

The Forward Eagle

Compiled Weekly

“Let us endeavor mutually to enlighten one another.”

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Current Events

1.

On July 14th the surface temperature of Earth’s tropical and mid-latitude oceans was higher than on any other July 14th in modern records. The same was true for every other day in July, and for almost all of the days in June, too. Europe has gone through three heatwaves since May, and though the continent is better prepared for such things than it used to be, tens of thousands will have died as a result.

America’s Fourth of July celebrations took place under a sweltering “heat dome”. Super typhoon Bavi, which saw well over a million people evacuated from the Chinese coast, owed much of its power to the rate at which it was able to suck up energy from the overheated sea. Fires are spreading far and wide. Worse is to come. The chances of this year being the hottest on record are growing; the El Niño getting under way in the Pacific all but guarantees next year will be.

Climate change is feeding on itself. The warming effects of greenhouse gases are driving processes that heat up the planet yet further. The one which is exciting—and alarming—scientists most is an unexpected reduction in an obscure but fundamental aspect of Earth: its albedo.

The albedo is the fraction of incoming sunlight that a surface or a planet reflects back whence it came. High albedos, whether they are created by white roofs or ice-covered seas, keep things cool; by contrast, when albedos are low, the incoming energy stays here on Earth, raising the planet’s surface temperatures. Robust satellite measurements of Earth’s albedo have now been taken for over two decades. They show it falling with surprising speed. The oceans, which are responsible for most of the sunshine’s absorption, have been accumulating much more heat as a result.

This is partly because of a scarcity of cooling clouds over the seas, a widely predicted effect of greenhouse warming. It is also owing to something else entirely. In 2006, in fact, 20 years ago this month, the late Paul Crutzen, a world-renowned atmospheric chemist, wrote an article pointing out the “policy dilemma” embedded in efforts to control emissions of sulphur dioxide. Sulphur dioxide, which comes from the burning of some fossil fuels, creates little particles in the atmosphere after it is emitted. They wreak havoc with human health. They also reflect sunlight back into space, thereby reducing the amount of energy that reaches Earth’s surface. Health agencies, Crutzen said, thought controlling the particles could save 500,000 lives a year; at the same time, by diminishing the sulphur’s cooling effect, the controls might increase global warming by perhaps 1°C (1.8°F).

Both albedo-reducing trends look set to continue, adding yet more to the heat. The industrial cities of the developing world are hardly likely to sacrifice the health of their smog-choked inhabitants in order to slow warming for the world at large, so sulphur emissions will continue to fall. The climate feedbacks which reduce cloud cover will not



The iconic "Earthrise" photograph was taken by NASA astronaut William Anders on December 24, 1968. He captured the famous image using a modified Hasselblad camera during the Apollo 8 mission, which was the first crewed spacecraft to successfully orbit the Moon.

stop while carbon-dioxide levels continue to rise. And even when the transition to renewable energy eats into the use of fossil fuels, as it is starting to do, what matters most is the cumulative level of greenhouse gases.

Around a decade ago the need to stabilize that cumulative level led lots of countries to embrace “net zero” goals. The idea’s proponents see putting no more greenhouse gases into the atmosphere than you are taking out as good planetary housekeeping. They are right. But it is an unavoidably slow process. What’s more, its critics are also correct when they say that only for the largest economies does a single country’s progress towards net-zero goals have any discernible effect on the world’s overall trajectory. The idea was conceived when America was a believer in international agreements and the level of idealism needed to imagine countries spurring each other on to better things was merely high—not, as it is now, delusional.

There are still places where climate change is understood to be important and where action can be coordinated. Being committed to net zero should buy a country a certain standing when it is negotiating other, more near-term options for limiting climate change, such as curbing methane emissions and the production of fluorinated gases used in cooling systems, both of which bring benefits faster than cutting carbon dioxide.

No form of emissions reduction, though, can quickly bend the current trajectory. Endurance is what remains. Making air conditioning more efficient, cheap and widespread saves lives and fits well with other policy goals, like making clean electricity cheap to produce and consume. Ten years ago a commitment to phase out the fluorinated gases in cooling systems was reached in Kigali, the capital of Rwanda. There is scope for extra international efforts to improve the machinery that uses them. This could double the cooling benefit of phasing out the gases.

The most radical response is to make Earth a bit more reflective again. Crutzen’s provocative suggestion for how to resolve his policy dilemma over sulphur emissions was to replace harmful aerosols with benign ones. The brightening of cooling clouds has been tried over the Great Barrier Reef, but the technology needed to do it at scale remains elusive. An Israeli-American company, Stardust Solutions, has raised money to develop “safe” aerosols that it thinks a country or set of countries could use to cool the planet from the stratosphere.

Some oppose such geoengineering; hardly anyone endorses. But if nations can act in concert to warm the planet, as those of the International Maritime Organization did when they enforced new restrictions on ships’ sulphur emissions in 2020, they ought to be able to discuss the conditions under which they might cool it. Keeping silent about geoengineering does not stop someone from trying it.

Word of the Week

albedo

/al'bedo/ [al'βe.ðo]

noun

plural albedos

1: reflective power. Specifically the fraction of incident radiation (such as light) that is reflected by a surface or body (such as the moon or a cloud) compare reflectance

2: the whitish, spongy inner part of the rind of a citrus fruit : the mesocarp of a hesperidium

Usage in a sentence:

When a person peels a grapefruit, some of the white substance that sticks to the fruit is a spongy white tissue called *albedo*.

High *albedo*, usually for the moon, means bright areas, and low albedo refers to dimmer locations,

So the Earth itself seems to have a much higher *albedo* than the moon.

Scientists have long believed that the freeze intensified because of the ice-*albedo* feedback, a process in which expanding ice reflects more sunlight back into space.

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