TEMPERATE PHENOLOGY

Some private family phenology and weather records

Government weather records begin. Naturalist societies form. Scientific records for spring onset phenology

Long term records begin to show change in spring onset in northern hemisphere. Global climate changes start to be investigated

First research results links warming temperatures and shifts in spring phenology. Research is led by plant and environmental sciences.

Research attributes early spring phenology to climate change. General efforts to compile long-term phenological data sets and weather across Europe Citizen science networks are created.

Phenology is recognized as a key discipline for detection and monitoring effects of climate change (IPCC 2007) Remote sensing techniques become widespread as a proxy for leaf phenology across biomes and show feedbacks to local weather patterns. Near-remote phenology with digital cameras starts and networks are created Citizen science creates huge databanks on temperate ecosystems.

Phenology is identified as an Essential Biodiversity Variable. Recovered Herbarium records show long-term changes and shifts in North America.

Remote sensing enables tropical and temperate phenology research to be compared at large scales; Heavy emphasis on global trends in leafing Citizen science data largely collected and analysed focusing on global change research.

No systematic records for phenology or weather

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Some herbarium records recovered, few weather records

Observations and records from early naturalists

Botanists begin first systematic plant phenology studies

Animal biologists begin studies of flower and fruit resources

Phenology of tropical trees shown to be responding to climate variables at sites in South and Central America

Reviews addressing tropical phenology

Long-term data sets in, Africa and Asia investigated for climate responses Serious gaps in weather data are identified for Africa.

Long-term phenology research: new sites and networks

Digital cameras, satellite data, climate models and new analytical tools become available for tropical phenology. Collection of empirical data increases Phenology is linked to biodiversity conservation and ecological restoration Reviews and synthesis of tropical phenology and climate change

The future: Citizen science and phenology networks (ephenology) Long term funding programs Improved weather data Field experiments (Amazon Face) Cross-continental comparisons, New methods and protocols

TROPICAL PHENOLOGY