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How Does Global Warming Impact the El Niño-Southern Oscillation?

Reference

Collins, M., An, S.-I., Cai, W., Ganachaud, A., Guilyardi, E., Jin, F.-F., Jochum, M., Lengaigne, M., Power, S., Timmermann, A., Vecchi, G. and Wittenberg, A. 2010. The impact of global warming on the tropical Pacific Ocean and El Niño. *Nature Geoscience* **3**: 391-397.

Collins *et al*. (2010) write that "the El Niño-Southern Oscillation (ENSO) is a naturally occurring fluctuation," whereby "on a timescale of two to seven years, the eastern equatorial Pacific climate varies between anomalously cold (La Niña) and warm (El Niño) conditions," and that "these swings in temperature are accompanied by changes in the structure of the subsurface ocean, variability in the strength of the equatorial easterly trade winds, shifts in the position of atmospheric convection, and global teleconnection patterns associated with these changes that lead to variations in rainfall and weather patterns in many parts of the world," which end up affecting "ecosystems, agriculture, freshwater supplies, hurricanes and other severe weather events worldwide." Hence, it naturally follows that one of the more important questions of the day -- especially for the inhabitants of a world that is claimed by climate alarmists to be experiencing unprecedented global warming -- would have to be: *What happens to the ENSO phenomenon as planetary temperatures rise?*

We find an answer to this burning question in a paper recently published in *Nature Geoscience* by a team of twelve researchers hailing from six different countries (Australia, France, India, South Korea, the United Kingdom and the United States), wherein they review the findings of what they describe as "a hierarchy of mathematical models [that] have been used to explain the dynamics, energetics, linear stability and nonlinearity of ENSO," while noting that "complex coupled global circulation models have become powerful tools for examining ENSO dynamics and the interactions between global warming and ENSO." So what have those powerful tools revealed to us?

Among other things, Collins *et al*. write that "the tropical easterly trade winds are *expected* to weaken; surface ocean temperatures are *expected* to warm fastest near the equator and more slowly farther away; the equatorial thermocline that marks the transition between the wind-mixed upper ocean and deeper layers is *expected* to shoal; and the temperature gradients across the thermocline are *expected* to become steeper [italics added]." However, they state that "it is not yet possible to say whether ENSO activity will be enhanced or damped, or if the frequency of events will change." Or, we might add, if their several *expectations* will ever come to pass.

Interestingly, students of the subject a decade ago (including two of the authors of the Collins *et al*. paper) seemed to actually "know" *much* more than those of today do; and they were likewise much more *sure* of themselves. Timmermann *et al*. (1999), for example, developed a global climate model that indicated, in their words, that when "forced by a realistic future scenario of increasing greenhouse-gas concentrations, more frequent El-Niño-like conditions and stronger cold events in the tropical Pacific Ocean result," a scenario that was also suggested by Collins (2000a,b) and Cubasch *et al*. (2001). As more has been learned, however, and as models have been improved and more paleoclimate data have been acquired, it has become clear that we currently "know" much *less* about the global warming/ENSO connection than we *thought* we did a decade ago. And perhaps a decade from now we will discover we actually know much less than we believe we know now, although we obviously hope for the opposite. For the present, however, we are left with the conclusion of Collins *et al*., i.e., that "it is not clear at this stage which way ENSO variability will tip ... As far as we know, it could intensify, weaken, or even undergo little change depending on the balance of changes in the underlying processes."

Additional References

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