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SPACE-TIME PROCESSES IN SUBDUCTION ZONES WITH
REFERENCE TO THE NEW HEBRIDES (VANUATU).

Claude Blot

Mission Autonome de Recherches Internationales et
d'Etudes des Tremblements de Terre et des Eruptions .
La Farliède , 83210 Solliès-Pont , France .

The space-time distribution of earthquakes in a subducting plate (postulated by the author twenty years ago) is controlled , in a first approximation, by the elementary relation :

$$(I) \quad t = k \cdot \log \frac{h_{d,i}}{h_s} \cdot \frac{1}{\sin a}$$

where "t" is the delay (in days) between earthquakes at the deep or intermediate depth "h_{d,i}" (in km) and at shallow level "h_s" ; "a" is the dip angle of the link vector ; K is a velocity parameter unrelated to the magnitude of earthquakes but dependent on the structure and the strain in the environment concerned and may be an investigation tool on the rheology of the upper mantle .

The inferred migration speeds are of the same order as estimated by several authors from observations of seismic patterns along plate boundaries , i.e. 50 - 100 km/year . The relation (I) takes into account the increased velocity migration with depth.

Catalogues , maps and diagrams of the numerous space-time correlations between intermediate-depth earthquakes and shallow events, observed in the Santa Cruz - New Hebrides - Matthew island arc, provide useful complementary information on structure in the strips of this subducted zone , on their complex patterns of stresses and also highlight the different processes involved .

In general the trajectories related to upward and downward migrations of earthquakes within the subducting blocks are coincident with the principal axes of stress determined by focal mechanism solutions . These results suggest a process of earthquake triggering disturbance along tectonic lineaments (faults) within the subducted lithosphere.

The prominent gaps in shallow and slightly deeper earthquakes located in the strips crossing Ambrym, Lopevi islands (in the central New Hebrides) and Tanna island (in the southern New Hebrides) are consistent with the high activity of these volcanic islands, the earthquakes at depth beneath these volcanoes being related to their eruptions .

The relation (I) applied to the deep earthquakes occurring eastward of the New Hebrides shows that striking space-time correlations exist between deep, intermediate-depth and shallow events inspite of a wide-spread gap in seismic activity at depth between 350 and 550 km .

(Previously at Office de la Recherche Scientifique et Technique
Outre-Mer , 24 rue Bayard , 75008 Paris , France)

20 DEC 1983
O. R. S. I. O. M. Folios Documentaire

No : 4257

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Recent data allows a morpho plate contact z Ridges and the Malekula block. by a trench bet appears to be v casteaux ridge indente the west by lateral plast may be explained the North d'Entr porated to the 1 plate contact zc and the shallow stresses generat New Hebrides. P theoretical stra rigid plastic bo casteaux zone. T bent under verti and pushed eastw chain can be exp the subduction o for the changing of the arc, to a adjacent parts w troughs.

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