Earth Sciences

Cheryl Simon reports from San Francisco at the meeting of the American Geophysical Union

Sea level rise tied to glacial changes

In the last century the level of the world's oceans has risen about half a foot, and scientists have been grappling for an explanation for the rise. It is too soon for the warming some expect from the increasing levels of atmospheric carbon dioxide (CO_2) to melt the polar ice caps, and thermal expansion of the oceans accounts for only about half of the measured rise.

Now, Mark Meier of the United States Geological Survey (USGS) in Tacoma, Wash., suggests that melting from the world's mountain glaciers has added enough fresh water to the oceans to make up the difference. The change has occurred not at the great ice sheets that cover Antarctica and Greenland but at the small glaciers that cover only one-thirtieth as much land. Meier says that records from 1965 through 1975 on fluctuations of glaciers show little or no change in global net balance for small glaciers, but longer-term records suggest that since 1880 the glaciers may have lost enough mass to explain the remaining portion of the sea level rise. He sees little immediate threat that sea level will rise catastrophically due to the projected warming caused by CO_2 buildup. Says Meier: "I think it would take a long time for us to destroy the West Antarctic ice sheet."

Mauna Loa eruption within two years?

On Nov. 16, when a magnitude 6.7 earthquake slashed through a valley midway between the summits of Kilauea and Mauna Loa volcanoes on the island of Hawaii, scientists at the USGS Hawaii Volcano Observatory were braced for almost anything. A quake of that strength could disrupt the internal plumbing of Kilauea, which is engaged in an on-going eruption that began Jan. 3 (SN: 1/15/83, p. 39; 7/9/83, p. 24). Or it could trigger an eruption at Mauna Loa, Kilauea's larger, sister volcano that has been inactive since 1975 when a brief eruption sent a voluminous 30 million cubic meters of lava down the mountainside. But neither event occurred. "Although the shaking was quite severe, it didn't seem to affect the plumbing of either system," says Robert Decker, director of the observatory. Mauna Loa usually erupts about every four or five years, but 25 years passed between the last previous event and the eruption in 1975. In 1980, the number of shallow earthquakes increased, and again jumped dramatically last spring. Decker says that if the quakes and swelling of the volcanic summit continue to increase, an eruption is likely in the next year or two. As for Kilauea, the present eruption continues with Old Faithful-like regularity, leading scientists to compare it to the eruption called Mauna Ulu, which persisted from 1969 to 1974. Since January, scientists estimate, 130 million cubic meters of lava have poured from the volcano and active phases have occurred about once a month. The eruption too has earned a special title: The site of the newest lava flows, Decker says, has been dubbed "Pu'u O" or "Enduring Hill."

Of celestial cycles and rising tides

After last winter's ravaging storms along the California coast, some scientists forecast ever stronger tides and a new era of severe Pacific weather. But on the basis of only astronomical effects — the most predictable of the factors that effect tides — things don't look so bad. Bernard Zetler of Scripps Institution of Oceanography in La Jolla, Calif., projected tides until the year 2000, and finds that the highest tides will occur between 1986 and 1990, with the peak in 1987. He says that even if high tides caused by severe storms are added to this effect, the tides will exceed those of 1982 and 1983 by only a few tenths of a foot. The other components believed to effect tides — weather fluctuations and the gradual change in sea level over the last century — may be significant, Zetler says, but the astronomical effects of lunar and solar cycles are the only ones "amenable to skillful scientific prediction."

Biomedicine

Julie Ann Miller reports from Washington, D.C., at the Symposium on Drug Allergy

Bad reactions for drugged country

One of every 30 hospitalizations in the United States is the result of an adverse response to medication. In addition, about 30 percent of all medical patients who are in a hospital develop at least one adverse drug reaction, 10 percent of which are life-threatening, during their stay. This high incidence of unpleasant responses is not surprising given the amount of drugs taken, says Hershel Jick of Boston University. "Exposure to drugs in our country is staggeringly high," he says. As outpatients, 75 million U.S. adults take one or more drugs at least once a week. And the average hospital patient receives 9 or 10 drugs during his stay. Other countries use far less; in Scotland the average is 4.6 drugs per hospital stay. Jicks says, "One method of cutting down on adverse reactions is to cut down on drug use."

When forbidden drugs are required

Most patients can avoid a drug to which they are likely to be allergic. But sometimes that drug is the only means of curing a life-threatening disease, avoiding persistent pain or making a necessary diagnosis. In some cases special procedures have been developed for desensitizing the patient to the required treatment. The procedures consist of pre-treatment medicine or cautious incremental doses of the allergy-provoking substance under close medical supervision.

Desensitization to penicillin and related drugs has been successful in more than 70 people, reports Timothy J. Sullivan of the University of Texas Health Science Center in Dallas. He and colleagues give 14 gradually increasing oral doses of the drug at 15-minute intervals, then inject larger doses. An allergist stays at the patient's bedside. Although some of the patients have experienced minor reactions, they were able to sustain the necessary pencillin therapy. The patients included five pregnant women with syphilis.

People who have asthma are often allergic to aspirin and other nonsteroidal anti-inflammatory drugs. But these drugs are the best treatment for rheumatoid arthritis and chronic headache. Therefore, Donald D. Stevenson and colleagues at Scripps Clinic and Research Foundation in La Jolla, Calif., have worked out a desensitization procedure for asthmatic patients who need aspirin but who have an aspirin allergy. On the first day of the procedure they give the patient a very small aspirin dose, which they increase during the day until the patient shows an allergic response. The next day, they find that same dose causes no reaction, and they continue increasing the dose until they reach the level required for treatment or there is an allergic response. In their 66 patients, the required level was reached after one or two allergic reactions, Stevenson says. The desensitization lasts two to five days, but it can be maintained indefinitely if the patient takes aspirin daily. Aspirin desensitization also allows the patient to tolerate other nonsteroidal anti-inflammatory drugs.

Although many people suffer adverse reactions to local anesthetics, probably less than one percent of these are true allergies, says Michael Schatz of the University of California at San Diego. When a patient who has had an adverse reaction again needs a local anesthetic, Schatz suggests using a skin test to identify a drug the patient can tolerate, then administering it in gradually increasing doses.

Allergic reactions to the contrast medium used in diagnosing heart disease occur in two to eight percent of patients and are life-threatening in one case in every 1,000. What can be done when a patient who has had a severe reaction again requires the diagnostic procedure? Paul A. Greenberger of Northwestern University in Chicago reports that treatment with three medicines used to control allergic reactions and asthma — prednisone, diphenhydramine and ephedrine — before the diagnostic test reduces the risk of adverse reaction from more than 35 percent to 3 percent.