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The USA National Phenology Network: A national science and monitoring program for understanding climate change

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Patterns of phenology for plants and animals control ecosystem processes, determine land surface properties, control biosphere-atmosphere interactions, and affect food production, health, conservation, and recreation. Although phenological data and models have applications related to scientific research, education and outreach, agriculture, tourism and recreation, human health, and natural resource conservation and management, until recently there was no coordinated effort to understand phenology at the national scale in the United States. The USA National Phenology Network (USA-NPN; www.usanpn.org), established in 2007, is an emerging and exciting partnership between federal agencies, the academic community, and the general public to establish a national science and monitoring initiative focused on phenology. The first year of operation of USA-NPN produced many new phenology products and venues for phenology research and citizen involvement. Products include a new web-site (www.usanpn.org) that went live in June 2008; the web-site includes a tool for on-line data entry, and serves as a clearinghouse for products and information to facilitate research and communication related to phenology. The new core Plant Phenology Program includes profiles for 200 vetted local, regional, and national plant species with descriptions and (BBCH-consistent) monitoring protocols, as well as templates for addition of new species. A partnership program describes how other monitoring networks can engage with USA-NPN to collect, manage or disseminate phenological information for science, health, education, management or predictive service applications. Project BudBurst, a USA-NPN field campaign for citizen scientists, went live in February 2008, and now includes over 3000 registered observers monitoring 4000 plants across the nation. For 2009 and beyond, we will initiate a new Wildlife Phenology Program, create an on-line clearing-house for phenology education and outreach, strengthen our national land surface phenology program, continue the development of regional phenology networks, and improve tools for data entry, download and visualization.