

Abstract

We propose to measure the abundance of three cosmogenic nuclides (^{10}Be , ^{26}Al and ^{14}C) in 25 samples collected from the upper reaches of the Rio Puerco basin, NM. Samples will be collected from bedrock outcrops, arroyo walls and modern channels. As part of project, Mr. Erik Clapp will travel to Lawrence Livermore National Laboratory for several weeks and work collaboratively with Dr. Marc Caffee to refine techniques required to measure ^{14}C in rocks.

Statement of Work

In order to constrain better the rate at which sediment is generated and transported in a headwater sub basin of the Rio Puerco, we propose to gather twenty five samples for analysis of in situ produced ^{10}Be , ^{26}Al and if possible, ^{14}C . We will collect these samples from a variety of locations within the sub-basin. On hilltops, we will collect samples of the soil overlying bedrock as well as the exposed bedrock. On hillslopes, we will collect samples of the colluvium; at the base of the hillslopes, we will collect a series of samples from ^{14}C -dated deposits exposed in arroyo walls. We plan to collect such samples not only from the main channel but from the smaller channel which bisects the colluvial fan at the base of the hillslope.

These samples will be processed in our extraction laboratory at the University of Vermont. In the lab, we will make pure quartz mineral separates which we will dissolve and use to prepare targets for Al and Be isotopic analysis. We will travel to Livermore National Laboratory to make the isotopic analyses. As part of this study, Erik Clapp, a UVM doctoral student will spend several weeks at Livermore Laboratory refining sample preparation techniques for measurement of in situ- produced ^{14}C -- an isotope of great utility to this study if we develop a protocol for making reproducible and reliable measurements.

The isotopic data we gather will be used to interpret the source of the material now being

the sampled sub basin. These data should be of significant utility as you attempt to understand better sediment generation and transport in the entire Rio Puerco system.

The proposal includes funds for travel to the field for Bierman and Clapp. Funds are also included for all laboratory supplies and for travel to Livermore Laboratory to make isotopic analyses. Sample preparation will be done by Clapp under Bierman's supervision as indicated by the salary distribution. We understand that the funding of isotopic analyses at Lawrence Livermore National Laboratory will be provided by the USGS.

At the conclusion of the period of funding, we will deliver to the USGS a final report containing the isotopic data and our interpretation of those data in terms of erosion rates.

Current and Pending Support

Source	Title	Amount	Effort (summer)	Status
US ARO	Erosion measurement	\$35,000	1 mos	funded
NSF	Baffin age dating	\$50,000	1 mos	funded
U of Washington	Isotopic analysis	\$32,000	0.25 mos	funded
USGS	Isotopes and VT groundwater	\$22,000	0 mos	pending
NSF	Amazon erosion	\$50,000	0.5 mos	pending
NSF	River dynamics	\$120,000	0.5 mos	pending
USGS	NEHRP -- Owens Valley	\$35,000	0.5 mos	pending
USGS	NM erosion dynamics (this proposal)	\$20,000	0.75 mos.	pending