

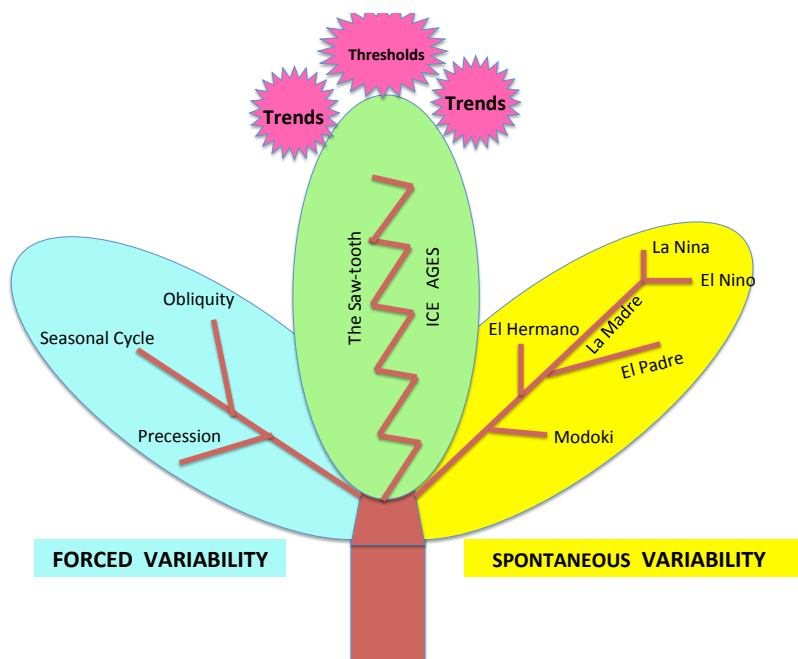
George Philander

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Philander studies past and future climate changes, interactions between the ocean and atmosphere that produce phenomena such as El Niño and La Niña, Ice Ages...He is the founder of ACCESS (African Centre for Climate and Earth System Science) in Cape Town South Africa, Member of the National Academy of Sciences, Fellow of the American Academy of Arts and Sciences, Fellow of the American Geophysical Union, Fellow of the American Meteorological Society.

Family Tree of El Niño

Fluctuations in tropical Pacific rainfall and sea surface temperature (SST) patterns involve different processes on different timescales, but nonetheless have certain features (traits) in common so that all can be viewed as members of the same family. The well-known children El Niño and La Niña who perform the Southern Oscillation by moving warm surface waters back and forth across the Pacific, have nephews and nieces in the Atlantic and Indian Ocean. They all depend on the thermocline having a suitable depth which the parents El Padre and La Madre control and, at times, make so deep that oscillations are impossible and El Niño conditions become permanent. This is the spontaneous, natural branch of the family. Another branch responds to external forcing (externally imposed variations in sunlight) and has as members the cycles of the seasons, of obliquity, and of the precession of the equinoxes. Being acquainted with this family is an advantage because they can shed light on the recurrent Ice Ages, and can assist with improving complex climate models.



The Family Tree of El Niño

One branch is spontaneous and Latin, with Japanese influence. Another responds to forcing and is predictable. The third branch seems unstable, and is given to trends that feedbacks sustain and thresholds reverse.