

Annual Report, 1999

SCEC Survey-Mode GPS Data Archive

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This project supports the collection and archiving of Survey GPS (SGPS) data gathered throughout southern California (distinct from the continuous GPS data from the SCIGN network). These data form an important input to the SCEC Crustal-Motion Model (CMM), since they cover many regions of southern California where few SCIGN measurements will be made.

The activities of the archive center include:

1. The collection of GPS data (data files and logsheets) from those investigators and agencies with GPS data of “crustal-deformation” quality at points of interest.
2. The conversion of these data to a standard RINEX format, with inconsistencies and incompleteness removed. These RINEX files are archived at the SCEC Data Center in Pasadena. As part of this conversion, we also produce a machine-readable file of “metadata” (information from the RINEX header and logsheets).
3. The construction of an index of geodetic monuments.
4. A cross-reference between monuments and data files.
5. Provision of the needed parts of the above information to the UNAVCO “seamless archive” effort, so that SCEC GPS data are widely available through a standard interface.

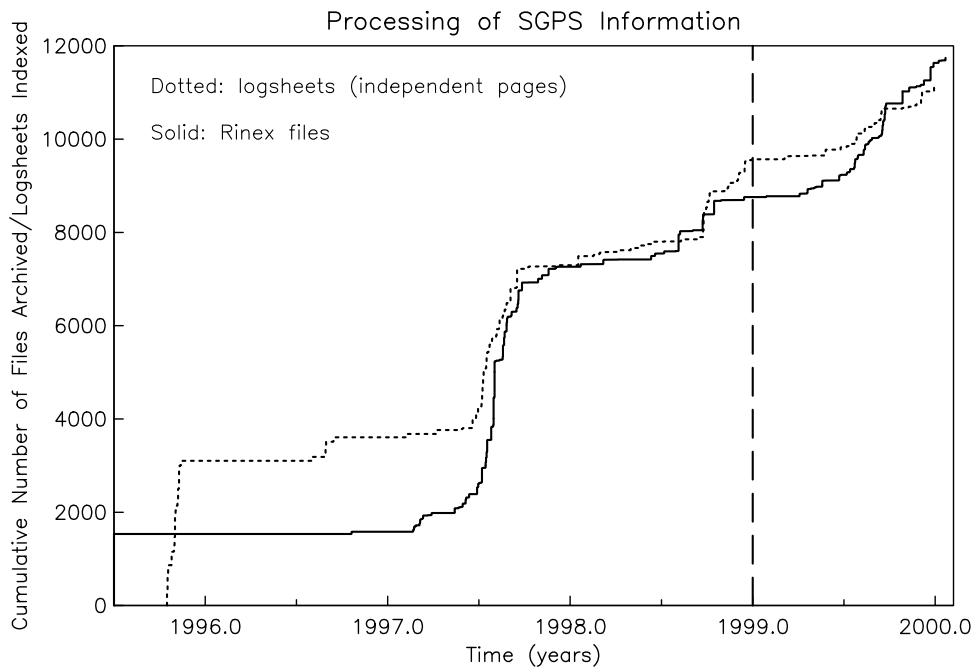


Figure 1

Current Activities

Our focus this year was on completing the above tasks for all data to be used in the CMM. We have come close to meeting this goal, in that essentially the entire backlog of data has been archived, most notably the data collected by the U.S. Geological Survey. **Figure 1** shows our progress, in terms of RINEX files present at the SCEC Data Center, and also in terms of logsheets we have indexed (a preliminary step in the processing). In the last year we archived 2985 RINEX files, bringing the total number of RINEX files at the Data Center to 11743. **Figure 2** shows the distribution in time of files archived in this and previous years. We archived many more files in 1999 than in 1998, partly because of the availability of data requested during past years, and partly because the archive system was used for several datasets being analyzed by the California Spatial Reference Center (CSRC), a joint SIO/Caltrans/NGS project to provide up-to-date spatial referencing for agencies in the State of California. During its pilot phase the CSRC has analyzed several surveys, and has adopted the SCEC Archive processing scheme for dealing with the data—a most useful form of outreach. (Funds for archiving these data have come from CSRC, not SCEC).

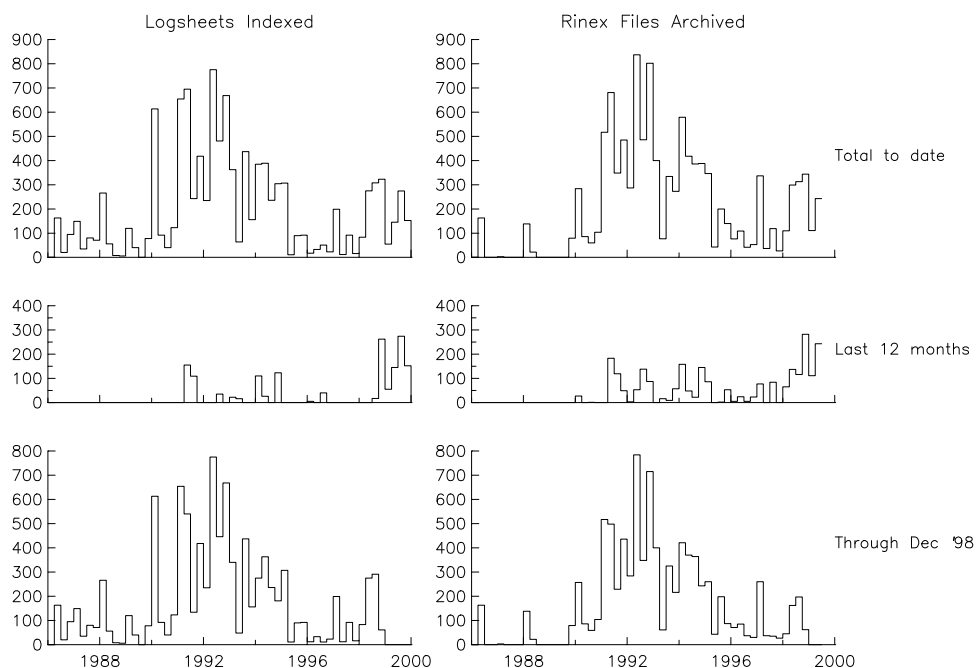


Figure 2

In addition, there has been the burst of data-collection activity created by the Hector Mine earthquake on 18 October 1999, which we are still dealing with. The effort put into the archive paid off handsomely in planning the SCEC SGPS response: having all the prior GPS data indexed made it easy to decide which points should be revisited to determine coseismic and postseismic measurements. The SCEC GPS archive has also provided a convenient single location for survey-mode data collected by a number of agencies; we expect it will see wide use by those interested in the deformations from this earthquake. We have so far archived 265 files from survey-mode GPS collected around this earthquake, and have another 385 such files in process; the large number of files comes from the many multi-day occupations. Of course, participating in the GPS fieldwork associated with the Hector earthquake also delayed some of

the archiving of other data; given the need to monitor possible postseismic motion, we were prepared to take time from this project to make such field measurements.

A major accomplishment this year was the challenging job of associating data files with sites: this is necessary because the ID's used in data files are not a consistent guide to where the data were gathered. Our index of geodetic monuments now includes 1159 points, each with coordinates good to 1 m, a unique identifier, a brief description, and a "SCEC official" 4-character ID. By various tests, including rough positioning of the file (using scripts developed by Li-Yu Sung at UCLA), comparison of file and monument ID's, and careful manual checking against the logsheets, we have been able to associate 10204 of the files archived with a monument. This includes all the files associated with points that will be used in the CMM; most of the remaining unassociated files are from single occupations of points, or from the CSRC data. After the association is made, the RINEX header is modified to contain the monument position. Having this consistently present, and also a table showing which file belongs with which monument, is essential to the subsequent automatic processing of the data, which was an aim of the Working Group this year—and has been successfully carried out.

Having the files associated also allows us to show, for example, how long it has been since particular points were last observed, which we do in **Figure 3**. The colored triangles in this figure show (in 2-year bins) when sites were last observed: something we made use of in devising our plans for fieldwork this year. (The red dots are discussed in the accompanying proposal).

We have continued to coordinate with UNAVCO's move towards a "seamless archive"; Johnson has played a major role in designing the final specifications. Under these, the SCEC Data Center serves as a "wholesaler", making indices of data available to other groups who would provide the actual user interface. As files are associated with sites, we put them into the seamless archive.

At the end of this period (partly with an eye to Y2K problems) we moved all our procedures from our (ancient) Sun workstation to a new HP system, taking the opportunity to make our programs and scripts more portable. As always, all the procedures and the format of all files of metadata have been fully documented.

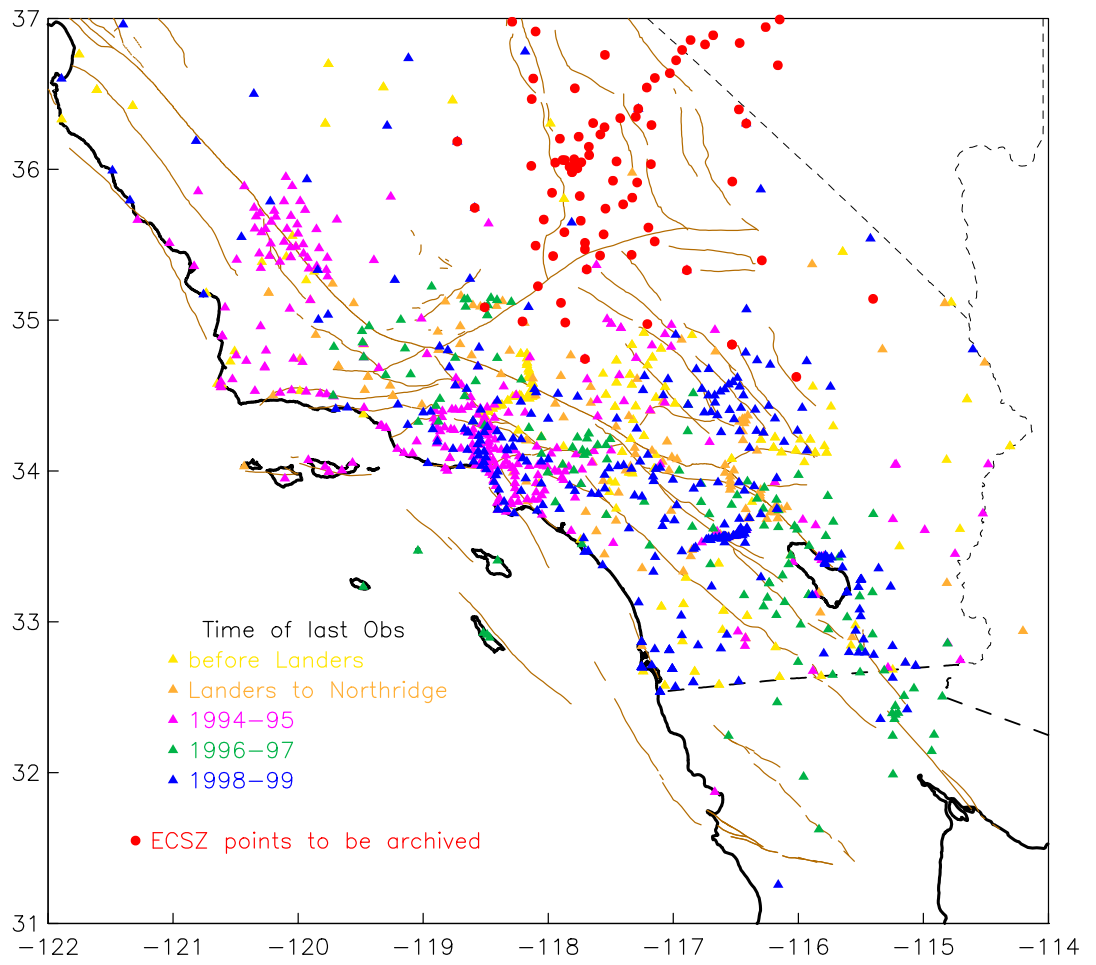


Figure 3