# Wavefield Demonstration Experiment Call for Concepts

Dear IRIS Community:

IRIS is excited to announce a Full Wavefield Demonstration Experiment that will take place in 2016. The goal of this experiment is to allow the seismological community to gain experience with new acquisition techniques for obtaining full wavefield observations using a range of instrumentation at multiple spatial and temporal scales. The goal of these new techniques is to increase resolution and reduce aliasing while optimizing instrument usage (i.e. using the right instruments and geometry for the appropriate part of the spectrum). The experiment will utilize next generation 3-component nodal type instruments and our existing pool of broad, intermediate and short period instruments to demonstrate new capabilities and modes of operation, and to collect an open wavefield dataset for the community to explore and utilize in new ways. Full wavefield observations were discussed in a series of online workshops in the past 18 months, with more complete information, including recordings of the workshops, presented at:

www.iris.edu/wavefields

To identify a target(s) and design for this demonstration experiment IRIS is soliciting concepts from the community for an experiment design utilizing new nodal-type instruments and existing PASSCAL instruments for a short-term deployment during the Spring or early Summer of 2016. There is no expectation that funds will be awarded to any institution as a result of this announcement.

Individuals and groups should feel free to put forward complete experiment concepts, scientific / geographic targets, or more general suggestions and ideas that might be incorporated into an experiment. The final community project could be a hybridization of several concepts into a single experiment design.

IRIS is also seeking broad community participation during the experiment itself and has reserved some funds for this purpose.

## Call for Concepts

We are asking the community to suggest concepts for the target and design of the Full Wavefield Demonstration Experiment, that meets the goals, constraints, instrumentation capabilities, and schedule discussed below. This will be a community experiment designed and conducted in a collaborative structure, with open data. Sharing of ideas, broad participation, and sharing of results is encouraged and expected.

## Demonstration Experiment Goals

The demonstration experiment should generate a unique, scientifically interesting dataset that is recorded using a “wavefield” approach. The project will also serve to evaluate new capabilities for the SAGE portable facility - small, light, highly integrated 3-component seismic systems that

record in the mid-period to high frequency band that can readily be deployed in large numbers. The experiment should engage the community and the IRIS staff, and begin developing a "Concept of Operations" of how new capabilities can both address key scientific challenges and can be best incorporated into current and future SAGE facilities.

Concepts that include the observation of local, regional and teleseismic sources are encouraged. We are looking for concepts that may utilize the existing and new equipment in innovative ways to gather higher resolution images of full wavefield phenomena.

Location

The experiment must be in a location in the lower 48 states with access and permitting constraints consistent with the project timeline. Site access must allow participation by up to roughly 40 students and investigators who may participate in the installation.

Staffing

IRIS personnel will support the experiment and coordinate community involvement. Depending on the specific experiment plan, support could include planning, permitting, field engineering, and data formatting and upload to the DMC. If the experiment is structured as a piggyback or collaboration with an existing experiment then IRIS staff will also coordinate with the PIs of the host experiment.

Sources

There is no funding available for explosive active sources, but smaller portable sources can be made available, as necessary (Propelled Energy Generator (PEG), hammers, etc).

Data

IRIS staff will generate the metadata and upload the data and metadata to the IRIS DMC in PH5 format. Data will be immediately made freely and openly available through the DMC.

Collaborations and “Piggybacks”

Proposed concepts could be for a stand-alone experiment, or for a piggyback experiment on an existing, already funded experiment. Special consideration will be given to concepts that can leverage existing experiments or provide additional instrumentation beyond those in the PASSCAL instrument pool to expand the experimental design and more fully address techniques for observing the wavefield. However, this is not a requirement. Instruments can be shared with the demonstration experiment whether or not a concept is being proposed. In any case, data from the wavefield experiment will be made immediately available to any interested investigator, and openness of the rest of the piggyback experiment’s data, at least for the window of the wavefield augmentation, is preferred. Willingness to share all data from this time window openly will be considered in the evaluation of piggyback proposals.

Instrumentation

A key to the demonstration is the use of multiple instrumentation types with an array that incorporates broadband, intermediate period, short period and high frequency sensors arranged

appropriately to observe wavefields of interest sampled at the appropriate spatial-temporal distributions. The full range of current PASSCAL/SAGE instrumentation is available plus we are willing to make use of leased, borrowed, or procured next generation nodal type instruments for this experiment (5-10 Hz 1-C and 3-C nodes). Instrumentation that could be mobilized for this experiment includes:

- A limited number (e.g., <20) of broadband stations
- A limited number (e.g., <40) of intermediate to short period 3-component stations (as available)
- 150 - 400 3 component "nodal" style seismographs (e.g., 3 component geophones with 5 Hz low frequency corner - estimating 30 day single deployment)
- Texan single-channel recorders

Experiment Schedule

We are targeting spring to early summer of 2016 for the fieldwork. Ideally the fieldwork would be completed by May, but can run through August 2016 if circumstances do not allow early completion.

Data Management

IRIS staff will coordinate all aspects of data management to archive the experiment and make the data openly available via the IRIS DMC request tools and/or hard media.

Funding Constraints

IRIS has funding for this project sufficient to mobilize several hundred instruments to the field for a period of one to three months. We have limited funding for permitting, so concepts that include areas of study where site access is simplified are preferred. No awards will be made to institutions to participate in the experiment and no funding will be available through IRIS for data analysis. However, we do have funding to allow investigators and students from the community to participate in the field work. Information on how to apply to participate in the experiment will be publicized via IRIS Bulkmail and on the IRIS website in late January or early February when the experiment planning and schedule have been finalized.

Format for Concept Input and Due Date

Complete concepts should be presented in **four** pages or less, and should be submitted by **January 15, 2016**. "Proposers" should address the points identified in the evaluation criteria. In the spirit of an open, collaborative experiment, individuals or groups should feel free to bring forward any ideas or suggestions for improving the demonstration experiment, regardless of whether they have a complete, end-to-end experiment concept to put forward.

Concept submissions will not be considered as sensitive information as in a typical proposal, but IRIS will not openly publicize the submissions. As this is not a formal proposal process or procurement - there may be some interaction between the selection committee and concept providers to clarify concepts or encourage joint ideas from groups with similar concepts prior to a decision.

Evaluation Criteria

The concept to be implemented by IRIS for the Wavefield Experiment must be of a scope and scale that can be accomplished within the budget constraints and time window outlined here, must show a potential for **obtaining important scientific results with wavefield techniques,** as well as a deployment that maximizes the hands-on participation of a large number of community members.

The evaluation of these concepts will be based on criteria that emphasize the goals of the demonstration experiment, which include:

- Optimize the potential science return from this work
- Demonstrate a multi-modal (mixed-instrument) deployment concept
- Potential to collect data that will support multiple wavefield analysis techniques
- Openness to direct participation / engagement of the broader community
- Provide relevant experience in the Wavefield concept of operations
- Immediate free and open access to data (for piggyback proposals associated with other projects – greater open access to data is preferred)
- Logistics must fit within cost and schedule constraints

Concept Selection

An ad-hoc panel of researchers from the community, approved by the IRIS Board of Directors, will serve as a selection panel. Members of the panel will not be allowed to submit a concept for this experiment.

Communications

IRIS encourages collaborations and discussions of concepts and ideas, and will provide venues for idea exchange.

This will be presented at the IRIS membership meeting at the Fall AGU. This will take place on Monday, December 14th at the Marker Hotel - 501 Geary Street starting at 6pm

In addition, we will host a Special Interest Group (SIG) meeting on Wednesday, December 16th at AGU. This will take place from 4-6PM at the hotel Zelos (formerly the Palomar) in the MOMA room on the 9th floor.

Concept submissions as well as comments or questions can be directed to:

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