

physical sciences

GEOPHYSICS

Continental drift evidence

Further evidence for the spreading of the ocean floor has been dredged up by the *Glomar Challenger*, research ship of the National Science Foundation's Deep Sea Drilling Project (SN:10/12, p. 362).

The results from the third leg of the *Challenger's* 40,000-mile journey indicate that the continents of Africa and South America were joined approximately 150 million years ago, report Drs. Arthur E. Maxwell and Richard P. Von Herzen of the Woods Hole Oceanographic Institution, chief scientists for the third leg of the project.

If the ocean floor spread is caused by a surging up of mid-oceanic ridges, then the oldest sediments would be those farthest from the ridges. In the South Atlantic, the spreading appears to be symmetrical about the axis of the Mid-Atlantic Ridge that bisects the ocean floor between Africa and South America. Ten sea bottom cores were taken during the voyage from Dakar to Rio de Janeiro.

In an earlier leg, the *Challenger* scientists were bothered by the discovery of sediments 150 million years old in deep ocean around the Bahamas. But the expected distribution of sediment ages was found in the latest tests in the South Atlantic.

METEOROLOGY

Simulation of hurricane's life cycle

Observations and analyses of hurricanes have shown that the energy driving the swirling vortex comes from the latent heat of condensation released by towering convective clouds around the center. Frictionally induced inflow of surrounding air into the vortex plays a major role in maintaining the clouds' activity.

These factors have been combined into a theoretical model of a hurricane's life cycle by Dr. Katsuyuki Ooyama of New York University's Geophysical Sciences Laboratory. Numerical integration with a computer shows his model is capable of simulating the "typical life cycle of tropical cyclones, including the mature hurricane stage, with a remarkable degree of reality."

Nevertheless, Dr. Ooyama cautions in the *JOURNAL OF ATMOSPHERIC SCIENCES*, "the model is not realistic enough to predict the behavior of individual tropical cyclones as they occur in nature." He therefore stresses the need for continued, and hopefully expanded, efforts to collect more observations of tropical cyclones at all stages, essential to improving any numerical hurricane models.

ASTRONOMY

Pluto's dimming not permanent

Although Pluto, the solar system's most far-out planet, has appeared to be growing slightly dimmer for the past ten years, this is not a permanent change.

Dr. Robert H. Hardie, director of Vanderbilt University's Dyer Observatory, believes the dimming is due to the fact that the small planet's surface is more slushy than usual and therefore it does not reflect as much

sunlight. Pluto is now moving around in its 248-year orbital period to a point slightly closer to the sun than its average of 3,664 million miles.

The planet's surface may be covered by ice and snow made of frozen nitrogen that alternately freezes and liquefies, as Pluto rotates once every six days and nine hours. Changes in the planet's apparent brightness are caused, Dr. Hardie reasons, by variations in the surface conditions when the frozen dark side emerges into sunlight.

On the dark side the temperature dips to about minus 420 degrees F., while the sunny side warms up to about minus 330 degrees. This temperature is high enough to melt the solid nitrogen into a slush that changes Pluto's reflectivity not only with its rotation period but as it varies in distance from the sun.

GEOPHYSICS

Airglows studied by satellite

Two scientists at the Naval Research Laboratory, Dr. Talbot A. Chubb and Grady Hicks, have studied for the first time the far ultraviolet light from intertropical red arcs as observed from a satellite.

These arcs, thought to be airglow, can often be seen from the ground, but their far ultraviolet emissions cannot. They usually completely encircle the earth quite symmetrically in positions 12 to 15 degrees on either side of the magnetic dip equator, an imaginary line near the actual equator on which a magnetic needle has no dip.

The NLR scientists found, from observations made aboard the OGO-4 satellite, that the intensity of red arcs, including the ultraviolet part of the spectrum, does not correlate with magnetic activity. The arcs are most often seen about one month after the time when the sun crosses the equator.

In most instances, the peak intensity of the emissions is the same north and south of the line. In some cases, however, the intensity may be three or four times greater on one side than on the other. In rare cases, emissions will be lacking on one side while present on the other.

ASTROPHYSICS

Condensed objects in the Crab

In a supernova explosion, such as occurred in the Crab nebula about 1,000 years ago (SN: 3/1, p. 207), "a rotating object with a mass greater than the critical mass for a neutron star breaks up into many smaller objects."

This suggestion, by Drs. Geoffrey R. Burbidge of the University of California in San Diego and Fred Hoyle, director of the Institute of Theoretical Astronomy in Cambridge, England, is made in the March 1 *NATURE*. They suggest that high resolution studies of the Crab in X-ray wavelengths should show several hot spots, the condensed remnants of the supernova.

Drs. Burbidge and Hoyle propose that the radiation from the very small, steady radio source and the X-ray source in the Crab, as well as from the pulsar NP-0532 and perhaps NP-0527, may all arise in very strong magnetic fields surrounding very dense objects.

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