ANNOUNCER [KF]: Will the Wet Get Wetter and the Dry Drier? Animations and graphics displaying results of climate model experiments conducted at NOAA’s Geophysical Fluid Dynamics Laboratory.

NARRATION [GV]: Not all regions of the Earth receive the same amount of precipitation.

As shown in this graph, the subtropics (roughly the band from 20 to 35 degrees of latitude in both the Northern and Southern Hemispheres) is a fairly dry region.

This is the latitude range where you'll find arid regions such as the Sahara, Arabian, Kalahari, and Australian Deserts, as well as the deserts of northwestern Mexico and the southwestern United States.

Compared to the subtropics, locations near the Equator as well as subpolar latitudes (roughly the zones between 50 and 70 degrees of latitude in each hemisphere) tend to experience higher annual precipitation amounts.

The reason that the subtropics are relatively dry and subpolar latitudes are relatively wet is that water that evaporates in the subtropics is continually being transported poleward by the atmosphere before it falls as rain or snow.

In response to increasing greenhouse gas levels, air temperatures rise.

As the atmosphere warms, it is capable of holding more water vapor, and computer climate models as well as observations indicate that the amount of water vapor in the atmosphere is increasing.

This animation shows a computer climate model projection of how precipitation amounts could change during the 20th and 21st centuries.

To create the animation we first consider the model’s simulation of 20th century precipitation at each location.

We rank each 5-year period as having above normal, normal, or below normal precipitation.

Drier periods appear as tan. Wetter periods are colored in turquoise shades.
As the model simulation progresses through the 21st century, two additional colors appear.

A dark khaki color indicates when a 5-year period is projected to be drier than any 5-year period in the 20th century.

Similarly, a dark blue-green color appears when the model simulates a 5-year precipitation total that exceeds any 5-year period in the 20th century.

Though variability exists, a pattern emerges.

As the planet warms, the atmosphere pulls more water out of the subtropics as evaporation.

Much of that water condenses into clouds and is transported poleward by the winds, where it eventually is deposited as precipitation in subpolar latitudes.

So, as temperatures rise, there’s an increase in the total amount of water evaporating and precipitating over the Earth – a strengthening of the global hydrologic cycle.

Combined with wind pattern changes that cause the entire atmospheric circulation to shift poleward, the global hydrologic cycle changes as the climate warms – resulting in especially strong drying tendencies in several subtropical regions.

Many subtropical land regions that are arid today are expected to receive even less rainfall in the future, while most subpolar regions that today have more precipitation than evaporation are projected to receive additional precipitation as the planet continues to warm.

The simulated subtropical drying can been seen in this graph as a decrease of 3 to 4 inches of annual precipitation centered near 35 degrees of latitude in both hemispheres.

The model projects increases in precipitation near the Equator and in the subpolar latitudes.

This pattern can be described in broad terms as the wet getting wetter and the dry getting drier.

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