extreme Physics and Chemistry Community
Scientific Steering Committee, University of California Los Angeles

Donald Dingwell, Local Host
DCO Executive Committee, Ludwig Maximilian University

Magali Ader
DCO Deep Energy Community Scientific Steering Committee, Institut de Physique
du Globe de Paris

Liz Cottrell
DCO Reservoirs and Fluxes Community Scientific Steering Committee, Smithsonian
Institution National Museum of Natural History

Craig Schiffries
DCO Secretariat, Carnegie Institution of Washington

Matt Schrenk
DCO Deep Life Community Scientific Steering Committee, Michigan State University

VENUES

Conference Hotel (Included breakfast buffet begins each morning at 06:00)
Holiday Inn Munich–City Centre, Hochstraße 3, 81669

Icebreaker (Wednesday, 25 March, 18:00 – 20:00)
Holiday Inn Munich–City Centre, Hochstraße 3, 81669

Science Meeting (Thursday, 26 March, Registration and coffee, 08:00;
Program 09:00 - 17:00; Friday and Saturday, 27–28 March, Registration and coffee,
08:30; Program 09:00 - 17:00)
Deutsches Museum, Museumsinsel 1, 80538

DCO Community Dinners (Thursday, 26 March, 20:00 - 22:00)
Deep Energy and Deep Life, Restaurant Alter Hof, Alter Hof 3, 80331
Reservoirs and Fluxes and Extreme Physics and Chemistry, Zum Spöckmeier,
Rosenstraße 9 (direct by the Marienplatz), D-80331

Poster Sessions (Friday, 27 March and Saturday, 28 March, 17:00 - 19:00)
Holiday Inn Munich–City Centre, Hochstraße 3, 81669

All-Conference Dinner (Saturday, 28 March, 20:00 - 22:00)
Hofbräukeller, Innere Wiener Straße 19, 81667
ICEBREAKER, Holiday Inn Munich–City Centre

WEDNESDAY, 25 MARCH

18:00 - 20:00 Icebreaker

OVERVIEW:
SCIENCE MEETING, POSTER SESSIONS, AND THURSDAY AND SATURDAY EVENING DINNERS

Science Meeting: Deutsches Museum
Poster Sessions: Holiday Inn Munich–City Centre
Dinners: See Venue info for locations

THURSDAY, 26 MARCH

<table>
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<tr>
<th>Time</th>
<th>Event</th>
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<tr>
<td>08:00 - 09:00</td>
<td>Registration and Coffee</td>
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<tr>
<td>09:00 - 09:25</td>
<td>Welcome</td>
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<tr>
<td>09:25 - 10:40</td>
<td>Thursday Morning Program I</td>
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<tr>
<td>10:40 - 10:55</td>
<td>Break</td>
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<tr>
<td>10:55 - 12:35</td>
<td>Thursday Morning Program II</td>
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<tr>
<td>12:35 - 13:25</td>
<td>Lunch</td>
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<tr>
<td>13:25 - 15:05</td>
<td>Thursday Afternoon Program I</td>
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<tr>
<td>15:05 - 15:20</td>
<td>Break</td>
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<tr>
<td>15:20 - 17:00</td>
<td>Thursday Afternoon Program II</td>
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<tr>
<td>17:00</td>
<td>Group Photo (location at the museum to be announced)</td>
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<tr>
<td>20:00 - 22:00</td>
<td>DCO Scientific Community Dinners (see Venue info for locations)</td>
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</tbody>
</table>
FRIDAY, 27 MARCH

08:30 - 09:00 Registration and Coffee

09:00 - 10:40 Friday Morning Program I

10:40 - 10:55 Break

10:55 - 12:35 Friday Morning Program II

12:35 - 13:25 Lunch

13:25 - 15:05 Friday Afternoon Program I

15:05 - 15:20 Break

15:20 - 17:00 Friday Afternoon Program II

17:00 - 19:00 Friday Poster Session (Holiday Inn Munich–City Centre)

Friday Evening Dinner (schedule as you wish)

SATURDAY, 28 MARCH

08:30 - 09:00 Registration and Coffee

09:25 - 10:40 Saturday Morning Program I

10:40 - 10:55 Break

10:55 - 12:10 Saturday Morning Program II

12:35 - 13:25 Lunch

13:25 - 15:05 Saturday Afternoon Program I

15:05 - 15:20 Break

15:20 - 17:00 Saturday Afternoon Program II

17:00 - 19:00 Saturday Poster Session (Holiday Inn Munich–City Centre)

20:00 - 22:00 All-Conference Dinner (Hofbräukeller)
**PRESENTATION SCHEDULE, Deutsches Museum**

**THURSDAY, 26 MARCH**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker(s)</th>
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</table>
| 09:00 - 09:25 | **Welcome**                                                             | Craig Schiffries, DCO Secretariat  
Donald Dingwell, Ludwig Maximilian University  
Wolfgang Heckl, Deutsches Museum  
Helmuth Trischler, Deutsches Museum |
|               | Morning Moderators: Donald Dingwell and Liz Cottrell                    |                                                                                                 |
| 09:25 - 09:50 | **Uncertainties and key open questions in the geological carbon cycle**  | Mike Burton, University of Manchester  
M Burton, F Arzilli                                                                                |
| 09:50 - 10:15 | **Carbon in magmas; budgets and roles in volcanic processes**            | Paolo Papale, Istituto Nazionale di Geofisica e Vulcanologia                                    |
| 10:15 - 10:40 | **H₂O and CO₂ solubility in silicate melts at crustal/upper mantle pressures** | Mark Ghiorso, OFM Research                                                                       |
| 10:40 - 10:55 | **Break**                                                                |                                                                                                 |
| 10:55 - 11:20 | **Undegassed carbon content from a highly depleted segment of the Mid-Atlantic Ridge (1-5°S): Evidence from melt inclusions** | Marion Le Voyer, Carnegie Institution of Washington  
M Le Voyer, K Kelley, E Cottrell, E Hauri                                                        |
| 11:20 - 11:45 | **CO₂ flux from East African Rift contributes significantly to global carbon emissions** | Tobias Fischer, University of New Mexico                                                           |
| 11:45 - 12:10 | **Mantle to surface: The role of CO₂ and magma plumbing system on volcanic activity at Kilauea volcano, Hawaii** | Helge Gonnermann, Rice University  
HM Gonnermann, AP Blaser, D Ferguson, T Plank, E Hauri, BF Houghton, D Swanson                  |
| 12:10 - 12:35 | **Satellite detection of volcanic CO₂ degassing**                       | Christoph Popp, Smithsonian Institution National Museum of Natural History  
C Popp, BJ Andrews, K Chance, E Cottrell                                                          |
| 12:35 - 13:35 | **Lunch**                                                                |                                                                                                 |
Afternoon Moderators: Terry Plank and Craig Manning

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<tr>
<th>Time</th>
<th>Topic</th>
<th>Authors/Institutions</th>
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<tbody>
<tr>
<td>13:25 - 13:50</td>
<td><strong>Melt inclusion records of magma mixing: Implications for magmatic volatile budgets</strong></td>
<td>Marie Edmonds, University of Cambridge, M Edmonds, D Neave, L Salem, J Maclennan, M Hartley</td>
</tr>
<tr>
<td>13:50 - 14:15</td>
<td><strong>Does deep carbon have a seismic signature?</strong></td>
<td>Catherine McCammon, University of Bayreuth, C McCammon, L Dubrovinsky, V Cerantola, I Kupenko, R Sinmyo, A Kantor, A Chumakov</td>
</tr>
<tr>
<td>14:15 - 14:40</td>
<td><strong>Carbon, nitrogen and water recycling in the mantle transition zone</strong></td>
<td>Graham Pearson, University of Alberta, DG Pearson, T Stachel, M Palot</td>
</tr>
<tr>
<td>14:40 - 15:05</td>
<td><strong>The deep mantle carbon cycle</strong></td>
<td>Mike Walter, Bristol University, M Walter, A Thomson, S Kohn</td>
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<tr>
<td>15:05 - 15:20</td>
<td><strong>Break</strong></td>
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<tr>
<td>15:20 - 15:45</td>
<td><strong>Viewing deep carbon in a diamond anvil cell</strong></td>
<td>Wendy Mao, Stanford University</td>
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<tr>
<td>15:45 - 16:10</td>
<td><strong>Hidden carbon in Earth’s inner core</strong></td>
<td>Jackie Li, University of Michigan</td>
</tr>
<tr>
<td>16:10 - 16:35</td>
<td><strong>How isotopes can constrain the carbon in planetary cores</strong></td>
<td>Anat Shahar, Carnegie Institution of Washington, W Mao, M Reagan, A Gleason and E Schauble</td>
</tr>
<tr>
<td>16:35 - 17:00</td>
<td><strong>Ramp compression of carbon above 50 Mbar on the National Ignition Facility</strong></td>
<td>Ray Smith, Lawrence Livermore National Laboratory, RF Smith, JH Eggert, R Jeanloz, TS Duffy, DG Braun, JR Patterson, RE Rudd, J Biener, AE Lazicki, AV Hamza, J Wang, T Braun, LX Benedict, PM Celliers, GW Collins</td>
</tr>
<tr>
<td>17:00</td>
<td><strong>Group Photo</strong></td>
<td>(location at museum to be announced)</td>
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<tr>
<td>20:00 - 22:00</td>
<td><strong>DCO Scientific Community Dinners</strong></td>
<td>(see Venue info for locations)</td>
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### FRIDAY, 27 MARCH

Morning Moderators: Matt Schrenk and Magali Ader

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<tr>
<td></td>
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<td>U Harms, B Horsfield, C Knebel</td>
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<tr>
<td>09:25 - 09:50</td>
<td>Defining the temporal, physical and chemical framework for carbon speciation in the deep crust</td>
<td>Chris Ballentine, University of Oxford</td>
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<td></td>
<td>CJ Ballentine, B Sherwood Lollar, TC Onstott, G Lacrampe-Couloume, G Holland, L Li, GF Slater</td>
</tr>
<tr>
<td>09:50 - 10:15</td>
<td>New estimates of global H(_2), CH(_4) and hydrocarbon production from the Precambrian crust</td>
<td>Chelsea Sutcliffe, University of Toronto</td>
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<td>CN Sutcliffe, CJ Ballentine, TC Onstott, C Glein, J McDermott, G Lacrampe-Couloume, B Sherwood Lollar</td>
</tr>
<tr>
<td>10:15 - 10:40</td>
<td>Deep Underground Laboratory and Deep Energy: Exploration of the Songliao Basin, China</td>
<td>Chengshan Wang, China University of Geosciences</td>
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<tr>
<td>10:40 - 10:55</td>
<td>Break</td>
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<tr>
<td>10:55 - 11:00</td>
<td>In situ microimaging of carbon speciation in serpentinites: implications for the diversity of associated abiotic organic molecules and deep ecosystems</td>
<td>Benédicte Ménez, Institut de Physique du Globe de Paris</td>
</tr>
<tr>
<td>11:00 - 11:45</td>
<td>Natural and experimental serpentinization</td>
<td>Muriel Andreani, Université de Lyon</td>
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<tr>
<td>11:45 - 12:10</td>
<td>Microbial carbon processing in serpinizing subsurface ecosystems: Insights from the Coast Range Ophiolite Microbial Observatory</td>
<td>Matt Schrenk, Michigan State University</td>
</tr>
<tr>
<td>12:10 - 12:35</td>
<td>Subseafloor methane budget and microbial players</td>
<td>Antje Boetius, AWI/MPI Bremen</td>
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<tr>
<td>12:35 - 13:25</td>
<td>Lunch</td>
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<td>13:25 - 13:50</td>
<td><strong>Lighting up the underworld</strong></td>
<td>John Ludden, British Geological Survey</td>
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<tr>
<td>13:50 - 14:15</td>
<td><strong>Origin, movement and fate of methane from the Cayman hydrothermal vent fluids</strong></td>
<td>Max Coleman, NASA JPL / Caltech, M Coleman, J Eiler, D Stolper</td>
</tr>
<tr>
<td>14:15 - 14:40</td>
<td><strong>Principles and prospects of clumped methane isotopologues in deep carbon research</strong></td>
<td>Shuhei Ono, Massachusetts Institute of Technology, S Ono, DT Wang, DS Gruen</td>
</tr>
<tr>
<td>14:40 - 15:05</td>
<td><strong>Isotopic bond ordering: beyond temperature</strong></td>
<td>Ed Young, University of California Los Angeles, E Young, I Yeung</td>
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<tr>
<td>15:05 - 15:20</td>
<td><strong>Break</strong></td>
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<tr>
<td>16:10 - 16:35</td>
<td><strong>Effects of extreme pressure on microorganisms</strong></td>
<td>Isabelle Daniel, Université de Lyon</td>
</tr>
<tr>
<td>16:35 - 17:00</td>
<td><strong>Exploring deep life in coal-bearing sediments down to ~2.5km below the seafloor</strong></td>
<td>Fumio Inagaki, JAMSTEC, F Inagaki, KU Hinrichs, and IODP Expedition 337 shipboard and shore-based scientists</td>
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**Friday Poster Session** (Holiday Inn Munich–City Centre)

**Friday Evening Dinner** (schedule as you wish)
**SATURDAY, 28 MARCH**

Morning Moderators: Mitch Sogin and Isabelle Daniel

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<td>09:00 - 09:25</td>
<td><em>Endolithic life in methane-derived carbonates</em></td>
<td>Victoria Orphan, California Institute of Technology</td>
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<tr>
<td>09:25 - 09:50</td>
<td><em>Microbes in a highly dynamic terrestrial subsurface habitat</em></td>
<td>Kirsten Küsel, Friedrich Schiller University Jena</td>
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<tr>
<td>10:15 - 10:40</td>
<td><em>What can we learn from microbial cell counts in subsurface sediments?</em></td>
<td>Jens Kallmeyer, GFZ Potsdam</td>
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<tr>
<td>10:40 - 10:55</td>
<td><em>Break</em></td>
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<tr>
<td>11:20 - 11:45</td>
<td><em>Marine deep sediments as incubators of microbial life</em></td>
<td>Jan Amend, University of Southern California, J Amend, D LaRowe</td>
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<tr>
<td>11:45 - 12:10</td>
<td><em>The flux of organic carbon into the mantle</em></td>
<td>Terry Plank, Columbia University Lamont Doherty Earth Observatory, T Plank, A Malinverno</td>
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<td>12:10 - 12:35</td>
<td><em>Graphitic carbon: recycling carbon between Earth’s surface and interior</em></td>
<td>Olivier Beyssac, CNRS Institute of Mineralogy and Physics of Condensed Matter</td>
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<td>12:35 - 13:25</td>
<td><em>Lunch</em></td>
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<td>13:25</td>
<td>Understanding carbon mobility in deep fluids: What we need to know and why</td>
<td>Dimitri Sverjensky, Johns Hopkins University</td>
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<td>13:50</td>
<td>Ultrafast dynamics of fluid water and ices under pressure</td>
<td>Roberto Bini, LENS - University of Florence</td>
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<td>R Bini, S Fanetti, M Citroni</td>
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<td>14:15</td>
<td>Fluid densification, partition and transport under confinement - Possible relation to CH₄ synthesis</td>
<td>Alberto Striolo, University College London</td>
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<td>A Striolo, D Cole</td>
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<tr>
<td>14:40</td>
<td>A thermodynamic model for oxidized C-O-H fluids in subduction zone fluids</td>
<td>Carmen Sanchez-Valle, Universitaet Muenster</td>
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<td></td>
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<td>C Sanchez-Valle, D Mantegazzi, T Driesner</td>
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<tr>
<td>15:05</td>
<td>Break</td>
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<tr>
<td>15:20</td>
<td>Advanced models for fluid-solid transport in subduction zones</td>
<td>Marc Spiegelman, Columbia University Lamont Doherty Earth Observatory</td>
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<td>M Spiegelman, C Wilson, P van Keken, B Hacker</td>
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<tr>
<td>15:45</td>
<td>Re-evaluating carbon fluxes in subduction zones: What goes down, mostly comes up</td>
<td>Peter Kelemen, Columbia University Lamont Doherty Earth Observatory</td>
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<td>P Kelemen, CE Manning</td>
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<td>16:10</td>
<td>The rise of experimental volcanology: Opportunities for Deep Carbon?</td>
<td>Don Dingwell, Ludwig Maximilian University</td>
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<td>16:35</td>
<td>Looking ahead to 2019: DCO synthesis and integration</td>
<td>Robert Hazen and Russell Hemley, DCO Secretariat</td>
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<td>17:00</td>
<td>Saturday Poster Session (Holiday Inn Munich–City Centre)</td>
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<td>20:00</td>
<td>All-Conference Dinner (Hofbräukeller)</td>
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POSTER SESSIONS, Holiday Inn Munich–City Centre

FRIDAY, 27 MARCH – RESERVOIRS AND FLUXES POSTERS

Variations in Mid-Ocean Ridge CO₂ Emissions Driven by Glacial Cycles
JMA Burley, RF Katz

Catalogue of the main gas manifestation of Greece: a basis for nationwide estimations of gas hazard and total geogenic gas output
S Calabrese, K Daskalopoulou, K Kyriakopoulos, W D’Alessandro

Diffuse CO₂ Earth degassing in Italy: a globally relevant study case
C Cardellini, G Chiodini, D Frondini, A Frigeri, S Caliro

Global mapping of CO₂ fluxes and mantle CO₂ content along mid-ocean ridges
D Chavrit, E Humler, O Grasset

Constraints on the carbon content of the Iceland plume, from laser-ablation C-He-Ar analyses of individual vesicles in a volcanic glass from Iceland
A Colin, M Moreira, C Gautheron, P Burnard

Characterization of the biotic and abiotic processes that control the geochemistry of the fluids circulating in the Kizildag ophiolitic body (Turkey)
W D’Alessandro, G Yuce, F Italiano, S Bellomo, AH Gulbay

The Network for Observation of Volcanic and Atmospheric Change (NOVAC) and its relation to DECADE
B Galle, S Arellano, A Aiuppa, F Gil, A Munos, M De Moor, G Garzon, the NOVAC team

CO₂ emissions from plate boundary faults: the case of the San Andreas Fault System
DR Hilton, T Evans, JT Kulongoski, CJ Ramirez, K Blackmon, PH Barry

A mantle source for carbon in continental intraplate volcanism: identifying the source using petrology and geochemistry
Emma R Humphreys-Williams, D Ken Bailey, Frances Wall, Chris J Hawkesworth, Teresa Jeffries

An overview of the UK consortium ‘Mantle Volatiles: Processes, Reservoirs and Fluxes
Looking through diamond at garnet-bearing lithologies in the transition zone
Ekaterina S Kiseeva, Duane J Smythe, Anke Wohlers, Bernard J Wood

Using zoning in diamonds to constrain the history and nature of diamond-forming fluids in the mantle
SC Kohn, L Speich, GP Bulanova, CB Smith

Temporal variations in CO$_2$ flux measures and its correlation between atmospheric parameters: a case study from Lipari island (Sicily, Italy)
M Lelli, B Raco, G Virgili, D Continanza

Subduction to eruption: The volatile life of ocean island basalts unveiled by CO$_2$, H$_2$O, S, F, and Cl contents in mineral-hosted melt inclusions
Jared P Marske, Erik H Hauri, Frank A Trusdell, Michael O Garcia, Aaron J Pietruszka

Do diamondites herald new information about carbon cycling, silicate melting, and metasomatic events in the sub-cratonic mantle beneath Southern Africa?
Sami Mikhail, Francis McCubbin, Frances Jenner, Roxanne Bowden, Doug Rumble, Steven B Shirey, John J Gurney

A petrological assessment of the mantle nitrogen cycle as recorded by diamonds implies occasional decoupling of nitrogen from carbon and the noble gases
Sami Mikhail, Dimitri Sverjensky, Daniel Howell

Development of a field-portable He-isotope detector: A novel instrumental approach for quantitative assessment of magma compositional dynamics and monitoring fluxes of magmatic volatiles
Gary M McMurtry, David R Hilton

Isotopic constraints on the signal of magmatic carbon
S Shilobreeva, V Polyakov, I Martinez, V Busigny, P Agrinier, J Alt, M Javoy

CO$_2$ degassing zones in various volcanic systems of the Azores archipelago (Portugal) – continuous and discrete measurements
Fátima Viveiros, Carlo Cardellini, Teresa Ferreira, Stefano Caliro, Giovanni Chiodini, Catarina Silva, Maria Pedone, César Andrade, Vittorio Zanon, AR Hipólito
**FRIDAY, 27 MARCH – DEEP LIFE POSTERS**

**Nucleic acids suggest activity and preservation on the subsurface Iberian margin**
J Biddle, J Russell

**It is crowded down under**

**Metagenomic investigations of serpentinization-powered microbial ecosystems**
William J Brazelton, Katrina I Twing, Matthew O Schrenk

**Functional metagenomics of igneous minerals incubated in the suboceanic aquifer**
Frederick Colwell, Amy Smith, Martin Fisk, Olivia Mason, Andrew Thurber, Gilberto Flores, Radu Popa

**Exploring life’s limits: Deep geobiochemistry**
Alysia Cox, Arizona State University

**Interactions of ribonucleotides with aluminum and iron oxide minerals under varying environmental conditions**
Cecile Feuillie, Mathieu Pedrot, Dimitri Sverjensky, Robert Hazen

**High reactivity of deep biota under anthropogenic CO₂ injection into basalt**
E Gérard, P le Campion, R Trias, SR Gíslason, HA Alfreðsson, KG Mesfin, SO Snæbjörnsdóttir, ES Aradóttir, I Gunnarsson, B Ménez

**Spatial and temporal diversity of microbial mats in the shallow-water hydrothermal system of Milos Island (Greece)**
Donato Giovannelli, Dionysis Foustoukos, Nadine Le Bris, Stefan M Sievert, Mustafa Yucel, Costantino Vetriani

**Insight into the evolution of carbon fixation revealed by comparative genomic and proteomic analyses of the anaerobic chemosynthetic bacterium Thermovibrio ammonificans**
Donato Giovannelli, Stefan M Sievert, Michael Hügler, Thomas Schweder, Costantino Vetriani

**Fungal-prokaryotic consortium in subseafloor basalts**
M Ivarsson
Workshop to develop deep life continental scientific drilling projects

The importance of the in situ nitrogen cycle to the terrestrial subterranean carbon cycle: How? By whom?
MCY Lau, C Magnabosco, R Alleva, W Wang, D Perlman, S Kyin, S Smart, DM Sigman, S Maphanga, E van Heerden, TC Onstott

Linking deep subsurface microbial dark matter to their carbon cycling functions
K Lloyd

Never was so much carbon owed by so many to so few or “This is what you get for combining isotopes with metagenomes”

Metabolic ecology of chemosynthetic nitrate reducing Epsilonproteobacteria and Aquificae from deep-sea vents
I Perez-Rodriguez, D Foustoukos, SM Sievert, ML Fogel

Total and active microbial community structure within North Pond sediments
BK Reese, L Zinke, H Mills, P Girguis, B Orcutt, K Edwards, J Amend

Cabeço de Vide metagenome, a work in progress
I Tiago, MO Schrenk, A Verissimo

Carbon-cycling genes of microbes from the serpentinite subsurface environment
KI Twing, WJ Brazelton, and MO Schrenk

Microbial populations in iron-rich sediments of Lake Towuti at varying bottom water oxygenation levels – Results of a pilot study for the 2015 ICDP drilling campaign
Aurèle Vuillemin, André Friese, Mashal Alawi, Dirk Wagner, Jens Kallmeyer

Reconsidering the roles of archaea in carbon cycling in marine sediments
F Wang
FRIDAY, 27 MARCH – SECRETARIAT POSTERS

Phinch: An interactive, exploratory data visualization framework for high-throughput sequencing datasets  
Holly M Bik, Pitch Interactive

Increasing the use of existing scientific collections for Deep Carbon Observatory projects  
B Blakeney DeJarnett

Towards volcanic field deployment of the laser isotope ratio-meter  
R Brownsword, D Weidmann

Progress in DCO simulation projects using the DCO computer cluster  
P Fox

Enabling the Science Network of DCO - Status and directions  
Peter Fox, John Erickson, Patrick West, Marshall Ma, et al

2nd DCO Early Career Workshop  
Donato Giovannelli, Alysia Cox, Daniel Hummer, Katie Pratt, Cody Sheik, Dana Thomas, Fatima Viveiros

Ultrafast laser instrument for in situ measurements of elastic, electronic, and transport properties of carbon-bearing fluids and crystalline materials  
A Goncharov

DCO Secretariat: Coordination, integration, and governance  
Robert Hazen, Russell Hemley, Craig Schiffries, Andrea Mangum, Yael Fitzpatrick

DCO Engagement: Connect, collaborate, communicate  
Sara Hickox, Sunshine Menezes, Katie Pratt, Frank Baker, Josh Wood, Darrell McIntire

Planned Oman Drilling Project  

Formal specification of data types in the Deep Carbon Observatory Data Portal  
Xiaogang (Marshall) Ma, John Erickson, Patrick West, Peter Fox, Han Wang, Yu Chen
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A high pH ocean on Enceladus as evidence of serpentinization
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Formation of reduced C compounds using natural catalysts
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Episodic organic carbon burial during the Phanerozoic indicated by a new atmospheric pO$_2$ record
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A Stadnitskaia
Potentials for major abiogenic hydrocarbon formation by serpentinization offshore SE-Brazil
Peter Szatmari, Luciano Magnavita

Noble gas time constraints on formation of hydrocarbon materials
I Tolstikhin, C Ballentine, B Polyak, E Prasolov, O Kikvadze

Constraining isolation ages of Archean deep carbon systems using noble gases
Oliver Warr, Jon Fellowes, Barbara Sherwood-Lollar, Chelsea Sutcliffe, Chris Ballentine

SATURDAY, 28 MARCH – EXTREME PHYSICS AND CHEMISTRY POSTERS

Thermodynamics of planetary ices in extreme conditions of icy satellites
Jennifer Beam, Jung-Fu Lin, Jin Liu, Jing Yang, Ye Wu

Hydrate and ice nucleation triggered by carbon
Yuanfei Bi, Raffaela Cabriolu, Tianshu Li

Tetrahedrally coordinated carbonates in Earth’s lower mantle
E Boulard, D Pan, G Galli, Z Liu, WL Mao

Carbon in aqueous fluids: an experimental study at supercritical conditions
E Boulard, D Testemale, J-L Hazemann

Thermodynamics of the diagenetic transformations of lipid biomarkers
G Boyer, E Shock

Carbon in the core: how good and how much?
R Caracas

High-pressure investigation of phase relations and transitions of iron-bearing carbonates
V Cerantola, C McCammon, I Kupenko, E Bykova, M Merlini, L Ismailova, S Petitgirard, A Chumakov, L Dubrovinsky

Experimental constraints on CO₂ solubility in rhyolitic melts – Implications for carbon flux in subduction zones
M Duncan, R Dasgupta

Carbon speciation in saline solutions in equilibrium with aragonite under subduction zones conditions
Sébastien Facq, Isabelle Daniel, Gilles Montagnac, Hervé Cardon, Dimitri A Sverjensky
Pressure effect on the ultra-fast dynamics of solutions  
Samuele Fanetti, Marco Pagliai, Andrea Lapini, Margherita Citroni, Sandro Scandolo, Roberto Righini, Roberto Bini

Diamond formation in eclogitic rocks  
Daniel Frost, Vincenzo Stagno, Christopher Beyer

Viscosity of carbonate-silicate melts using ultra-high resolution falling sphere viscometry  
Daniel Hummer, Craig Manning, Abby Kavner, Yoshio Kono, Changyong Park, Curtis Kenney-Benson

High-pressure structures and properties of noble gas clathrates and inclusion compounds  
Dennis D Klug, Hanyu Liu, Yansun Yao, and Cristopher A Tulk

Ferromagnesite in the Earth’s deep Mantle  
Jung-Fu Lin, Jin Liu, Jill Yang, Zhu Mao, Caleb Jacobs, Vitali Prakapenka

Optical properties of siderite (FeCO$_3$) across the spin transition in P-T conditions of the lower mantle  
Sergey S Lobanov, Alexander F Goncharov, Konstantin D Litasov

New experimental data on carbonate structures at high pressures and high temperatures  
M Merlini

Physics of monolayer and bilayer graphene under hydrostatic pressure  
Avinash P Nayak, Cheng Tan, Xiao-han Wang, Twinkle Pandhi, Jin Liu, Li Tao, Deji Akinwande, Jung-Fu Lin

CO$_2$-IV at high pressure and temperature, a neutron diffraction study  
Sarah Palaich, Adam Makhluf, Afu Lin, Malcolm Guthrie, Jamie Molaison, Chris Tulk, Abby Kavner, Craig E Manning

Carbon mobility by hydrous Ca-carbonate liquids at subduction zones  
S Poli

Moissanite (SiC) stability in the Earth’s mantle  
A Rohrbach, MW Schmidt, C Gao, A Golubkova, JAD Connolly

A thermodynamic model for oxidized C-O-H fluids in subduction zone fluids  
C Sanchez-Valle, D Mantegazzi, T Driesner
**Equation of state and sound velocity of Fe\textsubscript{3}C at high pressure and temperature, and implications for carbon in the inner core**
Suguru Takahasi, Eiji Ohtani, Seiji Sakamaki, Tatsuya Sakamaki, Naohisa Hirao, Hiroshi Fukui, Alfred Q. Baron

**Singly bonded layered planar nitrogen (LP-N) at extreme conditions**
D Tomasino, M Kim, J Smith, CS Yoo

**Variable cage occupancy of hydrogen filled clathrate hydrates**
C Tulk, D Klug, J Molaison, C Koh

**The DFG Research Unit 2125: Structures, properties and reactions of carbonates at high pressures and temperatures**
Bjoern Winkler, Karen Appel, Lkhamsuren Bayarjargal, Natalia Dubrovinskaia, Leonid Dubrovinsky, Gerhard Heide, Sandro Jahn, Monika Koch-Müller, Edwin Kroke, Catherine McCammon, Sergio Speziale, Christian Sternemann, Max Wilke

**CO\textsubscript{2} released from carbonated eclogites during their exhumation**
Jianjiang Zhu, Renbiao Tao and Yingwei Fei

**SATURDAY, 28 MARCH – SECRETARIAT POSTERS**

**Increasing the use of existing scientific collections for Deep Carbon Observatory projects**
B Blakeney DeJarnett

**Towards volcanic field deployment of the laser isotope ratio-meter**
R Brownsword, D Weidmann

**Progress in DCO simulation projects using the DCO computer cluster**
P Fox

**Enabling the Science Network of DCO - Status and directions**
Peter Fox, John Erickson, Patrick West, Marshall Ma, et al

**2nd DCO Early Career Workshop**
Donato Giovannelli, Alysia Cox, Daniel Hummer, Katie Pratt, Cody Sheik, Dana Thomas, Fatima Viveiros

**Ultrafast laser instrument for in situ measurements of elastic, electronic, and transport properties of carbon-bearing fluids and crystalline materials**
A Goncharov
**DCO Secretariat: Coordination, integration, and governance**
Robert Hazen, Russell Hemley, Craig Schiffries, Andrea Mangum, Yael Fitzpatrick

**DCO Engagement: Connect, collaborate, communicate**
Sara Hickox, Sunshine Menezes, Katie Pratt, Frank Baker, Josh Wood, Darrell McIntire

**Planned Oman Drilling Project**

**Novel synchrotron x-ray probes for deep carbon**
W Mao

**VGAM: Volcanic Gas Analytical Monitor using compact, low-power mass spectrometry for in situ multi-species determinations**
Gary McMurtry, Tobias Fischer

**Quantum cascade laser-infrared absorption spectrometer for clumped methane isotope thermometry**
Shuhei Ono, David T Wang, Danielle S Gruen

**Geochemical signs of hydrocarbon migration and re-formation of oil fields**
Irina Plotnikova, Sergey Ostroukhov, Fidania Nosova, Gulmira Salakhidinova, Nikita Pronin

**DCO high-pressure biological sampler and transporter user facility**
Karyn L Rogers, Anaïs Cario, Hervé Cardon, Isabelle Daniel

**A combined instrument for molecular imaging in geochemistry**
A Steele, J Toporski, S Siljestrom, Y Goreva

**Novel large-volume diamond anvil cell (LV-DAC) for neutron scattering**
C Tulk, M Guthrie, R Boehler, J Molaison, R Hemley

**A unique high-mass-resolution gas-source mass spectrometer**
E Young, D Rumble, P Freedman
MEETING PARTICIPANTS

Magali Ader, Institut de Physique du Globe de Paris, France
Bill Allman, Smithsonian Institution, USA
Jan Amend, University of Southern California, USA
Muriel Andreani, Université de Lyon, France
Jesse Ausubel, Rockefeller University/Sloan Foundation, USA
Wolfgang Bach, University of Bremen, Germany
Chris Ballentine, University of Oxford, UK
Douglas Bartlett, Scripps Institution of Oceanography/UCSD, USA
Olivier Beyssac, CNRS IMPMC, France
Jennifer Biddle, University of Delaware, USA
Holly Bik, University of Birmingham, UK
Roberto Bini, LENS - University of Florence, Italy
Beverly Blakeney DeJarnett, University of Texas Bureau of Economic Geology, USA
Antje Boetius, University of Bremen, Germany
Gaetan Borgonie, Extreme Life Isyensya, Belgium
Eglantine Boulard, Institut Neel, France
Marshall Bowles, University of Bremen, Germany
Grayson Boyer, Arizona State University, USA
William Brazelton, University of Utah, USA
Michael Burton, University of Manchester, UK
Sergio Calabrese, University of Palermo – DiSTE M, Italy
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Christopher Glein, University of Toronto, Canada
Nir Goldman, Lawrence Livermore National Laboratory, USA
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Kirsten Küsel, Friedrich Schiller University Jena, Germany
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Tianshu Li, George Washington University, USA
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Tingting Liu, The Ohio State University, USA
Karen Lloyd, University of Tennessee, USA
John Ludden, British Geological Survey, UK
Xiaogang (Marshall) Ma, Rensselaer Polytechnic Institute, NY
Ananya Mallik, Bayerisches Geoinstitut, Germany
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Craig Manning, University of California Los Angeles, USA
Wendy Mao, Stanford University, USA
Jared Marske, DTM, Carnegie Institution for Science, USA
Isabelle Martinez, Institut de Physique du Globe de Paris, Francs
Bernard Marty, CRPG-CNRS, University of Lorraine, France
Catherine McCammon, University of Bayreuth, Germany
Gary McMurtry, SOEST/University of Hawaii, USA
Benedicte Menez, Institut de Physique du Globe de Paris, France
Sunshine Menezes, University of Rhode Island, USA
Marco Merlini, Università degli Studi di Milano, Italy
Alexandra Navrotsky, University of California Davis, USA
Eiji Ohtani, Tohoku University, Japan
Salim Ok, The Ohio State University, USA
Shuhei Ono, Massachusetts Institute of Technology, USA
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H-Holger Rogner, International Institute for Applied Systems Analysis, Austria
Arno Rohrbach, Institute of Mineralogy, University of Münster, Germany
Carmen Sanchez-Valle, Westfälische Wilhelms-Universitaet Muenster, Germany
John Saul, Independent Researcher, France
Craig Schiffries, Carnegie Institution of Washington, USA
Max Schmidt, ETH Zürich, Switzerland
Martin Schoell, GasConsult International Inc., USA
Matt Schrenk, Michigan State University, USA
Anat Shahar, Carnegie Institution of Washington, USA
Cody Sheik, University of Michigan, USA
Svetlana Shilobreeva, GEOKHI RAS, Russia
Everett Shock, Arizona State University, USA
Raymond Smith, Lawrence Livermore National Laboratory, USA
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Mitch Sogin, Marine Biological Laboratory, USA
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Marc Spiegelman, Columbia University Lamont Doherty Earth Observatory, USA