Bob Maurer, who is a member of our Society and a chartered Engineer, has consistently maintained that from a Mechanical Engineer's point of view the unrelenting tectonic movements and orogenic activities of the Earth cannot be adequately and solely explained by subduction via the omni-directional heated currents within the Earth's mantle.

Bob offers an alternative analysis based on the forces associated with the rotational velocity of the Earth to explain supercontinent break-up followed by tectonic plate movements, subduction, and orogenic processes. This is in contradiction to current wisdom which accepts that the movement of a continental plate (CP) is the result of the 'pulling action' applied to it by the subduction of the higher density oceanic lithosphere (OL) as it descends below the CP. The direction of the heated convection currents considered to cause subduction must vary over time and distance. It was this inability to reconcile the long term (Mya's) unidirectional movements of tectonic plates in an omnidirectional convection current based force environment, that prompted Bob from 2002 to 2020 to analyse the constant forces generated by the rotational velocity of the Earth.

Robert Maurer, MSc, Ceng, FInstMC, FGS



By considering the Earth as an unbalanced rotating body with an offset centre of a mass (COM) it was possible to develop equations to quantify the magnitude of the circumferential tensile stresses developed in the Earth's rim as a function of the distance between the COM and the centre of rotation (Radius of Eccentricity). In doing so this treatise will principally demonstrate that there is a separation of the forces acting to influence plate tectonics:

(A) The forces responsible for the break-up of a supercontinent, separately from

(B) The forces initiating and sustaining subduction.

Furthermore, the radical approach taken allows for the concept of 'momentum' to a moving continental plate (CP) to be introduced into this field of study. In this manner, it is possible to offer alternative explanations to the Hess heated circulatory convection current system, presently used to describe tectonic plate movements and subduction.

Fig iii. Taken from Section 7: A mutual gravitational pull will exist between the centre of mass (COM) of the Sun and that of the newly accreted planet Earth. For planetary rotation on its own axis to be initiated, the planet's COM must be pulled off-centre to provide leverage for a torque force.



The Separate Forces for Supercontinent Break-Up and Subduction

Fig iv. Taken from Section 12: Circumferential tensile forces cause the break-up of a supercontinent. The movement of the continental plates initiates and sustains the process of subduction.



Subduction is a consequence of Tectonic Plate movements Principal subduction stages p = M cp x V cpStage 2 CP Subduction initiated by downward force due to weight of overriding CP Fby*Au Fbs*Au Stage 3 CP Slab-Pull (Fsp) is established as more OL is pushed under moving CP Frv*Au SP = Fwslab/cosø is opposed by Frv, Fby & Fbs. CP movement is unaffected Fby*Au Fbs*Au

SP=Fwslab/cosd

Stage 4

The gained momentum will ensure the continous movement of the CP when Slab becomes detached

Stage 5

Subduction cycle is restarted These events may be noted by changes in surface topography







The Shaping of Planet Earth by its Rotational Velocity **ROBERT MAURER** MSc CEng FlnstMC FGS

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"An Engineer's approach to the forces responsible for tectonic and orogenic movements"