

NOVUS NEWSLETTER

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The Novus RCN

*Ecosystems and
Disturbance from Tens
to Millions of Years*

NOVUS WORKSHOP III: APPLICATIONS OPEN

We are pleased to announce details for the third Novus workshop, titled “Biogeochemical responses to ecosystem disturbances from decadal to millennial time scales,” which will be held in Minneapolis, Minnesota, USA, May 16-21, 2016. The workshop will consist of three days of field work at [Cedar Creek Ecosystem Science Reserve](#), and three days of lab work at the [University of Minnesota](#) processing samples.

The workshop will be structured as an active technique exchange among paleoecologists, dendrochronologists, and neo-ecosystem ecologists in an oak-savanna environment. The workshop theme focuses on the fire regimes of the oak-savanna ecosystem, particularly historical fire suppression and recent prescribed fire, and the biogeochemical consequences of disturbance regimes at short and long temporal scales.



*Prescribed burn at Cedar Creek,
photo from CCESR website*

Applications are currently being accepted for the workshop. To apply, email the following information to Dr. Bérangère Leys at bleys@ksu.edu: 1) your name, affiliation, and email address, 2) your position and career stage (PhD student, professor, etc), 3) your area of research expertise, 4) the ideas and questions that interest you regarding the topic of the workshop and study site, and 5) the tools and techniques with which you are familiar and would like to integrate into the workshop. The deadline to apply is Friday January 22, 2016.

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SEP Site Visit: Bioavailability of soil carbon in a complex, multiple disturbance environment

In June 2015, [Dr. Brian Buma](#) visited the lab of [Dr. Rebecca Barnes](#). This SEP was unique among the projects funded by Novus in that it was a ‘dual exchange’ visit, whereby both the host and awardee exchanged methodological expertise. Dr. Buma instructed Dr. Barnes and her lab in the protocols for quantitative sampling of above-ground biomass, coarse woody debris, and soil characteristics and Dr. Barnes illustrated the protocols for soil incubation experiments and black carbon digestion.

The team focused on using charcoal records to rebuild carbon cycle responses to overlapping & compound disturbance,



Field site, Routt Natl Forest, photo from Buma

increased disturbance frequency, and climatic warming in Colorado subalpine forests. Results of the project will be published and used by the team in NSF and Fire Program funding proposals.



SEP Site Visit: Application of confocal laser microscopy to the study of conifer species

In May 2015, post doctoral research [Dr. Emanuele Ziacco](#) visited the lab of [Dr. Ingo Heinrich](#) to assess cellular parameters of *Pinus longaeva* from Great Basin National Park, NV spanning the last 250 years using confocal laser scanner microscopy, which allows for non-destructive, semi-automated data collection. Relationships between wood anatomy and climatic disturbance will be used to assess vulnerability of forests to future climate change scenarios.

SEP Site Visit: Cajander larch seed germination in response to fire-driven variations in soil

In May 2015, [Dr. Heather Alexander](#) visited the lab of [Dr. Jill Johnstone](#) to study the role of post-fire soil conditions on seedling germination and the long-term relationships between fire activity, climate change, and species composition in larch forests of Cherskii, Russia. The team assessed the impacts of fire intensity and stand structure on seed viability and seedling regeneration using field germination trials and lab-based x-ray and embryo stains of seeds. In addition to the SEP host/awardee team, this project built collaborations with the [Northeast Science Station](#) in Cherskii, Russia.



Drs Buma and Barnes during their SEP, photo from Buma

SEP Site Visit: Constraining boreal forest fire-vegetation feedbacks with satellite imagery

In June 2015, Dr. Ryan Kelly visited the lab of [Dr. Tatiana Loboda](#) to study the impacts of increased fire frequency on Alaska boreal forest community structure using satellite imagery. They identified unique spectral structures of early- and late-successional species to document change in post-fire recovery, which were then assimilated into previously developed modeling frameworks.

In his interaction report, Dr. Kelly noted that “Tatiana and I had talked repeatedly about getting this project started but had never quite gotten around to it. The funding to visit and work one-on-one finally kickstarted the collaboration we had planned but never realized.”



SEP Site Visit: Combining remotely sensed and pollen data to evaluate bark beetle outbreaks

In September 2015, [Arjan Meddens](#) visited the lab of [Dr. Bryan Shuman](#) to evaluate the effects of bark beetle outbreaks in Colorado forests by combining proxy data from Landsat satellite imagery, lake sediment cores, and surface pollen collection. The team reconstructed woody cover over the last 4,000 years, finding that recent bark beetle outbreaks have had unprecedented impacts on woody biomass compared to past outbreaks. The study is in prep for submission.

SEP Site Visit: Unifying tree-ring methods for reconstructing disturbance dynamics

In September 2015, [Volodymyr Trotsiuk](#) visited the lab of [Dr. Neil Pederson](#) to compare the efficacy of methodologies for detecting disturbance events in tree-ring chronologies, specifically examining species-specific growth responses to rapid environmental change. Trotsiuk's visit included a workshop between the SEP team and seven additional researchers to discuss and compare methodologies. The team is finalizing a manuscript, as well as a publicly available R package and Matlab file.

Research Highlight: Do Boreal Forests Need Disturbance to Maintain Productivity?

A recent study in *Ecosystems* seeks to answer the title question using three chronosequences of 90 boreal forest stands in the Canadian Shield of Quebec spanning 2,000 years post-fire. The authors hypothesized that the organic layer thickness (OLT) would increase post-disturbance due to low soil temperature, low nutrient availability, and low site productivity. The authors measured numerous traits, including OLT, nutrient conc. of mineral soil and foliage, ground cover, and above-ground biomass. The authors found that OLT increased after fire for 64 years before leveling off.

There was no significant decrease in productivity after 80 years post fire, indicating ecosystem traits reach a steady state early in disturbance recovery. Additionally, the authors found no evidence for long-term declines in site productivity or soil processes in the absence of disturbance, suggesting fire may not be necessary for avoiding ecosystem retrogression.

Full citation: Ward, C, D Pothier, D Paré, (2014) [Do boreal forests need fire disturbance to maintain productivity?](#) *Ecosystems*, 17:1053-1067



Calder, Meddens, and Shuman during Meddens' SEP visit, photo from Meddens

Novus Workshop I Manuscript Now Available

Out of the discussions held at the first Novus workshop, several participants developed a conceptual framework around the partitioning ratio (ratio of soil to plant nutrient pools) to track biogeochemical responses to ecosystem disturbance. Disturbance events can then be separated into 'accreting' disturbances, which increase nutrient availability in the ecosystem, versus 'depleting' disturbances, which decrease nutrient availability. The authors tested this concept using ecosystem nitrogen stocks in process-based ecosystem models and in published data of nutrient availability in US forest ecosystems.

Full citation: Kranabetter, J. M., et al (2015). [A framework to assess of biogeochemical response to ecosystem disturbance using nutrient partitioning ratios.](#) *Ecosystems*, DOI: 10.1007/s10021-015-9934-1

Share Your Ideas for the Novus Blog and Novus Newsletter!

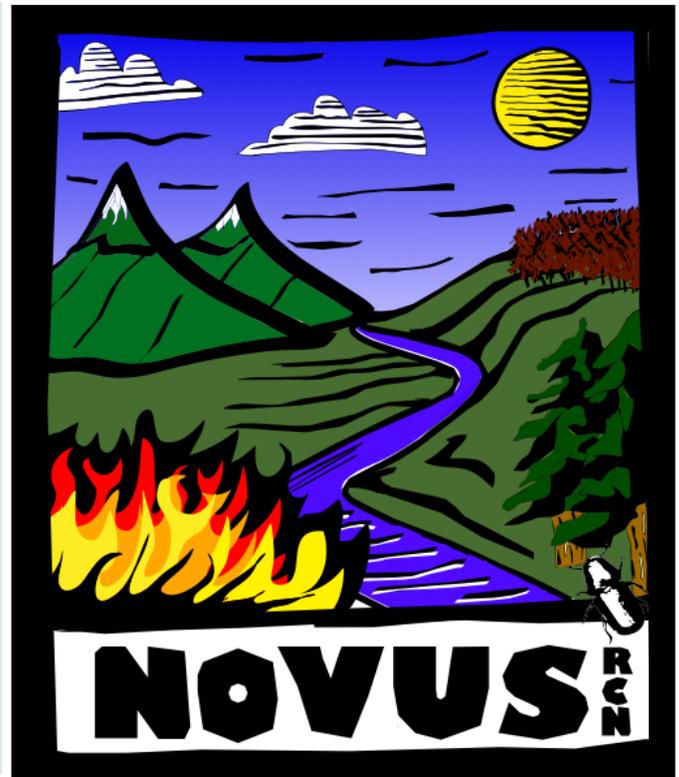
We are always looking for new content for the Novus blog and newsletter. If you have new information to share, please send it to Laci Gerhart-Barley at rockchalk@ksu.edu

Topics for newsletters include:

- Publication highlights
- New projects and grants
- New Novus products or personnel

Topics for blog posts include:

- All newsletter topics
- Job announcements (all levels)
- Funding opportunities (grants, fellowships, stipends)
- Conferences and workshops



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