EUROCORES Programme
European Collaborative Research

Networking / Dissemination Activity
Scientific Report Form

a) Summary

The 2014 ***Biogenic Hydrocarbons and the Atmosphere*** Gordon Research Conference presented most recent research of the emission and fate of hydrocarbons released by vegetation. Topics in this multi-disciplinary conference included plant physiology, plant biochemistry, ecosystem ecology, and atmospheric sciences with participation from biology, plant physiology, ecology, chemistry, and atmospheric science. The theme of this conference was "Interactions in a Changing World" with a focus on the evolving role of biosphere hydrocarbons under global change.
The overall objective of the EuroVOL programme was to understand the roles of BVOC in the food-web and in plant interactions with the environment under current and future climate. For this reason, this GRC has been of interest for researchers involved in the three cooperative EuroVOL projects (MomeVip, InvaVol and A-Bio-Voc). With this ESF application, we were able to support participation of scientists, mostly young scientists, involved in the three collaborative projects of EuroVOL. Applicants presented their EuroVOL results to the Conference. Chairs (Allison L. Steiner & Janne Rinne) and vice chairs (Todd N. Rosenstiel & Thomas Karl) of the conference considered all abstracts interesting for the scope of the event. In particular, Francesco Loreto was invited to give the opening talk ("Ecology of Plant Volatiles: Now and in the Future"), and the contribution proposed by Werner Jud was accepted for an oral communication within the *Early Career Session* of the scientific program. The contribution by Elisa Vanzo received an award as the most relevant poster proposed by young scientists.

b) Final programme of the event

Biogenic Hydrocarbons & the Atmosphere Interactions in a Changing World
June 29 - July 4, 2014
Melia Golf Vichy Catalan Business and Convention Center
Girona, Spain
Chairs: Allison L. Steiner & Janne Rinne
Vice Chairs: Todd N. Rosenstiel & Thomas Karl

SUNDAY

4:00 pm - 8:00 pm Arrival and Check-in

6:00 pm Dinner

7:30 pm - 7:40 pm Welcome / Introductory Comments by GRC Site Staff

7:40 pm - 9:30 pm **Global Change and Biogenic Hydrocarbons: From Global to Cellular**

Discussion Leader: **Russ Monson** (Arizona State University)

7:50 pm - 8:25 pm **Francesco Loreto** (CNR, Italy)
"Ecology of Plant Volatiles: Now and in the Future"

8:25 pm - 8:40 pm Discussion

8:40 pm - 9:20 pm **Ian Galbally** (CSIRO Marine and Atmospheric Research)
"BVOC Research: A Personal and Historical Perspective"

9:20 pm - 9:30 pm Discussion

MONDAY

7:30 am - 8:30 am Breakfast

9:00 am - 12:30 pm **Biogenic Hydrocarbon Response to Biotic and Abiotic Stresses**

Discussion Leader: **Jaana Bäck** (University of Helsinki)

9:10 am - 9:50 am **Dorothea Tholl** (Virginia Tech)
"Organizing Plant Volatile Synthesis in Space and Time"

9:50 am - 10:05 am Discussion

10:05 am Coffee Break

10:35 am - 11:15 am **Maaria Rosenkranz** (Helmholtz Zentrum Munchen)
"Fungi Calling Plants - Belowground Volatile Signaling and Interactions"

11:15 am - 11:30 am Discussion

11:30 am - 12:10 pm **Ulo Niinemets** (Estonian University of Life Sciences)
"Stress Induced Volatiles Under Global Change"

12:10 pm - 12:30 pm Discussion

12:30 pm Lunch

1:30 pm - 4:30 pm Free Time

4:30 pm - 6:00 pm Poster Session I

6:00 pm - 8:00 pm **Changing Plant Functions Under Global Change (Session in Memory of Ray Fall)**

Discussion Leader: **Josep Penuelas** (CSIC, Spain)

6:10 pm - **Jonathan Gershenzon** (Max Planck Institute of Chemical Ecology)

6:50 pm	"Roles of Plant Volatiles in Plant Life: Prospects in a Changing World"
6:50 pm - 7:05 pm	Discussion
7:05 pm - 7:45 pm	**Joanna Joiner** (NASA Goddard Space Flight Center) "New Satellite Measurements Related to Plant Physiological Functioning"
7:45 pm - 8:00 pm	Discussion
8:00 pm	Dinner

TUESDAY

7:30 am - 8:30 am	Breakfast
8:30 am	Group Photo
9:00 am - 12:30 pm	**Biogenic Hydrocarbons and Changing Ecosystems**
	Discussion Leader: **Silvano Fares** (Research Centre for the Soil-Plant System, Italy)
9:10 am - 9:50 am	**Peter Curtis** (Ohio State University) "Forests in Flux: Disturbance, Succession and Biosphere-Atmosphere Interactions in Deciduous Broadleaf Ecosystems"
9:50 am - 10:05 am	Discussion
10:05 am	Coffee Break
10:35 am - 11:15 am	**Gannet Hallar** (Desert Research Institute) "BVOC Emission and Aerosol Formation Resulting from Large Scale Beetle Infestation"
11:15 am - 11:30 am	Discussion
11:30 am - 12:10 pm	**Riikka Rinnan** (University of Copenhagen) "BVOC Emissions from the Changing Arctic"
12:10 pm - 12:30 pm	Discussion
12:30 pm	Lunch
1:30 pm - 4:30 pm	Free Time
4:30 pm - 6:00 pm	Poster Session II
6:00 pm - 8:00 pm	**Biogenic Hydrocarbons and Changing Land Use**
	Discussion Leader: **Kirsti Ashworth** (University of Michigan)
6:10 pm - 6:50 pm	**Evan DeLucia** (University of Illinois, Urbana-Champaign) "Bioenergy, Land Use Change, and Greenhouse Gas Exchange with the Atmosphere"

6:50 pm - 7:05 pm Discussion

7:05 pm - 7:45 pm **Shiliang Wu** (Michigan Technological University)
"Impacts of Changes in Land Use and Land Cover on Biogenic VOC Emissions and Atmospheric Chemistry"

7:45 pm - 8:00 pm Discussion

8:00 pm Dinner

WEDNESDAY

7:30 am - 8:30 am Breakfast

9:00 am - 12:30 pm **Aerosol Formation from Biogenic Hydrocarbons in a Changing Climate**

Discussion Leader: **Marianne Glasius** (University of Aarhus)

9:10 am - 9:50 am **Scot Martin** (Harvard University)
"The Influence of Urban Pollution on BVOC Oxidation and the Implications for Secondary Organic Aerosol Production, as Observed During the Wet Season of the Central Amazon"

9:50 am - 10:05 am Discussion

10:05 am Coffee Break

10:35 am - 11:15 am **Nadine Unger** (Yale University)
"Strong BVOC-Chemistry-Climate Feedbacks in Modern and Deep Time"

11:15 am - 11:30 am Discussion

11:30 am - 12:10 pm **Michael Boy** (University of Helsinki)
"BVOC and Their Impact on Future Climate"

12:10 pm - 12:30 pm Discussion

12:30 pm Lunch

1:30 pm - 4:30 pm Free Time

4:30 pm - 6:00 pm Poster Session III

6:00 pm - 8:00 pm **Early Career Session**

Discussion Leader: **Todd Rosenstiel** (Portland State University) and **Thomas Karl** (University of Innsbruck)

6:00 pm - 6:15 pm **Mary Alice Upshur** (Northwestern University)
"Synthesis and Analysis of Molecular Constituents Relevant for Surfaces of Isoprene-Derived Secondary Organic Aerosol Material"

6:15 pm - Discussion

6:20 pm

6:20 pm - 6:35 pm **Werner Jud** (University of Innsbruck)
"*Nicotiana tabacum* as Model for Ozone - Plant Surface Reactions"

6:35 pm - 6:40 pm Discussion

6:40 pm - 6:55 pm **Catherine Morfopoulous** (University of Exeter)
"Modelling Plant Isoprene Emissions as a Function of Reductant Availability"

6:55 pm - 7:00 pm Discussion

7:00 pm - 7:15 pm **Angie Jardine** (Instituto Nacional de Pesquisa)
"Monoterpene Speciation in the Ambient Air of a Central Amazonian Terra Firma Forest"

7:15 pm - 7:20 pm Discussion

7:20 pm - 7:35 pm **Ditte Mogensen** (University of Helsinki)
"Can Boreal Forest Management Be Used to Combat Climate Change?"

7:35 pm - 7:40 pm Discussion

7:40 pm - 7:55 pm **Roger Seco** (University of California Irvine)
"Canopy-Level Isoprenoid Emissions and the Influence of Drought Stress"

7:55 pm - 8:00 pm Discussion

8:00 pm Dinner

THURSDAY

7:30 am - 8:30 am Breakfast

8:30 am - 9:00 am Business Meeting

Nominations for the Next Vice Chair; Fill in Conference Evaluation Forms; Discuss Future Site and Scheduling Preferences; Election of the Next Vice Chair

9:00 am - 12:30 pm **The Oxidation of Biogenic Hydrocarbons in a Changing Atmosphere**

Discussion Leader: **Jose Fuentes** (Penn State University)

9:10 am - 9:50 am **Delphine Farmer** (Colorado State University)
"Tracing Biogenic Oxidation Chemistry in the Atmosphere: Insight from the Southeastern US"

9:50 am - 10:05 am Discussion

10:05 am Coffee Break

10:35 am - 11:15 am **Tzung-May Fu** (Peking University)
"Sensitivity of Surface Ozone and PM2.5 to the Interannual Variability of Climate: The Role of BVOCs"

11:15 am - 11:30 am	Discussion
11:30 am - 12:10 pm	**Thomas Mentel** (Forshungszentrum Julich) "Atmospheric Oxidation of Biogenic Organic Volatile Compounds and Formation of Secondary Organic Aerosols in a Changing Climate"
12:10 pm - 12:30 pm	Discussion
12:30 pm	Lunch
1:30 pm - 4:30 pm	Free Time
4:30 pm - 6:00 pm	Poster Session IV
6:00 pm - 8:00 pm	**Synthesis: Biogenic Hydrocarbons from the Old to the New World** Discussion Leader: **Christine Wiedinmyer** (National Center for Atmospheric Research)
6:10 pm - 6:50 pm	**Almut Arneth** (Karlsruhe Institute of Techology) "BVOC and Land Use Change: How Far Back in Time Should We Go"
6:50 pm - 7:05 pm	Discussion
7:05 pm - 7:45 pm	**Alex Guenther** (Pacific Northwest National Laboratories) "Biogenic VOC in a Changing World: Incomprehensible, Irrelevant or Imperative?"
7:45 pm - 8:00 pm	Discussion
8:00 pm	Dinner

FRIDAY

7:30 am - 8:30 am	Breakfast
9:00 am	Departure

c) Description of the scientific content of the event (abstracts can be provided)

During the 2014 ***Biogenic Hydrocarbons and the Atmosphere*** Gordon Research Conference, most recent researches of the emission and fate of hydrocarbons released by vegetation were presented. Topics in this multi-disciplinary conference include plant physiology, plant biochemistry, ecosystem ecology, and atmospheric sciences with participation from biology, plant physiology, ecology, chemistry, and atmospheric science. The theme of this conference was "Interactions in a Changing World" with a focus on the evolving role of biosphere hydrocarbons under global change. Plants release in the atmosphere products of secondary metabolism (hydrocarbons) recognised as BVOCs (Biogenic Volatile Organic Compounds). These secondary metabolites usually only occur in special, differentiated cells and are not necessary for the cells themselves, but may be useful for the plant as a whole. Plants at different taxonomic levels (family, genus, and species) produce a characteristic mix of secondary metabolites that can be utilised as characters in classifying plants. BVOCs play an important role in terrestrial ecosystems because of their interaction with - and their impact on - atmospheric chemistry and climate. BVOCs are ecologically important compounds for plants: they act as a fundamental defence

against abiotic and biotic stresses, and are emerging as one of the most important traits of plant communication with other organisms. BVOCs are important across multiple scales, from the leaf level to the ecosystem level. Secondary metabolites can be classified on the basis of their chemical structure, composition, solubility in various solvents or the pathway by which they are synthesised. Some BVOC also are powerful antioxidants and protect plants from abiotic stress. BVOC strengthen cellular membranes and scavenge substantial amounts of reactive oxygen compounds, thereby reducing oxidative damage to sensitive plant organelles and structures. Moreover, BVOC may play a signalling role in activating plant biochemical pathways. Recently, volatile emissions at the below-ground level became of particular interest for their interaction with the plant root system and the related protective role against below ground herbivores (talks by Dorothea Tholl and Maaria Rosenkranz). Genetic mechanisms controlling volatile production and emission (Jonathan Gershenzon), and empirical models for measuring stress induced volatiles under global change (Ulo Niinemets) have been presented in model plant species. Several talks dealt with the impact of atmospheric volatile emission in different climatic and ecologic regions of the world (Scot Martin, Joanna Joiner), and discussed the impact of emissions into the atmosphere according to future climatic scenarios (Rikka Rinnan, Michael Boy). Low-volatility atmospheric oxidation products of BVOC contribute to the growth of secondary organic aerosol (SOA) particles that are climatically important through scattering and absorbing solar and thermal radiation and by acting as cloud condensation nuclei (CCN), thereby affecting cloud properties and precipitation. Finally, BVOC emissions have been proposed to play a central role in trends of glacial-interglacial atmospheric methane concentrations and thus to contribute to climate changes over the Holocene.

d) Assessment of the results and impact of the event on the EUROCORES programme.

The participation of EuroVOL scientists to the Gordon Research Conference (GRC) was an occasion for disseminating results obtained within the individual projects. Young scientists had the opportunity to present and to discuss unpublished results with an outstanding audience represented by highly qualified GRC speakers. For experienced scientists the GRC on biogenic hydrocarbons as well represented an important prospect for discussion with researchers who were not involved in the EuroVOL programme and for programming future co-operation and publications.

e) List of speakers and participants

EuroVOL Participants GRC Girona		
UK	Acton	Joe
IT	Arena	Carmen
CH	Bonnet	Christelle
IT	Brunetti	Cecilia
IT	Cataletto	Pia Rosa
NL	Cristescu	Simona
IT	Fineschi	Silvia
FIN	Ghimire	Rajendra
DE	Ghirardo	Andrea
AT	Hansel	Armin
IT	Haymele	Bruno
AT	Jud	Werner
IT	Litto	Maria
IT	Loreto	Francesco
FIN	Maja	Mengistu
IT	Pollastri	Susanna
NL	Senning	Melanie
DE	Schnitzler	Jörg-Peter
DE	Vanzo	Elisa
BG	Velikova	Violeta