Uneven warming shifts equatorial rain band, midlatitude westerlies

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In a band near the equator, southward Northern Hemisphere winds and northward Southern Hemisphere winds come together to form the Intertropical Convergence Zone (ITCZ). In the ITCZ the equatorward winds rise and cool, creating a region of high precipitation and weak surface winds. The location of the ITCZ and the precipitation it delivers to the rainforests is not static—seasonal differences in temperature between the hemispheres drive the ITCZ north and south, with the convergence zone moving toward the warmer hemisphere.

One expected consequence of global climate change is that the hemispheres will not heat evenly. Previous research suggests that the north will warm more swiftly than the south, and using a series of atmospheric models Ceppi et al. find that this imbalance will have a consequent effect on the location of the ITCZ and of the powerful Southern Hemisphere midlatitude westerlies.

Through a series of modeling studies the authors find that a warming of the midlatitude Northern Hemisphere would drive the ITCZ and the Southern Hemispheric westerly jet north. The authors propose a novel physical mechanism for the shift: as the ITCZ moves north, following the warming, the Hadley cell in the Southern Hemisphere gets stronger. This causes the subtropical jet, a powerful tropospheric atmospheric current, to grow in strength. This, in turn, affects how large-scale atmospheric waves penetrate into the tropics, affecting the behavior of the eddy-driven westerly surface jet.

The authors note that this is not the only proposed mechanism relating climate change to the behavior of the ITCZ and the westerly jets, and that a full understanding of how these systems will evolve requires considering all known mechanisms.

More information: "The Relationship Between the ITCZ and the Southern Hemispheric Eddy-Driven Jet" *Journal of Geophysical Research-Atmospheres*, doi:10.1002/jgrd.50461, 2013