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SUBJECT: FALL 1993 MEETING OF THE AMERICAN GEOPHYSICAL UNION

Enclosed is a report on speical topics presented at the fall meeting of the American Geophysical Union which I attended from December 6 to December 10, 1993. Also included in the report are notes on an ad hoc meeting for regional and local seismic networks.

Original Signed by
Ernst Zurflueh

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FALL 1993 MEETING OF THE AMERICAN GEOPHYSICAL UNION

San Francisco, California, December 6 - 10

The AGU Fall Meeting was again a well attended event featuring many interesting papers. This year, however, some of the excitement of past meetings was lacking, because no special events had occurred during the year. Consequently, many of the papers tended to present further conclusions - even reiterations of previous results - on earlier earthquakes, such as the Landers and Cape Mendocino events. Again, a large number of poster papers were included. A trend started earlier seems to be the norm now, namely that each subject presented in an oral session is repeated in a poster paper. This has the advantage that a paper that was missed, for instance in a concurrent session, can be picked up at the poster session. On the other hand, it tends to make the meeting more monotonous with fewer results available overall.

In a general (Union) session on active tectonics, the kinematics and state of stress in the earth's crust as related to earthquakes were discussed. Results of Global Positioning System (GPS) measurements were prominent in this discussion. Herring presented an overview of capabilities that have been developed using GPS. Based on California data, horizontal positions of reference points are now measured with an accuracy of 3-5 mm, and vertical components are accurate to 10-20 mm. This permits determining crustal velocities to accuracies of 1-2 mm/y over distances of 10-500 km, and strain rate accuracies are 2×10^{-8}/y. Heights, the least accurate GPS component, are now competitive with first order leveling at distances greater than 300 km. A new development is a worldwide network of GPS tracking stations that provide very accurate determinations of satellite orbits. Accurate orbits, in turn, make data processing simpler and more accurate; they also permit automatic data processing. These developments promise that GPS results with up to three times greater accuracy may be attained in the future. Better orbits have also increased the accuracy of surveys in remote areas. Finally, the problems with selective availability and anti-spoofing imposed by the military have been overcome and are not significant anymore.

Bock reported on a permanent geodetic GPS array in Southern California. This array began with three stations in 1990, and was able to detect coseismic signals of 1 mm/day for two weeks during the Landers earthquake. Small postseismic deformations were detected 70 km from the surface rupture in locations where no preseismic deformation occurred. Stein discussed blind faults associated with young folds. These earthquake generating faults are present in the subsurface in areas where the crust is upwarped and under compression. A prominent example of this type of occurrence are the New Idria, Coalinga, and Kettleman Hills earthquakes. They form a sequence of earthquakes that progressed from northwest to southeast and are associated with folds in the subsurface. These and similar earthquakes were generated on low-dip surfaces at moderate depth. Geodetic and GPS measurements show that the folds grew (were upwarped) during the earthquakes. Whereas in faults that break through to the surface stress is relieved, the faults at depth generate large stress concentrations that lead to aftershocks. The overall process is that repeated movement on faults at depth builds up the folds associated with them. Because of the associated stress concentrations, it is also likely that these hidden faults eventually break through to the surface.

Peltzer et al. described the use of radar interferometry for measuring crustal deformation associated with earthquakes. Synthetic aperture radar (SAR) images using the ERS-1 satellite were used to map deformations resulting from the Landers earthquake. By differencing phase signals before and after the event, a contour map of deformations is obtained. The map provides very dense spatial sampling, deformation values agree with GPS data to 5 cm, and contours agree very well with a theoretical elastic deformation model. Hauksson analyzed the stress field before and after the Landers earthquake. The Big Bear event rotated the stress field 9-23° westward in the central zone, and Landers rotated it back to the previous direction. The Landers event, thus, recharged some of the stress in the area of the Joshua Tree earthquake. The Eastern California Shear Zone seems to be a weak zone and a stress refractor like the San Andreas fault.

A poster by Ebel analyzed focal depth of earthquakes in New England. Focal depths derived from arrival times alone are often poorly constrained because of insufficient density of seismic stations. Ebel found that the time when the P-waveform reaches maximum amplitude is controlled by source depth within a range of a few hundred km. This fact can be used to obtain a better estimate of focal depth. Mirecky and Rosenbaum presented a poster describing analysis of sediments from Reelfoot Lake. A disturbed layer, dated at about the age of the 1811/12 earthquakes is correlated with the New Madrid events. Below this layer, sediment properties indicate wetland sources; above the layer, pollen, etc. shows that cultivated fields surrounded the lake. This may point to an elevation change in the area.

Sieh presented a paper on the accomplishments of paleoseismology. Paleoseismology has changed the situation that existed two decades ago, when the historical or instrumental record was the only information available for estimating earthquake recurrence. Investigations in the Landers area have shown that the 1992 earthquake was a very rare event. A previous event occurred 9000 years ago, as documented by lake sediments offset by the Emerson fault. It is not certain that the earlier event had a multiple-event fault pattern like the Landers event, but other faults in the area appear to have ruptured at about the same time.

A paper by Zoback et al. described the complexity of faulting resulting from the 1906 San Francisco earthquake. The earthquake seems to have nucleated offshore next to the Golden Gate. Seismicity recorded since 1969 shows activity north of the Crystal Springs reservoir and south of the peninsula with a gap in between. South of the peninsula, the activity is off the San Andreas fault (SAF) but parallel to it on both sides. Focal mechanisms show a pattern of both normal and strike-slip faulting in the epicentral area. Right-lateral strike slip occurs on planes subparallel to the SAF and reverse faulting on north to north-northwest trending planes. The area from San Francisco to Point Reyes corresponds to a right step in the SAF, and reflection profiles have found a 2.5 km wide graben filled with Quaternary sediments in this area. Analysis of data from the 1957 Daly City earthquake shows that a northeast-southwest trending fault may extend across this area.

Kanamori analyzed earthquake mechanisms from broadband recordings. He found that a plot of energy radiated/seismic moment (Es/Mo) characterizes the radiation pattern of an earthquake. He distinguished four general cases of rupture: an abrupt rise (slip-lock) model, a normally fast rise, overshoot (slow earthquake rupture), and creep, which produce increasingly flatter curves on the plot. The slip rate depends on the strength of the fault; on the San Andreas, for instance, we would expect low stress drop. The Landers earthquake, which progressed from south to north, produced a markedly asymmetric radiation pattern, showing that the assumption of spherical propagation generally is not justified. The 1906 earthquake was of surprisingly short duration, considering the length of rupture; heterogeneity must have been involved here. In general, earthquake sequences are very complex and usually involve more than one mechanism.

Williams et al. presented new data on the Rodgers Creek and Pinole faults. High resolution seismic reflection data from San Pablo Bay, acquired as a follow-up to the 1991 BASIX surveys, have provided new information on the structure in this area. A new reverse fault, named the Pittsburg-Kirby Hill fault was found, and it was determined that the Concord-Green Valley fault creeps at a rate of about 4 mm/y. Investigation of the area of the right step of the Hayward fault to the Rodgers Creek fault under the bay shows that the Pinole fault, previously considered inactive, extends into the bay and links up with the Rodgers Creek fault. Growth features (differences in sedimentation thickness from one side of the fault to the other) were found; the features prove that repeated vertical offsets have occurred on the Pinole fault and that the fault has produced three major quakes in the last 8000 years.

A paper by Murray et al. analyzed the coseismic and long-term deformation at Cape Mendocino on the basis of geodetic (both GPS and normal geodesy) and marine terrace data. The 1992 Cape Mendocino earthquake caused an uplift of about 1 m and ruptured the Cascadia Subduction Zone. Nonlinear and Monte Carlo modeling, together with an uplift rate of 4 mm/y based on marine terraces, leads to an estimated recurrence rate of 100-200 years for such an earthquake.

Thermoluminescence (TL) dating methods were described in a poster by Benoit et al. These methods have, in the past, been applied to loess deposits up to 800 K years old using quartz. The investigators looked at the feasibility of using feldspar for TL measurements. In the past, it was shown that feldspars exhibit anomalous fading and assumed that they are, therefore, not useable. Because TL fills in a gap in dating between 40 K and 150 K years (roughly the upper and lower limits, respectively, of the C-14 and K-Ar methods) an effort was made to study the problem of anomalous fading. The reason for this phenomenon is unknown, although it may be caused by electron tunneling. It was found that the absolute induced TL intensity depends on the composition of the feldspar, with albite showing higher intensity than anorthite. From cathodoluminescence images, however, it was determined that this is caused by a change in wavelength rather than in total intensity. It was also found that anomalous fading occurred only in a limited number of feldspar samples. Furthermore, using an induced glow curve, anomalous fading can be identified and a correction factor applied. Thus, feldspars should be useable to determine TL ages. TL is sensitive to temperature, and the age determined refers to the last thermal event that exceeded a few hundred degrees C. No statement was made on the accuracy of the method.

Oglesby and Archuleta investigated the Nahanni and Petrolia (Cape Mendocino) earthquakes with respect to the phenomenon that very high ground acceleration may be measured at some locations but not at other locations nearby. The Nahanni event produced accelerations of 2 g and the Petrolia earthquake 1.5 g, approximately. They tried to explain this phenomenon on the basis of a rupture model that may concentrate ground motion at certain locations. They used a circular rupture on a dipping fault and found that, at a point of symmetry on the surface, the ground motion is concentrated both with an implosion or explosion type motion on the circular rupture. However, the implosion produces greater accelerations and was, therefore, pursued in the modeling. In the case of the Petrolia earthquake, this model applied to a fault dipping 13 east, produces a pattern very similar to the one observed in the field with accelerations of 2-2.5 g in a narrow area.

Jackson et al. reported on a project of the Southern California Earthquake Center with the aim of defining seismic hazards in southern California. They studied combinations of fault segments with associated magnitudes using a combination of geology, geodesy, and seismic catalogs in order to determine the rate of moment release. In comparison to plate tectonic models, the seismic model overpredicts earthquakes of magnitude 6 and 7 by a factor of about two or three. This shows that the last 150 years are not a typical interval for this area. Using segments of major faults, a probability of 50% is estimated for an earthquake of magnitude 7 in the next 30 years. Including distributed events, that is those occurring on more obscure faults, this probability increases to 70%. In these estimations, M_{max} is important but not well known.

Stein et al. studied how stress changes induced by an earthquake can trigger another event on an nearby fault. They used the Coulomb criterion to calculate stress changes on the SAF induced by the Landers earthquake and found that the event increased stress in certain locations. They also found that the predicted pattern of stress increase correlates closely with observed aftershocks. They also predict that the Landers effect will increase with time.

Goes and Ward analyzed earthquake recurrence data to test the regularity commonly associated with the seismic gap theory. Data from the SAF showed that, for events smaller than m=7, clustering was the dominant mode of recurrence, whereas larger events showed a higher degree of regularity. These results are not influenced by choice of fault segments, and they are confirmed by the paleoseismic record at Pallett Creek. A more general analysis of earthquakes around the world again showed that larger events seem to recur with greater regularity than smaller ones. It was also found that short data sets tend to underestimate the aperiodicity. Thus, it seems that the data do not support the regular recurrence of events usually assumed for the seismic gap theory.

In a session on tsunamis, Bernard et al. estimated flooding potential for northern California from tsunamis. Observations from the Cape Mendocino earthquake show that the earthquake produced both uplift and a tsunami. This happened at low tide, and the largest wave energy arrived 4 hours after the earthquake. They then attempted to model tsunami hazards on the coast of northern California from subduction earthquakes, as calibrated by the Cape Mendocino event. They used a two-step modeling process. First, a linear model is used to estimate the wave generated by as fault in the offshore area to about 50 m depth. At that depth, the maximum amplitude was 2.8 m. Second, a nonlinear runup model was employed to estimate the effect on the coast. The runup in shallow water was estimated to be 10 m. However, as was clear from other papers in this session, computed runup figures are usually lower than the observed wave heights. For instance, the Hokkaido-Nansei tsunami produced runup about 10 m higher than the models showed. The Alaska earthquake also produced a tsunami with much higher runup than calculated because of local effects. Thus, the runup in northern California might be as high as 20-30

Beaudoin reported on the Mendocino Triple Junction Seismic Experiment, an effort involving four universities, the USGS and the Geological Survey of Canada, and lesser contributions of other institutions. In 1993, two 300 km east-west profiles and one longer north-south profile were measured with both refraction and reflection. A total of 27 shots were used to acquire the data. Preliminary results reveal a strong reflection from the subducted Gorda slab north of the triple junction, and very strong near-vertical reflections from the lower crust/upper mantle in the transform region near Clear Lake. Future work will include ocean bottom seismometers deployed in a 3-d array near Cape Mendocino.

Walters et al. described the re-analysis of COCORP data from the Williston basin. Reprocessed profiles and additional vibroseis and dynamite surveys provide new insight into the structure of an Early Proterozoic suture between the Wyoming craton and oceanic and microcontinental terranes of the Trans-Hudson Orogen (THO). As was expected, the dynamite data proved to be superior for defining very deep reflections. The structure of the THO is interpreted to be a west-dipping subduction zone. The THO also shows structure that is similar to that of other orogens of very different ages, such as the Appalachian orogen and the Alps. A strong upper mantle reflection is found at 20-25 s reflection time.

A poster by Bonamassa et al. attempted to analyze the Loma Prieta data using two perpendicular P- and S-wave refraction profiles. They were tomographically inverted, using a travel time inversion without ray path calculation. The results show that the scatter in the earthquake data is caused by shallow geologic features and not by surface topography.

A poster by Schweig et al. showed evidence for the recurrence of strong earthquakes in the New Madrid region during the past 5000 years. Several sites were investigated, and sand blows of various ages were found. C-14 dating shows that all the events are less than 5000 years old. In one location, a large sand blow is crosscut by a younger sand blow that may have been formed during 1811/12. Near that site, other investigators have found evidence for two pre-1811 earthquakes within the last 2000 years. Overall, these and other data support a recurrence interval of a few thousand years or less for strong ground shaking in the New Madrid area.

Tuttle et al. presented a poster describing a large sand blow in northeastern Arkansas. Indian artifacts yield an age of 800-1100 years before the 1811/12 event, an age that is consistent with the soil development above the sand blow. Other, similar sand blows show that a large earthquake occurred in the New Madrid area at that time.

A poster by Fenton et al. described an analysis of northern Ontario seismicity for nuclear waste studies. Because of low seismicity and very limited data in time, the investigators used comparisons with Ungava and other Precambrian shield areas. They estimated the rate of damaging earthquakes and surface ruptures in Northern Ontario by looking at rates of instrumentally recorded seismicity in such areas and then extrapolating a seismicity rate per unit area to Ontario and tying it to levels of microseismicity at m=2,3 recorded in the area. Although studies in Sweden and Scotland show that surface ruptures have been common in those areas in the postglacial period, few such examples have been found in eastern Canada. The example of the Ungava earthquake shows that evidence for ruptures may be difficult to decipher.

Theodulidis et al. described the use of Horizontal to Vertical Spectral Ratio (HVSR) in a poster. This ratio has been recently used to define site effects. The stability of HSVR was analyzed using high-sensitivity accelerometer data from the Garner Valley downhole array. Theoretical and experimental data show that the HSVR shape is stable and correlates with local geological structure. The shape of the ratio is insensitive to source location and mechanism, but its absolute level seems to depend on the wave field.

Katz and Aki presented a paper on earthquake prediction based on neural networks. One-dimensional and three-dimensional equations were used to predict a deterministic function (not probability) for earthquake occurrence, named the danger function. A cascading assembly of neural elements was used, which is similar to a scheme that is used to predict porosity for rock mechanics. Stability of the algorithm has to be balanced against sensitivity to input data. The system is sensitive to some of the 17 parameters used, others are less important. A time window of 15-25 months before the event is needed, and the predicted value depends on the choice of the window. Overall, the scheme worked well, and a prediction of the Landers earthquake was made before the event occurred. Using the 3-d function, this was a prediction of both the location and the time of the event.

Fraser-Smith and McGill reported on earthquake precursors measured from variations of the natural ULF magnetic field. As was previously reported, an array near Corralitos measured a signal 10 times the background level two days before the Loma Prieta earthquake. They now have several arrays operating in California. The signal recorded by individual stations is remarkably stable over large regions. By taking differences between stations, the natural variations can be eliminated, and the sensitivity increased. It appears that there is a threshold of m=5 for detecting earthquake related electromagnetic signals.

A special session on the Cascadia subduction zone repeated a lot of facts that were known already and added a few new ones. Obermeier et al. reported on liquefaction studies along the Columbia River. Numerous liquefaction features have been found in the tidal reaches of the river; some new features were found recently farther up the river, including an area east of Portland. Some of the liquefaction found in cores occurs in high blow count sands, with blow counts of about 20, indicating large accelerations. The features found in this area strongly indicate that, about 300 years ago, a coastal subsidence event along the Cascadia subduction zone was accompanied by shaking in the inland areas.

Palmer et al. performed a geotechnical survey along the Columbia River with the aim of estimating the minimum peak acceleration during the subduction zone earthquake of 300 years ago. Results suggest that loose, clean sands could liquefy up to 100 km inland for an m=7-8 earthquake. For Wallace and Deer Islands, liquefaction in medium dense clean sand would indicate a magnitude greater than seven, and in medium dense silty sand the magnitude would be between seven and eight. These results are still preliminary, and further work will follow.

Kelsey et al. investigated river and lake sediments in the Cape Blanco area in Oregon. The data suggest that there were three tsunamigenic earthquake events in the last 2000 years. Two of these events were also accompanied by liquefaction. It is significant that for all three events, coseismic subsidence is indicated and not uplift.

<u>Meeting of the Council on the National Seismic System</u>

On Monday evening, December 6, the Council on the National Seismic System (CNSS) held a meeting. John Filson of the USGS led the discussion, and he was assisted by Walter Arabasz of the University of Utah. Filson explained that the charter of the Council specifies that U.S. institutions and any interested individuals may be members. At the start, the question of funding and its stability was raised, particularly with respect to eastern networks. Presently the networks are funded by the USGS on a three-year cycle. Filson promised that the funding would be continued at about the same level. Rob Wesson pointed out that any increase in network funding would have to come out of the topical research program and that this is not feasible. It was then suggested that industrial concerns might be invited to participate, and it was pointed out that Union Pacific Corp. has attended meetings of the Council. Another suggestion was that funding through the National Earthquake Hazard Reduction Program should be increased.

Next, individual working groups reported on their activities. Bill Ellsworth reported on Rapid Detection and Notification. This involves integrating information from different networks in order to provide rapid earthquake notification to the public. Tom Heaton mentioned that southern California has such a system, and it is being expanded into northern California. He also mentioned that a new journal will come into existence, with John Ebel as editor, that includes information on the National Seismic System (NSS).

Steve Malone reported for the working group on Data Archiving and Exchange of the CNSS. The group's goals are to produce a report, encourage archiving of data and emphasize common and desirable aspects of data to be archived. IRIS is mostly involved in international aspects of archiving, but is also involved in the NSS. All data centers use WORM type optical juke boxes; IRIS uses robot tape changers. For the exchange of data, he suggests the SEED format which has available conversion routines to AH, SAC, CSS; or CUSP which can be translated to AH; and AH itself. For a test, Steve tried to access data using Internet, finger, ftp, autodrm, and the bulletin board. The data selections he obtained using these routines all turned out to be different. There are now four data centers in existence, and Virginia Tech, for instance, should join one of them.

Art Lerner-Lamb (for Bill Menke) reported on the Hardware and Software working group. They have identified four topics for discussion: a) What role will the NSS have in the next five years, and what hardware and software will be needed? b) How can costs be lowered? c) How can hardware and software development be funded? d) How to prioritize?

Bob Page described activities of the Instrumentation subgroup. He mentioned that NSF has discussed strong motion seismology with them, and the conclusion is that this working group will handle this subject. It has been determined that both the interests of seismology and seismic engineering can be served with digital instruments. Other issues to be looked at relate to data types and formats. John Ebel, heading the working group on Meeting User Needs with NSS, said they are looking into interaction with state governments and how to interact with the public and press.

Jer-Ming Chiu (for Arch Johnston) discussed Rapid Deployment of Portable Instruments. The working group has not been formed yet. He said that instruments for deployment will be needed and mentioned that coordination will be needed to cover future events. For instance, various institutions going to Landers resulted in chaotic deployment. Tom Heaton countered with the opinion that there is no harm in overlapping coverage of some areas. He considers integrating the data once they are collected to be a much bigger problem, which is a data management question. He also mentioned that the Applied Technology Council (seismic engineering) is very interested in this subject.

Carl Johnson of the University of Hawaii has been working on the exchange of data over the Internet. He has developed an event picker and an associator that looks at large amounts of data and correlates them. Peter Ward related that a IASPEI committee under Karl Fuchs is using the SUDS format with associated filters. An announcement related to this is attached. The University of Alaska also uses SUDS for their seismic array. One of the advantages of this system is that it is applicable to seismic refraction and reflection; it is also truly machine-independent and can be used on PCs, workstations, etc. They are working on a graphical user interface (related to ZINC) that will simplify the use of the system. A major goal of SUDS is to reduce the programming load on seismic analysts.

As a final item, John Filson asked if meetings of the CNSS should be held at society meetings, such as the AGU, or in individual working groups. A member of the audience suggested that work group meetings could be most effectively conducted over Internet. A second comment was that telephone conferences would be even better. The meeting was then adjourned without a firm conclusion on this point.

International Beta-test of the Seismic Unified Data System

December, 1993, to April, 1994

The MEMSAC Committee of IASPEI and ILP is leading an international Beta-test of SUDS Version 2.5 with the intent of establishing an international standard **SUDS Version 3** by May, 1994. Large seismic data sets will be converted to SUDS-3 and it is the intent of the committee that this standard will be fully supported and upward compatible with all future versions of SUDS, under the auspices of an international standards committee. **We urge you to use this opportunity, before the standard is adopted, to evaluate whether SUDS will meet your needs and whether there are small changes to the standard that would improve the way SUDS meets your needs.**

SUDS is a machine independent, operating-system independent, computer-manufacturer independent data format, relational data model, processing environment, and programmer's toolkit (EOS, v. 73, no. 35, p.380, 1992). SUDS was designed for seismic data of all types but applies to any data from any discipline that can be represented in tables of information and arrays of data.

> **The primary focus of SUDS is to make it easy to merge data of all types internationally, to process the data, to write processing programs and to exchange processing programs.** SUDS is also ideal for data exchange and archiving.

> **The primary goal of SUDS is to reduce the monetary and person costs of exchanging and processing seismic data by fostering machine independence and widespread sharing of program development.**

The most complete input to the design of SUDS has been from the viewpoint of regional seismic network processing and major refraction and seismicity experiments with portable instruments. It is the intent of SUDS to apply equally well to strong-motion and reflection seismic data. We strongly encourage evaluation and input from any aspect of seismology.

Representatives from seismic equipment manufacturers including Geotech, Kinemetrics, Lennartz, Nanometrics, and Refraction Technology have agreed to provide filters that convert from their output format to SUDS when the data are being combined in a field computer. Lennartz has committed to output SUDS data directly from the field recorder. Filters are currently being refined to convert data from Canadian, Geotech, Lennartz, and RefTek/Passcal field recorders. Filters are also being refined for conversion of seismic network data for Central California and Alaska. SUDS was designed to be a superset of common seismic data formats such as AH, CSS, CUSP, SAC, SEED, and SEG-Y.

Major software packages that currently allow SUDS input or are seriously considering allowing SUDS input include XPICK, SAC, GEOTOOL, PITSA, DISCO and PROMAX. SUDS includes a subroutine library and many commands for selecting, utilizing and listing SUDS data. A subroutine library is presently being developed for visualization within the Zinc Application Framework, a graphical users' interface that works within X-windows, MS-Windows, MAC-windows and other window systems under most popular operating systems and computer types, providing machine independent analysis software. SUDS is ideally suited for use with relational database management systems and prototype seismic databases are being implemented in Sybase and the Raima Data Manager (formerly db_Vista).

Major data sets are being converted to SUDS format. The USGS intends in 1994 to make Central California Seismic Data available over Internet through a SUDS database system and files within the mass storage system located at the University of California, Berkeley. The University of Alaska intends in 1994 to make their seismic data available in a SUDS database system over Internet together with complete SUDS data on CDROM. Members of the MEMSAC committee intend to make major sets of refraction data from North America and Europe available in SUDS format in 1994.

SUDS, Version 1, was ported to PCs running MS-DOS and is called PC-SUDS. It is the data format for the IASPEI Software Library (distributed by SSA) that is used at more than 50 locations worldwide. SUDS-2 is a substantial upgrade to provide machine independence and a relational model. PC-SUDS will continue to be maintained and supported as a subset of SUDS-2 on PCs only. A simple migration path will be provided to convert data in both directions between PC-SUDS and SUDS-2 and to run SUDS-2 on 80386 and later PCs.

SUDS-2 is not presently a turnkey environment for processing your data. There is still much work to be done and it will go faster with teamwork. SUDS is well enough developed and established in the seismological community that you are likely at some point to want to use SUDS data and you are likely to find that SUDS will be making it easier for you to meet your data-processing needs. **We strongly encourage you to consult the SUDS manual, try converting some of your data to SUDS, try converting one or more of your analysis programs to SUDS, and provide your evaluation to us before April, 1994.**

The basis for the Beta-test is SUDS Version 2.5 that will be available in mid-December, 1993, after input from the recent MEMSAC meeting has been included. The manual in PostScript format and the UNIX version of the software will be available via anonymous FTP from the computer **dmc.iris.washington.edu** in the directory **pub/suds/suds_2.5**. Printed manuals and software versions for PCs and Macintosh are available from **ward@andreas.wr.usgs.gov** (Peter Ward, USGS, MS 977, 345 Middlefield Road, Menlo Park, CA 94025; 415/329-4736). Technical questions and requests for help should be sent to the same address. An email discussion group is becoming active and may be accessed by using **rlogin dmc.iris.washington.edu -l bulletin** with password **board**. You can contribute by mailing your comments to **suds@dmc.iris.washington.edu**. You can also request to have the discussion broadcast directly to your email address.

Karl Fuchs, Chairman

Mega Earth Mobile Seismic Array Consortium

(MEMSAC is described in EOS, v. 74, no. 37, p. 421, 1993)

International Lithosphere Program (ILP)

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