



August 12, 2005

Kaye Shedlock, Jim Whitcomb, and Herm Zimmerman  
Earth Sciences Division  
National Science Foundation  
4201 Wilson Boulevard  
Arlington, VA 22230

Dear Kaye, Jim and Zimmie,

Along with the co-signers of this letter (see attached), I disagree with the recent NSF decision to declare the Aleutian magmatic part of the Plate Boundary Observatory (PBO) to be completed far short of any deployment target ever discussed by the broad earth science community. We regret that miscommunication and a series of unfortunate events now threaten to dramatically curtail the potential of PBO to achieve important scientific goals laid out in the PBO White Paper and the EarthScope proposals. We hope that a compromise solution can be found that addresses NSF's concerns while maintaining as much as possible of the scientific capability of EarthScope/PBO. Further, we feel that for EarthScope to be successful, there needs to be a restoration of positive two-way communication between NSF and the EarthScope scientific community, and also the spirit of cooperation that marked the development period of EarthScope.

The loss of the Aleutian volcano networks will significantly reduce the capability of EarthScope to address magmatic processes, as already pointed out in detail in other letters. If this decision stands, PBO will neglect Okmok, which has experienced about 60 cm of time-variable uplift in the center of its caldera since 2000, Pavlof, which erupts every few years through what may be an "open pipe" from a deep source, and the volcanoes of Unimak Island, which display a significant variety of morphologies yet similar chemistry, not to mention significant deformation and seismicity. Instrumentation of these volcanoes by PBO is necessary to address compelling scientific questions, including multidisciplinary investigations of magma dynamics that blend geophysics and petrology that have been highlighted in EarthScope science plans since its beginning. If PBO stops deployments at Aleutian volcanoes with only 5 sites on Augustine and 8 sites on Akutan, then not only will key scientific opportunities be lost, but the highest scientific priorities in the Aleutians would have been ignored. The two volcanoes instrumented first were chosen for convenience of permitting, not for scientific priority.

The loss of the majority of Aleutian volcano sites would reduce the effectiveness of EarthScope to address important scientific goals not only in the realm of magmatic

processes, but also in the dynamics of subduction zones. The Aleutian volcano sites would have provided a critical augmentation to the network to study subduction zone dynamics in periods where there was not significant volcanic unrest. They also would have provided the means to study relationships between tectonic activity and volcanism, another EarthScope science target. Aside from the volcano sites, the PBO network in the Aleutian arc is sparse, with roughly 200 km site spacing for most of the arc beyond Kodiak Island. It is only in the Shumagin islands (3 sites) and where the volcano networks were to be located that PBO has the site density to estimate robustly the extent of the seismogenic zone or to detect unambiguously whether slow slip events or other transients occur there. Uniquely within the area covered by PBO, the Pavlof volcano network is located within a region (the Shumagin segment) where the strain rates observed in the past (by episodic measurements unable to distinguish between steady and irregular creep) demonstrate that much of the subduction interface is dominated by aseismic creep. The Unimak island network may straddle the boundary of this largely aseismic segment with the 1957 great earthquake rupture zone. The ability to answer the question of whether these predominantly creeping segments slip steadily or episodically through slow slip would be largely removed from PBO. The specific topic of slow slip was not highlighted in the PBO White Paper or even at Palm Springs, because the slow slip events that we now know are widespread had not yet been recognized at that time, but it is at the heart of the principal scientific theme of PBO. This issue also illustrates how networks designed for one science target may become critical for the resolution of unanticipated questions as well.

We are also puzzled and concerned that NSF has declared this part of the PBO deployment completed when it does not resemble any plan ever discussed. Because NSF's recent statements indicate that you do not consider the deployment plan developed after the Palm Springs workshop to have been approved, we can only presume that the NSF-approved deployment plan is based on the PBO White Paper. The White Paper made specific recommendations about the number of sites to be deployed at the two Aleutian volcanic centers, as well as the others. Page 36 of the White Paper states this very clearly: "With the exception of Yellowstone, *each magmatic center* will be instrumented with 15-20 CGPS receivers and 4 strainmeters [*italics mine*]." The 13 sites installed on Augustine and Akutan (plus one site 80 km from Akutan in Dutch Harbor) is far below the 15-20 sites at each of two centers required by the White Paper. Either the present deployment is incomplete, or the NSF-approved plan is somehow based on something that the community has never seen.

We request that NSF take one of three actions: (1) reverse the original decision completely, if that is still possible; (2) install the additional sites (to a total of 15-20 each) at Augustine and Akutan that were called for in the PBO White Paper and approved by NSF when the White Paper was approved; or (3) be receptive to a change process in which the additional Aleutian volcano sites called for in the White Paper (the present deployment is 16-26 sites short) are installed on different volcanoes in the Aleutians to restore as much of the planned scientific capability as possible. The second option has no budgetary impact relative to the approved White Paper plan, as it is exactly what was envisioned before Palm Springs. The third option represents only a small deviation from

that, as the same number of sites would be installed as were originally considered in the White Paper. Of these options, (1) and (3) would have the greatest scientific payoff.

We believe that for EarthScope to be successful, there needs to be a cooperative relationship between NSF, the community-based organizations that are its prime contractors, and the community as a whole, where everyone is pulling in the same direction to achieve the EarthScope science goals. We all need to move toward that goal. Too much is at stake to let EarthScope fail in any substantive way. We do not believe that an adversarial relationship between NSF and the community whose research it supports will move EarthScope on the road to success.

The attached list gives the co-signers to this letter as of this date. I expect that more people will express their willingness to co-sign this letter over the days to come, but due to travel commitments this letter had to be written and a response organized on short notice. I will update you in the future if significantly more co-signers sign on.

Sincerely,

A handwritten signature in black ink that reads "Jeff Freymueller". The signature is fluid and cursive, with a long horizontal line extending to the right.

Jeff Freymueller  
Professor of Geophysics  
Geophysical Institute  
University of Alaska Fairbanks  
Fairbanks, AK 99775

List of co-signers to date attached.