

COMMENT: SURGE THEORY WEIGHS IN ON THE BALANCE OF EVIDENCE IN THE DEBATE ON GLOBAL WARMING

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[Follow up article to "Seismic Predictors of El Nino Revisited" by Daniel Walker American Geophysical Union EOS Transactions, Vol. 80, #26, June 22, 1999]

The "missing link" between seismicity and El Nino's may well be tectonic micro-gravity induced atmospheric pressure changes. Walkers observations (1988; 1995; and 1999) of increased T-phase seismicity along the East Pacific Rise correlated to episodic seafloor spreading and reduced pressure in the high pressure cell of the Southern Oscillation should be explainable with current geophysical theory. If geophysicist fail to explain this there is little chance that the debate on "the human contribution to climate change" will ever be clearly resolved.

The interesting fact about micro-gravity is that it takes very little change (0.3-0.4 μ gals/mbar or approximately 1 μ gal for every 3mbars) to produce atmospheric pressure flux of one mbar. This relationship has been demonstrated and quantified as early as 1977 by Warbuton and Goodkind using super-conducting gravity meters. Typical micro-gravity changes of 6 μ gals were noted with typical weather patterns with maximum shifts up to 45 μ gals. This means the small regional atmospheric fluxes of the Southern Oscillation, which are typically 4-6mbars, may be explained with only a 2 μ gal change in micro-gravity. Are tectonic dynamics capable of producing micro-gravity shifts of this magnitude? Francis et al. in 1997, document a 17 μ gal shift in the gravity field with super-conducting gravity meters moving through Membach, Belguim. They attribute this shift completely to geophysical origin. This 17 μ gal shift, which moved through Europe in early 1996, may also be related to the 1997/98 El Nino if it migrated towards the Pacific Basin as a tectonic front or micro-gravity wave. It also follows that increases in hurricanes in the Atlantic after an El Nino may be explained by eastward migration of tectonic fronts. Modulation of jetstream patterns by across basin sea-level pressure oscillations is a common denominator in large-scale climate change and hurricane formation.

Another interesting point is the location of these teleconnected sea-level pressure oscillations. They occur directly over very active large-scale tectonic features. The high pressure of the Southern Oscillation is over the East Pacific Rise, which is the largest and most dynamic tectonic feature on earth. The low pressure of the Southern Oscillation is centered just north of Darwin, Australia over the Banda Sea. This is considered a triple junction of the Pacific, Australian and Southeast Asian plates within the plate tectonic hypothesis and is very seismically active. Geoid undulations with frequencies associated with El Ninos mobilizing plates motion is one possible explanation, but a superior explanation

emerges with surge tectonic theory (Meyerhoff et al., 1992; 1996) and tectonic vortex analysis.

Surge theory allows atmospheric circulation patterns such as Walker Circulation to be considered as a model for tectonic dynamics in the Pacific Basin instead of simple Hadley Cell convection considered as a driving force in Plate tectonics. Once this simple shift in perspective is made it is fairly easy to understand how large downwelling tectonic pressure cells along offsets on the East Pacific Rise are dynamically linked to mantle upwelling in the Banda Sea tectonic vortex. Upper mantle stream flow processes around the Pacific "Rim of Fire" diverging in the Banda Sea and converging on the East Pacific Rise along with a deep connection near the outer core complete a simple Walker Circulation model for the tectonics of the Pacific Basin. A detailed surge model of the Banda Sea is portrayed by Leybourne and Adams, 1999.

Plate theory seems to be the limiting factor on explaining the link between seismicity and El Nino. Walker uncovered this mysterious tectonic link to climate as early as 1988 with no apparent explanation to date. That random ocean/atmospheric interactions are considered the driving force behind the Southern Oscillation, which drives El Nino, is in my opinion a weak explanation at best, especially in light of a tectonic link. Until this mysterious link is explained it is all but impossible to separate the influence of man on climate from those naturally occurring in the earth/ocean/atmosphere/solar coupled system. Measuring micro-gravity in tectonic vortexes may provide the data needed to separate natural vs. man-made climatic influences. Other tectonic structures to be investigated include the ones controlling the North Atlantic Oscillation. The Icelandic Low is underlain by Iceland a well know upwelling hotspot. The Azore High is centered above a kink in the Mid-Atlantic Ridge. And finally the Siberian High is located directly above Lake Bakail the deepest continental rift lake in the world.

B. A. Leybourne is an employee of the Naval Oceanographic Office. However, the opinions and assertions contained herein are those of the author, and are not to be considered as official statements of the U.S. Department of the Navy.

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