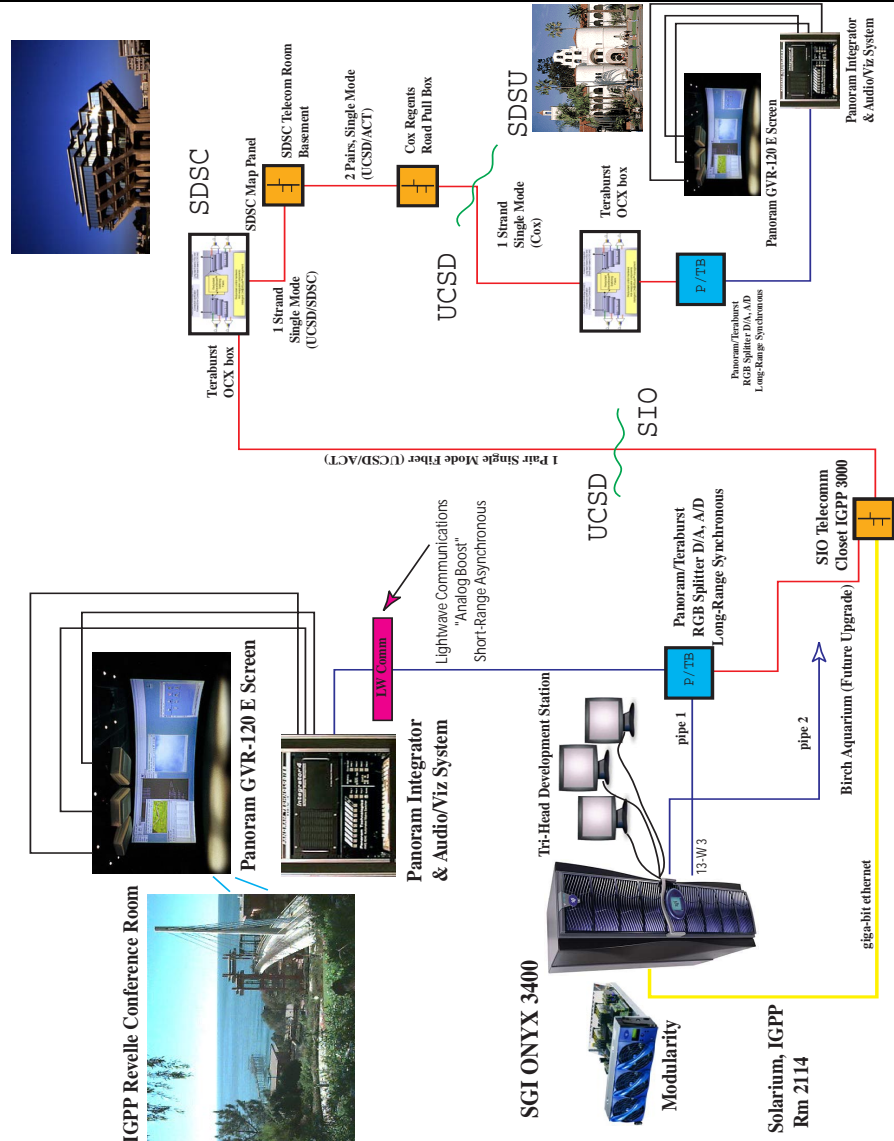



| Computing Equipment | |
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| SDSC | <p>The San Diego Supercomputer Center (SDSC) offers a number of multiprocessor computers that will be of considerable use for computations associated with this proposal. In addition to the supercomputers available at SDSC, we will be constructing a computer cluster at Scripps with funding provided by this proposed grant.</p> <p>Blue Horizon is a Teraflop IBM supercomputer consisting of 1,152 IBM RS/6000 processors (222 MHz) and is presently the most powerful computer available to the U.S. academic community and the 8th most powerful computer in the world ranked by the University of Tennessee and the University of Manheim through the Top 500 Supercomputing Sites. The machine currently computes at 1.7 teraflops with 576 GB of total system memory and 5.1 TB of disk space.</p> <p>In addition to the new Blue Horizon, SDSC also operates a CRAY T90 parallel vector supercomputer with 14 vector processors and a peak speed of 25 Gflops, a CRAY T3E scalable parallel system with 272 300 Mhz processors and a peak speed of 163 Gflops, a SUN HPC 10000 with 64 400 MHz processors and a peak speed of 51 Gflops, an IBM SP with 128 160 MHz processors and a peak speed of 51 Gflops, and a Tera MTA featuring 8 multithreaded processors and a peak speed of 6 Gflops. The TERA machine is presently being upgraded to 16 processors and 16 GB of memory. The TERA is the most novel machine at SDSC in that it features shared-memory with hardware multithreading. The benefits are high processor utilization, near linear scalability, and reduced programming because of the multithreading, shared memory and a very sophisticated compiler. The allocation of these resources is controlled through the National Partnership for Advanced Computing Infrastructure (NPACI), which is a partnership between a large collection of universities including UCSD, Caltech, the University of Texas, UC Berkeley, and the University of Virginia. While SDSC and NPACI are excellent resources for developing new code and running moderate-level computational jobs, the development of a parallel cluster computing facility, such as that proposed, is important for providing the resources needed for full scale computations. SDSC's new Director, Francine Berman, is a Professor of Computer Science and Engineering at UCSD and a pioneer in parallel distributed computing. Given her interests and background, she will foster the growth of cluster computing at UCSD and be quite helpful in nurturing parallel computing for the proposed STC.</p> |
| SOPAC & CSRC | <p>SOPAC/CSRC's computer facilities consist of four Sun Ultra workstations, one Sun Enterprise 3000 server, one HP Workstation, six Dell PowerEdge servers, four Dell Optiplex/Dimension computers used for development, 18 Intel-based dual-processor PC's used to analyze data, and three Intel-based PC's to download data. The primary systems are maintained in a high availability environment including fault tolerant sub-systems, RAID arrays, and battery backup. SOPAC – Scripps Orbit and Permanent Array Center. CSRC – California Spatial Reference Center.</p> |
| IGPP | <p>IGPP is presently installing a visualization system in the Revelle Conference Room with the support of Cal-(IT)². The Cal-(IT)² <i>Control Room</i> will provide advanced graphical views of data streams that will aid in the assessment of the</p> |

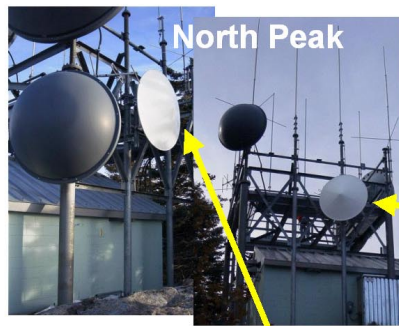
wireless network's performance. Furthermore, many of the data streams will be converted to information which can also be visualized. To strike a balance between graphics acceleration, CPU horsepower, and the ability to remotely export visualization via graphic pipes, we are presently acquiring a SGI Onyx 3400 server with group visualization on a Panoram GVR-120 E cylindrical wall display that is some 24 feet in width. This graphical supercomputer will be driven by at least 8 processors (R12000 CPUs) (likely 16 processors) with visual output through 2 graphic pipes. This system is based on the new SGI NUMA architecture, which increases memory bandwidth and reduces memory latency thereby enhancing graphical and computation output. The modular "brick" design of the new Onyx 3400 will enable easy upgrades to graphic, CPU, I/O and other sub-systems when the need arises. This system will be located on the Scripps campus, with the immersive environment sited at the IGPP Revelle Conference Room. A collaborative effort between Panoram Technologies, Cox Cable and TeraBurst will allow immersive images to be exported via an ultra-high speed network to other campuses or agencies, such as San Diego State University or CalTrans, for real-time interaction.

CAL-(IT)² Visualization Center

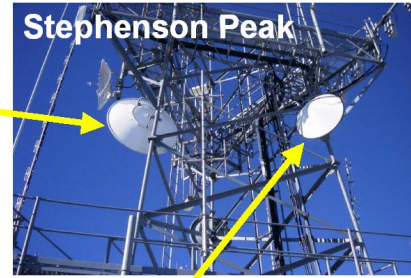


| Mass Store | |
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| CSRC | <p>SOPAC/CSRC's archiving facility consists of three tiers of storage. The first tier is designed for speed and consists of 2 TB of on-line disk space in RAID sets comprised of four Dell PowerVault 201/211 disk arrays controlled by Dell PERC RAID controllers and two nStor Andataco hardware RAID arrays. The second tier consists of 600 GB on a HP 600FX eight drive MO jukebox. The third tier consists of an 8 TB six drive DLT tape library that will be upgraded this coming year to 2 TB. The MO jukebox and the DLT (Digital Linear Tape) tape library are being used in cooperation with the IGPP Digital Library.</p> |
| IGPP | <p>The core of the IGPP Digital Library comprises a 20 TB DLT mass storage device from StorageTek, a SUN Enterprise 250 server, and GbE network connections throughout IGPP and to/from SDSC. The Library software consists of AMASS (copyrighted through the Advanced Digital Information Corporation – ADIC), and various library users superimpose a variety of database applications (for example, SOPAC/CSRC uses Oracle as a relational database). The Library is well suited for large datasets with large file sizes. The figure to the left shows the physical tape robot.</p>  |
| SDSC | <p>The current archival storage system at the San Diego Supercomputer Center (SDSC) is called the HPSS (High Performance Storage System). It is the world's largest HPSS system and it presently stores 150 TB in 13 million files, with about 6 TB of new data added monthly. The IBM SP at SDSC serves the mass store and includes 2 TB of disk storage, which is to be upgraded to 7 TB soon. The tape capacity is currently 180 TB in three StorageTek Powderhorn 9310 silos with tape robotics, allowing robotic access to nearly 18,000 tape cartridges. The eight 9480 drives support 20 GB cartridges, which will double the capacity to 360 TB raw.</p> <p>An ATM interface, added recently, allows OC-12 (622 Mbps) transfers to the high-performance wide-area networks including Scripps and IGPP. Transfer rates of about 5 TB/day can be sustained with a normal mix of files; this increases to 10 TB/day with primarily large files. Joint HPSS backups of critical data are being done between SDSC and Caltech. The data currently are exchanged both by tape and via the CalREN-2 network at OC-12 speed (622 Mbps). The HPSS mass store is connected to the LAN and WANs by two means. An IBM High Performance</p> |

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| | <p>Gateway Node (HPGN) connects HPSS directly to the Cisco 8540 ATM switch, the Cisco 6509 GbE switch, and to a HiPPI switch that connects computers such as the Cray T90, Cray T3E, and Tera MTA. HPSS is also attached to the Cisco 6509 GbE switch by means of four striped GbE ports. These four channels will be used in parallel to achieve approximately 150 MBps of bandwidth to the 5-teraflops computer.</p> <p>SDSC has deployed a 9 TB storage area network (SAN) based on Sun Microsystems T3 disk array technology and Brocade fibrechannel switches. SDSC's SAN incorporates arbitrated loop support for legacy fibrechannel devices as well as native fibrechannel fabric support. The SAN incorporates several zones for partitioning of services. Four native fibrechannel tape drives (IBM model 3590E) housed in an STK robotic tape silo are directly attached to the SAN as well as to nine Sun Enterprise systems and an IBM RS/6000 SP system. SDSC is in the process of deploying a hierarchical SAN infrastructure that allows seamless access of data from fibrechannel-attached disk and tape storage devices. For more information see http://www.sdsc.edu/</p> |
| CRD | <p>The Scripps Climate Research Division (CRD) maintains a Cray J90 supercomputer with 12 processors and 2.4 Gflops peak speed as well as an SGI Origin2000 with 16 processors and 9.6 Gflops peak speed. The machines are maintained by SDSC, but the computing resource supports climate modeling including that used for the proposed climate project in Yosemite. Several DEC ALPHA workstations equipped with 100's of GB of local storage are available for processing and local data storage.</p> |
| Experimental Facilities | |
| HPWREN | <p>In August 2000 the National Science Foundation (NSF) awarded a \$2.3 million, three-year research grant to UC San Diego to create, demonstrate, and evaluate a non-commercial, prototype, high-performance, wide-area, wireless network for research and education. The project involves a multi-institution collaboration led by Hans-Werner Braun of the NLANR group at SDSC and Frank Vernon of the Cecil H. and Ida M. Green Institute for Geophysics and Planetary Physics (IGPP) at SIO, and includes researchers from other institutions such as Paul Etzel, Director of Mount Laguna Observatory and Chair of the San Diego State University (SDSU) Astronomy Department, and Sedra Shapiro, Acting Director of the Field Stations at San Diego State University.</p> <p>HPWREN is creating a wireless backbone network in southern California that currently includes nodes on the UC San Diego campus and several mountaintops in San Diego County including Mt. Woodson, North Peak, Stephenson Peak, Mt. Laguna, and Mt. Palomar (Figure 1). To increase network robustness, and to provide additional coverage, new network links will be installed on Red Mountain and Toro Peak in Riverside County. Researchers in various disciplines and educational communities will be able to gain Internet connection through this backbone network.</p> |

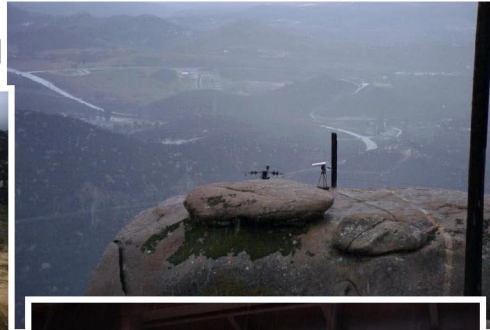


High speed backbone plus MLO



San Diego State University and the University of Illinois at Urbana-Champaign operate the Mount Laguna Observatory (MLO). The observatory was dedicated in 1968, and was built with funding from the National Science Foundation, with matching funds provided to SDSU by the State of California. The facilities include three research-grade telescopes of 16-, 24- and 40-inch apertures, and a 21-inch telescope for public viewing in conjunction with the Summer Visitor's program operated jointly with the United States Forest Service. Situated at an elevation of 6100 feet, MLO is only 35 line-of-sight miles from the home campus at SDSU; however, the observatory is still too remote to be served by anything but a single, dedicated phone-line that can only transmit data at 30 kilobits per second. Modern CCD-equipped telescopes generate images of more than eight megabytes each—hundreds per night. In addition to needing to transmit these sky images to colleagues or to the home campus for analysis, real-time connections are needed for coordinated observations with other observatories, including satellites, requiring high-performance traffic both to and from the observatory. In order to transfer the data from Mount Laguna to on-campus facilities or to other collaborators world wide, digital audio tapes (DATs) were used prior to the HPWREN connection. Moreover, observing by remote control over the Internet is now routinely raising efficiency and opening significant educational opportunities as astronomy becomes a global enterprise.

February 2001, CDF demonstration



high performance wireless research and education network

In Feb. 2001 HPWREN researchers and local California Department of Forestry (CDF) firefighters demonstrated a rapid response mobile wireless access point via a relay. The integration of rapid-reaction teams with regional environmental data and models is a goal of this proposal.

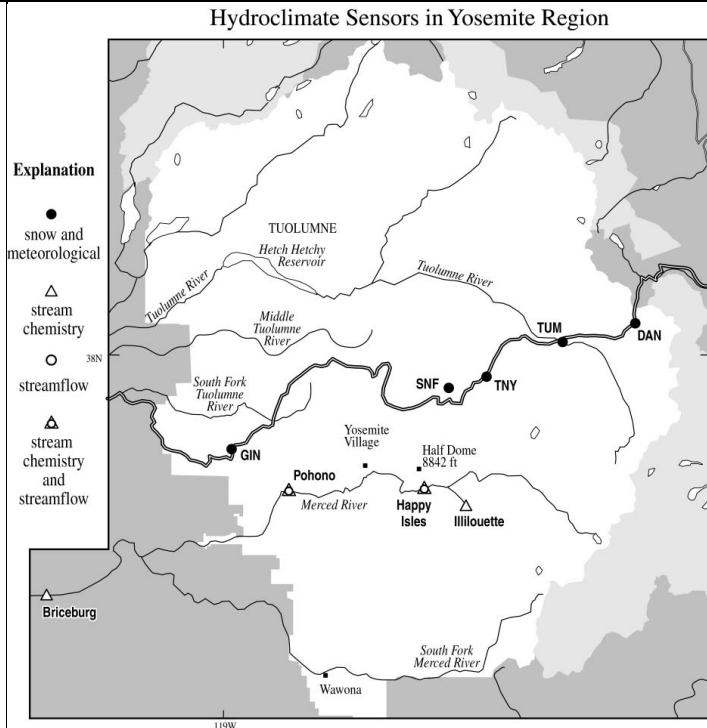
A quite different function of HPWREN is delivering Internet access to remote, underserved communities. Though many rural towns have access to the Internet via dial-up modems, there are many areas in the country (including San

Diego county) that lack stable, affordable, commercial Internet services. In an effort to bridge this de facto "digital divide," the HPWREN project is working toward delivering high-speed Internet connectivity to several remote communities in eastern San Diego County.

The HPWREN team has established a wireless link to the Pala Native American Indian reservation, which is home to more than 600 tribal members, including more than 150 children who attend elementary school on the reservation. Additionally, connectivity has been recently established with the Rincon and La Jolla reservations. Although the establishment of wireless connectivity is of great benefit to these communities, education programs are also an important aspect of any outreach project. To ensure that tribal members are fully aware of the opportunities available to them via high-speed Internet access, the HPWREN team has created an education program for each reservation's learning center and is collaborating with education communities at universities and elsewhere to layer programs on top of the networking environment. For example, a separate UCSD program has on various occasions undertaken distance-learning activities with the Pala Indian reservation, utilizing the HPWREN network as well as equipment the UCSD program added locally at Pala's Learning Center. In addition, the

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| | <p>HPWREN team also recently worked with students at the San Jose Valley Alternative High School to provide the school and the Warner Community Resource Center with access to high-speed Internet. By extending their T-1 Internet connection across Highway 79 via a wireless Ethernet bridge, Warner Unified School District now has the ability for all computers to receive broadband Internet connectivity. While the equipment was paid for by the school district, the HPWREN team participated in the installation and also provided technical expertise to guide the students through the deployment process.</p> |
| CSS/CDIP | <p>As a result of several decades of oceanographic instrument deployments at different locations along the California coast as well as at other locations around the world (Gibraltar, Straits of Indonesia, Gulf of Mexico, Gulf of California), the Center for Coastal Studies (CCS) has developed the personnel, skills and equipment to deploy and maintain moored instrument arrays for both oceanographic and meteorological variables anywhere over the California shelf and along the California Coast. The CDIP (Coastal Data Information Program) (http://cdip.ucsd.edu/) in which Scripps Institution researchers are key participants, and the National Data Buoy Center jointly maintain about a dozen wave buoys at offshore locations along the California coast; these report data in real time by telephone link to nearby shore stations. In addition, SIO researchers regularly deploy such instruments as pressure sensors, electromagnetic current meters, and acoustic altimeters from just beyond the surf zone up onto the beach. Over the past decade, The Santa Barbara Channel - Santa Maria Basin study has maintained arrays of up to a dozen current meter moorings, some at stations tens of km offshore in the general vicinity of Point Conception for several years (http://ccs/research/sbcsmb/sbc_home.html). A monitoring array of four such moorings is presently in place (http://ccs/oilspill/). A field program of somewhat smaller scope is now in place near Bodega Bay (http://ccs/coop/west/).</p> <p>Both the material and human resources necessary to successfully initiate and maintain such programs are in place at the Center for Coastal Studies. These include mooring hardware, fabrication facilities and expertise; different current sensors (crossed propeller vector measuring current meters that sense currents at their single depth on the mooring line are being replaced by acoustic doppler current profilers (ADCP) that provide current profiles over most of the entire water column); various autonomous surface parcel-following drifter systems; meteorological sensors and data logging packages. The Scripps Institution of Oceanography additionally maintains the seagoing facilities and personnel that are essential for deploying and recovering offshore moorings and are utilized by Scripps Institution coastal researchers.</p> |

Yosemite




Yosemite National Park will provide access and freight (pack mule) to the High Sierra camp in upper Merced basin. Yosemite Park, California Snow Surveys and USGS will assist in deployment of sensors and communications hardware/software and will contribute routine maintenance of wilderness instruments and emergency services as needed, using available personnel. An SIO graduate student, Jessica Lundquist, is conducting PhD research to

understand dynamics and impacts of climate/weather on snow melt runoff. The new hydrometeorological network will serve as a core component of this project, and she will work closely with the California Snow Surveys and the USGS to deploy, maintain and harvest datasets from the Yosemite hydromet network, beginning this (2001) summer season. An Armed Forces Research Fellowship will support Lundquist's salary and student tuition. A USGS team (D. H. Peterson, M. D. Dettinger, and D. Clow, PI's) will contribute stream flow, chemistry and temperature instruments and will handle installation and much of maintenance, as well as scientific guidance for data processing, distribution and analysis. Data outreach will be accomplished by Western Regional Climate Center (DRI, Reno), the California Snow Surveys, and the SIO California Applications Program (CAP).

Hydrometeorological sensors to be installed in Yosemite National Park will build upon existing snow measurement platforms, meteorological stations and stream gages in the Merced and Tuolumne River drainages that lie within the Park. Park communications infrastructure, including towers and internet portal, will be employed.

Assembly and testing of hydrological, meteorological and snow sensing instrumentation will be carried out at SIO Climate Research Division in La Jolla, the US Geological Survey Water Resources Division facility in Menlo Park, and the California Department of Water Resources Cooperative Snow Surveys laboratory in Sacramento.

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| <p>IGPP IDA</p> | <p>The IDA (International Deployment of Accelerometers) is a global network of broadband and very long period seismometers operated by the Cecil. H. and Ida M. Green Institute of Geophysics and Planetary Physics. Project IDA is an element of the IRIS (Incorporated Research Institutions for Seismology) Global Seismic Network (GSN) supported by the Cecil and Ida Green Foundation for Earth Sciences and the National Science Foundation. There are currently 40 broadband stations deployed worldwide. Construction of the GSN is being completed and we expect there will be 42 IDA stations in place when this work is complete.</p>  <p>The IDA Near Real Time System (NRTS) for seismic data collection provides rapid access to seismic data, which may be of vital interest. The near-real-time data are used for scientific research and support programs with considerable societal interest including tsunami warning, emergency response, and monitoring underground explosions. Most of the IDA stations are connected through a global Wide Area Network (WAN) linking the station computers with the IRIS/IDA Data Collection Center (DCC) in La Jolla. Some of the stations are connected to the WAN via dedicated circuits while other stations are connected through switched or dial-up circuits. Several stations make use of satellite telemetry for returning data to IDA. Only 7 stations have no connections to the WAN. Experience has shown that duplex, real-time telemetry to stations greatly eases maintenance tasks and enhances the up-time of the observatories. For more information, see http://epicenter.ucsd.edu/public/welcome.html/</p> |
| <p>CSRC</p> | <p>The California Spatial Reference Center is located at the Cecil H. and Ida M. Green Institute of Geophysics and Planetary Physics (IGPP). A group of surveyor activists started a grass roots movement to leverage the GPS infrastructure established for earthquake research in California as the basis for defining and maintaining a statewide geodetic reference frame. They felt that California had special geodetic needs because of its tectonic setting, extensive land subsidence, and natural hazards, along with one of the largest economies in the world. This effort eventually coalesced into the California Spatial Reference Center, a major outreach program of the geophysical community in California.</p> <p>The CSRC has the following mandate in California, in partnership with the National Geodetic Survey (NGS) at NOAA (National Oceans and Atmosphere</p> |

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| | <p>Administration) and the California Dept. of Transportation (Caltrans):</p> <ol style="list-style-type: none"> 1. Provide the necessary geodetic services to ensure the availability of accurate, consistent, and timely spatial referencing data. 2. Establish the legal spatial reference system for California. 3. Monitor temporal changes in geodetic coordinates due to tectonic motion, volcanic deformation and land subsidence. <p>For more information see http://csrc.ucsd.edu/</p> |
| SOPAC | <p>The Scripps Orbit and Permanent Array Center (SOPAC) is located at the Cecil H. and Ida M. Green Institute of Geophysics and Planetary Physics (IGPP). SOPAC's primary scientific role is to support high precision geodetic and geophysical measurements using Global Positioning System (GPS) satellites, particularly for the study of earthquake hazards, tectonic plate motion, plate boundary deformation, and meteorological processes.</p> <p>SOPAC investigators conduct research on the implementation, operation and scientific applications of continuously monitoring GPS arrays and Synthetic Aperture Radar (SAR) interferometry.</p> <p>SOPAC is a major participant in the International GPS Service for Geodynamics (IGS), serving as a Global Data Center and a Global Analysis Center, the Southern California Integrated GPS Network (SCIGN), and the University NAVSTAR Consortium (UNAVCO). The National Aeronautics and Space Administration (NASA), National Science Foundation (NSF), U.S. Geological Survey (USGS), the Southern California Earthquake Center (SCEC), the National Oceanic and Atmospheric Administration (NOAA), and the William M. Keck Foundation fund these activities..</p> <p>SOPAC provides the following services and products to the scientific community:</p> <ol style="list-style-type: none"> 1. Precise near real-time and predicted GPS satellite orbits, 2. Precise polar motion and Earth rotation variations, 3. On-line data archive of continuously operating GPS tracking stations, for data collected since 1990, 4. Time series of daily three-dimensional positions for the global and California stations with respect to the International Terrestrial Reference Frame (ITRF), 5. Software for remote downloading of continuous GPS data, 6. Consultation on installation and operations of continuous GPS arrays. 7. Web-based user applications based on Oracle 8.1 DBMS. <p>Data from the SOPAC archive may be retrieved via ftp or through the SOPAC home page:</p> <p>ftp lox.ucsd.edu (132.239.152.86) login: anonymous; password: your email address directories: rinex, raw, products, regional, global</p> <p>For more information see http://sopac.ucsd.edu/</p> |

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| <p>SDSU Field Stations</p> | <p>The SDSU Field Stations are managed to support the research, teaching and education on the natural ecosystems of southern California by students, faculty, scientists, teachers, and other cooperating partners. The College of Sciences administers the Field Station Programs as a university-wide and community resource with collaborators and users from local, national, and international areas. SDSU has a strong commitment to this program and supports campus administrative staff, on-site personnel, and operations. Partnerships and outreach activities are an important component of management and educational goals.</p> <p>The San Diego State University Field Station Program includes a network of four sites in the San Diego area representing the major environments one finds in the south coast eco-region and a total of approximately 9000 acres. Our region is defined as bounded by the northern boundary of the Santa Margarita Watershed (in Riverside County) and the southern boundary of the Tijuana River watershed (in Baja Mexico). This range entirely encompasses San Diego County, a portion of South Western Riverside County (City of Temecula – closest marker) and the North Western area of Baja Mexico (City of Tijuana – closest marker). The 4344 acre Santa Margarita Ecological Reserve and the 1600 acre Sky Oaks Field Station are the two sites that will be used as model demonstration sites for this project integrating information technologies with field sciences.</p> <p>The Santa Margarita Ecological Reserve (SMER) currently supports 56 research projects and a variety of class use from K-12 through university level; it also has a volunteer citizen docent corps trained in natural history of the area, hosts workshops and training programs for resource managers and partners, and is developing stewardship practices in areas such as fire management and exotics control based in adaptive management principles utilizing information gained through these various research and education activities.</p> <p>Both SMER and Sky Oaks have weather stations and micrometeorological and eddy covariance towers that asses CO₂ flux and energy balance. Environmental data collected includes soil moisture, soil temperature (active layer thickness), radiation, temperature, day length, and ecosystem net CO₂ flux. Digital cameras can make available images of cloud cover, meteorological and eddy correlation towers, and surrounding terrain and vegetation. Additional sensors at SMER include anabat monitors (sonar detection of bats) and automated cameras used for carnivore tracking. We plan to increase the numbers of sensors and types of sensors collecting environmental data. One technology we would like to explore is the use of automated digital video cameras for wildlife monitoring. This would elevate the potential for carnivore monitoring providing real-time images without heavy reliance on field personnel. We anticipate installing hydro stations, enhancing capabilities and augmenting our anabat monitors, developing new methodologies for carnivore tracking, and exploring other areas where IT can evolve field based research, monitoring, and education.</p> <p>Both Sky Oaks and SMER have modest facilities that offer housing, lab space, shop areas and meeting and class space for visiting users. SMER can sleep 30 individuals comfortably and is managed by a resident reserve manager and</p> |
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resident research steward. Sky Oaks can sleep 19 individuals and supports several long-term resident researchers.

The SDSU Field Stations provide a unique opportunity to develop and integrate information technologies in the environmental sciences. A variety of environmental information, historical and current, is collected at these research areas. We also are exploring information management systems and the design

Technician installing sensors on automated micrometeorological station at the Santa Margarita Ecological Reserve.

of websites in an effort to develop a regional web-based ecoinformatics resource so that users

at varying levels of knowledge can interact with, use, and learn from real environmental data made accessible through the Internet.

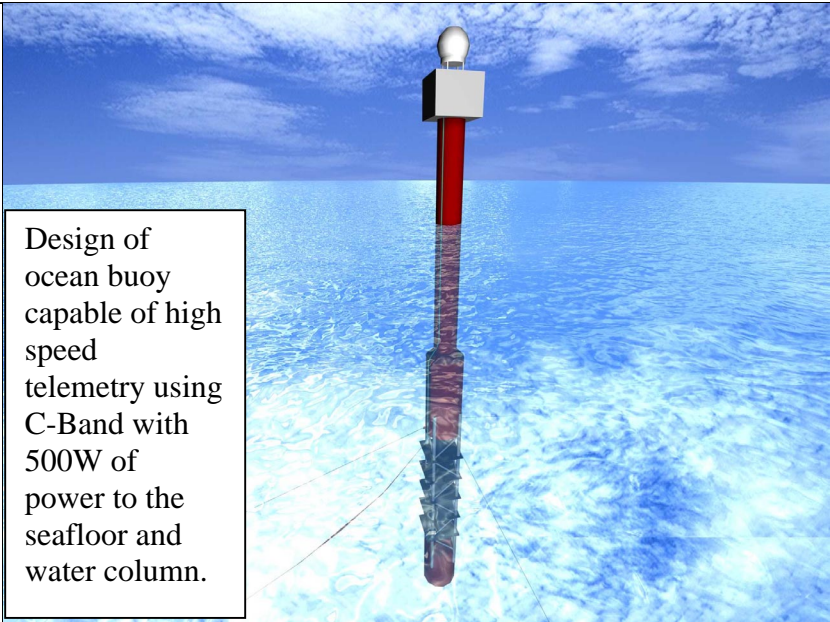
IGPP
ANZA

The ANZA Seismic Network <http://epicenter.ucsd.edu/ANZA/home.html> utilizes state-of-the-art broadband sensors and 24-bit data-loggers combined with real-time telemetry to monitor local and regional seismicity in southernmost California. The goal of this project is to provide on-scale digital recording of high-resolution three-component seismic data for all earthquakes, provide real-time data to other regional networks and the USNSN (US National Seismic Network), and provide near real-time information to the greater San Diego community. This proposal requests funds to support the continued operations of the ANZA network.

The ANZA network has been a leader in developing techniques for real-time data delivery over the Internet. To affect rapid data transfer to TriNet (an extensive southern California seismic network operated by the USGS and Caltech), we routinely transfer all the ANZA data within ten seconds of real-time. In this way, the broadband data are seamlessly integrated in the Caltech/USGS real-time data processing system. The ANZA network exports data in real-time to the IRIS Data Management Center where it is automatically archived and is immediately available to the seismological community. Real-time data exchanges between UCSD - UC Berkeley and UCSD - University of Nevada-Reno have been operational since late 1998.

The ANZA network enhances the broadband coverage provided by the TriNet in southernmost California. ANZA stations are designed to operate in remote areas without any supporting infrastructure such as AC power, telephone or computer communications. Each station can operate using solar power and all communications between stations and IGPP are dedicated spread spectrum radio

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| | links (see HPWREN). The current configuration of the ANZA network will allow for on-scale recording of local events with magnitudes less than $M \sim 5$. At present, over 32,000 events have been recorded during the 18 years of continuous operation. The median station data return rate is 99.22%. |
| GPS in Orange County | <p>The California Spatial Reference Center has been awarded \$1M in FY2001 from the National Geodetic Survey, to support two primary tasks: height modernization and real-time GPS networks.</p> <p>Building upon the database and web interface of the Scripps Orbit and Permanent Array Center (SOPAC), CSRC will become a full-service online data portal for GPS coordinates and metadata in California. CSRC will demonstrate a real-time three-dimensional GPS network capability in collaboration with the Geomatics/Land Information Division of Orange County's Public Facilities and Resource Department (PFRD). The central telemetry sites will receive data continuously from the eight continuous GPS sites in the county and relay the data to a central facility at the CSRC Operational Center in La Jolla and to a mirror facility at PFRD. The data will be analyzed for integrity, stored on data servers, and GPS real time kinematics (RTK) data will be streamed via the Internet at both facilities. Surveyors will be able to receive RTK data through cellular modems attached to a personal computer and obtain real-time three-dimensional position fixes with cm-level horizontal precision and 5-cm vertical precision. Longer occupations at a site will allow improved precision in both the horizontal and vertical coordinates. PFRD has matched the CSRC contribution to this effort (\$300,000) with \$80,000 of funds necessary to purchase the telemetry equipment for installation in Orange County.</p> |
| DEOS | <p>We are presently working on prototype testing for a new NSF Major Research Equipment (MRE) program called Ocean Observatories. Scripps and Woods Hole have completed a design study for an open ocean buoy system and more information can be found at http://obslab.whoi.edu/buoy.html . Later this year, we will be mounting a Ku-Band antenna and modem/computer system on the R/P FLIP at Scripps and running a variety of open-ocean tests through the end of November between Scripps and experiment sites near Hawaii. We are cooperating with Cal-(IT)2 and Hughes Network Systems (HNS) in this testing and funding is provided by the Office of Naval Research (ONR). IGPP is experimenting with HNS' global satellite communications systems. In particular, HNS has implemented a global satellite IP network for the Comprehensive Test Ban Treaty Organization, which consists of some 400 remote earth stations. IGPP has established one of these stations at the La Jolla labs. The purpose of the experiment is to establish a separate IP network using the same satellite channels in a manner that compromises neither the security nor throughput of the CTBTO network. The issues being investigated involve channel prioritization and efficient and secure network address translation of public to private IP space. If this work is successful, it will be possible to obtain near-real-time communications for low-priority seismic data at a very low cost.</p> |



Design of ocean buoy capable of high speed telemetry using C-Band with 500W of power to the seafloor and water column.

Software

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| <p>SDSC SRB</p> | <p>The SDSC Storage Resource Broker (SRB), implemented at SDSC, is client-server middleware that provides a seamless, uniform interface for connecting to heterogeneous data resources over a network and accessing replicated data sets. SRB, in conjunction with the Metadata Catalog (MCAT), provides means for accessing data sets and resources based on their attributes rather than their names or physical locations. The SRB provides access to archival resources such as HPSS, UniTree and ADSM, file systems such as Unix File System, NT File System and Mac OSX File System and databases such as Oracle, DB2, and Sybase. The SRB provides a logical representation for storage systems, digital file objects, and collections and provides several features for use in digital libraries and persistent archive or collection management systems. SRB also provides capabilities to store replicas of data, for authenticating users, controlling access to documents and collections, and auditing accesses. The SRB can also store user-defined metadata at the collection and object level and provides search capabilities based on these metadata.</p> <p>The SRB has been implemented on multiple platforms including IBM AIX, Sun, SGI, Linux, Cray T3E and C90, Windows NT, Mac OSX, etc. The SRB has been used in several efforts to develop infrastructure for GRID technologies, including the Particle Physics Data Grid (NSF/DOE), Information Power Grid (NASA) and GrPhyN (NSF). The SRB also has been used for handling large-scale data collections, including the Digital Sky Survey Collection for 2MASS data (10 TB of 5 million files), NPACI datasets (over 150 TB), and the Digital Embryo collection (20 TB leading up to 500 TB) and LTER hyper-spectral datasets. More details on the SRB can be found at: http://www.npaci.edu/DICE/SRB/.</p> |
| <p>IGPP Antelope</p> | <p>Antelope Environment Monitoring Software is a distributed open-architecture UNIX-based acquisition, analysis and management software system. It is designed to provide a comprehensive set of environmental monitoring data and processed information in real-time. Antelope takes full advantage of the extensive support services provided by the UNIX environment and standard TCP/IP network</p> |

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| | <p>utilities over multiple physical interfaces.</p> <p>The current generation of Antelope provides full functionality for seismic network and array operations and control, including real time data acquisition from field digitizers, interactive control of field equipment, system state-of-health monitoring, real-time, automated data processing (detection, picking, seismic event association, seismic event location, archiving). It also offers interactive and batch processing, information system functions, automated distribution of raw data and processed results, batch mode seismic array processing and a powerful development toolkit for extending and customizing the system.</p> <p>The Antelope Seismic Information System uses the relational database (RDBMS) formalism and the CSS v. 3.0 schema for information organization (CSS- Center for Seismic Studies). Antelope runs on SUN Microsystems' Solaris operating system on both SPARC and Intel architectures. In addition to providing specific functionality for seismic monitoring systems, Antelope provides a robust and versatile substratum of generic functions that can be used to support other non-seismic monitoring applications. This software is provided to IGPP by BRTT, Inc.</p> |
| <p>IGPP Seamless Archive</p> | <p>The University NAVSTAR Consortium (UNAVCO) is developing a seamless archive for the GPS Geodesy/Geophysics community, called the GPS Seamless Archive Center (GSAC). GSAC is a collection of GPS data archives and their operating agencies who agree to exchange information about their individual data holdings in order that users need not contact each archive separately to locate desired information. The Scripps Orbit and Permanent Array Center (SOPAC) is actively participating in the GSAC as a functioning Wholesaler, creating Data Holdings Records (DHRs) in a regular and automated fashion for both Data Holdings Files (DHF) and Monument Catalog (MC) holdings. SOPAC will begin implementing GSAC functionality into its regular data collection processes shortly, making use of other GPS archive centers' GSAC participation. SOPAC will also serve as a GSAC Retailer, providing a gateway for the GSAC to GPS users around the world.</p> <p>A large part of SOPAC's participation in the GPS Seamless Archive Center is to develop and support Perl-based software for the GSAC's functioning. SOPAC is providing the following software components:</p> <ul style="list-style-type: none"> • Wholesaler GSAC Data Holdings Publication • Retailer GSAC Data Holdings Collection • Retailer GSAC Data Holdings Serving • Wholesaler & Retailer GSAC Database Management • Wholesaler & Retailer GSAC Database Reporting |
| <p>Outreach</p> | |
| <p>SDSU</p> | <p>The SDSU outreach and public education coordinator is a key staff position to work with community groups, K-12 classes, and decision makers in transferring information generated by the diversity users and research projects at field stations to the general population. This staff position is supported via cost-sharing dollars and will work with community members on how to use the technology developed through this proposal. It is envisioned that community members will visit field stations, engage in some sort of scientific activity such as water quality sampling</p> |

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| | <p>or wildlife viewing and then be trained in how to use the web site for continued “virtual visits” to field station properties. The goal is to engage a large cross-section of society to work with and understand environmental information provided through a user-friendly web site. The SDSU web designer will help create a user-friendly interface, which builds from and helps present fairly complicated synthesis done by the project data management team, to be widely accessible to a regional user group and global scientific community. Information will have to be presented for users at a K-12 level as well as users at a university level.</p> |
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