METEOROLOGY

Colder Winter Weather

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➤ THE WINTER of 1961-62 was colder than normal. The temperatures for December, January and February averaged colder than usual for the northern two-thirds of the nation. Only exceptions were the extreme Pacific Northwest and New England, where temperatures were near normal, and Florida where they were above.

Low temperature records for the day, the month, the season or the year were broken in many places. Although some of the country was still shivering in wintry weather and digging out from under heavy snowfalls, as far as weathermen are concerned winter is over and spring comes on March 1.

Meteorologists take December, January and February as the three months of winter. This is because winter weather patterns are usually well established by December, whereas March weather, despite such severe snowstorms as lashed the eastern part of the country March 5 to 7, tends to be more spring-like.

Temperatures averaged four to eight degrees below normal in such Plains states as Minnesota and Iowa. Considering that these are average figures, this means that thermometer readings many times dipped very far below normal, since normal or above normal readings occurred during some periods.

A frigid winter gripping most of the country from the East Coast to the West Coast is most unusual. The pattern is more likely to be a cold east and a warm west, or vice versa. The last time the entire country was colder than normal from coast to coast during winter was in 1910, based on records dating back to 1899.

However, the 1910 pattern was different than that of this winter, Jerome Namias, head of the U.S. Weather Bureau's extended forecast section, told SCIENCE SERVICE. He said his theory for this year's pattern was based on a feedback mechanism operating between the atmosphere and surface factors.

Once a weather pattern is established, the feedback mechanism tends to reinforce it. The pattern generates weather systems that produce factors on the surface, such as snow, and these factors in turn affect the atmosphere.

Mr. Namias said that, according to his feedback theory, each part of the "great circle of weather" is linked with every other part. One factor in the scene for winter's weather pattern was set in the fall, when the surface waters of the eastern Pacific warmed up. This warming continued unabated through the winter, and the pool of warmth expanded considerably.

The warm-up was due to abnormal air circulation, established in the fall and continued into the winter, that prevented mixing of ocean waters. It amounted to an average of two to four degrees in most places, with patches as high as six degrees above normal, Mr. Namias said. Water holds quite a lot of heat and rapidly influences air masses moving over it.

There is also indirect evidence, Mr. Namias said, that waters of the central and western Pacific were colder than normal. Since air masses over these waters would not be warmed as much, a steep contrast in temperature differences occurred.

Under these conditions, if the atmospheric circulation is favorable to the development of storms, not uncommon in the central Pacific, then these storms would develop more intensely than normal.

As the storminess developed, Mr. Namias said, a trough also developed in the upper level winds that circle the earth, known as the planetary wave. A ridge then developed in the planetary wave to the east of the trough. This ridge was centered in the Gulf of Alaska, where normally there is a trough (a dip in the planetary wave). As soon as the ridge built up, it began to funnel cold air down into the Far West. Gulf of Alaska air, Mr. Namias noted, is a key factor influencing weather in the United States. If there had not been a persistent ridge in the Gulf of Alaska, the U.S. would have had much more of the relatively warm Pacific air instead of great blasts of cold Arctic air.

To the east of the Alaskan ridge was another trough in the meandering planetary wave, centered over the far Southwest and sloping broadly up to the Great Lakes region. Disturbances moving northeastward along this trough line laid down extensive snow cover over the middle of the country, particularly Iowa, Minnesota, Wisconsin and Michigan.

These very heavy snows early in winter refrigerated the cold air masses pouring down from the Gulf of Alaska, preserving their coldness. The cold air masses also acted as a bulwark to the warm air masses pushed over them.

The weather pattern's effects are worldwide, so the winter's pattern in the U.S. was also linked with one of the worst storms ever to hit northern Europe, which devastated areas in West Germany in mid-February.

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SPACE

Solar Orbiting Satellite

➤ THE WORLD'S first orbiting "eye" to look at the sun is working like a charm. It points at the sun with an accuracy of sighting a one-cent piece a half mile away.

The OSO, orbiting solar observatory, is such a near-perfect satellite that it had National Aeronautics and Space Agency scientists exclaim in such superlatives as: the highest, largest, most sophisticated technologically, highest in power and most important of scientific satellites.

At a progress report on the new child in the family of satellites, NASA scientists said that the 458-pound spacecraft is in orbit at 370 miles when farthest away and 343 miles when closest to earth. This orbit is closer to a circle than that of any previous NASA satellite.

The OSO takes a turn around the earth each 96.15 minutes. During its first 90 orbits, the satellite 73 times sent back 90 minutes of scientific data in just five minutes each time as commanded from the ground when the satellite passed within range of the Minitrack stations ready to receive its information.

The OSO is a curious looking "bird" with three legs fastened onto a wheel which spins once each two seconds to give it stability. Gas jets are used to speed up the spin if needed. The scientists reported that the gas jets are not as efficient as believed and that the satellite is running colder than expected. The 13 experiments on board are working satisfactorily. The spin axis of OSO deviates only one-fourth of a degree a day which will be corrected every 12 days when the deviation amounts to 3 degrees.

The satellite contains rotating parts such as ball bearings and slip rings, parts generally avoided in satellites. However, the panel of scientists reported that no deterioration had been detected in these parts yet.

With OSO, man will get a better look at space beyond the atmosphere which is beneficial because it protects humans against dangerous rays from space but bad for astronomers as it veils their "window" to the skies. Gamma ray experiments on the satellite may give new information about the nuclear processes on the sun and may also give information on cosmic rays and a clue to the origin of the universe. Studies of invisible X-ray and ultraviolet rays, not possible before because of the earth's atmospheric shield, are also being made by OSO.

Solar satellites will be of great use in studying rays dangerous to man in space. It is now believed that variations in X-rays and ultraviolet rays are greater at times when solar flares shoot millions of miles into space. However, even at times of relative quiet on the sun, studies are important to tell astronomers how the sun behaves. The lowest ebb of solar activity in its 11-year cycle will occur in 1964.

In future probes, NASA scientists would like more, bigger and more sophisticated experiments to study the earth-sun relationship and observe the sun as our closest star. A distant goal is to measure the magnetic field of the sun and its electron densities.

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