California's Quakes: Narrower Odds

The date of the next great California earthquake well may be the hottest number in the West. While the precise timing of the long-heralded event still eludes scientists, they are making the boldest estimates yet for when earthquakes may occur along specific segments of the San Andreas fault.

The fault, a jagged northwest/southeast trending gash through the state, is subject at various points to different stresses and kinds of movement. Two teams of researchers, working independently, have come up with remarkably similar probabilities for large quakes along nine segments of the restless seam between two of the earth's moving crustal plates. The estimates were reported at the recent meeting in San Francisco of the American Geophysical Union. The researchers' methods involve simple statistical approaches that incorporate the date of the last large quake along a given stretch, and the average or expected interval believed to elapse between quakes.

The fault's northernmost expanse — including San Francisco — is unlikely to suffer a recurrence of the great 1906 quake in the next 30 years, the scientists agree. While they are uncertain when the last quake of that magnitude occurred in northern California prior to 1906, the researchers believe too little stress has built up since then to allow a repeat of that devastating, magnitude 8.0 event. Still, from west of San Jose to San Juan Bautista, they say, the chance for a magnitude 6.0 to 7.0 quake is about 30 to 60 percent in the next 20 years. The chance for such a temblor is slight on the central portion of the fault, from Parkfield (midway between Los Angeles and San Francisco) north to Hollister.

The highest probability for a great quake of magnitude 8.0 is for the southern third of the fault, which extends for about 200 miles from Cajon Pass, past San Bernardino, and down to the Salton Sea. There is a 25 percent chance that a great quake will happen there in the next 20 or 25 years, researchers say. The researchers involved are Allan Lindh and William Ellsworth of the United States Geological Survey (USGS) in Menlo Park, Calif.; and Stuart P. Nishenko of USGS in Denver and Lynn R. Sykes of Lamont-Doherty Geological Observatory in Palisades, N.Y.

The most intense interest is riveted on the sparsely populated stretch from Parkfield south to the tiny town of Simmler. Three quakes of moderate size have occurred near Parkfield since 1922. The last of these was in 1966 and seismologists are using the area as a laboratory for earthquake prediction. In 1934 and 1966, sequences of foreshocks preceded the main quake, and scientists now scrutinize every tremor for its precursory value.

Lindh and Ellsworth told reporters that there is a 75 percent chance that a magnitude 5.5 to 6.0 quake will strike at Parkfield in the next 20 years, but they are braced for the fault to lurch into motion at any time. On May 2, 1983, when a magnitude 6.5 quake shook through Coalinga, 20 miles to the north (SN: 5/21/83, p. 329; 12/17/83, p. 388), the array of sensitive creep meters near Parkfield showed that the earth there was slipping — an alarming development because substantial slip is suspected to have preceded the 1966 quake. But the creep leveled off, and in a puzzling turn of events the movement has actually reversed, a phenomenon that scientists cannot explain.

The willingness of scientists to state more precise odds for quakes along specific fault segments has grown partly from work conducted over the past few years by Kerry Sieh of the California Institute of Technology in Pasadena. Through painstaking excavation of a deposit at Pallett Creek in Southern California, he pieced together the earthquake history for that site over the past 1,500 years. He found that 10 quakes of magnitude 8.0 took place during that interval, an average of one every 145 years. The finding, Ellsworth says, has furthered the concept of recurrence intervals, and has encouraged seismologists to try to establish probabilities based on the most detailed information that can be gathered about earthquake histories at specific sites. *—C. Simon*

A BASIC standard for digital dialects

A new dialect, True BASIC, will soon join the long list of computer languages that computers, from small personal machines to giant mainframes, can "speak" and understand (SN: 9/24/83, p. 202). This new version of BASIC is the first announced attempt to implement a forthcoming national standard being developed for the language. It is also the handiwork of John G. Kemeny and Thomas E. Kurtz, who invented the original version of BASIC in 1964 for use at Dartmouth College in Hanover, N.H.

BASIC is now practically a universal computer language. Almost every small computer automatically comes equipped with at least one version. However, these hundreds of different implementations have created a bothersome Babel of digital dialects that make it difficult to run a computer program written in one version of BASIC on another computer using a different form of BASIC. To help bring some stability to this chaotic situation, in 1974 a subcommittee of the American National Standards Institute (ANSI) began the long, slow process of developing a voluntary standard for BASIC. A "minimal" BASIC standard appeared in 1978, and the "full" BASIC standard may be ready in about a year.

Meanwhile, Kurtz, who chairs the ANSI subcommittee, and Kemeny saw a chance to perfect their language and to introduce quickly a structured version of BASIC that meets the specifications of the new standard. Kemeny says that the sense of urgency was partly a response to some "pretty bad" implementations of "old" BASIC that helped give the language a bad name in some computing circles. The original edition of BASIC, although copyrighted, was distributed freely to anyone who wanted to use it. This time, Kemeny says, "we were worried somebody was going to rush out a really bad version of structured BASIC." To forestall this, Kemeny and Kurtz came up with True BASIC.

Like the standard, True BASIC is a much bigger and more complex language than the original BASIC. It adds the concept of structured programming so that a programmer can write software in small, clear segments and use these to build larger programs. A graphics module makes it easier for people to draw pictures on their computer monitors. Although the new language is "vastly more powerful," it is built in such a way that a beginner can still learn enough to write a simple program without delving into complicated details, a popular feature of the original edition, Kemeny maintains.

Kurtz and Kemeny have formed a company to produce and sell their new edition of BASIC aimed primarily at schools and colleges. Kemeny says, "We're going to try hard to keep the price as low as possible because we'd like to see the language get around as widely as possible." The group will start testing a True BASIC prototype next month at Dartmouth. A version for the IBM personal computer should be completed by September, with implementations for other computer brands following at three-month intervals.

John Cugini of the National Bureau of Standards in Gaithersburg, Md., a member of the ANSI BASIC subcommittee, says that anyone is free to develop a version of BASIC that meets the standard. He suspects that several companies are working on their own implementations already, although they may be reluctant to commit themselves publicly at this time. Cugini says that current plans call for the federal government to adopt the ANSI standard, once it is officially approved. This would push companies interested in selling BASIC-using equipment to the government into making sure it meets the standard specifications. *—I. Peterson*