**AccelNet: Global Rules of Life governing nutrient cycling in terrestrial ecosystems**

**PI:** Frank W. Davis, Executive Director, Long Term Ecological Research (LTER) Network Communication Office, National Center for Ecological Analysis and Synthesis, University of California, Santa Barbara

**[Co-PIs TBD]**

**Project Synopsis (<2500 characters)**

Cycling of carbon, nitrogen and phosphorus in terrestrial ecosystems is tied to ecosystem structure, composition, functioning, and a host of ecosystem services on which society depends. Nevertheless, we have poor understanding of underlying rules governing how organisms interact with the physical environment to regulate nutrient cycling in diverse environments. Such understanding requires long-term, coordinated experiments and monitoring that engage ecologists, geoscientists, and molecular biologists. This research must span microbes to macro-organisms and account for the potential for phenotypic variation and genotypic adaptation of organisms in changing environments.

The International LTER (ILTER) Network is a network of 40 national LTER networks dedicated to long-term, site-based ecological and socio-economic research and monitoring. Established in 1993, the network is organized into 5 regional networks - East Asia Pacific, North America, Central-South America, Europe, and Africa. Working through these regional networks, along with allied networks such as the U.S. Critical Zone Observatory Network and ForestGeo, we will accelerate collaborative, international network-to-network efforts to discover general rules of life that govern cycling of carbon, nitrogen and phosphorus in the Earth’s major terrestrial biomes. These networks encompass long term research sites ranging from tundra to tropical rainforest to subtropical deserts.

We envision convergent, multidisciplinary activities that will include international workshops, data collation and integration, synthesis working groups, training for students and early career scientists, identification of common research infrastructure needs, and design of new coordinated experiments. The proposed project is well aligned with at least two of NSF’s 10 Big Ideas: Growing Convergence Research, and, Understanding the Rules of Life. Only such an international network of networks is capable of long-term, site-based research on nutrient cycling spanning the earth’s variety of environmental and phylogenetic settings. The ILTER network is well positioned to undertake such research but needs resources for meaningful, sustained, international engagement.

We anticipate that all five regional networks will participate in this 5-year effort. The contributions from each network will include scientists’ participation in international workshops and working groups, site-level participation in coordinated network-wide field experiments, data sharing, and development and sharing of training materials and curricula. Design and implementation of coordinated, low-cost experiments will be used to stimulate international networked science. For example, standardized organic matter decomposition experiments with tea bags will be designed and initiated to provide comparable information about organic matter decomposition, carbon cycling and storage. The methodology is simple and provides significant potential to engage students as well as cultivate protocols promoting data sharing among sites and networks.

A full proposal will be submitted at the Full-Scale Implementation level.

NSF Guidance:

A compliant LOI submitted by the Authorized Organizational Representative of the Principal Investigator only is required for proposal submission. LOIs are used to help gauge potential community interest and therefore better understand proposal review requirements. They are not used as pre-approval mechanisms for the submission of proposals, and no feedback is provided to the submitters.

Submitting an LOI does not represent a requirement or commitment on behalf of the submitting institution to submit a full proposal. Failure to submit a LOI, however, will result in a full proposal being returned without review. No more than one LOI may be submitted by

a PI or co-PI in response to this solicitation, whether Catalytic or Full-Scale Implementation.

Submit a one-page LOI through FastLane by the deadline with the following information:

The name and departmental affiliation of the Principal Investigator (PI) and the co-PI(s).

The project title, which must begin with “AccelNet:”.

A Project Synopsis (up to 2500 text characters) that provides a summary of the theme the network of networks will address (see Section D above for more information on themes); the benefit of a network of networks approach to this theme (to the participants, U.S. and international research communities, and society); the anticipated U.S. and international networks and their contributions; and the connection to an NSF Big Idea or a community-identified scientific challenge. This section should also include examples of the kinds of collaborative activities planned to promote meaningful intellectual integration and synergy of efforts across the networks as well as examples of professional development activities planned for the students,

postdoctoral scholars, and early-career researchers. Please indicate whether a full proposal, if submitted, would be under the Catalytic or Full-Scale Implementation level.

Letter of Intent Preparation Instructions:

When submitting a Letter of Intent through FastLane in response to this Program Solicitation please note the conditions outlined below:

Submission by an Authorized Organizational Representative (AOR) is required when submitting Letters of Intent.

Submission of multiple Letters of Intent is not permitted

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via Grants.gov or via the NSF FastLane system.