

Waiting for the Word from Uranus

Michael Kaiser has been waiting for a radio broadcast. He has been awaiting it for months, with no real idea of when it will begin, or even whether it will take place at all (although its total nonappearance would be quite a surprise). No one else knows either, but that has not kept a number of people from speculating about when it should go on the air. Which is why the blackboard in Kaiser's office at the NASA Goddard Spaceflight Center in Greenbelt, Md., is bedecked with what looks like your favorite radio programming guide, except that instead of listing a variety of shows for the day, it carries numerous predictions of when the one Big Show should come on.

The topic: a message from Uranus.

Kaiser is one of many scientists working with the Voyager 2 spacecraft, which will flash past Uranus next Jan. 24. More specifically, he is a co-investigator with the craft's Planetary Radio Astronomy (PRA) team, which, having already studied radio emissions from Jupiter and Saturn, expects to do the same thing for Uranus.

But Uranus will be the least-known planet to which spacecraft have ever been. The planet is so remote that it was not even discovered until astronomy was nearly two centuries into the Age of Telescopes. As for radio emissions, Jupiter's were discovered by earth-based radiotelescopes in the 1950s, but smaller Saturn's weaker signals were not detected until Voyager 1 (Voyager 2's predecessor, not bound for Uranus) had carried its own PRA instrument well past *Jupiter* a quarter-century later. Uranus is smaller still, and its signals presumably even weaker, but Voyager 2 is now only about half as far from Uranus as Voyager 1 was from Saturn when that planet's emissions were first picked up.

Merely detecting Uranus's radio broadcast at all will be strong evidence that the planet has a magnetic field. That in turn would probably mean that it also has an ionosphere — radiation belts, in at least some sense — and that bright ultraviolet (Lyman alpha) emissions detected from Uranus by the earth-orbiting International Ultraviolet Explorer satellite are probably signs of brilliant auroras.

As the spacecraft gets closer and more details are known, however, almost everything learned about the planet's electromagnetic domain will be not only new but also different. Unlike the other worlds of the solar system, Uranus spins on an axis that lies almost in the plane of the ecliptic and which is now pointing almost directly at the sun, so that the incoming charged particles from the solar wind are pouring nearly straight into the planet's magnetic pole. This could mean that the

solar wind can penetrate far deeper into the magnetosphere — which holds such particles at large distances in the cases of earth, Jupiter and Saturn — and could thus more directly populate any possible radiation belts. Another consequence could be that the incoming solar-wind "plasma" produces such a dense ionosphere that radio emissions may hardly be able to escape at all.

Planetary magnetic fields are an arcane, little-understood subject, however, and the predictions on Kaiser's blackboard about when such emissions may appear run the gamut from the end of last winter — "Those are already down the tubes," he says — to only the few hours encompassing Voyager 2's closest approach to the planet on Jan. 24. It was even suggested about a decade ago that Uranus might have no magnetic field at all, and hence no radio emissions, based on the idea that the gravity of the planet's satellites might not contribute enough angular momentum to its core to drive the "dynamo" that would otherwise generate the field.

Kaiser and NASA Goddard colleague

Michael Desch are on the blackboard too, with a prediction published last year that the emissions should have shown up by this June 1 just past. By June 11, however, Kaiser had seen Voyager 2's PRA data from only as recently as May 10, plus a bit more from May 19 to 22, and still no Big Broadcast. Voyager's data come first to the spacecraft control center at Jet Propulsion Laboratory in Pasadena, Calif., and the PRA part must then be separated out from the spacecraft's overall transmissions (which include data from the many other Voyager instruments) and sent to Kaiser at Goddard by mail courier.

The dates on Kaiser's blackboard, which range from published papers to hallway comments, have produced a number of wagers among the experimenters. Kaiser himself is on the line with three of them for bags of peanuts. In addition, he has a bet with the researcher who suggested that radio emissions would only be detected over a few hours next January. That is astronomer Alain Lecacheux from the Paris Observatory. The stakes? A bottle of champagne. —J. Eberhart

Effective therapists foster 'alliances'

Researchers at the University of Pennsylvania in Philadelphia recently discovered that opiate-addicted men improve far more when drug counseling is combined with psychotherapy. They noticed, however, that the patients of some therapists did markedly better than the patients of others.

The scientists found that the most successful therapists are seen by patients as helpful during the first few treatment sessions. A "helping alliance," or cooperative patient-therapist relationship, is the result. This sets the stage for a therapist to effectively use specific techniques, such as interpreting conflicts behind symptoms or identifying problem behaviors. Without a helping alliance, any number of therapy approaches are likely to fall flat, report Lester Luborsky and colleagues in the June ARCHIVES OF GENERAL PSYCHIATRY.

Clinicians have long assumed that a therapist's personal qualities play a role in the success or failure of psychotherapy, but "there is a remarkable lack of tested information on the topic," say the investigators.

They randomly assigned 110 male opiate addicts to one of three treatments: drug counseling, psychoanalytically oriented psychotherapy with drug counseling, or cognitive therapy with drug counseling. Patients attended ses-

sions once every week or two over a six-month period. Nine therapists — three per treatment — participated, and all sessions were videotaped.

One month after completing treatment, patients in the two psychotherapy groups reported less drug use and criminal activity, higher rates of employment and better psychological functioning than those receiving only counseling. Improvement among the psychotherapy patients varied considerably, though, depending on the therapist.

The patients had similar backgrounds that did not account for the different outcomes, explain the researchers. But there was a strong relationship between improvement and a "helping alliance" measure obtained from both patients and therapists after the third therapy session. Psychoanalytic techniques, which stress working through inner conflicts, and cognitive methods, which focus on changing behaviors and moods, worked equally well for therapists who consistently formed a warm, supportive relationship with patients.

The sample needs to be expanded, note the researchers, and therapists who treat nonaddicted patients should also be studied. But for now, the data support the view that the therapist makes the therapy, rather than vice versa.

—B. Bower