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POSSIBLE MAGMATIC INTRUSION IN THE NEW HEBRIDES ISLAND ARC REVEALED BY TILT AND SEISMICITY.

B.L. ISACKS[1], J-L. CHATELAIN[1,2], G. HADE[1], R. PREVOT[2], R. MELLORS[1]

[1]INSTOC, Cornell University, Snee Hall, Ithaca NY 14853; [2]ORSTOM, BP A5, Nouméa, New Caledonia.

During the past ten years tilt has been monitored in the central New Hebrides island arc by periodic releveling of bench mark arrays and operation of tiltmeter recorders. An unprecedentedly large tilt change of about 10 microradians was determined by releveling on Efate Island between May and November, 1986. In late October-early November, 1986, an unusual swarm of very shallow (depths near 10-15 km and less) earthquakes occurred about 15 km NNW of the releveling array and tiltmeter instruments. The 5-day duration of the swarm correlated very closely in time with a pronounced and unambiguous 4-5 microradian ramp-like tilt signal recorded on the 100 m long-baseline water tube tiltmeter; the signal was also recorded on the bubble-level tiltmeters. All three tilt measurements showed a tilting upwards towards the N-NNW, i.e., towards the earthquake swarm. The shallow seismic episode is a classical swarm type sequence characteristic of volcanic regions, with no dominant event and a symmetrically shaped temporal histogram. A major Pleistocene volcanic complex is located on and north of Efate island about 25 km east of the swarm, and recent detailed bathymetry directly above the swarm reveals a possible submarine volcanic edifice. All these observations are consistent with the hypothesis that the unusual tilt and seismicity signals in late 1986 are related to magmatic intrusion. The observed and inferred volcanism near Efate is located anomalously trenchward of the main magmatic arc, and may be related to important transverse structures in the upper plate that control the interplate seismicity. The shallow swarm was immediately preceded by a small cluster of events located at depths of about 40 km nearly beneath the swarm and near the interplate zone.

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3. (a) Bryan L. Isacks
INSTOC
Snee Hall
Cornell University
Ithaca, NY 14853
(b) 607 255 2307

4. S or V

5. (a) None
(b) 7230 Seismicity

6. S

7. 0 %

8. Charge to Bryan L. Isacks

9. C

10. none

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