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Earthquake precursors in the ionosphere: electrical linkage provided by the fundamental physics of gravitation

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For more than a decade, evidence has been mounting that major earthquakes may be preceded, days to weeks later, by the appearance of local changes in electron density-gradient in the Earth's ionosphere above that area. Such linkage, albeit co-seismic, has been observed even when the earthquake was deep below electrically conducting seawater [1]. This appears to rule out many of the kinds of linkage that have been proposed.

My inquiry as to the nature of the physical mechanism by which gravitational force is developed has led me to the surprising finding that the Newtonian potential is inevitably always accompanied by a corresponding positive-body-repelling radial electric field. I have called this the Gravity-Electric (G-E) field and have adduced evidence for its action at many astronomical scales [2 –4].

After outlining the reasoning that has led me to this result I will refer to observations which suggest that the G-E field is indeed the precursor link that we seek. Time permitting, I will show briefly how the likelihood of an ionospheric precursor will, in this case, depend on the plate dynamical mechanism and nature of the pre-quake deformation.

Historical background. Newton's work on gravitation astride the end of the 17^{th} century concentrated on the behaviour of the force, not upon its origin.. But he already endorsed the idea of an ubiquitously intervening aether tp convey the force and, as Huygens had already reasoned, also to transmit light waves. Then, in the 1860s, people [5, 6] started to think of fundamental particles as being aether in a vortex-like motion which would, by mutual attraction, provide their mass property and gravitation. In such a set-up, particles and the aether around them would not be dynamically independent, so the Michelson-Morley experiment, 20 years later [7], could equally have been interpreted as supporting that situation, not as disproving the existence of the aether.

But, in setting up Relativity (1905-1916), Einstein took the latter view, then pursuing the clear inconsistency of greatly valuing electromagnetic waves as messengers but denying the aether, known from Maxwell's equations [8] to be essential for their existence and propagation. Further, General Relativity treats particles as infinitesimal entities, thus denying them any volume within which to develop their individual external mass property, and inhibiting any attempt at physical understanding of its development [9]. The GR-equations' supposition that the mass is 'intrinsic' to that specific infinitesimal point in space gets us nowhere in that respect.

Origin of the mass property and of gravity; a fresh attempt. We start by implementing, apparently as never before, Maxwell's aether as a massless, compressible, continuum of negative electric charge. And we follow [5, 6, 9] in regarding fundamental particles as constructs of vortical aether motion. Particles of opposite relative charge, e.g. electron-positron pairs, are then dynamically similar but one incorporates more aether than the mean, and the other less. From this we use observations to show that the aether's mean density is extremely high ($> 10^{30}$ C/cm^3). The statistically prevalent tendency of such vortices will be to suck themselves together, not to scatter, thus providing the origin of gravitation. In any resulting gravitational assemblage, that sucking action is continually seeking to maintain a lower aether charge density in the interior. That charge density gradient is an electric field; the Gravity-Electric (G-E) field. Gravitational interaction with the rest of the Universe means the G-E field extends indefinitely outside the body, as does its Newtonian one.

Distinctive action of the G-E field; its evaluation for the Earth. Neutral particles will experience only the Newtonian field but, on sufficiently charged positive ions in a plasma, the G-E field will result in a net outward force, with electrons being propelled inwards. In the Sun the electrons detached from the solar wind ions are evident in the negative H ions whose opacity is responsible for the solar photosphere 'surface' [11]. The Earth displays the same effect, with 90% of lightning strikes bringing negative charge to ground, and a concensus estimate of 250 kV between F-layer and ground.

The earthquake precursor link. The conclusion offered in this presentation is that the precursory electron

density-gradient change in the ionosphere is due to the build-up of elastic deformation of Earth's crust that changes the surface gravitational potential and the associated G-E field. So our caveat is that there will be no precursory sign in the ionosphere if the build-up of pre-seismic stress is by a dynamical mechanism that does not do that. On the other hand, this understanding should help to dispel doubts about interpreting a short-term ionospheric change as an earthquake precursor when one does appear over an active region. Other reasoning or measurements could then be concentrated on that location for guidance as to the kind of earthquake to be expected and its human severity.

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