Kid's Korner

There's More To Snow Than Snow

After slogging through it, being stuck in it and even dying from it, you'd think that human beings by now would know everything there is to know about snow. Not so.

Solid, liquid and gas at varying times, snow is a complex substance whose behavior — on land and in the air — still eludes scientists. Wet snow is an entirely different material from dry snow, and within the wet and dry categories are numeorus different types.

When snow hits the ground, it is no longer the same substance that has been falling through the atmosphere. And fallen snow, a good insulator of the soil it blankets, undergoes constant change.

What happens to snow on the ground - how it bonds, breaks apart, melts and refreezers - matters for everything from avalanche prediction to the design of better-performing tires for military tanks and private cars, safer skis for airplanes, faster skis for people, more effective but environmentally correct deicing chemicals for highways and "grooming" techniques for smoother, longer-lasting snow roads and snowmobile trails.

The end of the Cold War has melted some snow-cover research, says Russell Alger, director of the Institute for Snow Research in Michigan's Upper Peninsula. Except for Bosnia in winter, the big push now militarily is for improved vehicle mobility — not in snow, but in desert sand.

More than 95 percent of Earth's seasonally snow-covered land lies in the Northern Hemisphere, which holds most of the planet's landmass.

From December through March, the white stuff blankets 16 million to 20 million square miles of the hemisphere, the majority of the land north of 40 degrees latitude. By midsummer it all disappears, except for glacial snow and ice fields.

Since 1972, satellite images, which have provided the first consistent record of snow coverage, have shown that the year-to-year horizontal expanse of winter snow has not varied significantly across the Northern Hemisphere as a whole.

"But the snow has melted earlier in the spring in the past six years — in March and April, rather than April and May," says geographer David A. Robinson of Rutgers University in New Jersey, who has analyzed the satellite data.

"The biggest change in recent snow cover is not so much its lack in winter as its early end, its reduction in spring," agrees Kenneth F. Dewey, professor of climatology at the University of Nebraska.

Why the early spring snow loss? Scientists aren't sure.

"There is a strong correlation between temperatures in the Northern Hemisphere and the extent of snow cover," says Robinson. "Does recent warmth in spring cause the early end of snow cover, or does the early snow loss have a subsequent impact on temperature? Once you have the loss, it kind of snowballs."

Researchers are "trying to unravel this chicken-and-egg question," Robinson tells National Geographic. "It is too early — the record is too short — to attribute this to global warming."

While snow coverage has not changed much globally, snow depth may have decreased. There is no similar satellite record, because the current technology cannot yet distinguish different snow depths.

"Monitoring snow cover may give an index to future climate change," says Robinson. "Snow has to be an important piece of the climatological puzzle."

Earth loses a good portion of its heat from the reflection of sunlight off snow.

Snow on the ground, especially fresh snow (the whitest), reflects back about 90 percent of sun's rays, says Samuel C. Colbeck, a senior research scientist at the U.S. Army Cold Regions Research and Engineering Laboratory in Hanover, N.Y. "The more snow cover, the more solar radiation is relfected back."

To fit another piece into the weather puzzle, Dewey is analyzing satellite data of Southern Hemisphere snow cover for the first time to determine whether it is in phase with the Northern Hemisphere's. About 800,000 square miles of the Southern Hemisphere, mostly in South America, is snow-covered seasonally.

Although it may seem odd, it hardly ever snows in Antarctica, Earth's driest continent. Antarcitica gets less than 2 inches of new snow a year.

Etching new trails in spring snow, expert skiers swoop down the Canadian Rockies in British Columbia. Scientists study what happens to the white stuff, which changes constantly on the ground, to improve avalanche prediction and to design faster skis, better-performing tires and safer de-icing chemicals.

Snow, which covers more of Alaska than any other U.S. state, blankets an abandoned copper-mining camp in the Wrangell Mountains. The deepest seasonal snow is found in Southeast Alaska and Washington state. More than 95 percent of the earth's snow-covered land lies in the Northern Hemisphere.

Batteries Going Green

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WASHINGTON, D.C. — 'Tis the season to buy batteries — not to figure out how to get rid of them.

During the holidays, gadget-crazy Americans grab up the largest percentage of the 2.5 billion household batteries sold in the United States each year.

It's not just gift-giving that boosts sales of these small technological wonders that inevitably wind up as toxic trash. Dark winter weather demands fresh batteries for flashlights and helps put the annual charge into the dry-cell battery market.

More than 90 percent of household batteries are non-rechargeable and most will end up in municipal dumps or incinerators. As the casings decay, their potentially toxic contents, particularly mercury and cadmium, could leak from landfills and thence sink into underground water supplies. Or, the poison could fall to the ground from incinerator stacks.

But batteries — by nature capsules of chemicals — are now "greener" than they've ever been. Manufacturers are taking the heavy metals out of many of them.

To promote environmentally correct batteries, a number of states have banned the use of mercury. A handful of cities and counties are encouraging safe disposal by collecting dead batteries by the bucketfuls.

Eveready's Energizer alkaline battery boasts: "Mercury not included." Duracell too has re-engineered its alkaline batteries to eliminate the substance. The world's two biggest battery manufacturers say that means that their most popular types of household batteries contain no added mercury — apart from trace elements that naturally occur in any battery.

"We believe it's smarter to avoid harmful materials in the first place, rather than worry about disposal later," says Eveready's Keith M. Schopp.

In 1992 Eveready introduced a no-added-mercury zinc-air hearing-aid battery to replace mercuric oxide ones that were 35 percent mercury.

Button-cell batteries, like those used in calculators, contain the most mercury. More and more camera batteries are being made of longer-lasting, less-toxic lithium.

"It's better for the environment that the mercury is out, but that doesn't mean batteries are innocuous," says Juliet Rogers of the New York-based Natural Resources Defense Council. "There are still metals in there that are going to be leached out."

Like the disposable batteries, the rechargeable varieties, used in camcorders, power tools and portable vacuum cleaners, now contain less than .025 percent mercury. But the cadmium in the rechargeables has increased, Rogers tells National Geographic — except for a new type made by Rayovac that is alkaline instead of nickel cadmium.

Batteries that can be recharged 300 to 1,000 times have reduced landfill waste. But when eventually discarded — many still sealed within the product — they put hundreds of tons of highly toxic cadmium into the environment every year.

Some environmentalists say that no battery of any type should enter the waste stream. But because of the expense and logistical problems, very few batteries are recycled nationwide.

Federal hazardous waste regulations exempt household trash, which is governed at the municipal solid waste level.