

# Hydrologic cycle gives Earth life

By DIETER KRIEG

**EDITOR'S NOTE:** This is the 15th article in a continuing series on one of the most powerful and vital forces known to man - the weather.

"The hydrodynamics of meteorology presents without doubt the most complicated series of interrelated problems not only that we know of but that we imagine." So says mathematician John von Neumann, who has spent much of his career working with meteorological equations.

To understand von Neumann's comment on a global scale, we must realize that the Earth's weather machine is powered by some 240 trillion atomic horsepower per day. They're emitted from the sun. This inconceivable amount of power churns our oceans and atmosphere constantly. More than 1000 billion tons of sea water are sucked up per day as a result of this energy, and some 50,000 thunderstorms are spawned daily. Each of these thunderstorms has the equivalent power of a 1-megaton hydrogen bomb. All told, the Earth's daily thunderstorms release energy equal to explosions from billions of tons of TNT. Is it any wonder then that an occasional storm comes along? And then there are also hurricanes, blizzards, tornadoes, typhoons, severe drought, and much more.

With its awesome powers, and the ability to give and take life, weather is the single most important ingredient necessary to sustain life.

What farmer hasn't seen leaves of corn curled up tightly and pointed straight for the sky in a prayer-like manner in desperation of rain? Who hasn't seen cracks in the Earth, as the soil opens itself up for want of moisture? And who hasn't experienced the ravaging, devastating effects of a sudden downpour?

Nobody who has ever farmed needs to be informed as to how important rain is. That rain gauge on the corner fencepost is a most interesting little gadget.

Scientists call the constant exchange of water from ocean to air to land and back to ocean the "hydrologic cycle." That's the mechanism which makes everything else tick, for without water for our crops - we have nothing.

The hydrologic cycle is an unending exchange by which water is constantly transferred from ocean to atmosphere, from atmosphere to land, and finally, from land to sea. Powering this whole system is the sun, of course. But there are other factors involved which determine what's going to happen. Mountain ranges, for example, play a big roll as they can block the path of rain clouds can cause them to release their precious cargo sooner than they would have otherwise.

It is estimated that the "natural refining process" of transforming and transferring salt water into usable fresh water takes up about one-third of the total solar energy reaching our planet. Evaporation is constantly taking place, and naturally enough, so is precipitation.

Winds carry moisture laden air from the oceans to the continents. Various air masses interact with each other due to differing densities and temperatures. The air parcels therefore keep moving in all directions (even up and down) and eventually reach a stage where their moisture is condensed and then precipitation falls. The most common forms of precipitation are rain and snow. Less common types are drizzle, hail, ice pellets, snow pellets, snow grains, and ice crystals.

"The amount of water vapor that can exist in any given space is a function of temperature: the warmer the air, the more active its molecules and the greater its capacity for water vapor," say spokesmen at the National Oceanic and Atmospheric Administration (NOAA). When its capacity is reached, the air is saturated. At 70 degrees Fahrenheit, for example, a cubic yard of saturated air can hold nearly four times as much water vapor as the same volume of air at 32 degrees Fahrenheit.

With that in mind, we can understand why most of our rainfall comes during the warmer seasons. Fortunately for farmers in this part of the country, precipitation most always comes when it's needed in the Spring, while moisture levels are significantly lower during late Autumn. This year that didn't hold true 100 per cent, for Pennsylvania since rain was more than plentiful during harvest time, but in most cases that's the way the cycle operates. And if it didn't, we wouldn't have nearly the excellent growing conditions that we have in and around the "Garden Spot."

## 'Iron grandma' named

FLEMINGTON, N.J. - Joining a select group of cows recognized as "Iron Grandmas" by the Holstein-Friesian Association of America was Milk & Honey Athene Ivanhoe, owned by J. S. Johnson, Cedar Lane Farm, Oldwick, N.J. At the age of 14 years, 8 months, Athene's lifetime output stands at 210,657 pounds milk and 8,486 pounds butterfat.

This amounts to something over 100,000 quarts of milk produced. And, she is still going strong, according to George Harner, herdsman at Cedar Lane Farm.

Athene's best record in a single year was made when she was six years, 10 months of age, milking twice daily for 323 days, she produced 24,460 pounds of milk and 1,005 pounds butterfat.

She is classified "Excellent" and has been designated "4E," which indicates that she had been officially scored "Excellent" on four consecutive classifications.

Athene was bred in the Cedar Lane Farm herd. She was sired by Osborndale Ivanhoe, (EX-GM)

TRY A CLASSIFIED



Scientists say that there is always some amount of condensation suspended in the air - even on the fairest of days. But the moisture does not always fall. It takes some sort of triggering device. In all instances, this trigger involves temperature, and that can be brought about by lifting the air. Mountain ranges force air upwards in an obvious manner. As it rises, the air cools, sublimation takes place, and presto, rain falls. Air also rises due to its entering a low pressure area, which, incidentally, is a fine way of producing thunderstorms and hurricanes. This system, as was described in earlier "Weather Reports," feeds on itself and can result in some pretty heavy downpours.

A third way for air to be lifted is by frontal occlusions, which is simply a cold and warm front colliding, and the warm air being pushed up as a result of it. Once the warm air is lifted high enough, precipitation falls.

Rain and other forms of precipitation return to the oceans through streams and rivers, but not before they have given refreshment to living things in their paths. And in some cases, of course, also destruction.

Farmers believe the hydrologic cycle is important enough to be monitored with that raingage on the fencepost. During planting and harvest seasons nearly all plans are made with considerable consideration being given to the hydrologic cycle.

The U.S. Weather Service believes this vital cycle deserves an awful lot of attention. They have a network of more than 13,000 gauges to measure rain and snow, and use additional information gathered by radar, aircraft, and satellites. All things considered, these instruments have not only allowed our society to plan for the days ahead a bit better, they have annually saved more than \$100 million in flood damages alone and an untold number of lives.

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