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An alternative view on subduction zones

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Statement of the Problem: Conventional models of subduction zones are contradicted by motion direction within the mantle beneath Wadati-Benioff zones, entitling the quest for alternative models.

Present View: According to current interpretations, the Earth has not increased its mass/size since its final accretion about 4.5 billion years ago. This standpoint is adopted by the theory of plate tectonics, which, fulfilling its requirements, is compelled to link the evidence of growing oceanic crust along mid-oceanic ridges to a speculation. It states that old crust must plunge into the mantle along subduction zones to compensate for newly created crust. The process is believed to be proved by earthquakes taking place in the inclined Wadati-Benioff zones.

Alternative Model: Analysis of seismic anisotropy data has shown that the motion direction within the mantle directly beneath Wadati-Benioff zones is mostly at right angles to that implied by the subduction model. It means that the mantle, instead of plunging downwards, creeps horizontally showing a remarkable parallelism to the alignment of subduction zones. In accordance with this finding, my interpretation states that subduction zones are in fact inclined counterparts of doubly bounded transcurrent systems with which they usually merge (Figure 1). Both represent crustal manifestations of the mantle currents beneath. For this reason the tilted structures should be considered as inclined transcurrent systems rather than subduction zones. They are ubiquitous wherever the generating mantle currents have flow directions that differ from the sense of Earth rotation, which lends support to the hypothesis that the tilting may be a combined effect of vertical shear and Coriolis force. The fact that there are no 'subduction zones' trending east-west could be explained in this way. Regarding the earthquakes within Wadati-Benioff zones, I interpret them as being caused by mantle outgassing, in accordance with ideas enunciated by Thomas Gold.

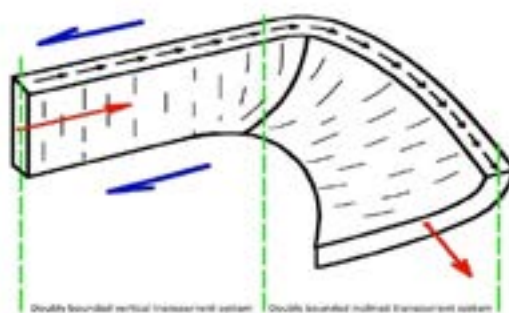


Figure 1: A doubly bounded transcurrent lineament merging into an inclined transcurrent system ('subduction zone')

Biography

Carl Strutinski studied Geological Sciences at the University of Bucharest. He worked for over 15 years in a geological enterprise for prospection and exploration, and then for another 17 years at the Geological Institute of Romania (Bucharest), studying metamorphism and geotectonics. Since 1990, he published seminal papers on the transcurrence phenomena in mountain building.

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