2012 LTER ASM working group report

Synthesizing long-term phenology data: Perspectives across the International Long Term Ecological Research Network (ILTER)

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Convened on September 11, 2012 in Estes Park, Colorado.

Introduction

Phenology is strongly linked with ecosystem structure, function, biogeochemical cycles and global climate change. A sensitive indicator of climate change, phenology has shifted in recent decades. But the magnitude and the complexity of this shift and the consequences to ecosystem structure and function as a whole are not well understood.

Long-term ecological research across the United States and across the world has accumulated rich phenological information at species, plot, ecosystem, and regional scales. However, numerous phenological data have yet to be revealed and synthesized. Two LTER ASM working groups on phenology have been convened, "Phenology: data, research, synthesis" in 2006 organized by Geoff Henebry and Doug Goodin, and "Coordinating Phenology Monitoring and Research Across the LTER Network" in 2009 organized by Mark Losleben and Jake Weltzin. "A White Paper on Phenology across LTER" has been published by Henebry et al. (2007). However, more solid synthesis products are required to use the existing phenological data and an international perspective should be extended across the International Long Term Ecological Research Network.

Goals

Sponsored by the LTER International Committee, The goals of this working group are to:

- Establish a phenology working group across U.S. LTER sites and across the ILTER sites
- Reveal existing phenological datasets, and discuss new insight and direction
- List a few synthesis topics
- Develop a plan to seek funding support to host workshops to conduct the synthesis activities.

We will focus on plant phenology, particularly on leaf phenology (green-up and senescence) in response to climate change, covering scales of leaf, canopy, landscape, regional, to the global.

We will collaborate with the National Phenology Network (www.usanpa.org), a national network of integrated phenological observations across space and time, the goal of which is to understand how plants, animals and landscapes respond to environmental variation and climate change. We will also collaborate with other phenology-oriented network such as the National Ecological Observatory Network (NEON, http://www.neoninc.org/) and PhenoCam (http://phenocam.sr.unh.edu/webcam/).

Existing data (not exclusively collected from the participants):

Jess Zimmerman and Chris Mytch (LUQ): 20 years of phenology data, biweekly, including leaf phenology, litterfall, greenup/flushing/turnover, fruiting, and flowering data. Also measure annually seedling leaf area.

Mark Schulze (AND):. Vegetation phenology since 1970s, but not consistently across years, including 17 species.

Nina Lany (HBR): There are snow depth data and bird data since 1960s, and 2-3 cameras for species-based leaf observation.

Jan Dawe and Christa (BNZ): Remote sensing and ground-based observation; K-12 education and schoolyard observation. In spring-summer, we have data at 2-3 days frequency.

Jackie Moham (HFR): We have observation and warming treatment for seedling at 2-3 times per week, root phenology (weekly), and monthly stem growth rates data.

Jeff Hepinstall-Cymerman and Paul (CWT): We have manual, photo, and MODIS- based observation, We also have understory observation.

Yang Xia (SEV): Since 2002, we observe leaf, flowering, and fruit data monthly byspecies in grassland and shrubland.

Yuwei Chen (CERN/plwer China): Since 2009, we have recorded wetland vegetation weekly in spring and fall by species or group of species.

Research topics for future synthesis

- Impact of extreme weather on phenology in spring and fall.
- Climate impact on species phenology: modeling, from species to ecosystem scales
- Drivers of phenology over different ecosystems, including temperature, degree day, and generic control (genotype).
- Match citizen-based observation with professional observation.
- Connection between NPN, NEON and LTER data
- International collaboration in phenology observation and research
- Validate with remote sensing data (MODIS)
- Common garden approach

- Consequence of phenology shift on ecosystem function, interaction and mismatch.

Action item

We decided to seek funding to continue this workshop and working group. We will write a synthesis proposal to LTER.

A data synthesis proposal was submitted to LTER on October 15, 2012 by Jim Tang and Jackie Moham.

Participants

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