Wave-7

by GWYNNE DYER

First the ?heat dome?, with temperatures in the mid-to-high forties Celsius in many parts of western North America for up to a week (49.6° C in Lytton, B.C.). Then, when the forests were tinder-dry, came the wildfires (which wiped Lytton out). From northern California to northern BC, the records were being broken every day.

The extreme temperatures were unprecedented, but the weathermen had an explanation of sorts: a ?heat dome? that trapped hot air in the same area for a long time while the heat kept rising.

They didn't speculate beyond that because it would get them into a new and unproven hypothesis, but many meteorologists know that this could be our first glimpse of a new normal in which killer heat waves become regular events.

The proposed name for these new, lengthy super-hot spells is ?wave-7? or ?wave-5? events, because the heat waves strike simultaneously in several large regions around the planet. ?Wave-7?, the likelier candidate in this case, hits western North America, western or central Europe, and western Asia all at the same time.

Wave-7 is still a hypothesis, not a proven fact, but we had just that pattern of extreme heat in late June.

The temperatures were in the mid-to-high 40°s in western Canada and the US Pacific northwest for four consecutive days.

Temperatures in western and central Europe, as usual, were not so extreme, but they were hitting 35-40° in central Europe and the Balkans (plus a killer tornado in the Czech Republic, and the Mediterranean Sea is 3°-5°C warmer than normal).

And in western Asia, the heat reached the mid-40s in most of Pakistan and the high 30s all over Siberia, with peaks of 48°C in Jacobabad and Verkhoyansk. (The latter is on the Arctic Circle).

Record summer temperatures like this were foreseen as a consequence of global warming, but they were not predicted to arrive for another decade or so. The climate models are good at broad numbers like the average GLOBAL temperature, but not yet good at regional effects, so the ?wave? pattern came as a complete surprise.

Once a new pattern emerges, however, the climate scientists are all over it. They already understood the workings of the jet stream; all they had to do was work out how adding a lot of heat to the system would change things.

It may all be connected to the jet stream, a high-altitude, high-speed ?river? of air blowing from west to east around the planet. It used to flow so fast and straight that eastbound airliners cut an hour off their eastbound trans-Atlantic and trans-Pacific flights by hitching a ride on it. But they don't do that so much now, because the jet stream has slowed down and wanders all over the place.

It has slowed because it gets its energy from the temperature difference between the

Arctic air mass and the much warmer air of the temperate zone. In fact, the jet stream is the boundary between the two. But the Arctic is warming twice as fast as the rest of the planet, so the difference in temperature ? and the amount of energy available ? is less than before.

As the jet stream slows, it meanders in bigger and bigger loops, like a big, slow-moving river crossing a flat plain. These huge loops ? ?Rossby waves?, as they are called ? tend to get ?stuck? for a long time. Some pull Arctic air far to the south and hold it there, like last winter's Big Freeze in Texas. Others pull hot southern air farther north than usual, like last month ? and they too hang around for a long time.

The two kinds of loops alternate along the northern jet stream all the way around the planet like beads on a necklace. Every second loop is ?hot' when this pattern kicks in, so it follows that heat waves would be happening in sync in several different continents ? as they currently seem to be.

This is all quite new science, and still open to challenge. But over the past two decades the same pattern of seven stalled peaks and lows over the same regions ? ?wave-7? ? has lasted seven times for more than two weeks. Before 2000, it never happened.

If the ?wave? hypothesis is correct, then these killer heat waves will become more common in the northern hemisphere as Arctic temperatures soar and the jet stream slows, sometimes extending all the way from latitude 30°N to latitude 60°N.

We once believed that severe heating would not afflict the rich countries of the temperate zone until much later than the tropics and sub-tropics, but that may be wrong. We already have killer heat waves with the global average temperature up by only +1.1° C. It's bound to go to at least +1.5°C, even if we do everything right from now on.