Space

Watching the winds for the shuttle

Information on winds, important for aircraft landings, is even more so for the space shuttle, whose unpowered final descents will mean that it has to land successfully on the first try. Although it will be able to land as much as 1,100 miles to the side of its orbital ground track (an Air Force requirement to enable certain quick "up-and-down" missions), there will seldom be more than one or two sufficiently long landing sites within range by the time the shuttle is low enough to be affected by winds.

To forestall unpleasant surprises, James Scoggins and Steve Maas of Texas A&M University are studying the winds for the National Aeronautics and Space Administration, trying to fill in a data gap that exists between about 150 meters and one kilometer. Below that range, surface measurements are sufficient, and there are already a variety of routine balloon soundings to handle higher altitudes.

The researchers are using measurements from two sources. A 444-meter TV tower in Oklahoma City has been instrumented at seven levels by the National Severe Storms Laboratory to monitor steady-state wind profiles and shears, as well as variations in velocity, duration and direction. In addition, and perhaps more to the (geographic) point, are about 5.000 wind-profile measurements made from balloons at the Kennedy Space Center in Florida (the shuttle's primary landing site), from 300 meters to above the jetstream.

Time for everyone

Poised some 23,000 miles above the earth, synchronous satellites are in an ideal position to broadcast, as well as receive, information over large areas of the earth's surface. Studies at the National Bureau of Standards' Boulder, Colo., laboratories now confirm that the high-orbiting probes may in the future be able to provide time and frequency standards to widely distributed users far more accurately and reliably than the bureau's present radio transmissions over stations WWV and WWVH.

For two years, D. Wayne Hanson and his NBS colleagues supervised transmission of a standard-frequency l-kHz tone, "second ticks," voice announcements of the time of day and a time code to the synchronous ATS-3 satellite, which then rebroadcast the data back to earth stations at the NBS in Boulder, the Air Force Cambridge Research Laboratory in Massachusetts and Smithsonian Astrophysical Observatories in Peru and Brazil. Time accuracy, Hanson reports, was better than 25 microseconds, and should be about 200 microseconds even in the much narrower bandwidth (.4 kHz vs. 30 kHz) to be used in an upcoming test on the to-be-launched SMS-2 probe. Direct radio reception of WWV, by comparison, often provides only 1-millisecond accuracy due to noise and propagation-path variations. (The military NAVSTAR satellites may yield 1,000 times the NBS technique's accuracy, but from lower orbits with narrower coverage requiring more satellites.)

Landsat and Seasat—Whatsat?

The Earth Resources Technology Satellite—more manageably but less comprehensibly known as ERTS—has just been renamed "Landsat" by the space agency, just as work is beginning on an ocean-monitoring probe known as Seasat.

Perhaps due to this foray into at least quasi-English, informed Washington sources now deny rumors that NASA was about to be renamed the National Acronym-Slinging Agency.

Biomedicine

Designing cancer drugs rationally

As pharmacologists better understand molecular biology, they should be able to design drugs more rationally. This, in fact, seems to be happening with the design of cancer drugs. A team of molecular pharmacologists report in the December PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES that they have designed a drug that has a keen affinity for DNA, is highly active against leukemia and is nontoxic at therapeutic dose levels.

Most cancer drugs act on the DNA of cancer cells. But Jean-Bernard LePecq of the Institut Gustave-Roussy in Villejuif, France, and his team, wanted to design a drug that has even more affinity for the DNA of cancer cells. The insertion of a drug between layers of the DNA molecule is a rather well-understood mechanism. In fact, the place where a drug binds to DNA is known at atomic resolution. So LePecq and his colleagues studied the physicochemical properties of some compounds to see how they intercalate in DNA, in order to design a new compound with a higher affinity for DNA.

Taking this approach, they managed to synthesize a new compound with greater DNA affinity, and hence with potent anticancer activity.

What makes hormones go

One of the more fertile areas of hormone research right now is inquiry into what influences the release of hormones. Evidence reported in the December and January ENDOCRINOLOGY further underscores the influence of nerve chemicals, cyclic AMP, prostaglandins and stress on hormone release.

S. R. Ojeda and his physiology team at the Southwestern Medical School in Dallas report that the nerve chemical dopamine can exert an inhibitory effect on the hormone prolactin. And dopamine's effects on prolactin seem to be mediated by the intercellular messengers prostaglandins and by the intracellular messenger cyclic AMP.

Jean S. Euker and his physiology team at Michigan State University report that acute stress can alter the release of both prolactin and of luteinizing hormone. The researchers do not discuss the means by which stress alters the hormones. But it's quite possible that stress acts via nerve chemicals in the brain, and perhaps also through cyclic AMP and the prostaglandins.

Lead in the wilderness

Evidence incriminating lead as a widespread trace pollutant and as a health threat continues to accumulate. Lead particles have now been found in the Rocky Mountain wilderness. Lead has been found in the blood of people living near a lead-emitting smelter in El Paso, Texas.

Sigfredo Maestas and his team at the New Mexico Highlands University of Las Vegas, N.M., have been analyzing the Sangre de Cristo mountain range of the Rockies in northeastern New Mexico. They found lead pollutants at an altitude of 6,500 to 13,000 feet, far removed from city areas. The lead appeared to have arrived by air. The researchers believe that the lead came from auotmobile emissions as far away as Phoenix or even Los Angeles.

Philip J. Landrigan and his team at the Center for Disease Control in Atlanta tested the blood of persons of various ages living near a lead-emitting smelter in El Paso. They found abnormally high levels of lead in the blood of children living near the smelter. Adults living near the smelter had some lead in their blood, but not as much.