



Iceland Research Drilling Project

Samples from drill site and cliff in foreground yield 3,220-meter continuous core.

ical data have never before been available, Wilkens said. Data about the layer responsible for magnetic anomalies and the effects of depth on magnetism indicate depth has some effect on the intensity of magnetism, Shaul Levi of Oregon State University told SCIENCE NEWS. Temperatures of 72°C recorded at 1,600 meters indicate the possibility of economically feas-

ible geothermal energy for eastern Iceland.

Preliminary data from the core samples, which will be kept at Dalhousie University for two years and then returned to Iceland, will be published in March. But at least two years' more research is needed, according to Levi. At a total cost of \$250,000 for the drilling, it's "a great deal," Wilkens says. □

New data put quasars sky-high

To determine the distance to any object beyond, roughly, the remote boundary of our so-called local group of galaxies — about 100 billion billion kilometers away — astronomers must rely on an ingenious technique involving redshifts. That is, the faster an object is departing from you, the lower will appear the frequency of its radiation (thus visible light is shifted toward the red end — the low frequency end — of the spectrum and hence the term "redshift"). Furthermore, it has been observed that the distance to a galaxy is proportional to its speed of recession. Redshifts are therefore a form of yardstick.

Using this strategy, astronomers infer that quasars are very far away — approaching the very edge of our universe. This property of quasars coupled with their other eccentricities, however, has disquieted astronomers so that some have even suggested and made notably successful efforts toward proving that in some instances, at least, redshifts should not be trusted in the ordinary way. Now, Alan Stockton of the University of Hawaii has reported results that he concludes make "virtually certain" the conventional belief that most quasars are at immense distances from the earth.

First discovered in 1960 by Allan Sandage with the 200-inch Palomar telescope, quasars (quasi-stellar objects; also called QSO's) look deceptively like stars. But unlike stars, some emit huge quantities of radiation in the radio frequencies; others

have luminosities that vary wildly (by factors of twenty-five and greater) within periods only weeks long; and most typically are extraordinarily bright — that is, if their redshift distances from us are to be believed. If these were unreliable for some reason, then quasars might actually be closer to us and therefore less anomalously bright.

This prospect and others that would follow from learning that quasars were in reality close by, seem to have been dealt a serious blow by Stockton's research. Inspecting the immediate celestial neighborhoods of 27 exceptionally bright quasars, Stockton found that in each of eight cases there is at least one ordinary galaxy with a redshift not too unlike that of the neighborhood's resident quasar. Because the odds, as Stockton calculated, are overwhelmingly against these being simply chance coincidences or illusory companionships due to an accidental superposition of remote objects along a common line-of-sight, there is reason to surmise that the quasars are indeed associated with the galaxies. And since astronomers are quite convinced for a history of reasons that the redshift technique is valid for galaxies, then by association it must be valid for these quasars. It remains unclear due to other studies' conflicting data, however, just how generally true for all quasars are Stockton's findings, which appear in the Aug. 1 *ASTROPHYSICAL JOURNAL*. □

The South: A resource greater than oil

In the 1930s, President Franklin Roosevelt declared that the South was the nation's number one socioeconomic problem. He was right. It was rampant with tenant farming, racial segregation, a dearth of industry and a poor educational system. During the past 40 years, however, the South has made dramatic strides in eradicating these deficiencies. What's more, the South today has two other major bonuses that other areas of the United States cannot necessarily claim — valuable untapped natural resources and a largely uncontaminated natural environment so crucial for a high quality of life.

So declared Eugene P. Odum last week at the annual meeting of the American Institute of Biological Sciences, held at the University of Georgia in Athens. In addition to being a professor at the University of Georgia and one of the nation's leading ecologists, Odum was also the meeting's keynote speaker. The title of his talk was "The Nature of the Southeast in Transition."

Georgia, Odum explained, is a good ecological microcosm for the rest of the Southeast of the United States. The finest ground water in the world lies under this state, and ground water is indispensable for cooling power plants, farm irrigation and various industrial and municipal purposes. There will probably be a scramble for ground water in the years to come. Thus the South is "better off with water than with oil," he concluded, especially as oil is replaced by alternative power sources. Georgia also has a largely uncontaminated natural environment, consisting of rich farm and grazing lands, hundreds of swamps, coastal marshes and exquisite islands lining the coast and protected by the state, Odum continued.

But Georgia and other Southeastern states must be careful to preserve their natural resources and their natural ecosystems, Odum warns. A prime example of an omission in this area is the Copper Hill, Tenn., smelter, whose sulfuric acid fumes have carved out a 25-mile-square desert that is virtually devoid of vegetation and almost impossible to rehabilitate even 40 years later. Today Southeastern cities, he suggests, should learn from "Bo-Wash" — the strip of cities and industries that extend from Boston to Washington — and be sure to leave green "life belts" around themselves as they expand. That way people's quality of life can be maintained. So far, all Southeastern cities are surrounded by such belts with the exception of coastal Florida.

The construction industry in the Southeast must become more conscious of the dangers of erosion, because construction sites lose a lot of soil, Odum advises. Forests can help prevent erosion. So can