

just how to go about making sure their data are used, and used correctly, in decision-making. The speakers were not always able to give satisfactory answers. More seriously, others questioned the ethics of taking a stand on issues. Many adhere to the conviction that the scientist's role is to provide raw data; that he has no business making value judgments on the basis of his results or telling others what to do with them.

The philosophical questions were not resolved at the GSA sessions. But the feeling among many was that geologists should be doing more than they are now. Says Everett: "The jobs are there to be done and they will be done without our input unless we get involved."

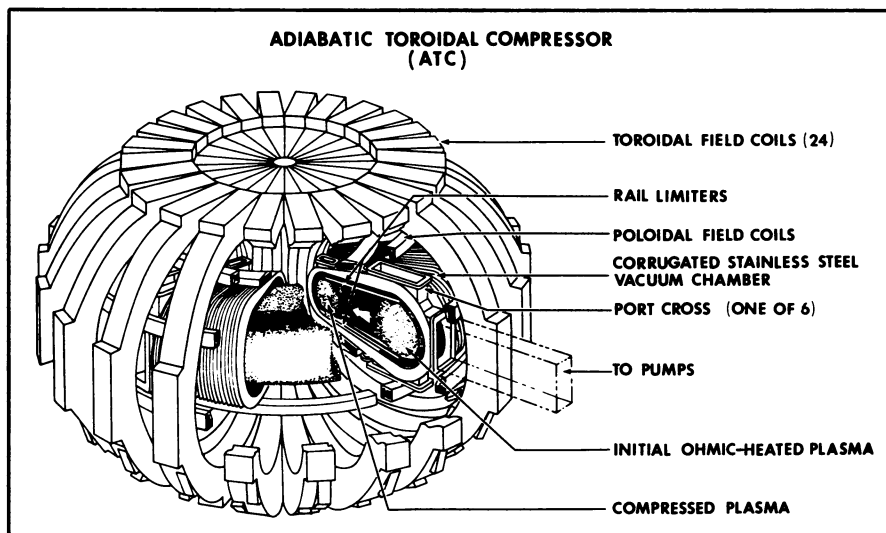
## Nearing ignition point in controlled fusion

One of the two approaches toward controlled thermonuclear fusion currently under investigation is the use of magnetic fields to confine a plasma or ions and electrons for a long enough time at high enough temperature and pressure to induce enough fusions to get a useful amount of energy out. (The other method is laser-induced fusion; see SN: 6/17/72, p. 388.)

The three important criteria are thus temperature, density and confinement times. Several years ago Russian physicists invented a device called tokamak that made a great advance in confinement time. It accomplished this by running an electric current through the plasma. The current both heated the plasma and contributed importantly to the shape of the confining magnetic field.

It was widely conceded, however, that machines of the pure tokamak design would not reach temperatures necessary to ignite thermonuclear fusion. The electric current heating would not do it. But now at the Princeton University Plasma Physics Laboratory, a variation on the tokamak design has recorded significant advances in density and temperature. The device is called the Adiabatic Toroidal Compressor. It is based on the idea that compression of the plasma should increase both its density and its temperature.

The compression is accomplished by pulsed magnetic fields. Russian physicists had suggested this, but due to the design of their tokamaks they would have had to use a high-frequency pulsation to produce many small compressions. It is easier to use low-frequency pulsations to make a large compression in one stroke. The theory of adiabatic compression was worked out by Harold P. Furth and Shoichi Yoshikawa of Princeton; the ATC experiments were done by a group headed by Robert A. Ellis Jr. The structural changes include



Princeton Univ.

Schematic of the ATC shows plasma positions before and after compression.

replacement of a copper shell, which the Russians thought necessary for stability, with magnet coils, and substitution of an air-core transformer for the iron-core one the Russians used to generate the electric current in the plasma. With these things out of the way it proved possible to compress the doughnut to half its original radius in one stroke.

The cycle in the ATC begins with the plasma being heated by resistance to the current running through it. This brings the temperature of the electrons in the plasma to 10 million degrees K. Then the plasma is compressed and the electron temperature rises to 25 million degrees (100 million will be needed to achieve ignition), and the electron density goes to a hundred trillion per cubic centimeter. This makes the ATC the first tokamak device to arrive at the density range necessary for ignition. The temperature of the ions, however, remains at about 7 million degrees K. According to theory the ion temperature will catch up with the electron temperature when larger tokamaks are built. □

## Anik's voice links sprawling Canada

With the successful launch of the satellite "Anik," Canada becomes the first country to have its own communications satellite system.

Anik, which means brother in Eskimo, was placed into a geostationary orbit over the equator by a Delta rocket launched from Cape Kennedy Nov. 9 by the National Aeronautics and Space Administration. NASA is reimbursed for the launch by Telesat Canada which operates the Canadian satellite communications system. A second satellite will be launched next spring.

Each satellite accommodates 12 color

television programs or 11,520 one-way voice conversations. The Anik antenna is constructed so that its signals are shaped into a beam that covers only Canada.

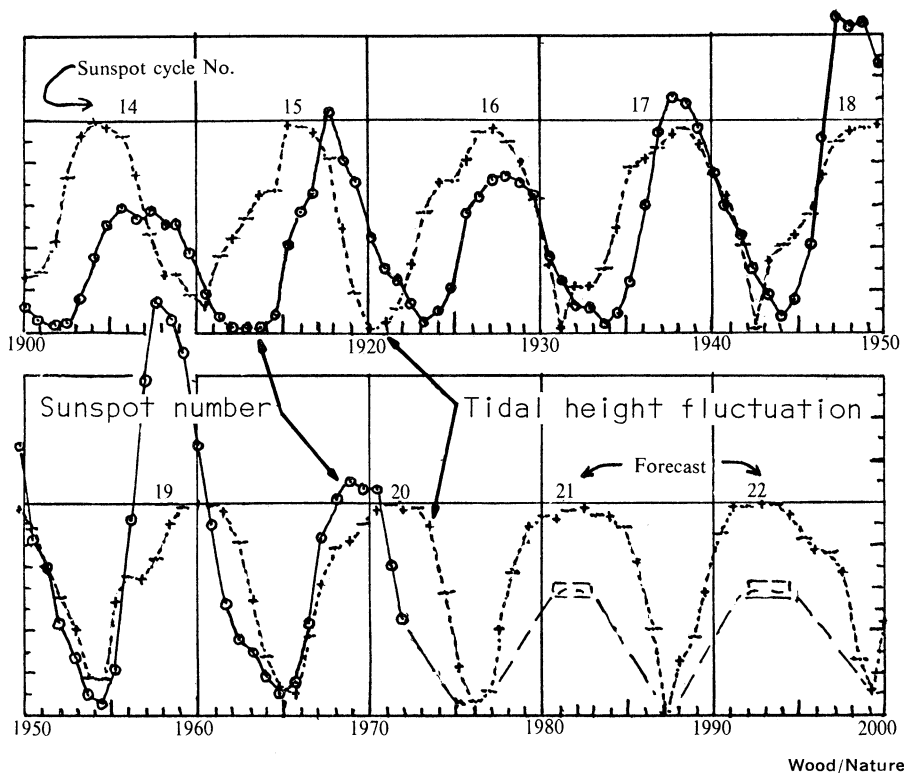
According to Harold Rosen of the Hughes Aircraft Co., builders of the satellite, Anik makes instantaneous communications possible throughout Canada. The country's sparse population of only 22.2 million people is scattered over a land mass six percent larger than that of the United States. □

## TV by satellite: UN debates curbs

The potential for direct television broadcasts from satellites to individual ground receivers around the world is a concern of many countries—especially if the broadcasting satellite is not their own. The Soviet Union's concern is mainly with the possibility of interference in what it regards as its sovereign affairs. The concern of a substantial number of other countries seems to be "cultural inundation." France, for example, seems concerned that English-language television programs would undermine use of the French language in France. Some developing countries fear direct broadcasts from major countries would undermine their national identity and retard their cultural development.

This month two world bodies—UNESCO (the United Nations Educational, Scientific and Cultural Organization) and the General Assembly of the United Nations voted to curb such use of space technology. The United States was the only dissenting vote on the U.N. resolution. (In UNESCO, however, there were several nay votes and abstentions.)

At its general conference in Paris, UNESCO adopted a declaration of "guiding principles" for direct broad-



Solar tidal fluctuations (up or down) compared to sunspot numbers since 1900. Wood/Nature

casts stressing the desirability of prior consent on the part of the receiving state.

The U.N. General Assembly voted 101 to 1 to "consider it necessary to elaborate principles governing the use by states of artificial earth satellites for direct television broadcasting with a view to concluding an international agreement or agreements." The General Assembly asked the Outer Space Committee of the U.N. to elaborate such principles.

The Soviet Union introduced a treaty that would, among other things, allow a state to take all measures to prevent so-called illegal broadcasting from such satellites (even to destroying the transmitting satellite). The Soviet intention was for this treaty to become the primary basis for any treaty ultimately signed. The resolution calling for elaboration of "principles," however, in effect denied the Soviet Union this strategy.

George Bush, U.S. ambassador to the U.N., in speaking against such curbs, noted that the United States attaches a cardinal importance to its "strong, 200-year-old belief in the free exchange of information and ideas." He also questioned whether such restraints would not be in violation of the Universal Declaration of Human Rights (a U.N. document) which embraces the freedom of information. No such restraints, for example, are placed on radio transmissions—probably because finding and destroying all the transmitters would be a mammoth task. □

## Do tugs of the planets affect the sun's cycles?

The influence of the sun on the planets that go around it determines the conditions found on them. Most of the scientific literature on the sun assumes that there is no reciprocity: The planets have no influence on the various upheavals, sunspots and flares, that characterize the surface appearance of the sun. These are regarded as caused by occurrences deep within the sun.

In the Nov. 10 NATURE R. K. Wood of the University of Colorado points out an interesting relationship between the 11-year cycle of sunspots and a known influence of the planets on the sun, the solar tides. Just as the moon and the sun raise tides on the earth so the planets raise tides on the sun.

The tidal influence of a planet depends both on its size and its distance. There are four planets that contribute appreciable effects to the solar tides. Taking the earth's contribution as one, the relative contribution of each of the others is: Mercury 1.15, Venus 2.17 and Jupiter 2.28. The remaining five planets make only negligible contributions. When Venus and earth are in line (conjunction or opposition), they cause a solar tide 50 percent greater than the largest caused by Jupiter. When Venus, earth and Jupiter are all in line, the tidal effects of the three planets add together at any point on the sun. In his calculations Wood left out the influence of Mercury because that planet's

tidal effect has a three-month cycle, and so it would have little effect on the 11-year sunspot cycle.

Wood plotted the tidal height fluctuations since 1750 for each interval between dates of earth-Venus conjunction and earth-Venus opposition against the smoothed monthly number of sunspots for the center of each interval. The result is graphs comparing the two data that seem to show a correlation between peak times of tidal variation (rise or fall) and peak numbers of sunspots.

There is a small difference between tidal maxima and sunspot peaks, the error of prediction of the peaks, as Wood calls it, which seems to vary according to a 170- or 180-year cycle.

Assuming that this cycle in the error of peak prediction is real, Wood publishes predictions of the sunspot peak, derived from computation of the solar tides, for the next 130 years (12 sunspot cycles). But he does not suggest a mechanism whereby the tides could influence the production of sunspots. □

## Poor nutrition: How is the fetus affected?

The quest for evidence about the effects of a prospective mother's diet on the mental development of her child is one of the most active interests of nutrition scientists. So far evidence is not only inconclusive but contradictory.

During the past few years, for example, investigators have determined that children born to malnourished mothers in Chile had fewer brain cells than control children. In Guatemala, giving protein supplements to women increased the birth weight of their offspring but did not appear to influence their intelligence.

Now, in the Nov. 17 SCIENCE, Zena Stein and colleagues at the Columbia University School of Public Health and Administrative Medicine report that young people who experienced the severe famine in Holland from 1944 to 1945 prenatally have not suffered loss of intelligence because of it.

The Columbia team studied 2,000 19-year-old subjects from seven cities in Holland. The subjects' intelligence was compared with that of 19-year-olds in 11 Dutch cities where the famine had not hit. The investigators found no comparable difference in intelligence between the two groups. They admit, though, that their results should be viewed with caution. For example, they compared subjects from cities that differed not only in famine experiences but also in size, religion and occupations. There is the question of whether the intelligence criteria they used (data from military induction exams) are accurate. Also, they looked at the effects