Earth Science

Richard Monastersky reports from Baltimore at a meeting of the American Geophysical Union

Kobe in California

When a major earthquake crippled Kobe, Japan, on January 17, it sent waves of concern rippling through Oakland, Calif., half a world away. To a geologist, Oakland and other cities east of San Francisco Bay bear a disconcerting resemblance to the Japanese city. Like Kobe, Oakland sits directly atop a fault, the Hayward, and parts of the city are anchored in soft, bayside sediments. Scientists warn that the Hayward fault has a one in four chance of producing a magnitude 7.0 earthquake by 2020.

This east bay fault last generated a major quake in 1868, but the region was so sparsely populated at the time that geologists lack even the most basic information about the extent of ground movement along the fault. By sifting through old surveying measurements, Ellen Yu and Paul Segall of Stanford University have managed to fill in some of the missing details.

Yu dug into surveys of the Bay area dating from 1853 to 1891. Because the studies bracket the time of the 1868 quake, Yu and Segall could calculate how much the land had shifted during the quake. The old data lack the precision of modern measurements, but they nonetheless provide important information, say the scientists. They plan to apply this technique to the study of other old earthquakes.

Geologists had previously estimated that the 1868 quake moved the ground 1.5 meters along a 35-kilometer-long segment of the fault. Yu and Segall calculate that the segment probably reached closer to 50 km in length, extending into present-day Berkeley.

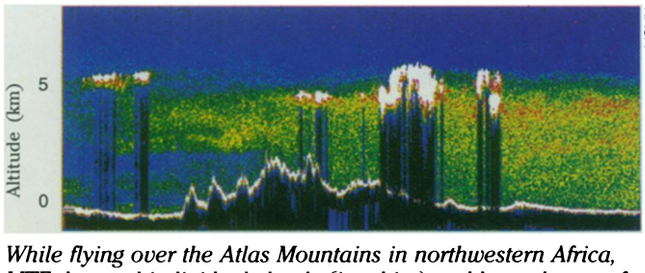
Space laser illuminates clouds

A powerful laser flown on the space shuttle last September captured unprecedented images of the cloud blanket enshrouding Earth, reports a team of atmospheric scientists. The laser tool, known as a lidar, offers a means of studying the natural clouds and pollution that influence the planet's climate.

A variation on radar, lidars detect objects by using laser beams instead of radio waves. Scientists routinely use ground-based lidars or fly them in airplanes to study the atmosphere. But NASA's Lidar In-space Technology Experiment (LITE) marks the first time a lidar has flown in space, says Patrick McCormick of NASA's Langley Research Center in Hampton, Va.

Pointing toward Earth from the shuttle's cargo bay, the $20 million lidar emitted a beam of light and then measured the amount that reflected off clouds and haze in the atmosphere. Unlike traditional weather satellites, LITE could penetrate high clouds to detect the lower-level ones that control weather. The lidar could also measure haze and other types of clouds invisible to weather satellites. LITE showed scientists for the first time that U.S. pollution crosses the Atlantic rather than getting cleaned out of the atmosphere by rain, as researchers had expected.

According to McCormick, the results coming from the project argue for flying a lidar on a future satellite. But it will have to compete against other promising technology for shrinking funds.



NASA

While flying over the Atlas Mountains in northwestern Africa, LITE detected individual clouds (in white) and long plumes of desert dust (gold).

A date for all people

Cesare Emiliani has a few complaints about the Gregorian calendar used by much of the world. The split between B.C. and A.D., he says, confuses arithmetic computations because there is no zero year. While time moves in only one direction, year numbers grow larger going both forward and backward in time. What's more, the calendar defines time relative to an event that holds little meaning for non-Christians, who make up more than half the world's population, according to Emiliani, a geoscientist at the International Academy of Sciences in Palm Beach Gardens, Fla.

As a solution, he suggests pushing back the starting date of the calendar 10,000 years, making the current year 11,995. Such a revision would have the beginning of the calendar coincide with the start of the current geologic time period, the Holocene epoch. This time has important worldwide significance because it marks the end of the last ice age and the beginning of agriculture, says Emiliani, who organized a session of historians and scientists to discuss the idea.

The resetting requires only simple arithmetic: add 10,000 to all A.D. years and subtract all B.C. years from 10,001. After the turn of the century, people could adopt a shortcut by replacing the number 12,000 with an apostrophe. The year A.D. 2001 would then become '1.

Has the time arrived for calendar reform?

"There are great advantages for certain people, but there are no advantages for others," admits Emiliani, who has been pursuing the idea for several years.

Comparison of notable dates in the present and proposed calendars

Event	Calendar	
	Present	Proposed
Approximate start of Holocene	10,000 B.C.	1
Approximate founding of Jericho	7000 B.C.	3,001
Founding of Rome	753 B.C.	9,248
Birth of Jesus	1 B.C.	10,000
Discovery of America	A.D. 1492	11,492
Start of the next millennium	A.D. 2001	12,001

Sprites captured above Amazon

Braving hair-raising electrical storms, a team of atmospheric researchers chased fleeting flashes of red light high above South America during an aircraft expedition in February. These researchers went in search of red sprites, a recently discovered phenomenon that has yet to yield to scientific explanation.

Davis D. Sentman of the University of Alaska in Fairbanks and his colleagues had spent the last few summers in the United States studying sprites and a rarer type of blue flash above thunderstorms in the Midwest. Scientists know that thunderstorms play some role in creating the red and blue fireworks, but the bursts occur much higher in the atmosphere than normal lightning does.

Sentman and his colleagues decided to take their search south, because equatorial storms generate the bulk of the planet's lightning. "Given the difference between the midlatitudes and the equatorial storms, we wanted to know if the equatorial storms are also the globally dominant source of sprites and blue jets," says Sentman.

In the six flights out of Lima, Peru, the scientists detected 20 sprites but saw no blue jets. They reason that during their flights, the storms never reached the intensity of the giant thunderstorms they saw over the United States.