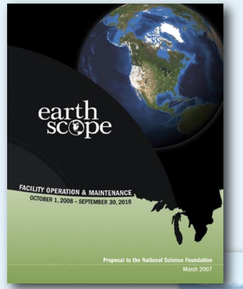
YEAR IN REVIEW

An essential ingredient for the success of IRIS activities is close communication with the members of the Consortium. Throughout the year, the Board of Directors, Standing Committees for each of the core programs, the Planning Committee, advisory groups for USArray, and a number of special working groups and committees meet to provide ongoing advice and direction for the operation of IRIS facilities and the development of new programs. The January meeting of the Board of Directors is traditionally held at the IRIS offices in Washington, DC. In addition to reviewing the major issues anticipated in the year ahead, the new Board members are introduced to their corporate, financial, and oversight responsibilities as directors. The meeting in Washington is also used as an opportunity to meet with program officers from NSF, our primary funding agency, and with representatives of other federal agencies and organizations. IRIS's collaboration with the US Geological Survey extends across many activities, so the Board of Directors was pleased to talk with the Survey's new Director Mark Myers during the January Board meeting. Based on Myers' plans to build on existing scientific strengths, IRIS is looking forward to continuing its broad partnership with the USGS. Characteristic of this cooperation, the station in Kabul, Afghanistan, newly installed through USGS efforts, was designated as a GSN-affiliated station and data began flowing smoothly through the NEIC to the DMC.



During January, IRIS submitted an MRI proposal (which was successfully reviewed and funded) to acquire instruments that will be managed at the PASSCAL Instrument Center and used to support NSF Polar Programs experiments planned during the International Polar Year. This acquisition builds on another successful MRI collaboration with UNAVCO to develop specialized power and communication systems for geophysical field programs in demanding Arctic conditions.

The start of the year was a productive time for IRIS E&O. In January, IRIS prepared a program overview for an evaluation meeting at NSF and also an AS-1 workshop. These activities were followed in February by establishment of an Active Earth Display outside the offices of the NSF Geosciences Directorate and release of an IRIS version of SeisMac, which uses built-in accelerometers to potentially turn millions of Macintosh laptop computers around the world into educational seismographs. February also brought a special workshop that defined questions to be addressed in a review of the PASSCAL program under the current Cooperative Agreement with NSF.

Some of the high-profile news during early 2007 was related to EarthScope. In January, the University of Washington received a grant from the M. J. Murdock Charitable Trust to acquire the instruments used at selected Transportable Array stations in their state—converting them to permanently operating stations as the TA moves eastward. The UW action started momentum towards similar efforts in other states, helped by IRIS's formalizing of the ground rules for Adopt-a-Station later in the year. Many people at IRIS (and at UNAVCO, Stanford University, and the USGS) were pressed through February and March, preparing for the EarthScope National Meeting and writing the EarthScope O&M proposal. As with other similarly large proposals, this one benefited from assistance from numerous people all across the geophysical community—and the payoff was outstanding reviews and approval by the National Science Board, which came in September. Based on this approval, the initiation of a second five-year phase for USArray, PBO, and SAFOD is expected to begin in September 2008. The support to IRIS during the O&M phase for EarthScope will allow for the continued eastward migration of the Transportable Array, support for the use by individual PIs of Flexible Array instruments, operation of magnetotelluric instruments, and associated data management activities.

Spring was a time of important developments for the GSN, including completion of stations on Tarawa Island, Republic of Kiribati (TARA), during March and in Ambohimpanompo, Madagascar (ABPO), during April. These developments were followed quickly by the start of transmission from Ar Rayn, Saudi Arabia (RAYN), during May and from Addis Ababa, Ethiopia (AAE), during June, both important steps in achieving the GSN goal of near-real-time telemetry at all stations. June also saw first delivery of the next-generation GSN data logger, the Quanterra 330. Complementing the near-real-time telemetry of GSN and other data, the Data Management System embarked on transcription of data to the newly established Active Backup during April. Located in Socorro, New Mexico, and funded by the EarthScope project, Active Backup ensures that data collection can continue in the event of severe disruption in Seattle, Washington, and even that most data distribution services will still be provided.

Amid all this, May was a particularly active month for other IRIS international activities, when staff members and faculty from several Voting Members participated in the Coordinators' Meeting for the China Earthquake Science Protocol and dozens of Foreign Affiliates gathered at an IRIS reception during the AGU Joint Assembly in Acapulco, Mexico. At the same time, PASSCAL Instrument Center staff continued working with RefTek to get retired data loggers refurbished, and prepared refurbished instruments for newly approved long-term loans to the University of Dhaka (Bangladesh), INPRES (Argentina), KNET (Kyrgyzstan), and OVSICORI (Costa Rica). In June, the E&O program joined forces with AfricaArray to hold a workshop for teachers.

Summer is always a demanding time at the PASSCAL Instrument Center, and this year the staff in Socorro prepared instruments for dozens of experiments and completed more than thirty support trips before the end of August, with everyone in the field at least twice. The Array Operating Facility works seamlessly in the same building at the PASSCAL Instrument Center, and the same staff members were also acquiring and preparing Flexible Array instruments for new experiments near Mendocino, California, in the Cascadia Mountains, in Oregon, and in Garner Valley—bringing virtually the entire pool of new broadband and short period instruments for USArray into use as quickly as the manufacturers can deliver them.

The New Mexico Tech facility is also the home of the Transportable Array Coordinating Office, TACO, which prepares instruments and assists with siting and permitting as the TA is installed and rolls across the country. TA construction and installation continued all year, of course, including a siting workshop at Colorado College during May and reaching of a major EarthScope milestone—the completion of the first "footprint" of 400 TA stations in August. Lest you be fooled, realize that "completion" simply means that now TA staff must continue installing stations at new sites further east as quickly as ever while now additionally decommissioning old sites!

Even with 21st century instrumentation, student grit and sweat remain essential to seismology field experiments, including FACES (Flexarray Along Cascadia Experiment for Segmentation).

As the IRIS/SSA Distinguished Lecturers for 2007, Anne Sheehan and Brian Atwater made nearly 20 presentations to the public.

Throughout the year, the DMS continued to expand its role as a near-real-time archive for seismic networks around the world, reaching agreements to receive additional data from the Japanese Meteorological Agency in January, the Polish National Seismic Network in May, a volcano observatory in Costa Rica, and the Romania National Network in September. In addition, the OBS Instrument Pool adopted the data policy recommended by the FDSN, so that data from at least one station in each OBSIP deployment will be available immediately from the DMC. Supporting the wider use of technical standards that facilitate such exchanges, the DMS held the third of it annual regional data management workshops in Malaysia during October, where new releases of the Portable Data Collection Center and DIGIT played important roles. The international embrace of data exchange norms and technical standards that IRIS spearheaded is represented by Tim Ahern's passing the baton of FDSN secretary to ORFEUS's Torild van Eck, after serving in that role for 12 years.

IRIS E&O summer activities included: the summer intern program, beginning with an orientation week at New Mexico Tech; student siting for Transportable Array stations commencing this year with a four-day introductory workshop in at the University of Colorado; an AfricaArray workshop at North Carolina A&T; and an workshop in Baltimore for the AS-1 program, which now boasts over 140 school installations.

IRIS took an important step during September, with an exploratory meeting on industrial liaisons that was organized jointly with the Society of Exploration Geophysicists.

Overall, the year demonstrated the continued strength and ongoing growth of interest in the Consortium, with the Board of Directors welcoming four new Voting Members—Miami University of Ohio, the University of Missouri, Rolla, the University of Rochester, and California State University, East Bay—as well as two new Educational Affiliates and twenty new Foreign Affiliates from Asia, Europe, the Middle East and the Americas.

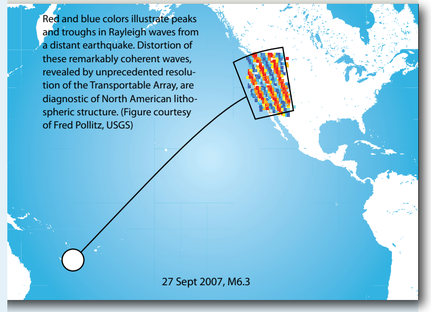
IRIS 2007 at a Glance

IRIS Board of Directors

Thorne Lay (Chair)	University of California, Santa Cruz
Tom Owens (Vice Chair)	University of South Carolina
James Gaherty (Secretary)	Columbia University
Charles Ammon	Pennsylvania State University
Ken Creager	University of Washington
Karen Fischer	Brown University
Anne Sheehan	University of Colorado
Anne Tréhu	Oregon State University
Suzan van der Lee	Northwestern University

IRIS Planning Committee

Brian Stump (Chair)	Southern Methodist University
Göran Ekström	Columbia University
Randy Keller	University of Oklahoma
Thorne Lay	University of California, Santa Cruz
Kate Miller	University of Texas at El Paso
Andrew Nyblade	Pennsylvania State University
David Simpson	IRIS Consortium
John Vidale	University of Washington
Ray Willemann	IRIS Consortium



Red and blue colors illustrate peaks and troughs in Rayleigh waves from a distant earthquake. Distortion of these remarkably coherent waves, revealed by unprecedented resolution of the Transportable Array, are diagnostic of North American lithospheric structure. (Figure courtesy of Fred Pollitz, USGS)

About IRIS

The Incorporated Research Institutions for Seismology is a university research consortium dedicated to exploring Earth's interior through the collection and distribution of seismographic data. IRIS programs contribute to scholarly research, education, earthquake hazard mitigation, and monitoring of nuclear explosions. IRIS operates facilities in partnership with the US Geological Survey, and with funding from the National Science Foundation, other federal agencies, universities, and private foundations.

Statement from the Chair

The IRIS-deployed and operated Transportable Array (TA) has begun to roll! This big year for USArray saw completion of the first full TA "footprint." During the year, 400 newly deployed stations and 65 cooperating stations operated. This is an extraordinary achievement, completed on time and under budget. While personally I would like each station to operate for at least two years, the project plan calls for redeployments after about 18 months in order to achieve the complete 2000-site deployment (including Alaska) by 2018. Already stations are being decommissioned and redeployed. The good news is that various initiatives are underway to continue operation at some of the TA sites, so that there will be a legacy of augmented broadband networks. And, yes, there is a future, too! The National Science Board recently authorized NSF to support, at up to proposed levels, EarthScope operations and maintenance from 2008–2013.

Of course, the TA is just one of many exciting IRIS efforts, and the core programs are sustaining critical roles. With seven great earthquakes since the 2004 Sumatra-Andaman event, the GSN has been returning wonderful global data for analyzing these huge tectonic events, along with many other contributions to source and earthquake studies. PASSCAL experiments continue across the globe, with great vigor and first-order discoveries. The DMS continues to excel in making IRIS data openly available, with many new tools to help access them. The E&O program educates the public about seismology, drawing new students to the field. A challenge for the future is to ensure that these core activities remain vital, with steady equipment replacement and adequate O&M support, especially given the tension arising as new initiatives emerge in other areas of the earth sciences.

The great deployment success and superb data return from IRIS programs enable a stunning variety of research, including investigations of seismic radiation from a coal mine collapse, many regional earthquake ruptures, wave multipathing and focusing, large surface wave triggering of local earthquakes, storm-generated seismic waves, receiver functions, mantle tomography, shear wave splitting, and array analyses of distant large earthquake directivity, core-mantle boundary structure, and mantle discontinuities in subduction zones. Ambient noise studies enable every single data sample to be used for scientific analysis. Has any other discipline ever exploited its data so fully as seismology now does? This excitement and research progress is enabled by the data acquired by hard-working teams of IRIS employees and contractors who collectively exceed all expectations. These folks all deserve a heart-felt "huzzah"!

As I step down from the IRIS Board Chair and membership on the EarthScope Management Team, I view with admiration the accomplishments of the many participants in USArray and all IRIS facilities. We can all help sustain and enhance support for IRIS facilities and activities by communicating the value of seismological research for many applications and contributing our personal time to IRIS governance.

Thorne Lay

2007

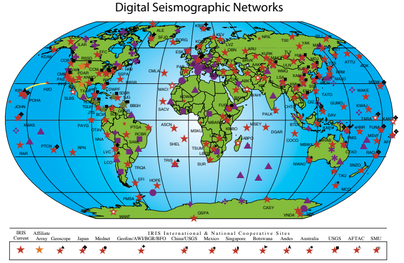
Global Seismographic Network

The Global Seismographic Network is a permanent network of state-of-the-art seismological and geophysical sensors connected by telecommunications to serve the scientific research and monitoring requirements of our national and international community. All GSN data are freely and openly available to anyone via the Internet. Installed to provide broad, uniform global coverage of Earth, 150 GSN and GSN Affiliate stations are now sited from the South Pole to Siberia and from the Amazon basin to islands in the Indian Ocean, in cooperation with over 100 host organizations and seismic networks in 69 countries worldwide. The GSN coordinates closely with other international networks through the International Federation of Digital Seismograph Networks (FDSN), of which the IRIS is a founding member. GSN data serve as the principal global data source for earthquake response and tsunami warning, and contribute to nuclear treaty monitoring. The GSN is operated and maintained through the USGS Albuquerque Seismological Laboratory (ASL) and through the University of California at San Diego IRIS/IDA group.

GSN Standing Committee

Jeffrey Park (Chair)	Yale University
Susan Bilek	New Mexico Tech
Robert Detrick	Woods Hole Oceanographic Institution
Miaki Ishii	Harvard University
Laura Kong	UNESCO
William Leith (ex officio)	US Geological Survey, Reston
David McCormack	Natural Resources Canada
Fenglin Nui	Rice University
Jeroen Ritsema	University of Michigan
Jeroen Tromp	California Institute of Technology

GSN & International Federation of Digital Seismographic Networks



GSN Stations with

Broadband seismometers	150
High-frequency seismometers	129
Strong-motion sensors	115
Borehole sensors	50
Microbarographs	53
Real-time communication	144

GSN Stations Serving as IMS Auxiliary Stations 29

GSN Stations Installed During 2007

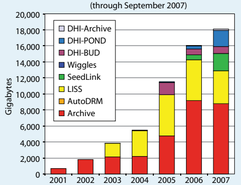
New stations	7
New or upgraded communications	11

Data Management Services

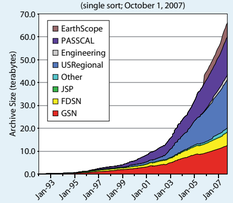
Data Archived (as of September 30, 2007)	65.9 terabytes
PASSCAL	16.6
GSN	12.5
EarthScope	6.1
FDSN	5.7
US Regional	21.1
Other	3.9
Data Shipped (projected to end of 2007)	23.6 terabytes
Customized from Archive	11.4
LISS	5.4
SeedLink	2.8
DHI (BUD/POND/Archive)	4.0

The Data Management System receives, provides quality assurance, archives, and distributes data from the GSN and PASSCAL programs, the USGS ANSS backbone, USGS- and NOAA-supported regional networks, EarthScope/USArray, FDSN networks, and other sources. The heart of the DMS is the Data Management Center in Seattle, Washington, which has the largest seismological data collection of this type in the world. GSN data reach the DMC via real-time telemetry to collection centers at UCSD's IDA facilities and the USGS's Albuquerque Seismological Laboratory. Principal investigators and New Mexico Tech staff at the PASSCAL Instrument Center review PASSCAL data before they are made available from the DMC. The DMC also performs automated quality control on most real-time data. Data Handling Interface servers, which are installed at the DMC, ORFEUS in The Netherlands, and NCEDC at Berkeley, enable user applications to interact directly with distributed waveform server databases while performing analyses or integrating seismic and other data types.

Gigabytes Shipped (through September 2007)



IRIS DMC Archive Growth (single sort; October 1, 2007)



DMS Standing Committee

Douglas Wiens (Chair)	Washington University in St. Louis
Chaitan Baru	University of California, San Diego
Emily Brodsky	University of California, Santa Cruz
Paul Earle	US Geological Survey, Denver
Megan Flanagan	Lawrence Livermore National Laboratory
John Hole	Virginia Tech
Keith Koper	Saint Louis University
Meredith Nettles	Columbia University
Doug Toomey	University of Oregon

USArray

During 2007, USArray continued to install Transportable Array and magnetotelluric stations and acquire Flexible Array instruments as the fourth year of the five-year EarthScope MREFC project was completed on September 30. All data are archived at the DMC. The status of USArray can always be found on www.iris.edu/USArray and www.EarthScope.org.

USArray Advisory Committee

Adam Dziewonski (Chair)	Harvard University
Michael Bostock	University of British Columbia
Göran Ekström	Columbia University
Matt Fouch	Arizona State University
Rainer Kind	GFZ Pottsdam
James Knapp	University of South Carolina
Thorne Lay	University of California, Santa Cruz
Joann Stock	California Institute of Technology
Rob van der Hilst	Massachusetts Institute of Technology
Doug Walker	University of Kansas

Transportable Array

The 400th Transportable Array station, located in Newdale, Idaho, was certified on August 2, nearly two months ahead of schedule. Having achieved its full 400-station deployment, dismantling of the first Transportable Array stations in California and Oregon began. When the equipment is removed from these stations, the instruments are shipped for installation at sites on the eastern edge of the array. This accomplishment marks the beginning of the Transportable Array's multiyear roll across the United States.

Transportable Array Stations

Stations commissioned	454
Installed by USArray	378
Stations removed	23

Magnetotelluric Stations

During October, the first of seven planned Magnetotelluric Backbone stations, at Soap Creek, Oregon, began operating. Early issues associated with obtaining instruments have been resolved, clearing the way for completion of the Backbone by September 2008. Deployment of the 20 sets of transportable equipment at 80 sites throughout Cascadia was completed this year.

Magnetotelluric Systems

Backbone operating	1
Backbone constructed	4
Transportable stations in 2007	80

Flexible Array

The Flexible Array has received all 120 planned short-period systems. The inventory of broadband systems increased to 222 this year and available active source systems grew to 1200. The Flexible Array obtained authorization to expand the broadband instrument pool to 326 and the active source pool to 1700 systems during the final year of the MREFC project. Flexible Array systems were actively used for research in five experiments during 2007.

Flexible Array Systems

Broadband systems	222
Short period systems	120
Single channel systems (Texans)	1200

Permanent Array

After completing the 39-station Permanent Array one year ago, title to all of the equipment was transferred to the USGS, which now operates these stations as part of the Advanced National Seismic System.

Permanent Array Stations

Operating	39

Program for the Array Seismic Studies of the Continental Lithosphere

Number of Experiments in 2007	60
Broadband	27
Short period	14
"Texan"	6
Multichannel	13

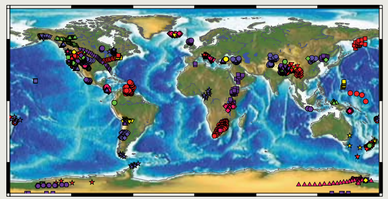
Data Logger Inventory

Three-channel data loggers	836
"Texans"	950
Multichannel	10

Sensor Inventory

Broadband	456
Intermediate period	93
Short period	188
High frequency	440

The PASSCAL Virtual Network of 3905 Stations



PASSCAL facilitates portable array seismology worldwide with end-to-end experiment support services, state-of-the-art portable seismic instrumentation, and advanced field and database management tools. Over its history, the program has supported more than 650 deployments to image plate boundaries, cratons, orogenic systems, rifts, faults, and magmatic systems. The instruments have been essential in a variety of environmental research projects, including volcanic system imaging, fault-zone studies, basin-related seismic hazard analyses, hydrologic studies, and climate-related glacial processes. About 70 PASSCAL experiments are active at some point during each year, including many broadband and short period passive experiments—requiring shipment of over 500 stations annually—and controlled source experiments recorded by single-channel and multichannel systems. The PASSCAL Instrument Center also supports USArray Flexible Array experiments and Transportable Array operations.

PASSCAL Standing Committee

Alan Levander (Chair)	Rice University
John Collins	Woods Hole Oceanographic Institution
Matthew Fouch	Arizona State University
Aibing Li	University of Houston
Tom Pratt	University of Washington
Arthur Rodgers	Lawrence Livermore National Laboratory
Stephane Rondenay	Massachusetts Institute of Technology
Ray Russo	University of Florida
George Zandt	University of Arizona

Education & Outreach

The IRIS Education and Outreach program is committed to making significant and lasting contributions to society's understanding of the Earth system through seismology and the unique resources of the IRIS Consortium. IRIS E&O examines existing resources related to seismology education and communicates with potential users to identify needs. Based on these assessments, the program develops and implements products and activities that meet these needs and are grounded in research-supported best practices. These products and programs serve a spectrum of audiences, including the general public, students in grade 6–12 and their educators, as well as post-secondary students and their faculty. In line with the strengths of the IRIS Consortium, exploring and explaining seismic data are at the core of IRIS E&O activities. Primary elements of the E&O program include summer research experiences for undergraduates, professional development for teachers and undergraduate faculty, seismographs in schools, IRIS/USGS museum displays, IRIS/SSA Distinguished Lecture Series, interactive and Web-based software, and educational publications.

E&O Standing Committee

Michael Wysession (Chair)	Washington University in St. Louis
Inés Cifuentes	American Geophysical Union
Susan Eriksson	UNAVCO
Kevin Furlong	Pennsylvania State University
David Herring	National Aeronautics and Space Administration
Sue Hough	US Geological Survey, Pasadena
Laura Serpa	University of Texas at El Paso
Catherine Snelson	University of Nevada, Las Vegas
Laura Wetzel	Eckerd College

E&O This Year

New Educational Affiliates	2
Undergraduate summer interns	10
IRIS/SSA Distinguished Lectures	17
Active Earth Display accounts	20
Total AS1 seismographs in schools	150
Teachers and college faculty attending IRIS workshops	150
Posters distributed	17,000
Students taught by IRIS-trained teachers	63,000
IRIS Web site visits, unique monthly visitors	2,000,000
Visitors to museums with IRIS/USGS displays	13,000,000