

Why should men prospecting for oil in the Philippines
be interested in the ionosphere a hundred miles above?

The Little

ONCE THERE WAS a little bird who lied but the men prospecting for oil in the Philippines weren't absolutely sure that the bird was lying. But they were suspicious of its veracity and their telegram to us at the Manila Observatory here in Baguio asked us to check into the bird's story.

In case that isn't 100 percent clear allow me to explain. For the past few months a highly scientific survey for oil has been going on throughout the Philippines. It has been carried out, not by pick and shovel, but on a much vaster scale by means of sensitive magnetic equipment attached to an airplane. After the plane has gained its proper altitude on an exploratory flight a magnetic instrument is lowered by a cable so that the instrument flies at a hundred feet below the plane. This object is familiarly spoken of by the party as "the bird." "The bird" has a story to tell those in the plane.

Everyone is familiar with the compass needle which points to the north because of the earth's magnetic field. "The bird" is similar to the compass needle; it puts itself automatically in line with the earth's magnetic field. But more than that—since it is electronic as well as magnetic "the bird," through the wires in the supporting cable, gives a measure of the strength of the total magnetic field. As the plane flies along "the bird" reports the changes in this quantity just as a plane altimeter gives the changes in the height of the plane. The magnetic changes are electronically recorded. One can study the records later on. Aerial photography associates the area beneath the plane with the changes in the magnetic field records.

Going over different mineral deposits in the solid earth the recorder quivers to indicate the corresponding changes in the total magnetic field. If there are minerals like iron the recording needle goes in one direction. If there are shale deposits it goes in the opposite. Shale is more likely to contain oil than is iron.

It is clear that this type of exploration depends on steady or normal conditions in the earth's magnetic field. If there were sudden great changes in the magnetic magnitudes—such conditions are known as magnetic storms—the recording device would be violently swamped or overloaded with the storm changes. The recorder would fail to separate the changes due to the storm from the changes due to the earth beneath.

During the search the oil prospectors became suspicious of their records on certain days. That is why they telegraphed to us for assistance. For the Manila Observatory of the Jesuit Fathers in Baguio is studying the upper atmosphere known as the ionosphere. From fifty to three hundred miles straight up are the regions where electrically charged particles accumulate in layers. These charged layers serve as mirrors for short wave radio energy so that radio communications at great distance become possible. If the waves were not reflected from the ionosphere they would proceed in straight lines out into space. Since the earth is curved, the reflection is necessary for the waves to get around the curvature of the earth.

When I received the telegram from the oilmen I looked up our ionospheric records for those days. These records are being constantly taken day and