Synergistic Activities Instructions and Template

INSTRUCTIONS & TIPS:

NSF requires this 1-page doc for all researchers that are included as Senior Personnel.

List up to five distinct examples that demonstrate the broader impact of your professional and scholarly activities, focusing on the creation, integration, and transfer of knowledge.[1]

Each item must be one activity and must not be followed by a listing of additional sub-activities. *Example:* The PI may summarize that they served on ten review panels, but they must not list the specific panels for that distinct example.

Examples of synergistic activities "include:

- innovations in teaching and training
- contributions to the science of learning
- development and/or refinement of research tools
- computation methodologies and algorithms for problem-solving
- development of databases to support research and education
- broadening the participation of groups underrepresented in STEM
- participation in international research collaborations
- participation in national and/or international standards development efforts
- service to the scientific and engineering community outside of the individual's immediate organization."[1]

Tips (with examples):

1) **Do not just name the journal where you served as editor or conference committee you chaired. Provide text that adds relevance and context. Examples:**

    a) **Food Systems Countdown to 2030 Initiative (FSCI):** Co-PI XXXX is the co-Chair for the FSCI, which involves 54 collaborators across 27 institutions to track and monitor food systems performance. The FSCI is a collaborative effort to monitor global food systems. It brings together indicators that span food systems and provides annual analysis to inform policy, business, and NGO priorities and actions. It supports the transformation of food systems, so they become equitable, sustainable, and resilient and positively contribute to achieving the 2030 SDGs and other global goals.

    b) **Fostering Interdisciplinary Dialogue**: Co-organized multiple conferences on food systems and resilience, including "Global food system vulnerabilities relevant to US institutions in a changing climate" (New York City, January 31, 2019) and "Systemic Risk in Global Agriculture" (Princeton University, October 24-25, 2014). These events facilitated knowledge exchange among diverse stakeholders, promoting interdisciplinary approaches to complex global challenges.

1. NSF's Proposal & Award Policies & Procedures Guide (PAPPG) effective May 20, 2024 : PAPPG II.D.2.h(iv) - https://new.nsf.gov/policies/pappg/24-1/ch-2-proposal-preparation#ch2D2hiv

c) **Contribution to the scientific community via peer review:** Served as a peer reviewer for journals in earth and planetary sciences (AGU Advances, Journal of Geophysical Research - Atmospheres, Physical Review X, Astrophysical Journal Letters, Nature Communications). Recognized as a 2023 Outstanding Reviewer for AGU Advances.
d) **Integration and transfer of knowledge:** Member of the Faculty of the Earth Institute at Columbia University which fosters cross disciplinary information exchange and collaboration, bringing climate science knowledge to multi-institution, cross disciplinary projects on, for example, climate adaptation, impacts of climate on food security, social unrest, human migration.

2) Include significance of your research-related activity rather than just naming the activity. Examples:

a) **Vision for Adapted Crops and Soils (VACS) project:** Led by the Special Envoy for Global Food Security in partnership with the African Union (AU) and the Food and Agriculture Organization of the UN (FAO), the VACS project seeks to build a resilient food system grounded in diverse, nutritious, and climate adapted crops grown in healthy, fertile soils. Co-PI XXXX contributes to VACS via the Agricultural Model Intercomparison and Improvement Project (AgMIP). More specifically Co-PI XXXX contributed vital information about the climate impacts on nutritional content and dietary quality.
b) **Development of databases to support research:** Created and served a database of large ensembles of long (1856 to present) simulations with multiple atmosphere models forced by observed sea surface temperatures. These simulations have been extensively used by researchers to diagnose causes of hydroclimate anomalies.

3) Include details on broadening participation aspects and educational impacts as much as possible in your student-focused activity descriptions. Examples:

a) **Food Systems and Climate Interactions course:** Co-PI XXXX is the co-director of this graduate level course which provides an overview of current and future anthropogenic climate change impacts on food systems and vice versa. Students explore the linkages between climate change impacts across food systems and how we grow, transport, process, and consume food impact climate and environmental change. They also look at various mitigation and adaptation measures across food systems. The course utilizes deep-dive case studies, course discussions, a podcasting assignment and visits to local farms to provide local and personal context for course materials.
b) **Curriculum Development for Emerging Challenges:** Created the innovative course "Water Governance" at Columbia University's School of Professional Studies and is currently developing "Food Systems, Global Trade & Climate Shocks" for the Climate School (Spring 2025). These efforts showcase the integration of research into education, preparing students to address complex, interdisciplinary challenges in sustainability and climate resilience.
c) **Broadening the participation of groups underrepresented in STEM:** In 07/2022, Field instructor outreach to Makerere University, Kampala, Uganda, to train indigenous

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geoscience undergraduate students on practical seismic interpretation and applications to resource exploration.

d) **Community driven design software infrastructure:** I have led the design of a suite of massive scale codesign tools to support the disaster insurance, anticipatory action and migration project needs working with the UN, World Bank, Insurance Companies, Governments and NGOs. These tools allow large numbers of town halls, games and phone interactions to directly drive the design of disaster preparedness and response models with local leadership and experts having design tools that incorporate government, satellite, humanitarian, and crowdsourced data to design solutions that can then be reviewed by the end beneficiaries themselves. These tools have supported work in dozens of countries, with thousands of town halls and thousands of game interactions for the design of products that directly serve millions of people.

e) **2023 GIA Training School** – I helped fund, organize, and run the 2023 GIA training school in Gävle, Sweden. The training school brought together 40 participants and 17 instructors from around the globe for 4 days of lectures and practical exercise as well as a 1-day field trip. Lectures permitted virtual attendance, which topped out at over 200 virtual participants, and were recorded and archived on the training school website. Topic spanned a wide range of disciplines from the collection paleo to modern observations of GIA, to geophysically probing the solid Earth, as well as GIA and ice sheet modeling. As part of the training school, I also gave lectures on 3D Earth structure and a 2-part exercise on using the adjoint method to calculate and explore viscosity sensitivity kernels for observations related to sea level, solid Earth deformation, and changes in gravity. Through this exercise participants gain experience with high performance computing, 3D visualization, and decoding the physical processes (e.g., water expulsion, continental levering, etc.) that are manifested within the kernels.

4) Include publication impact details when describing authorship. Examples:

a) Co-authored with XXXX an online textbook XXXX. The text was originally developed for instructing junior graduate students during my doctoral research and was used as the basis for a weekly lecture series in July 2015 in the Department of XXXX at the XXXX. The text continues to be actively developed and is available at my website.

b) Contributing author to the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6) on the topic of 'Ocean, Cryosphere, and Sea Level Change.'

c) Authored whitepaper for the Department of Energy's Artificial Intelligence for Earth System Prediction (AI4ESP), served as a breakout session chair, and was an invited participant at an AI4ESP meeting that followed the white paper call.

5) Consider including a topical subheading for each synergistic activity. Examples:

a) **Innovation in Teaching and International Knowledge Transfer**: Developed and taught a short course on "Climate Risk Management for Nutrition" for master's students in Human Nutrition at Cheikh Anta Diop University of Dakar (July 30, 2021). This initiative

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demonstrates a commitment to international education and the integration of climate science with nutritional studies, broadening the impact of research beyond traditional boundaries.

b) **Leadership in Advancing Food Systems Research**: Delivered a keynote presentation "Strategically Transforming Food Systems for Robustness and Resilience" at the 5th Global Food Security Conference in Leuven, Belgium (April 9-12, 2024). This contribution showcases the transfer of cutting-edge research knowledge to an international audience, influencing global discussions on sustainable and resilient food systems.

c) **Contributions to the Scientific Community**: Served as a regular session convener at the American Geophysical Union Fall Meetings on land use, food security, and migration topics (2014-2016, 2019-2024). This ongoing commitment demonstrates leadership in shaping scientific discourse and fostering collaboration across related fields.

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TEMPLATE:

Name: [Last name, First name, Middle name, including any applicable suffix.]
Position Title:
Primary Organization and Location:

Synergistic Activities:

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