Scientists lose contact with solar craft

The past couple of weeks should have been an easy transition for solar astronomer Arthur I. Poland. Retiring from his administrative role with an orbiting solar observatory so that he could devote his full attention to data acquired by it, Poland had been looking forward to obtaining new information on the giant flames of gas that arc high above the sun's surface.

Alas, the spacecraft that Poland had pinned his hopes on may no longer be able to make these or any other observations. On June 25, ground controllers lost contact with the Solar and Heliospheric Observatory (SOHO), and some fear the $1 billion spacecraft may remain silent.

Launched in December 1995, SOHO houses 12 instruments that probe the interior of the solar cauldron as well as its million-degree outer atmosphere. The observatory has already revealed new details of how gas and magnetic clouds shoot out from the sun, events that can trigger large-scale power outages on Earth (SN: 2/1/97, p. 68). It has also helped generate a three-dimensional view of the sun's interior and has provided spectacular images of sun-grazing comets and solar flares (SN: 5/30/98, p. 342). For most astronomers, however, SOHO's raison d'être was to have come 2 to 3 years from now, when the sun is expected to reach the peak of its 11-year activity cycle.

Able to stare continuously at the sun from a vantage point 1.5 million kilometers from Earth, SOHO was central to the observations planned for the coming solar maximum. Without the craft, "we're going to be blind," says John W. Leibacher of the National Solar Observatory in Tucson. "It's as if you lived in Houston and you were in hurricane season and there were no weather satellites."

He emphasizes, however, that it's premature to mourn SOHO's passing. The craft is "missing in action, it's not known to be dead," he says.

Mission controllers at NASA's Goddard Space Flight Center in Greenbelt, Md., speculate that they lost contact with the craft because it tumbled out of control, leaving its power-producing solar panels pointing away from the sun. Recent calculations suggest that over the coming weeks, the craft's motion may allow an increasing amount of sunlight to strike the panels.

SOHO spacecraft is missing in action.

If this prediction holds true, the panels may eventually absorb enough sunlight to charge the craft's batteries and allow SOHO to resume operation. Ground controllers are already trying to locate the craft using radar. Although the tumbling may have damaged instruments on the observatory, the mission scientists are guardedly optimistic.

In the meantime, Poland, who is based at Goddard, is already devising a backup plan. Contacting their colleagues, he and other SOHO scientists have begun making an inventory of spare parts and duplicates of instruments aboard SOHO. From that list, they hope to put together a smaller, less costly satellite that might be launched just after the turn of the century, in time to record solar activity at its most turbulent. *—R. Cowen*

Persistent pollutants face global ban

Last week, 34 northern industrial nations adopted two new United Nations agreements—pledges to phase down or out 19 toxic industrial pollutants. Known as the Aarhus Protocols, after the Danish city in which they were signed, the agreements call for mandatory controls on 16 persistent organic pollutants, or POPs, and on the heavy metals lead, mercury, and cadmium.

When ratified by 16 of the signatory nations, both agreements will become treaties with the binding force of international law, explains Lars Nordberg, deputy director of the United Nations Economic Commission for Europe (UN/ECE), whose 55 member nations drafted the new documents. Some of those members—such as Canada, the United States, and Russia—are not European.

At a United Nations Environment Program (UNEP) meeting in Montreal this week, representatives of 92 nations began a process to enact similar global controls on 12 of those POPs: polychlorinated biphenyls (PCBs), dioxins, furans, and the pesticides aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex, and toxaphene.

"While everyone here has a copy of the Aarhus agreements, there's no draft text yet [for a global treaty]," explains Michael Williams, a UNEP spokesman in Montreal. Participants at this week's meeting "have yet to even come up with a good definition of a POP," he told SCIENCE NEWS. "Indeed, that will be the heart of this convention—agreeing on criteria for defining POPs and how additional ones might be added [to the list requiring global controls]."

The UNEP negotiators will not tackle the other four POPs slated for controls under UN/ECE—polycyclic aromatic hydrocarbons, chlordecone (kepone), hexabromobiphenyl, and lindane. "Everyone here [at the Montreal meeting] agrees that the other 12 are an environmental problem," Williams explains, "so they started with the easy ones—pollutants that there are no arguments over." In fact, disputes over extending limits to additional POPs may focus less on justifying a need to control them, he says, than on how to limit ones that are still used, of great economic significance, and lacking affordable alternatives.

Many countries have already banned the production and use of some of the POPs, but the resistance of these compounds to breakdown and their propensity to evaporate and settle out hundreds or thousands of miles away (SN: 7/15/95, p. 38) means that distant populations, even those who have never used the chemicals, "may still feel their toxic impacts," observes Luke Trip of Environment Canada in Hull, Quebec.

POPs' long life gives them time not only to move around the globe but also to build up in the food chain, observes Michael Gilbertson of the International Joint Commission in Windsor, Ontario. This explains the need for global controls, he argues, because "if you make these chemicals, there's nowhere that won't eventually have them." *—J. Raloff*

Chemical switch cuts off melatonin

Many jet-lagged travelers, eager to reset their internal body clocks, rely on timely doses of the natural hormone melatonin to trigger sleep. Now, researchers at Rockefeller University in New York have found a substance that may have the opposite effect, promoting wakefulness by switching off melatonin's production.

A compound synthesized by chemists Ehab M. Khalil and Philip A. Cole effectively blocks one of two enzymes required to produce melatonin in the brain. The compound could help researchers explore the details of melatonin synthesis and offer a way to see if a reduction in the hormone's levels affects the sleeping patterns of animals and people.

"It's really an unexplored area because we haven't had the tools to evaluate it before," says Cole. Melatonin, made primarily by the pineal gland in the brain, plays a role not only in sleep but also in aging and reproduction (SN: 5/13/95, p. 300).

The transformation of the neurotransmitter serotonin into melatonin begins with an enzyme called arylalkylamine *N*-acetyltransferase (AANAT). This enzyme binds to both serotonin and a molecule called acetyl-CoA, then attaches a frag-