

APPENDIX A-1 PROPOSALS SUBMITTED 1987/88

<u>Principal Investigator</u>	<u>Agency</u>	<u>Award Period</u>	<u>Amount Requested</u>	<u>Status* / \$ Funded</u>
Archuleta, R.	NRC	9/1/88 8/31/89	\$465,103	Pending

Seismic Study of Soil Dynamics at Anza, California

The proposed research will focus on the effects that the near surface soil properties have on seismic waves. Downhole accelerometers have been installed previously at various depths from 0m to 300m. The data from the various accelerometers will be analyzed to determine how near surface material affects the amplitude of the incoming seismic waves, especially during strong shaking. The results will aid in earthquake engineering when building critical structures on relatively soft soil overlying competent bedrock.

Archuleta, R.	USGS	1/1/89	\$242,272	Denied
Nicholson, C.		12/31/90		

Fault Interaction, Segmentation, and Geometry Along the San Andreas Fault System, Southern California

The proposed research will analyze short-period velocity and acceleration data of the Superstition Hills earthquake, including its foreshocks and aftershocks, to resolve the distribution in space and time of the rupture behavior of the sequences. These results will then be compared with other information regarding foreshock and aftershock locations, focal mechanisms, surface ruptures, creep and geodetic data, in order to provide an understanding of the kinematic relationship of fault interaction, as well as to identify critical attributes of fault zone features which control fault segmentation and rupture history. Results will be combined with continuing efforts to understand the rupture behavior, fault segmentation and geometry of the southern San Andreas fault.

* Status of proposal as of 6/30/88.

Archuleta, R. Dept. of 1/1/89 \$54,449 Pending
Interior 12/31/89

Strong Motion in San Bernardino and Riverside Counties from a Moderate Earthquake on the San Jacinto Fault

The northern segment of the San Jacinto fault has one of the highest probabilities of earthquake rupture of any segment of the San Andreas fault system. The proposed research will compute the expected strong ground motion at various locations. The faulting model will be based on the local geology and seismicity, i.e., the inhomogeneous stress distribution on the fault will be inferred from regions where other faults intersect the San Jacinto and from seismicity mapped onto the fault plane.

Archuleta, R. US Air 2/1/89 \$252,011 Denied
Force 1/31/91

High Fidelity Recordings of Explosions and Earthquakes Using Short-Baseline Downhole and Surface Arrays

In order to discriminate between nuclear explosions and earthquakes, it is necessary to have high quality recordings of each. The proposed research will examine this discrimination using surface instruments and downhole instruments with an emphasis on how the near surface material vitiates the more pore (presumably) signal recorded are bedrock. Seismic waves from both explosions and earthquakes are analyzed using wave propagation, array analysis and spectral techniques developed at UCSB.

Archuleta, R. DURIP 2/1/89 \$63,049 Pending
1/31/91

Instrumentation for Short-Baseline Surface Array

This proposal requests funding for purchase and installation of five, dual gain, three-component surface accelerometers to be used in conjunction with downhole accelerometers being installed at Garner Valley, CA. The surface array data will be compared with the data collected downhole and will be used in conjunction with the downhole data for discriminating earthquakes from explosions.

Blenkinsop, T.	NSF	1/1/89	\$50,186	Denied
Luyendyk, B.		12/31/89		

Fracture Analysis of Crustal Rotation in Southern California

The aim of this proposed research is to determine the direction of strain in deformed crust of southern California using a method based on analyses of movement on small faults. The strain directions will be compared to the magnetic measurements to establish the crustal rotations independently and in more detail, leading to more refined models for the evolution of the crust in California.

Crowell, J.	Am Chem	9/1/88	\$59,999	Pending
Morris, R.	Society	8/31/91		

Late Cenozoic Evolution of Yuma Basin, Southwesternmost Arizona and Adjoining Areas

The proposed research will study the geologic history of the Yuma Basin, located in southwesternmost Arizona and extending into adjoining California, Sonora, and Baja California, by analyzing seismic reflection profiles, data from wells (water and those drilled for oil or gas), other geophysical data, and by surface mapping and stratigraphic studies. The researchers will be describing the subsidence history of a complex basin that has undergone several episodes of deepening under different tectonic controls.

Everett, L.	EPA	1/1/88	\$250,000	Funded
		12/31/90		\$250,000

Vadose Zone Equipment Specifications and Monitoring Strategies Development

The proposed research will continue work in developing monitoring methodologies and strategies for vadose zone monitoring. Special focus will be on development of standard testing procedures for vadose zone monitoring equipment and development of a performance standard for existing vadose zone monitoring equipment. Research will include studies of the zone of influence of pore-liquid sampling equipment, the interaction of hydrocarbons with existing types of pore-liquid sampling devices,

parameters for varying classes of hydrocarbons for pore-liquid sampling equipment, flow models for hydrocarbon migration in the vadose zone, and strategies for monitoring landfilled and surface impoundments using vadose zone monitoring equipment.

Everett, L.	EPA	9/15/87	\$250,000	Funded
		9/14/88		\$250,000

Vadose Zone Equipment Specifications and Monitoring Strategies Development

See above for description of proposed research.

Keller, E.	USGS	9/15/87	\$93,770	Denied
Chadwick, Jr.		9/14/88		

Recent History of Faulting Along the Hilina Fault Zone and Implications for the Earthquake Hazard Along the South Coast of the Island of Hawaii

The overall research objectives of this proposal is to better understand the earthquake hazard and tectonic framework that produces fault slip and large seaward displacements along the south coast of the island of Hawaii. The researchers plan to (1) measure fault displacement across lava flows of different ages to determine the history of past earthquakes; (2) evaluate this paleoseismic record to determine long term slip rates on the faults and a recurrence interval for large damaging earthquakes; and (3) integrate information from objects (1) and (2) to test kinematic models for the displacement of the south coast of the island of Hawaii and the growth of Hawaiian shield volcanoes.

Kimbrough, D.	NSF	4/1/88	\$130,214	Denied
Mattinson, J.		3/30/90		

Isotopic Investigation of a Cretaceous New Zealand Continental Arc

The proposal seeks support to study a newly recognized Cretaceous metamorphic core complex terrain in New Zealand that developed in response to the late Cretaceous breakup and rifting of the southern

Gondwana margin. The main focus will be to produce a detailed cooling-uplift curve for lower-plate rocks using U-Pb monazite, sphene, apatite, Ar-Ar hornblende and biotite, and Rb-Sr muscovite and biotite dates.

Kimbrough, D	NSF	1/1/88	\$47,108	Funded
Mattinson, J.		12/31/88		\$35,000

Correlation of Radiometric and Biostratigraphic Timescales for the Triassic and Jurassic Murihiku Supergroup of New Zealand

The proposal seeks support for high-precision zircon U-Pb age dating of vitric tuff beds that occur within well-preserved fossiliferous strata of the Murihiku Supergroup of New Zealand. The research will undertake a detailed study of the Middle and Upper Triassic sections of the Murihiku Supergroup, and extending the range of the sample to include the Lower Triassic and Jurassic portion of the sequence. Information on sedimentation rates and cycling rates of material between plutonism-uplift-erosion-transport-deposition will provide for greater understanding of the dynamics of basin evolution..

Luyendyk, B.	NSF	7/1/88	\$253,156	Denied
		6/30/91		

Paleomagnetism and Tectonics of Southern California - Accomplishments Based Renewal of EAR-8518142

Large crustal blocks in southern California are known to have rotated clockwise up to ninety degrees in the last 16 million years. This project will focus on rotations in the Mojave Desert where at least two episodes of rotation have been proposed. Also proposed are scale model laboratory experiments of the rotation process and computer reconstructions of the geography of southern California during the rotation episodes.

Luyendyk, B.	Pac Rim	7/1/88	\$99,607	Denied
Kimbrough, D.		6/30/89		
Tilton, G.				
Hopson, G.				

Comparative and Collaborative Geologic Studies in the Pacific Rim

The work proposed involves geologic studies in China, Southeast Asia and New Zealand. The thrust of the work is tectonic history of parts of these regions and the main techniques are paleomagnetism and isotope geology. Foreign scientists and the PI's will collaborate on field work.

Luyendyk, B.	NSF	11/1/88	\$269,843	Pending
Kimbrough, D.		10/31/90		

Geological and Geophysical Studies in the Ford Ranges of Marie Byrd Land, West Antarctica

Geologic and geographical studies are planned for the Fosdick and Phillips Mountains within the Ford Ranges. The objective of the proposed research is to understand tectonic history of the region and to ascertain whether it was originally part of the Gondwana supercontinent or exotic to it. Techniques to be employed include remote sensing, geologic mapping, geochemistry and paleomagnetism. Field work is planned for the austral summer of 1990 and 1991.

Luyendyk, B.	NSF	1/1/89	\$143,380	Denied
		12/31/90		

Paleomagnetism and Tectonics of Southern California - Renewal of EAR-8518142

Large crustal blocks in southern California are known to have rotated clockwise up to ninety degrees in the last 16 million years. This project will focus on rotations in the Mojave Desert where at least two episodes of rotation have been proposed. Also proposed are computer reconstructions of the geography of southern California during the rotation episodes.

Luyendyk, B	NSF	1/1/88	\$81,067	Denied
.		6/30/89		

Paleomagnetic Tests of Tectonic Models for New Zealand

New Zealand is theorized to be composed of a collage of tectonic plate fragments which amalgamated before Cretaceous time about 100 million years ago. Paleomagnetic techniques will be used to check the latitude of origin of selected plate fragments. Already this work has revealed that a segment of the South Island originated in low temperate latitudes while at the same time New Zealand proper was at high southern latitudes. Further work is proposed to refine this result and test the origins of other plate fragments.

Malin, P.	IRIS	4/1/88	\$54,993	Funded
		11/30/88		\$41,912

A Comparative Field Test of PASSCAL Prototype Instruments at Parkfield, California

The proposed research will conduct a field test of the PASSCAL prototype instruments against several types of seismic data acquisition instruments currently on the San Andreas fault at Parkfield, California. The test will be centered on a complete field evaluation of the PASSCAL prototypes, providing a robust test of their operation under typical conditions. The field deployment program will consist of a two week site and experiment document preparation period, following by a period of deploying moving and fixed stations. Following the field deployment, the completed data catalogue, along with the preliminary analysis results, will be collated and passed through a uniform data reduction stream, and the problematic aspects of the instrumentation and data found during the preliminary study will be analyzed.

Malin, P.	US Air Force	10/1/88	\$172,246	Pending
		9/30/90		

Vertical and Horizontal Seismic Observations for Wave Propagation Problems in Nuclear Monitoring

The proposed research will study how near receiver structure, scattering, and intrinsic attenuation distort the high frequency spectra and spectral

Mattinson, J. NSF 1/1/89 \$79,573 Denied
12/31/90

Tectonic and Thermal Evolution of the Shuswap Complex,. British Columbia: A Field, Petrologic, and Geochronologic Study of a Cordilleran Core Complex

The proposed research will apply a combined field, geochronologic, isotopic and petrologic approach to understanding the thermal petrologic and tectonic evolution of the Monashee Complex. U-Pb dating of various minerals from basement gneisses, and of metamorphic zircons, sphenes and monazites from amphibolites and schists will be used, along with petrologic data, to construct empirical Pressure-Temperature-time paths. These P-T-t paths will be compared and contrasted with those produced by numerical modeling.

Prothero, W. NSF 6/1/88 \$105,092 Denied
5/31/90

Teleseismic Converted Waves Studies at Long Valley Caldera

The proposed research will continue analysis of teleseismic body waves passing up through the probably magma chamber beneath the Long Valley Caldera. S-waves are produced by P-waves striking the liquid-solid boundary of the magma chamber. It is possible to map the shape of the magma chamber by recording and interpreting these waves.

Prothero, W. USGS 10/1/88 \$154,640 Denied
9/30/90

Geometry of Magma or Partial Melt Bodies in Coso Region with P to S Conversions from Teleseismic Body Waves

The proposed research will measure teleseismic body waves passing up through the possible magma chambers beneath the Coso region. S-waves are produced by P-waves striking the liquid-solid boundary of the magma chamber. The research will map the shape of the magma chamber by recording and interpreting these waves.

Prothero, W.	NSF	1/1/88	\$116,068	Pending
		12/31/89		

Teleseismic Converted Wave and Waveform Inversion Studies

The proposed research is a continuation of the analysis of previously obtained teleseismic measurements in the Mojave region. Teleseismic body waves will be recorded and inverted, using a new method for studying crustal compressional and shear velocity structure. Comparisons will be made with models determined by using reflection and refraction techniques.

Prothero, W.	NSF	3/15/88	\$75,670	Funded
		12/31/88		\$28,355

Lithospheric Structure of the Basin and Range: A PASSCAL Source Seismic Experiment

Funds are requested for a study of the Nevada Basin and Range using local earthquakes and teleseismic body waves. The research will be undertaken in cooperation with the University of Nevada, the University of Missouri, and Lawrence Livermore Labs. The study is being performed in an area previously studied by reflection and refraction techniques. The structure of the sub-moho lithosphere is of particular interest.

Reid, M.	NSF	7/1/88	\$140,600	Denied
		6/30/90		

Isotopic, Trace Element and Heat Production Profile of Proterozoic Continental Crust

The proposed research will study two suites of xenoliths which sample distinctly different depths of Proterozoic crust in southern New Mexico. These xenoliths will be explored for constraints on the nature and pervasiveness of silicate and other fluids and their effects on rheology, heat production, and seismic interpretations. The resulting data will be used to define a compositional profile of the Proterozoic crust, and to test models for its generation.

Sibson, R.	Stanford	1/1/88	\$40,000	Funded
		12/31/89		\$40,000

Deformation Fabrics and Microstructures

The proposed research will study the deformation of textures and microstructural features present in recovered core material. The research will be based primarily on petrographic textural analyses of recovered core material. These will be followed by more detailed analytical work involving XRD, microprobe, SEM, cathodoluminescence and fluid inclusion work when such are warranted.

Sibson, R.	NSF	1/1/89	\$182,682	Denied
Blenkinsop, T.		12/31/90		

Fault Geometry, Fluid Flow and Earthquake Rupture Mechanics

This project seeks to explore aspects of fluid flow and fault geometry related to the nucleation and arrest of earthquake ruptures at specific structural sites within major fault zones. This basic methodology involves structural field mapping of exhumed ancient fault zones and associated hydrothermal vein systems coupled with laboratory micro-structural studies. Fieldwork will center on the Yellowknife granite=greenstone terrain in the Northwest Territories of Canada. Compare and contrast studies with other shear zones of similar character within the southern Canadian shield and in the Mother Lode belt, California, are integral to the project.

Spera, F.	NSF	1/1/88	\$103,335	Denied
Tilton, G.		12/31/89		

Geological, Volcanological, Geochemical and Geochronological Evolution of the Tejada Magmatic System on Gran Canaria, Canary Islands, Spain

The proposal requests support for geological, volcanological, geochemical and geochronological studies of Miocene lava and pyroclastic flow rocks of the Guigui, Hogarzales, Mogan and Fataga formations on the island of Gran Canaria, Canary Islands. A synthesis of the data that will be gathered for this study will enable construction of an accurate physical and chemical picture of the TMS during its roughly 3 to 40 Ma history.

Spera, F.	NSF	5/1/88	\$104,591	Denied
Tilton, G.		4/30/90		
Busby-Spera, C.				

Geological, Volcanological, Geochemical and Geochronological Evolution of the Tejeda Magmatic System on Gran Canaria, Canary Islands, Spain

See above for description of proposed research.

Spera, F.	NSF	4/1/88	\$68,040	Denied
		3/31/90		

Quantitative Studies of Dynamical and Chemical-Physical Processes in Magma

Support is requested for the continuation of collaborative research on the dynamical evolution and physical properties of crustal magma bodies by means of state-of-the-art numerical techniques of supercomputers. The research will focus on the effects of viscous and adiabatic heatings and the influences of nonlinear thermodynamic properties on the thermal structure of plumes beneath plates. The objective is to obtain understanding of the effects of pressure and shear-rate on the viscosity and diffusion coefficients of magmatic substances.

Spera, F.	NSF	10/1/88	\$32,442	Pending
		11/30/89		

Quantitative Studies of Dynamical and Chemical Physical Processes in Magma

See above for description of proposed research.

Spera, F.	NASA	8/1/88	\$18,000	Denied
		7/31/89		

Chemical Heterogeneity in Magma Chambers

Spera, F.	DOE	10/1/88	\$112,294	Pending
Yuen, D.		9/30/90		

Experimental Investigations of Magma Rheology and Numerical Simulations of Caldera Collapse and Magma Withdrawal

The proposed research will attempt to measure the transport properties of multiphase magmatic mixtures at elevated temperatures and at varying shear rate and understand dynamical processes related to caldera subsidence and magma withdrawal. An experimental investigation of magmatic emulsions and magmatic suspensions will be used to test extant constitutive rheological models for relevance to geologic systems. Magmatic mixtures will be tested at a variety of temperatures, shear rates, crystallinities and voidages. The second part of the proposed research will concern simulation studies of several dynamical processes relevant to silicic magmatic systems.

Spera, F.	NSF	2/1/88	\$91,021	Denied
		1/31/90		

Experimental Rheometry of Silicate Melts and Suspensions at High Temperature and Variable Shear Rate

Funds are requested for experimental exploration of the rheological properties of simple and complex melts and magmatic suspensions as a function of shear rate, temperature and oxygen fugacity at atmospheric pressure. Research will include an experiment with Mount St. Helens dacite plus various amounts of vapor bubbles, and a study of Mount Etna's 1983 magma at high solids loading. The aim is to examine the transition from pseudoplastic to dilatant behavior as shear rate is increased at high volume fraction crystals.

PROPOSALS SUBMITTED:	36
AMOUNT REQUESTED	\$4,599,743