

Weather satellites 20 years old

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Washington—A group of veteran scientists and engineers gathered here last week to observe an anniversary in space flight that probably means more to the average person than all the moon landings combined.

The group recalled the good times and the struggles that preceded the launching of the first weather satellite, forerunner of today's sophisticated space vehicles that return to Earth the pictures that routinely flash on television screens during morning and evening newscasts.

It was April 1, 1960, in another presidential election year, that the National Aeronautics and Space Administration sent into orbit Tiros-1, which returned to Earth a fuzzy picture of a band of clouds hovering above an equally fuzzy globe.

Today, weather satellites that are five times as big and equipped with far more precise instruments have become such an integral part of modern life that their daily reports seem as commonplace as the stock market quotations from Wall Street.

The hurricane forming in the Caribbean, the snowstorm sweeping across the Great Plains, the April showers over the Chesapeake Bay are all there to see on the TV screen as weather forecasters speak knowingly of high-pressure systems, occluded fronts and tropical depressions.

But the use of data from these satellites extends well beyond the daily routine of most citizens.

For example:

- Ocean-going vessels use weather satellite information to locate and "ride" the northbound current of the Gulf Stream on voyages up the East Coast. The Gulf Stream's push saves fuel.

- Weather satellites help provide Florida's citrus growers with accurate frost warnings so that they can light their smudge pots to ward off the cold. Smudge pots, incidentally, are expensive, and the annual savings in Florida because weather satellites reduce unnecessary burning has been estimated at \$45 million.

- The satellites also map the snow cover in the Sierra Nevada river basins, providing important advance information to flood control managers in the West.

In brief, weather satellites have had a major impact on weather forecasting, according to David S. Johnson, director of the government's National Environmental Satellite Service.

How much of an impact?

People are always asking him that question, Mr. Johnson said. Meteorologists argue the point among themselves.

It is difficult to say, in a quantitative



Twenty years ago, a scientist pointed out features of Tiros-1, the first American weather satellite, shortly before it was launched into orbit around the Earth.

sense, but the satellites have had a "significant impact" on forecasting, Mr. Johnson said.

Mr. Johnson was among the group of scientists and engineers from the government and industry who met for lunch Tuesday at the National Press Club to talk about 20 years of weather satellites.

Prominent among the group was Abraham Schnapf, principal scientist at RCA's Astro-Electronics Division, in Princeton, N.J., which has helped develop four generations of these satellites for the NASA and the National Oceanic and Atmospheric Administration (NOAA).

Tiros was the first generation.

"Before Tiros," Mr. Schnapf recalled, "man's total knowledge of current global weather conditions was sketchy at best.

"Two-to-three day forecasts were still a thing of the future and a meteorologist was doing well if he knew, at any given day, the prevailing conditions on more than 20 percent of the planet outside the continental United States.

"Over the past 10 years, the Tiros-NOAA operational satellites have observed the planet every 12 hours."

One key advantage of weather satellites is their ability to see the weather over the vast ocean areas of the globe where conventional meteorological sta-

tions are sparse at best.

This advantage is particularly helpful to people on the West Coast of the United States who, in contrast to Easterners, don't have weather stations in Denver, Kansas City, Mo., and Cleveland to track the approach of storms on their eastward course across the globe.

Not many weathermen work in the Pacific.

Further, weather satellites literally gave meteorologists the big picture, Mr. Schnapf said. With the advent of these spacecraft, the weather could be evaluated in a "global context," he explained.

The customers for weather satellite data are global, too. Scores of countries around the world, some with only the barest minimum of forecasting equipment, rely on America's weather satellites to help them with their predictions.

The satellite data are received by more than 800 ground stations around the world.

Still to come are more and better satellites to help scientists understand more thoroughly the vagaries of that complicated weather machine called the atmosphere.

Meteorologists may never understand it all, but at least they should be able to say with something close to certainty that today's rain in Cumberland will fall on Dundalk tomorrow.