

Pecora Symposium
(1979) file

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Earth's water under satellites' eyes

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Four satellites will be turning their gaze on Luverne, Minn., Wednesday.

Their mission? Measuring soil moisture, a technique scientists hope someday to perfect to the point that they can predict floods and droughts.

Estimating soil moisture by satellite is still in the experimental stages, but scientists at a symposium at the downtown Holiday Inn say once the bugs are ironed out, experts will be able to monitor crop yields, aid the control of diseases and insects and make better forecasts about floods, droughts and runoff.

"A great deal of research has been done already, but it's going to take at least five more years before the methods are operational," said Donald R. Wiesnet. He is a senior research hydrologist for the National Oceanic and Atmospheric Administration, which monitors weather conditions and will be conducting the Luverne experiment along with the Soil Conservancy Service.

Wiesnet also is the general chairman of the symposium, which is examining the use of satellites in the study, development and protection of the Earth's water sources.

About 400 scientists, resource managers and planners from around the world are expected to attend the symposium, which started Sunday.

Measuring soil moisture has always been a headache for scientists wanting to put together accurate forecasts of natural disasters. If soil moisture could be accurately measured, Wiesnet said, disasters such as last spring's Red River flood in North Dakota and Minnesota, which caught people unaware because the amount of water was inaccurately assessed, could be avoided.

The problem is that the moisture content of fields varies greatly. Someone taking 100 samples from different points in a field probably would get 100 different soil moisture readings, Wiesnet said.

Through satellites, scientists hope to avoid the pitfalls of ground testing by using radiation to get a wider sampling of ground moisture and then averaging the results for a more accurate picture, Wiesnet said.

So far, scientists have found three tools for measuring soil moisture from satellites—microwave, thermal and visible/near infrared—but none of them is totally accurate, Wiesnet said.

Microwaves can look through cloud cover,

for instance, but measure one-fourth of a state at a time, far too large a sampling for accurate analysis, Wiesnet said.

Thermal, which measures temperature, can be used at night but its results are distorted by ground "clutter," such as terrain roughness, Wiesnet said.

Visible, which involves photography, is flawed in that it records only the surface of the soil, which can dry out quickly. The other two methods can get below the soil, Wiesnet said.

Currently, scientists are trying combinations of the three methods and comparing them to find their individual strengths and weaknesses, Wiesnet said.

But don't think that scientists are limiting their use of satellites to measuring soil moisture. Experts also are attempting to use satellites to survey the amount of surface water in storage, improve estimates of water withdrawal and consumption and to make more accurate predictions of snow melt runoff.

Satellites can even be used to find ground water, according to Vic Myers, director of the Remote Sensing Institute at South Dakota State University in Brookings, S.D.

Scientists, using their knowledge of geo-

graphy and typography, can study satellite and aircraft pictures of ground surface and make accurate guesses where ground water is hidden.

The experts get some help from infrared-invisible light waves—to penetrate the ground in search of the elusive water. The infrared reveals variances in temperatures that betray different currents of ground water.

Myers said the method works best with shallow ground water, and he noted that South Dakota's water works well because it is usually within 50 feet of the surface.

"We can't see the ground water, but we can tell where to drill for water," Myers said.

The symposium, which is held each year on a different satellite use-related topic, ends Friday. Each year a different professional society is selected to plan the symposium around a timely theme. This year's symposium was set up by the American Water Resources Association.

Among the participants is Merle Nelson, a native of Garretson, who presented a paper this morning about the use of satellites.