Workshop - Extreme weather and extreme events (Mats Björkman)

How do we define an extreme event?

- Pressure = climate change over time vs. Pulse = extreme event
- Site specific (an extreme event in one location may not constitute as an extreme event in another location)
- From each weather station – 100% in 100 years
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- Do we want an ITEX definition of an extreme event?

How does an increased frequency over the past 30 years compare to increased frequency over the next 30 years?
Can we disentangle the effects? (due to compounding event affects)
How do we simulate events?

- Inga (ROS garden experiment)
- Generally easier to remove than to add
- Herbivore outbreak experiment (Greg) (no effect on carbon fluxes)

What response variables are we interested in?
How frequent?

What are the scientific questions involving extreme weather/extreme events?

- How important are extreme events compared to long term change? And how do they interact?
- How does inter-annual and intra-annual variation affect phenology? (how many seeds, flowers do they produce and how does it affect the long term plant community?)
- Can extreme events accelerate the coming of tipping points?**
- Do extreme events increase mortality? How does that press into other parts of the ecosystem?
- How do EWE's impact the carbon budget? Specifically in the microbial community
- What is the recovery period after events? How do they affect the interactions between above and below ground communities?

Currently:
Meta review

- Ewe's have been researched comprehensively across the arctic
- Publications are increasing, with an almost even ratio of all events
- Publications on the human aspect increased over the last 3 years
- As research increases, the overall impact on a category decreases…
- Most publications are experimental

Are we missing any extreme events?

- Industrial activity
- Insect outbreaks
- Pathogen outbreaks

- Sandstorms
- Lightning frequency
- More cloud cover
- Discluded due to being a consequence of extreme weather…
    - Fire
    - Sea
    - Landslides, changes in topography

(Isla: Active layer detachments and other thermokarst events when many occur across the landscape due to either heat waves or high rainfall events)

What can we add to this study?

- Look into existing data from sites
    - Extract data over natural extreme event periods
    - Qualify experiments as extreme events
    - Encourage each site to use resources available to try these ewe simulations
    - **Experiment with the tipping point since plants are so resilient
    - *The Perfect Storm* of events that lead to the tipping point
- Ulf *Press and Pulse* data (no publication)
- Can we create a protocol for measuring extreme events?
    - Large scale experiment to help understand pulse vs pressure
    - Rolling average over 30 years of weather data with anomaly graph for july temp (found both positive and negative anomalies to have increased), with seed collection (Zoe and Greg)
    - Include ongoing experiments or ideas

Experiment ideas:

- Add a third OTC to ongoing experiments (CTC to simulate drought)
- Fire

Follow up:
Send email to gauge interest in participating in creation of protocol
Someone to look through old climate data
Can we use the extreme weather events thoughts to apply for funding through EU PhD grants

- November deadline

Interest in second review participation

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Isla Myers-Smith (and her new co-supervised PhD student Grégoire Canchon working on Arctic heat waves and where and when they are based on how we define them from a climatology and climate modeling perspective)
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