ASTRONOMY

Signs of New Solar Cycle

The first signs of the new 11-year solar cycle which should reach its peak in 1968 have been observed on the sun's face by McMath Hulbert Observatory.

➤ THE FIRST SIGN of a new solar cycle has been spotted high on the sun's face.

Although astronomers cannot say with 100% accuracy when one 11-year cycle ends and a new one begins, there are two ways of telling a sunspot of the old cycle from one of the new.

As a cycle begins, the dark spots on the face of the sun are found well above the solar equator. The group of sunspots discovered by McMath Hulbert Observatory of the University of Michigan and then by the U.S. Naval Observatory was charted at 34 degrees north and 45 degrees east above the equator.

That this group probably belongs to a new cycle was further supported by the reversed magnetic polarity of the disturbance.

Sunspots occur when streams of fiery matter burst through the sun's surface, spewing heat, light and particles into space. Just as a magnet has a north pole and a south pole, the magnetic disturbance caused by a sunspot also has two poles.

In the northern hemisphere of the sun, for example, the leading sunspots of a group might have positive polarity, while the leading sunspots in the southern hemisphere have negative polarity.

As soon as a new cycle begins, whatever was true in the old cycle is now true in reverse. In our example, the leading sunspots in the north would have negative polarity and those in the south positive.

The number of sunspots is considered high in a year when the groups of spots occur with great frequency. As a new cycle starts, it reaches its peak within three or four years and then starts to decline. This periodic cycle was first announced in 1943 by Heinrich Schwabe, an amateur astronomer in Germany.

Since the time of Galileo who first saw sunspots through his telescope, people have been trying to associate the 11-year solar cycle with everything from historical events, swallow migrations and wheat yields to horse races and the stock market.

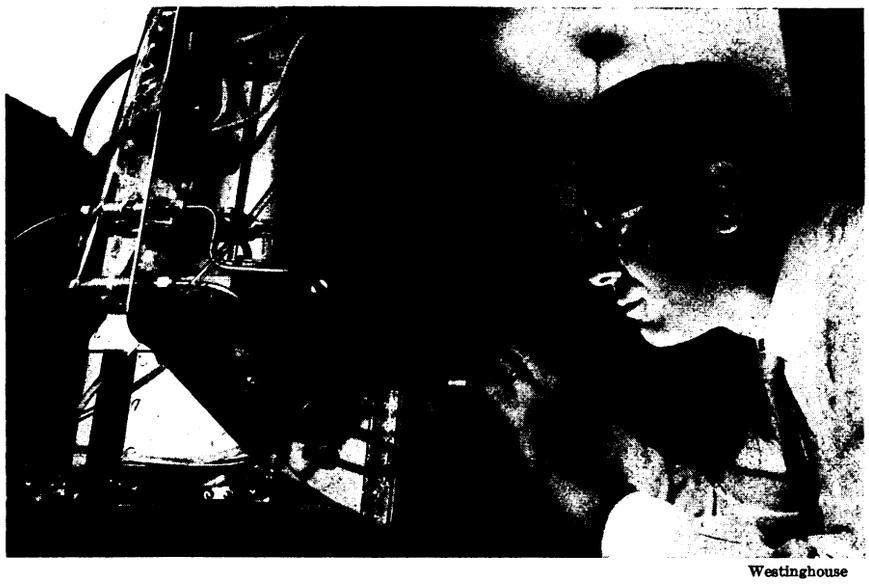
Occasionally streams of electrified particles from the sunspot's whirlpool are showered on earth, upsetting the earth's magnetic field.

This interferes with radio communications dependent upon the ionosphere, the earth's radio reflecting roof. At the same time, it induces the atoms in the ionosphere to give off light setting up the glow known as the aurora.

The sunspot cycle just now beginning should reach its peak in 1968, but it is not expected to be as high as that reached in 1958.

The 1958 high, which occurred during the International Geophysical Year, hit a record not previously exceeded since accurate observations of sunspot activity started more than 200 years ago.

• Science News Letter, 84:263 Oct. 26, 1963



Westinghouse

FUEL CELL FOR SPACE—Research engineer W. A. English of the Westinghouse Research Laboratories operates an experimental fuel cell system, a possible electric power source in space, constructed for the U.S. Air Force. In the cylindrical oven in the foreground is a battery consisting of three cells made completely of solid components.

SPACE

Ace Satellite Tracker Has 32,000-Mile Range

➤ A SATELLITE TRACKING system capable of two-yard accuracy at a range of 32,000 miles has been developed at the National Aeronautics and Space Administion's Goddard Space Flight Center in Greenbelt, Md., for use in a new installation at Carnarvon, Australia.

The installation will be NASA's first dual-purpose tracking station. It will be used in Project Gemini and in programs involving unmanned satellites with far-out, highly elliptical orbits.

The actual tracking device can develop up to three million watts power and is equipped with a 29-foot in diameter "mirror" antenna. Due to its size, power, accuracy and location almost directly opposite Cape Canaveral on the globe, it is expected to aid NASA's tracking capabilities considerably.

• Science News Letter, 84:263 Oct. 26, 1963

SPACE TECHNOLOGY

New Fuel Cells Surpass Air Force Requirements

➤ A LIGHTER, more powerful fuel cell that operates at high temperatures and thus requires little cooling is being developed to power the electrical systems of Air Force spacecraft.

Fuel cells are devices that produce a stream of electricity through chemical reactions. Most present models operate only at low temperatures, needing large radiators.

The Air Force has approved development of a prototype fuel cell built by the Westinghouse Research Laboratory in Pittsburgh. The unit, containing three cells, weighs only a fifth of an ounce and takes up a third of a cubic inch.

Strung together, these cells could deliver 150 watts per pound and operate at electrolyte currents of 780 amperes per square foot of cell area.

This surpasses what the Air Force had been looking for in every department, the firm's researchers said.

The new cells operate at a temperature of 1,750 degrees Fahrenheit. Cell systems of 500 watts or more could generate enough heat to maintain their own operating temperature.

To achieve this, Westinghouse researchers developed a ceramic of zirconium and yttrium oxides to use as a solid electrolyte. Hydrogen, the fuel, and oxygen gases flow into the battery and the reaction product, water, flows out in vapor form. This vapor can be condensed easily to provide pure, distilled water.

The fuel cell is popular among spacecraft designers as an auxiliary power plant because of its compactness, lightweight and its ability to operate at zero gravity.

Westinghouse also has been investigating the making of fuel cells that will burn coal, instead of expensive hydrogen, at high temperatures. This could lead someday to highly-efficient industrial power plants.

• Science News Letter, 84:263 Oct. 26, 1963