

The Stanford Synchrotron Radiation Lightsource (SSRL) proposes to partner with the NSF Organization for Synchrotron Hosted Analytical Facilities for the Earth Sciences to provide a resource for the Earth and Environmental Science (EES) community, with the goal of enhancing support and increasing scientific access and output for EES synchrotron users. SSRL is a substantial resource for EES with a significant fraction of beam time requests for XAS and imaging from NSF-funded EES users at SSRL). SSRL's four imaging beam lines and six X-ray absorption spectroscopy beam lines currently serve a broad community of EES scientists, whose research covers a wide range of topics that are critical to understanding past and current climate, contaminant transport and bioavailability, and biogeochemical processes, among others. These beam lines cover a wide range of energies from the tender to the hard x-ray regime, as well as imaging from the submicron scale to macroscales, with scan areas of up to 1000mm x 300mm.

One of the key challenges facing the ability of the EES community to utilize synchrotrons effectively is access to expertise in experimental design and data processing and interpretation. Typically, user support at beam lines has included optimizing the beam line for each user experiment, training users in how to operate the beam line and perform data collection, and provide general support during the experimental time. This level of support is insufficient for new users and is often inadequate for long-time users as well. We propose a shift in the overall approach of support provided in the form of additional beam line personnel who have deep knowledge of both synchrotron methods and Earth and Environmental Science. These staff will help onboard new users from the EES community as well as aid existing EES users in pursuit of their research goals. Specifically, the proposal requests to add two Staff Scientists and one Beam Line Scientist to the EES focused, high demand beam line operations of XAS and XAS Imaging.

Under the proposed staff increase, support will include forming a "pipeline" of synchrotron support for the EES community. This will include the crafting and submission of beamtime proposals, experimental design and data collection assistance, data processing and analysis, and publication of results. We believe that this degree of assistance, and effective "embedding" of personnel within user groups, will greatly facilitate knowledge transfer from staff to users, enable NSF-funded users to develop highly rated beamtime proposals, and streamline the experimental process. This will greatly benefit the EES community by enabling novice users to access synchrotron methods, increasing the efficiency of all users (new and experienced), reducing bottlenecks throughout the experimental process, and increasing overall throughput and scientific output.

This focus on user science is synergistic with the science-based focus of the user proposal system at SSRL. Proposals submitted through the General User Proposal mechanism can address broad experimental goals, including access to multiple beam lines, energy regimes, and techniques. As a future partner in the NSF-Organization, we will focus primarily on supporting the XAS and XAS Imaging beam lines, which are the two science areas that are the most requested by the EES community at SSRL. In a similar manner, NSF-funded staff will be cross-trained and able to provide support for a wide variety of experiments.

Both XAS and XAS imaging have become critical to EES research, and demand for these beam lines is growing in the EES community. It will be essential to provide support that enables efficient beam line use, which ultimately results in more high quality, high impact scientific results.