Piecing together the Little Ice Age

The problem with the climatological jigsaw puzzle is that researchers are never sure if they've fit together the right, or enough or too many pieces.

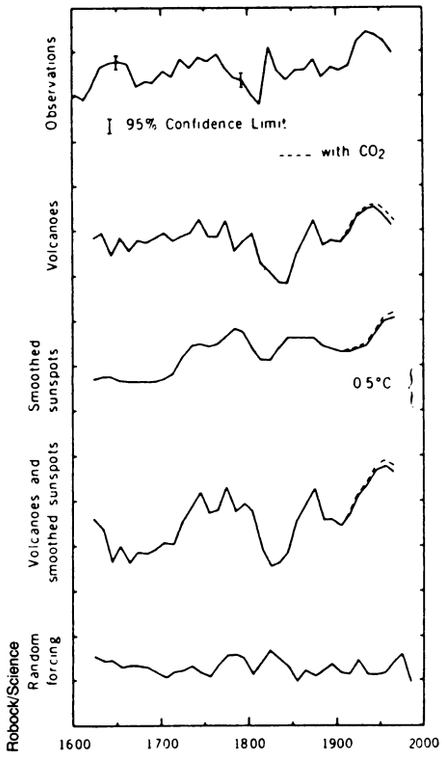
Take one example: The so-called Little Ice Age. During that period, roughly 1430 to 1850, Northern Hemisphere glaciers extended farther and the global average temperature is believed to have been about 0.5°C cooler than at present. Three years ago, John A. Eddy of the High Altitude Observatory of the National Center for Atmospheric Research in Boulder, Colo., proposed that sunspots might be the key to the puzzle. From historical records and tree-ring data, he found that at least part of the Little Ice Age coincided with a marked reduction in the number of sunspots (SN: 3/6/76, p. 154). He tentatively suggested that a change in the solar energy output related to the sunspot number may cause climate change.

Now, University of Maryland's Alan Robock has tossed out the sunspot piece and in its place has put another climatological favorite — volcanic dust. Volcanic dust is believed to affect climate by reducing the amount of incoming sunlight, thereby causing global temperatures to drop. In the Dec. 21 SCIENCE Robock states, "Volcanic dust produces a much better model simulation of the climatic change during and after this period [than do sunspots]. ... The hypothesis of sunspot-related solar constant changes is not supported."

Robock collected Northern Hemisphere data from 1600 to the present for four factors: volcanic dust, variation in sunspot number, variation in carbon dioxide and natural variability. (Records from 1600 were used because sunspot data first became available at that time.) Using a computer model to simulate climate behavior, he fed it various combinations of the data sets. The results of the model calculations were then compared with a recent reconstruction of observations of average surface temperatures for the Northern Hemisphere during the same period. Here, Robock and Eddy again put different pieces in the puzzle: Robock used average temperatures for the entire hemisphere, while Eddy had available only Western European temperatures.

Robock found that the model that included only volcanic dust most closely matched actual observations. While Eddy found good correlation between sunspot data and Western European temperatures, Robock found that the model that included sunspots made the worst match with hemispheric average temperature observations. Combining the effects of volcanic dust and sunspots did not improve the volcano results.

Eddy admits he is "somewhat shaken" by the results and the doubt they cast on the reliability of the Western European data. But he notes: "It illustrates how, until we really know the record of climate, that we will come up with different views. That's why we have so many peddlers with so many different cures." Or so many pieces in the puzzle. □



Observed average temperatures for the Northern Hemisphere (top) compare best with calculations that include volcanic dust, worst with model plus sunspots.

Ocean pollution plan

As offal from the seven-month-old Bay of Campeche oil spill (SN:12/15/79, p. 405) continued to threaten Texas's sensitive coastline regions, the National Oceanic and Atmospheric Administration last week released the first federal plan for research on ocean pollution.

The product of an interagency committee created by a 1978 federal act, the five-year plan calls for more research on the health effects of toxic materials; on the identification of sensitive and critical marine habitats; on coastal land use practices; on the effects of municipal sewage release and industrial waste disposal; and on oil spill damage assessment.

Not unexpectedly petroleum and petroleum products are the pollutants receiving most attention — about $61.2 million — by the eleven federal agencies involved in ocean pollution research. About $58 million of the $165 million 1978 budget went to collecting baseline data. The 1980 budget for the nearly 1,000 ocean pollution projects is expected to be about $190 million. □

Testing breast cancer therapies

There is ample evidence that modified mastectomies (total breast removal) should replace radical mastectomies (total breast removal of chest muscles and underarm lymph nodes) as the choice of surgery for early breast cancer and even for some breast cancers that have spread to underarm lymph nodes (SN: 6/16/79, p. 389). But data supporting only partial breast removal (excision of only a cancerous lump in the breast) instead of a modified mastectomy as the choice of surgery for breast cancer are much less substantial. Hence the National Cancer Institute's desire to further explore the value of partial breast removal as a form of breast cancer surgery.

The NCI is getting a clinical trial underway that will involve 300 women with proven or suspected breast cancer in stage one (a tumor of 2 centimeters or less with or without lymph gland involvement) or in stage two (a tumor of 2 cm or less with lymph gland involvement, or a tumor of 2 to 5 cm with or without lymph gland involvement). Half of the women will be randomly selected by a computer to receive a modified mastectomy and half to have removal of only the cancerous area of the breast followed by radiation. All of the women will get free breast cancer treatment for life, including the offer of free breast reconstruction if the breast is removed.

The NCI needs volunteers for this study. Women in any area of the United States may participate. Readers who want more information about enrolling in the study should call the NCI at (301) 496-5583. □

Digitalis as chemist

Digitalis or foxglove is a genus of perennial flowering plants whose natural poisons, called glycosides, are used medicinally in treatment of certain heart problems, especially heart failure. One glycoside, digoxin, is produced by the relatively rare woolly foxglove. One of the most potent heart stimulants is derived from it. Another glycoside, digitoxin, is produced by the more common red foxglove. Because it acts more slowly and remains in the body longer than the digoxin drug, use of digitoxin carries a higher risk that a fatal overdose might occur. Now a German team headed by Ernst Reinhard at Tübingen University has harnessed cell cultures — only a few cells, not an entire plant — of woolly foxglove to tack a hydroxyl group (a bound carbon and oxygen atom) onto digitoxin. This converts digitoxin to the preferred digoxin derivative, according to a report of the research in DEUTSCHER FORSCHUNGSDIENST, a German research news service. □