

MINUTES

FORHOT – 7th formal project meeting

Hotel Port Sitges, Sitges, Cataluña, Spain

and from a following workshop entitled “Joint Ecosystem Assessment on the Effects of Natural Soil Warming and N-input Manipulation on Subarctic Grasslands and Forests” 6-8 March, 2018



Attending: Altogether 38 ForHot participants attended the meeting in vivo and one with Skype:

Participants			
No	Country	Inst.	e-mails
	Cataluña / Spain		
1	Josep Peñuelas	CREAF, UAB	josep.penuelas@uab.cat
2	Bjarni D. Sigurdsson	CREAF, UAB	d.bjarni@creaf.uab.cat ; bjarni@lbhi.is
3	Sara Marañón Jiménez	CREAF, UAB	smaranon@ugr.es ; s.maranon@creaf.uab.cat
4	Jordi Sardans	CREAF, UAB	j.sardans@creaf.uab.cat
5	Albert Gargallo	CREAF, UAB	albert.gargallo@gmail.com
6	Guille Peguero	CREAF, UAB	guille.peguero@gmail.com
7	Iolanda Filella	CREAF, UAB	i.filella@creaf.uab.cat
8	Miriam Raluy	CREAF, UAB	miriamraluy@hotmail.com
9	Daijun Liu	CREAF, UAB	d.liu@creaf.uab.cat
	Iceland		
10	Gunnhildur E. G. Gunnarsdottir	Agric. Univ. Icel.	gunnhildur@lbhi.is
11	Pall Sigurdsson	Agric. Univ. Icel.	palls@lbhi.is
12	Edda S. Oddsdottir	Icel. For. Res.	edda@skogur.is
13	Bryndís Marteinsdóttir	Soil Conserv. Serv.	bryndis@land.is

	Belgium		
14	Ivan A. Janssens	PLECO, Univ. Antw.	ivan.janssens@uantwerpen.be
15	Erik Verbruggen	PLECO, Univ. Antw.	Erik.Verbruggen@uantwerpen.be
16	Cindy de Jonge	PLECO, Univ. Antw.	cindy.dejonge@uantwerpen.be
17	Sara Vicca	PLECO, Univ. Antw.	sara.vicca@uantwerpen.be
18	Niel Verbrigghe	PLECO, Univ. Antw.	Niel.Verbrigghe@uantwerpen.be
19	Lucia Fuchslueger	PLECO, Univ. Antw.	lucia.fuchslueger@gmail.com
20	Chao Fang	PLECO, Univ. Antw.	fangch12@lzu.edu.cn
	the Netherlands		
21	James Weedon	VU Univ. Amstered.	james.weedon@vu.nl
	Switzerland		
22	Tom Walker	EPFL	thomas.walker@epfl.ch
	Germany		
23	Christopher Poeplau	Thünen Inst.	christopher.poeplau@thuenen.de
	Austria		
24	Andreas Richter	Univ. Vienna	andreas.richter@univie.ac.at
25	Philipp Guendler	Univ. Vienna	pguendler@gmx.at
26	Joana da Silva	Univ. Vienna	joana.silva@univie.ac.at
27	Alexander Tveit	Univ. Vienna	alexander.tveit@univie.ac.at
28	Micahel Bahn	Univ. Innsbruck	Michael.Bahn@uibk.ac.at
29	Kathiravan M. Meeran	Univ. Innsbruck	Kathiravan.Mohamed-Meeran@uibk.ac.at
	Sweden		
30	Håkan Wallander	Lund Univ.	hakan.wallander@biol.lu.se
31	Erland Bååth	Lund Univ.	erland.baath@biol.lu.se
32	Jing Zhang	Lund Univ.	zhangj@scbg.ac.cn
33	Per Bengtson	Lund Univ.	per.bengtson@biol.lu.se
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35	Alf Ekblad	Örebro Univ.	Alf.Ekblad@oru.se
	Denmark		
36	Per Gundersen	Copenh. Univ.	pgu@ign.ku.dk
	Finland		
37	Marja Maljanen	Univ. Eastern Finl.	marja.maljanen@uef.fi
	Estonia		
38	Ivika Ostonen	Tartu Univ.	ivika.ostonen@ut.ee
	USA		
39	Jenny Soong	Berkeley Lab	jsoong@lbl.gov



Figure. The ForHot participants in Sitges

Agenda

1. ForHot project (current and past) participant overview
2. ForHot's main happenings in the past year (Mar 2017 – Mar 2018)
3. Project outputs since the Vienna ForHot meeting 2017: Papers, theses, reports.
4. The mini-conference on recent findings in ForHot
5. Publications planned for 2017-2018

6. Andreas Richter's session about the Seasonal Experiment on 7/3
7. Ivan's session about reasons for loss of aggregates in GN/GO on 7/3
8. Lucia's TNT-project session on 7/3
9. Andi's Meta-Transcriptome on 8/3
10. Session on more synthesis work on 8/3
11. Discussion about involve modellers into ForHot

12. ForHot funding 2018-2019
13. The ForHot database
14. Next steps in field research at ForHot (ForHot business meeting)
 - i. Infrastructure/measurements needed
 - ii. New measurements decided now.
 - iii. Action plan for 2018 season
15. Other issues/decisions

1. ForHot project status overview now (2018)

The list of participants of the ForHot project during 2012-2019. Researchers active now in 2017/2019 are in **bold/green**, but those not active are in **normal/brown**. Students who are still active in 2018 are in **bold/blue**; students who have finished or otherwise ended their work are in **normal/red**:

<p>Agric. Univ. of Iceland</p> <ul style="list-style-type: none"> • Prof. Bjarni D. Sigurdsson (coord.) • M.Sc. Gunnhildur E. G. Gunnarsdottir • Páll Sigurðsson (Ph.D. student 2016-) • Elín Guðmundsdóttir (M.Sc. student 2013-) • Paige Guevarra (internship student 2017) • Alice L. Sarolta Cosatti (internship student 2017) • Julia Bischof (internship student 2017) • Damiano Cilio (B.S. student 2014). • Dr. Úlfur Óskarsson <p>Icelandic Forest Research – Mogilsa</p> <ul style="list-style-type: none"> • Dr. Edda S. Oddsdóttir <p>Icelandic Inst. Nat. Hist</p> <ul style="list-style-type: none"> • M.Sc. Ásrún Elmarsdóttir <p>Univ. Akureyri</p> <ul style="list-style-type: none"> • Dr. Brynhildur Bjarnadóttir <p>Univ. of Iceland / Soil Conservation Service</p> <ul style="list-style-type: none"> • Dr. Bryndís Marteinsdóttir • Nia Perron (M.Sc. student 2016-2017) • Ella Thoen (B.Sc. student 2011-2012) <p>Univ. of Antwerp - Belgium</p> <ul style="list-style-type: none"> • Prof. Ivan Janssens • Prof. Erik Verbruggen • Dr. Sara Vicca (Post-doc 2017-2019) • Dr. Cindy De Jonge (Post-doc 2016-2018) • Lucia Fuchslueger (Post-doc 2017-2019) • Chao Fang (Post-doc 2018-2019) • Niel Verbrigghe (PhD student 2017-2018) • Johan de Gruyter (PhD student 2017) • Dr. Niki Leblans (Post doc 2016-2017) • Dr. James Weedon (Post-doc) • Dr. Jennifer Soong (Post-doc) • Wendelien Meynzer (M.Sc. student 2014-) • Niki Leblans (PhD student 2012-2016) • Stephanie Van Loock (M.Sc. student 2014-2016) • Katherine Vande Velde (M.Sc. student 2014-2015) • Steven Dauwe (PhD student 2015-) • Lieven Michielsens (M.Sc. student 2014-2015) • Mattias Janssens (job student 2016) • Elien de Schutter (job student 2016) • Dajana Radujkovic (M.Sc. student 2014-2016) <p>Thünen Institute - Germany</p> <ul style="list-style-type: none"> • Dr. Christopher Poeplau 	<p>Lund University</p> <ul style="list-style-type: none"> • Prof. Håkan Wallander • Prof. Erland Bååth • Dr. Per Bengtson • Jing Zang (PhD student 2017-2018) • Jian Li (PhD student 2018-2019) • Dr. Zhanfeng Liu (Postdoc 2016) • Dr. Magnus Ellström (Ph.D. student 2012) • Dr. Stephanie Reischke (Ph.D. student 2012) <p>Swedish Univ. Agric. Sci. (SLU)</p> <ul style="list-style-type: none"> • Prof. Thomas Kätterer • Dr. Monika Strömgren • Dr. Christopher Poeplau (Post-doc) • Hanna André (B.S. student from SLU 2014) • Agnes Bondesson (B.S. student from SLU 2014) <p>Örebro Univ</p> <ul style="list-style-type: none"> • Prof. Alf Ekblad <p>Univ. of Tartu, Estonia</p> <ul style="list-style-type: none"> • Prof. Ivika Ostonen • Dr. Martin Maddison • Kaarin Parts (Ph.D. student 2014-) <p>Copenhagen Univ. - Denmark</p> <ul style="list-style-type: none"> • Prof. Per Gundersen • Anna Theresa Edlinger (M.Sc. student 2016) <p>Aarhus Univ. - Denmark</p> <ul style="list-style-type: none"> • Prof. Martin Holmstrup <p>Univ. of Vienna - Austria</p> <ul style="list-style-type: none"> • Prof. Andreas Richter • Alexander Tveit (Post-doc 2018-2019) • Judith Prommer (PhD student 2017-2018) • Philipp Guendler (M.Sc. student 2018-2019) • Joana da Silva (PhD student 2018-2019) • Dr. Tom Walker (post-doc) • Dr. Anne Daebeleer (post-doc) <p>Univ. of Innsbruck - Austria</p> <ul style="list-style-type: none"> • Prof. Michael Bahn (2016-) • Kathiravan M. Meeran (2018-2019) <p>BOKU - Austria</p> <ul style="list-style-type: none"> • Dr. Hans Sandén • Christoph Rosinger (PhD student 2016-2018) <p>METLA - Finland</p> <ul style="list-style-type: none"> • Prof. Leena Finér
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<p>EPFL, Switzerland</p> <ul style="list-style-type: none"> • Dr. Tom Walker <p>Basel University, Switzerland</p> <ul style="list-style-type: none"> • Prof. Christian Körner • Dr. Armando Lenz (PhD student 2011-2012) <p>CzechGlobe, Czech Republic</p> <ul style="list-style-type: none"> • Dr. Karel Klem • Dr. Otmar Urban <p>Cardinal Stefan Wyszyński Univ., Poland</p> <ul style="list-style-type: none"> • Dr. Krassimira Ilieva-Makulec <p>Vrije University, Amsterdam, NL</p> <ul style="list-style-type: none"> • Ass. prof. James T. Weedon • Benjamin Hearn (M.Sc. student 2014-2015) <p>Leiden Univ., NL</p> <ul style="list-style-type: none"> • Prof. Peter van Bodegom <p>Univ. Eastern Finland</p> <ul style="list-style-type: none"> • Dr. Marja Maljanen • Prof. Christina Biasi • Heli Yli-Moijala (M.Sc. student 2012-) 	<p>Universitat Autònoma de Barcelona (UAB), Spain</p> <ul style="list-style-type: none"> • Prof. Josep Peñuelas • Dr. Jordi Sardans • Dr. Iolanda Filella • Dr. Olga Margalef • Dr. Albert Gargallo (post-doc 2016-2019) • Dr. Sara Marañón Jiménez (Post-doc 2017-2019) • Dr. Mireia Bartrons (post-doc 2016-2019) • Guille Peguero (Post-doc 2018-2019) • Daijun Liu (Post-doc 2018-2019) • Bang-Xiao Zheng (PhD student 2018-2019) • Miriam Raluy (M.Sc. student 2018) • Marta Ayala Roque (M.Sc. student 2016) <p>Bertley Lab - USA</p> <ul style="list-style-type: none"> • Dr. Margaret S. Torn • Dr. Jennifer Soong (Post-doc) <p>In total active in 2018-2019: 30 researchers, 12 postdocs and 13 MS and PhD students 25 universities/institutes 13 countries</p>
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2. ForHot's main happenings Mar 2017 – Mar 2018

- **ForHot meeting**, Vienna, March
- March. FN shoots for chemical- and morphological analysis taken by Bjarni/Palli
- April 9, 2017. Bjarni took gas samples from the geothermal vents around the ForHot area to determine the geothermal isotopic signature (^{13}C) from the geothermal vents. Those were measured at Andi's lab in Vienna.
- Field season 2017: April-Nov
 - Palli was site man. + two internship students: Julia Bischof (DE) and Alice Cosatti (AU)
 - NDVI + ThetaProbe biweekly - Soil leachates monthly in GN, GO, NT
 - LAImax campaign in Aug in GN, GO, NT.
 - FN dendrometers, tree phenology (from towers), minirhizotrons, ingrowth bags, litter bags w. needles and roots.
- April-June. Paige Guevarra – USA internship student did a morphological analysis of FN needles.
- June: A new ForHot experiment installed
 - Ivan, Michael, Sara V, Erik, Jenny, Lucia, Sara M., Andi and Tom started a new field experiment (the **TNT experiment**: *Plant-soil carbon responses to warming and nitrogen on recently warmed grasslands (GN)*).
- July 5-7. Håkan and Jing retrieved the last mesh-bags after two year incubation in FN/GN/GO
- July. Niel started his PhD work on the TNT experiment.

- Aug 7-11. A new ForHot activity started. The **Seasonal ForHot Experiment** in GN/NT + Sara's 15N pulse labelling experiment. Andi, Philipp, Sara M, Martin H, Palli and Gunnhildur did the first intensive campaign.
- Aug 21-26. Lucia, Jenny, Christia and Niel came and worked on the new TNT experiment.
- Sep 17-20. 2° sampling for the Seasonal ForHot Experiment in GN/NT (Gunnhildur)
- Sept- Oct. Repeated soil sampling in 0-30 cm in FN (for root + SOC changes). Palli
- Oct 7. Johan de Gruyter (Erik's PhD stud.) has sequenced protists from ForHot GN plot.
- Oct 16-19. Lucia and Niel came and worked on the new TNT ForHot experiment
- Nov 1-5. The 3°/2nd intensive campaign for the Seasonal ForHot Experiment in GN/NT + 15N labelling (Gunnhildur, Sara M.)
- Nov 22-23. Palli and Bjarni did the fourth forest inventory on 38 measurement plots in the FN
- Dec 01. The 4° campaign for the Seasonal ForHot Experiment in GN/NT (Gunnhildur)

2018

- Jan 11. The 5° campaign for the Seasonal ForHot Experiment in GN/NT
- Chao starts his Post-doc in Antwerp on root dynamics
- Kathiravan starts his PhD at Innsbruck Univ. on the TNT
- January 22 – 31: Chao + Palli had a „Root research methods, WinRHizotron™ training session“ with Ivika in Tartu

3. Project outputs

Older papers:

2016

JOURNAL PAPER: Sigurdsson, Leblans, et al. (2016). Geothermal ecosystems as natural climate change experiments: the ForHot research site in Iceland as a case study. *Icelandic Agricultural Sciences*. Link:

[http://www.ias.is/landbunadur/wgsamvef.nsf/Attachment/IAS%202016%205%20Sigurdsson%20et%20al%2053-71/\\$file/IAS%202016%205%20Sigurdsson%20et%20al%2053-71.pdf](http://www.ias.is/landbunadur/wgsamvef.nsf/Attachment/IAS%202016%205%20Sigurdsson%20et%20al%2053-71/$file/IAS%202016%205%20Sigurdsson%20et%20al%2053-71.pdf)

2017

JOURNAL PAPER: Poepplau, Christopher, Kätterer, Thomas, Leblans, Niki I. W., & Sigurdsson, Bjarni D. (2017). Sensitivity of soil carbon fractions and their specific stabilisation mechanisms to extreme soil warming in a subarctic grassland. *Global Change Biology*, Link:

<http://onlinelibrary.wiley.com/doi/10.1111/gcb.13491/epdf>

Since last meeting in March 2017:

1. **JOURNAL PAPER:** Marja Maljanen, Heli Yli-Moijala, Christina Biasi, Niki I. W. Leblans, Hans J. De Boeck, Brynhildur Bjarnadóttir, Bjarni D. Sigurdsson. The emissions of nitrous oxide and methane from natural soil temperature gradients in a volcanic area in southwest Iceland. *Soil Biology and Biochemistry*. Link: http://ac.els-cdn.com/S003807171730130X/1-s2.0-S003807171730130X-main.pdf?_tid=8250730e-0c7f-11e7-8651-00000aacb35f&acdnat=1489912924_1bb36d76fdf70075a19686935a2fea42

2. **JOURNAL PAPER:** Albert Gargallo-Garriga, Marta Ayala-Roque, Jordi Sardans, Mireia Bartrons, Bjarni D. Sigurdsson, Niki Leblans, Michal Oravec, Otmar Urban, Josep Peñuelas. (2017). Impact of soil warming on the plant metabolome of Icelandic grasslands. *Metabolites* 7(3), 44; doi:10.3390/metabo7030044. Link: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5618329/>
3. **JOURNAL PAPER:** Niki Leblans, Bjarni D Sigurdsson, Sara Vicca, Yongshuo Fu, Josep Penuelas, Ivan Janssens (2017). Phenological responses of Icelandic subarctic grasslands to short-term and long-term natural soil warming. *Global Change Biology* 23(11), 4932-4945. doi: 10.1111/gcb.13749. Link: <http://onlinelibrary.wiley.com/doi/10.1111/gcb.13749/full>
4. **JOURNAL PAPER:** Martin Holmstrup, Bodil Ehlers, Stine Slotsbo, Krassimira Ilieva-Makulec, Bjarni D. Sigurdsson, Niki Leblans, Jacintha Eilers and Matty Berg (2018). Resilience in functional diversity of Collembola subjected to long-term warming. *Functional Ecology* (in press). Link: <http://onlinelibrary.wiley.com/doi/10.1111/1365-2435.13058/abstract>
5. **JOURNAL PAPER:** Dajana Radujkovic, Erik Verbruggen, Bjarni D. Sigurdsson, Niki I. W. Leblans, Ivan Janssens, Steven Dauwe, Sara Vicca, James T. Weedon (2018). Prolonged exposure does not increase soil microbial community response to warming along geothermal gradients. *FEMS Microbiology Ecology* (In press). Link: <https://www.biorxiv.org/content/biorxiv/early/2017/01/23/102459.full.pdf>
6. **JOURNAL PAPER:** Marja Maljanen, Hem Raj Bhattarai, Christina Biasi & Bjarni D. Sigurdsson (2018). The potential effect of elevated soil temperatures on the production of carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), nitric oxide (NO) and nitrous acid (HONO) from volcanic soils in southern Iceland. *Icelandic Agricultural Sciences* (in press).

2017

1. **THESIS:** Nia Sigrun Perron. (2017). Warming responses of two native Icelandic species, *Ranunculus acris* and *Thymus praecox* ssp. *arcticus* in geothermal areas (M.Sc. thesis). Defended in June 2017. Faculty of Life and Environmental Sciences, School of Engineering and Natural Sciences, University of Iceland, Reykjavik, Iceland. 51 p.
2. **THESIS:** Wendelien Meynzer. (2017). The effect of temperature and nitrogen on plant community structure in Icelandic subarctic grassland ecosystems (M.Sc. thesis). Defended in August 2017. Faculty of Science, Department of Biology, University of Antwerp, Belgium. 59 p.
3. **REPORT:** Julia Bischof. (2017). PLANUNG UND ANLAGE EINER DAUERVERSUCHSFLÄCHE zur Beprobung der Hitzetoleranz von Wurzeln sommergrüner Gehölzpflanzen im Vergleich zur Sitka-Fichte (*Picea stichensis*). An internship report done for the Hochschule Weihenstephan-Triesdorf. 11 p.

4. **REPORT:** Paige Guevarra. (2017). Effect of geothermal soil warming on needle morphology of *Picea sitchensis* in southwest Iceland. A report done for the School for International Training: Iceland and Greenland Climate Change and the Arctic Spring 2017. 22 p.

4. The mini-conference on recent findings in ForHot

Pdfs from all the talks is available on a closed dropbox folder (the address is https://www.dropbox.com/sh/7t2ablktj6wfnx7/AABopLQ4eQUtAKtgd4MKm_dfa?dl=0)

5. Publication plans 2018-2019



We have had a very good year publication-wise! Before the ForHot meeting in Antwerp one year ago we had **two** published papers (Sigurdsson et al. 2016) and Poeplau et al. (2017). That number had risen to **eight** published papers before this meeting (see Item 3) and **three** papers more are probably going to appear before long, since they are more-or-less accepted w. changes (Tom Walker's, Sara Marañon's and Håkan Wallander's paper). This means that the success rate was close to 50% of what we pledged last year (we pledged in total to publish 21 papers after Antwerp ;o)

We made a new list of 24 publications that all will be submitted before the next ForHot meeting in 2019.

The following papers have been submitted or are just to be re-submitted and should appear before Sept. 2018

1. **JOURNAL PAPER:** Dmitry Kutcherov, Stine Slotsbo, Bjarni D. Sigurdsson, Niki Leblans, Matty Berg, Jacintha Ellers, Janine Mariën, and Martin Holmstrup (201X). Thermal reaction norm evolution in a subarctic springtail in response to habitat type and geothermal warming. Submitted to Thermal Ecology
2. **JOURNAL PAPER:** Kaarin Parts, Leho Tedersoo, Andreas Schindlbacher, Bjarni D. Sigurdsson, Niki I. W. Leblans, Edda S. Oddsdóttir, Werner Borken, and Ivika Ostonen (201X). Acclimation of fine root systems up to a dieback in response to artificial and geothermal warming. Submitted to Global Change Biology
3. **JOURNAL PAPER:** Cindy De Jonge, Dajana Radujković, Bjarni D Sigurdsson , James T. Weedon, Ivan Janssens, Francien Peterse (201X). Orphaned membrane lipids used for climate reconstruction vary with temperature only when the bacterial community composition shifts. PNAS (to be submitted).

The following papers will be submitted and published before the next ForHot meeting (March 2019).

4. **Jing et al.** The work in GN and GO which was presented
5. **Erland Bååth & James Weedon.** The soil bacteria growth and composition at FN/GN in 2012
6. **Erland Bååth & Liu.** The fungi PFLAs, OM spectroscopy and enzymatic responses in GN and GO
7. **Marja Maljanen et al.** Geothermal sources of ¹³C CO₂ fluxes from FN.
8. **Páll Sigurdsson et al.** Root turnover in FN
9. **Páll Sigurdsson et al.** Tree growth and forest productivity in FN
10. **Per Gundersen et al** Leachates in FN, GN, and GO 2015-2017
11. **Krassimira et al.** (2017) Nematodes in FN, GN and GO in 2014
12. **Hans Sandén et al.** (2018/2019) FN enz responses
13. **Bryndís Marteinsdottir, Nia Perron, et al.** (2017). Plant phenology and fitness at Hengill, GN and GO
14. **Tom Walker's et al.** synthesis paper on GN and GO
15. **Christopher Poeplau et al.** FN new fractionation data
16. **Niki Leblans et al.** Effect of short- and long-term soil warming on plant and soil stoichiometry in GN and GO
17. **Martin Maddison et al.** N₂, NO_x, CH₄, N₂O, CO₂ incubations from GN, GO and FN
18. **Sara Marañón et al.** The CNP-limitation incubation data on GN soils
19. **Niel Verbrigghe et al.** Priming paper from TNT
20. **Chao Fang et al.** Fine-root turnover in GN, GO and NT
21. **Albert Gargallo et al.** The next metabolomics paper (Seasonal Exp).
22. **Philipp Guendler et al.** Seasonal Experiment I
23. **Bang-Xiao Zheng et al.** Multi-gen chip for ForHot
24. **Jordi Sardans et al.** SEM of GN and GO

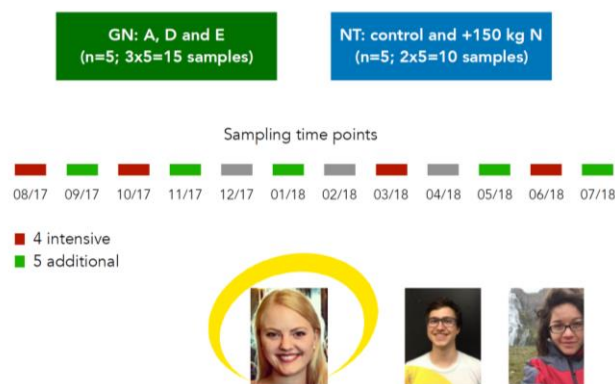
The following 17 papers will be submitted in 2019/2020 (After the ForHot meeting in 2019).

1. **Niki Leblans et al.** (2019) Effect of short-term and long-term soil warming on vegetation composition and traits, GO and GN.
2. **Niki Leblans et al.** (2019) NDVI and aboveground biomass stocks in GN and GO
3. **Wallander, Poeplau & Richter et al.** (2019/2020) Fractionations of GN/GO soil with different methods.
4. **Lucia Fuchslueger et al.** Decomposition results from TNT
5. **Kathiravan M. Meeran et al.** Pulse-labelling study 2018 in TNT
6. **Joana da Silva et al.** Org-N cycl MetaTranscriptome data form GN/GO
7. **Alexander Tveit et al.** MetaTranscriptome data form GN/GO on functional diversity
8. **Guille Peguero et al.** Soil invertebrates and environmental DNA from GN/GO
9. **Mireia Bartrons et al.** POPs and organic pollutants from Seasonal Exp.
10. **Sara Marañón Jiménez et al.** N-cycle from Seasonal Experiment in GN/NT
11. **Daijun Liu et al.** Multi-functionality synthesis paper from GN/GO/FN
12. **Bjarni D. Sigurdsson et al.** Effects of Land Use Change synthesis paper

13. **Christopher Poeplau et al.** RI-6 analyses on GN/GO/FN soil
14. **Josep Peñuelas & Jordi Sardans.** Biogeochemical Nitch Shifts in ForHot
15. **Páll Sigurdsson et al.** Root and aboveground phenology in FN
16. **Páll Sigurdsson et al.** C-balance changes in FN during 2013-2018
17. **Judith Prommer et al.** Gross N-P mineralization in GN and GO

6. Andi's session on 6/3: The ForHot Seasonal Experiment

It started in August 2017 and has so far had two intensive samplings + three additional for microbial biomass



People who are mainly responsible for the field sampling and sample processing are Gunnhildur (and Palli) + Philipp and Sara M.

Gunnhildur & Sara send samples to Vienna for further analysis + Philipp divides samples and sends to different people.

Further Gunnhildur sends Krassi samples from intensive campaigns for nematode extraciton and Palli sends samples to Martin for collembola etc. extraction.

Samples for CREAM are stored directly at -80°C in Iceland and later freeze dried. Freeze dried samples from the first two intensive campaigns have been brought to CREAM + one sample stored at -18°C for for POP analysis.

It was agreed that **Guille** will extract the DNA from the samples for everybody who are going to work with DNA (CREAM samples or samples from Andi??)

The aim is to have a pre-meeting just before (= 11/3 2019 Monday?) the next ForHot meeting where different datasets from the Seasonal Experiment will be compared.

- **Deadline** to have the data from all Seasonal Experiment WPs ready was set to **31. Jan 2019**

7. Ivan's session on 7/3: loss of aggregates in GN/GO

There was a lively discussion about this topic and with new research insight from Jing et al. that mycorrhizal production/turnover was not decreased (ingrowth bags) across the temperature gradients of GN and GO, even if the total amount of mycorrhizal fungi was decreased (PLFA analysis). So the hypothesis put forward in Niki's manuscript must be rejected. Rather than aggregates were lost first due to less AMF production and thereby the SOC-protection decreased - the C was lost first from the aggregates – More work needed on this issue.

8. Lucia's TNT-project session on 7/3

This session was about the upcoming large pulse-labelling campaign in Iceland in July. Niel and Kathir have made a separate minutes for this part which has been distributed to all the interested parties.

9. Andi's Meta-Transcriptonome on 8/3: The Datastorm is coming!

GN and GO A and E plots (n=4) = 16 samples.

Everybody who is interested is welcome to join (and chip in with little funding).

Main actors (see OHs from Andi):

- I. Decomposition and Functional diversity = **Alex Tweit**
- II. Taxonomic and community structure = **Tim Urich**
- III. Microbial N cycling = **Joana Silva**
- IV. Methods = **James Weedon? / Bang-Xiao?**

Workshop planned in Vienna in October 2018 to plan further analysis of this data. Would be great if we could get:

James Weedon/Ruud Rijkers: comparison to other methods that have been used within ForHot.

Josep/Bang-Xiao: qPCR added

Martin/Krassimira/Guille: soil invertebrates

Albert: metabolomics

10. Session on more synthesis work

This session was started by brain-storming about the many different synthesis activities we could focus on – and it was led by **Josep Peñuelas**.

Tom Walker then introduced the ongoing synthesis-work (that was accepted at the last ForHot meeting) about “holistic ecosystem responses to warming at GN and GO” based on >100 different parameters. Very interesting findings. There was a lot of discussion about how to present and interpret the findings. All data-owners will be invited to become co-authors. This work was then continued by Tom, Erik, Ivan, Andi and Bjarni on Thursday 8/3 and Friday 9/3. The manuscript will hopefully be sent to all co-authors before summer.

Jordi advocated that more work should be done with “discriminant functional analysis” or “structural (equation) model analyses” on the variables in soil on one hand and in plants on the other. This could be done on the “next version” of the database, when data for 2016-2017 is also included. The group encourages Jordi to take the leadership on another work. This became a manuscript activity. Resulted in two manuscript activities by Jordi and Josep (see list).

Ivika Ostonen presented an idea she has started to work on with **James Weedon** about linking aboveground and belowground “food-web interactions” in response to warming in FN. E.g. changes of soil microbial communities, links to GHG, ECM, mycelial biomass, stoichiometric shifts linked to shifts in vegetation allocation patterns (aboveground vs. belowground). This activity is just starting. **Christopher Poeplau** will add fractionation data from FN. This activity was accepted by the ForHot group.

Bjarni introduced the idea to use GN and FN A and B plots to evaluate the effect of land-use change on ecosystem structure and function. Already interested are **Per Gundersen, Alf Ekblad, Ivika Ostonen; Edda S. Oddsdottir**, et al. This activity was accepted by the ForHot group.

Håkan Wallander showed some work on soil hydrophobicity and FTIR data. Fungal biomass produce hydrophobic substances that make aggregates more stable. Hydrophobicity declines with temperature in bulk soil and SC fraction, but not in the SA fraction. This may be the key for the loss of stability of aggregates.

There was a discussion about using data on soil (organic matter) structure by different methods for a common paper (FTIR, fractionation, Rock Eval 6 =RE6, 14C=Jenny...). Ivan suggested to repeat “all” the different analyses on the samples taken this summer. Resulted in a manuscript activity (see list).

Bjarni introduced an idea from the CREAM post-doc **Daijun Liu** to do a synthesis work on drivers and the calculation on ecosystem functionality from the ForHot database. This activity was accepted by the ForHot group and resulted in a manuscript activity (see list).

Ivan proposed an integration of incubation and mineralization data into a common synthesis paper. People were very positive, but this was not specifically defined later as a manuscript activity. Pending.

11. Discussion about involve modellers into ForHot

- **Ivan** proposed that he will take the lead on this. He will set up meetings with:
 - Daniel Goll
 - Berthran Guenet
 - Philipp Ciais

Who are working with land-surface modelling at small-to-larger spatial scales. Sara M. had also been approached by Daniel Goll about sharing her incubation data for modelling.

Ivan proposed to organize a modelling workshop in Antwerp in Jan 2019

Christopher Poeplau was also interested in coordinating a comparison study using Roth-C and other SOC models.

12. ***ForHot funding (plans) for 2018-2019***

Now we have (research) funding from:

1. The Icelandic ForHot-Forest project (ends 2020)
2. The post-doc project of Sara Maranon (ends 2019)
3. The TNT project of Lucia, Sara V. and Michael
4. Some inputs through Imbalance-P
5. Some inputs from Univ. Antwerp ForHot project

Some applications have been submitted or will be submitted.

- The **Future Arctic** ITN/ETN project appl. = 15 new PhD projects. We will know in June.
- The **TecMex** COST application (Sara Vicca). We will know in June if we get it.
- ForHot/Iceland will be included in the upcoming **ExperiNet** I3 EU application (20 March)
- **NordForsk** (Scand/Baltic), deadline 1 June (Bjarni will coordinate an application)
- Ivika Ostonen will apply for national funding in Estonia to add belowground-root biodiversity component to the studies in GN/GO.
- All participants are encouraged to seek national funding for ForHot projects!!
- Josep Peñuelas and Bjarni will check for possibilities within H2020 etc.

13. **The ForHot Database**

Bjarni will soon send out requests to all ForHot participants to send him all missing data.

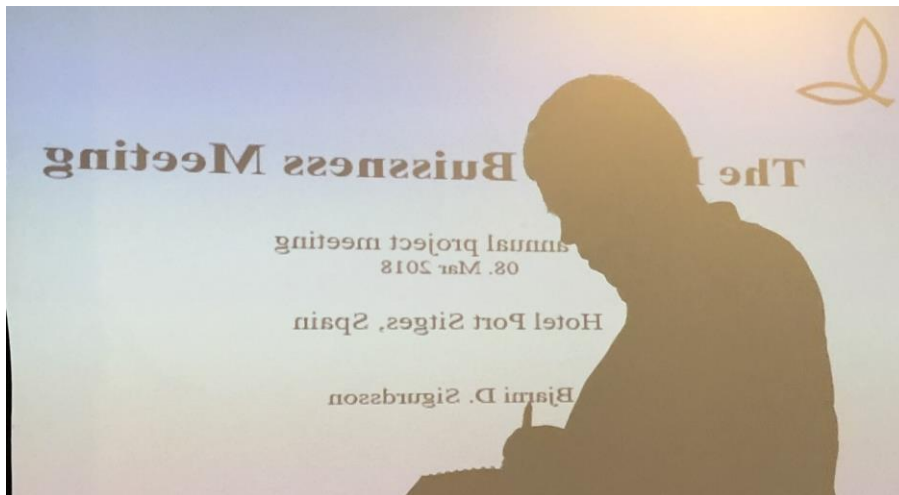


Photo: Andreas Richter

14. Next steps in field research at ForHot

i) Points about improvements of the ForHot infrastructure or data – basic knowledge

- We should make a database about available DNA and other soil/plant/animal samples archived at different institutes.
 - Bjarni will try to coordinate that we collect this information.
- PI's should report before the ForHot meetings what has been done during the past year.
 - We will try to set this up before the next ForHot meeting.
- The ForHot database policy will soon need to be updated, since more and more European countries are requiring an open-access publication of raw data when papers are published.
 - Something to continue working on.
 - We should prioritize to get more infrastructure funding and funds for better database.
 - Part of the upcoming Nordic application?

ii) Additional measurements decided now

- **Ivan** et al. will resample plants and soil from GN, (NT?) and GO in July 2018.
- **Martin H.** probably going to Iceland this summer in collaboration with Josep for sampling (large samples) for soil invertebrate DNA for **Guille** from all experiments.
 - **Andi** was interested in adding isotope analyses to trace the foodweb
- **Palli** will send **Christopher** soil samples from FN for fractionation
- **Gunnhildur** will send ball-milled needle samples from FN to **Alf**, who will do a 13C and 15N
- **Palli/Gunnhildur** will send the un-analyzed water samples from 2016 (FN, GN, NT, GO) and 2017 (GN, NT, GO) to **Per**. Bjarni will pay for analysis of FN and Ivan for GN, NT and GO.
- **Bryndís** will add paired plots outside the GO grazing enclosures to study the “long-term” effect of grazing (continue the work that Vendelien (M.Sc. student from Antwerp) started in 2015. Has plans to continue to 2027!
 - **Ivan** interested to add N-deposition plots to this set-up as well
- **Seasonal Experiment**
 - **Palli** will coordinate with **Sara Vicca/Ivan** that he will get enough PRS-probes for making the last Intensive Campaign.
 - **Andi** will send **Cindy** samples for analysis
 - **Edda** will “rent” a technician to Ivan who will increase the frequency of minirhizotron measurements to once every 3-weeks for Chao.

iii) Action plan for the 2018 summer field season

Iceland:

- Palli will be the site manager Mar 2018 – Mar 2019.
- One internship student Mar-Jun 2018 (Ben
 - NDVI, Theta-Probe, Max LAI.
 - Lysimeters in GN/GO/NT??

- Mini-rhyzotrons every 6-7 weeks to July (Edda rents staff for more campaigns)
- Gunnhildur will be the local coordinator for the Seasonal Experiment until July 2018

March 2018

Sara M comes to Iceland for Seasonal Exp. (3rd intensive campaign).

April 2018

Bjarni will apply for getting EOSENSE automated Rs chambers to ForHot

Niel & Kathir come to fertilize TNT

Chao comes for his first mini-rhyzotron campaign and to install root-nets in GN, GO and NT?

Gunnhildur fertilizes NT

May 2018

Gunnhildur & Ben do the Seasonal Experiment monthly sampling

Niel & Kathir come to prepare the infrastructure for the pulse-labelling

June 2018

Sara M. & Albert come for 4th and last intensive campaign of the Seasonal Experiment

Andi (and Michael?) come for 2 days in the middle of the month

Gunnhildur fertilizes NT

Bjarni measures photosynthesis/conductance in FN

July 2018

Ivika & Edda measure root exudation (again) in FN 2-5/7

Ivan Janssens + 16 persons come for intensive field campaign (resampling GN/GO/NT? and work on the pulse-labelling in TNT – Niel and Kathir will come 2/7 and leave in early Aug)

Gunnhildur & Ben do the last Seasonal Experiment monthly sampling

Jenny & Margaret come during TNT pulse labelling

Gunnhildur fertilizes NT

August 2018

Bjarni measures photosynthesis/conductance in FN

Bryndís will measure paired plots outside the grazing enclosures in GO for plant composition

Sept 2018

Chao takes up his root nets in GN, GO and NT?

Oct 2018

Andy has a workshop in Vienna about Meta-Transcriptome data

Jan 2019

Ivan plans to organize a modelling workshop in Antwerp

Other things:

Sweden: All fieldwork ended

Finland: All fieldwork ended

*It would be appreciated if **you** could notify Bjarni if there are some additional measurements planned within ForHot in 2018-2019 that are not listed here.*

15. Other issues / decisions / comments

- **NEXT ForHot meeting will be (11)12-14 March 2019.** Participants wanted to repeat such a meeting next year at the same venue. Time was decided from late arrival (for foreigners) on 11 of March. Meeting Tue-Thu 12-14 March 2019. Location: “Hotel Port Sitges”. Participants wanted the same format; i.e. mini-conference (10+5) and longer discussion sessions. “Local organiser” will be Bjarni, together with Josep.
- **New ForHot participants were accepted**
 - **The Berkley Lab, USA.** Jenny Soong and Margaret S. Torn
 - **CzechGlobe, Czech Republic.** Karel Klem and Otmar Urban
 - **Univ. Vienna. A new Austrian group.** Michael Wagner and Petra Pjevac
- **Talks from 2018 meeting.** Everybody accepted that pdfs of the talks would be made available to all participants in a dropbox folder.
- **Photosynthesis** should be looked more in detail. Ivan will have a summer-student working on this in July 2018 for GN and GO and Bjarni will do some more photosynthesis work for FN (in the three scaffolding towers).
- **Christopher Poepflau:** Stresses the importance of us setting up a soil archive with samples from different plots.
- **Bjarni et al.:** General agreement that we should start looking for funding for doing a transplant experiment in ForHot in 2019/2020 – and that is the most prioritized addition to the ForHot project now. Many people were interested in this. Participants also encouraged to seek national funding to get this started!