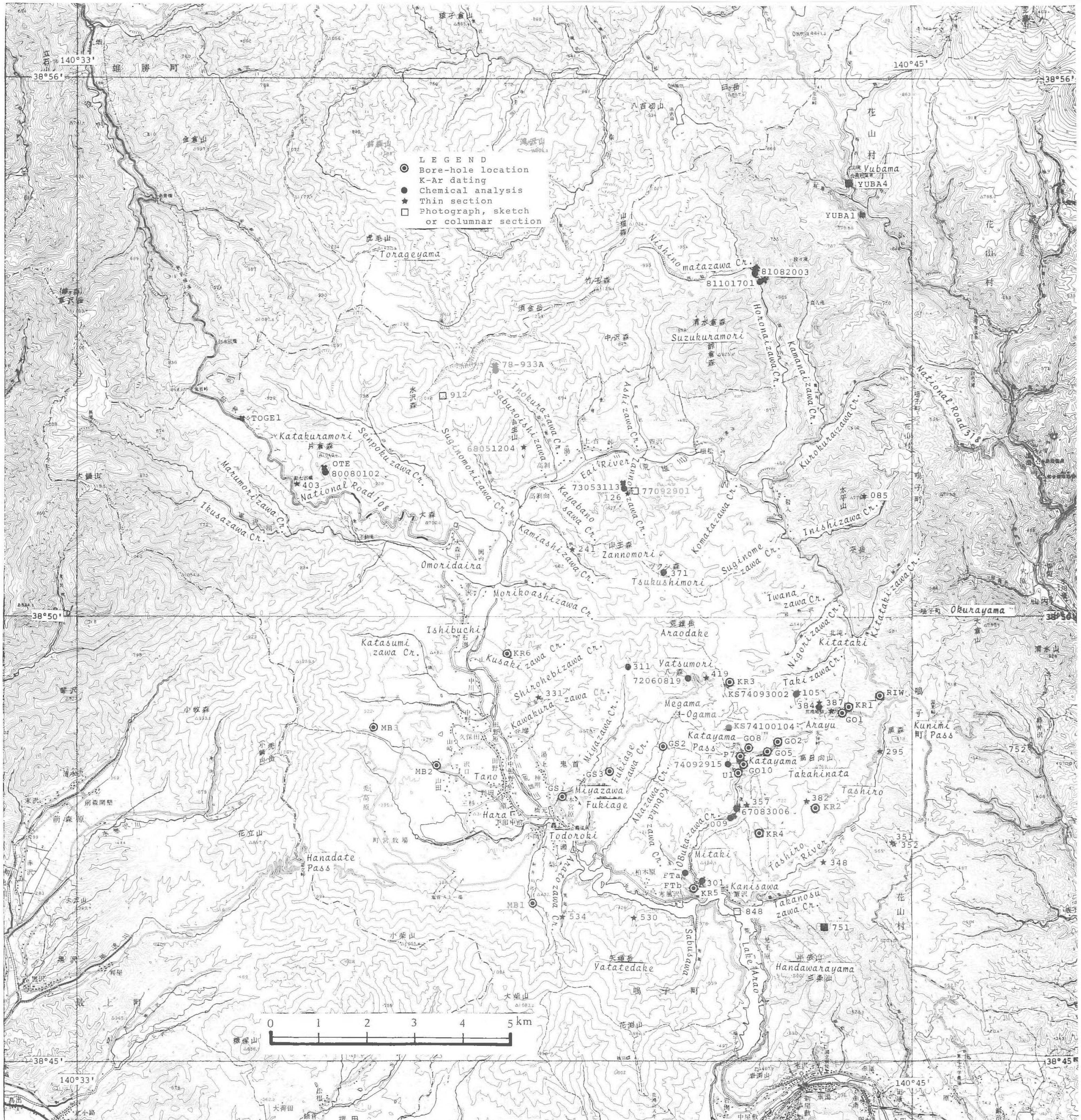


Fig. 2 Locality map showing topography of the Onikobe area, geographic names, and the bore-hole, sample and other localities.

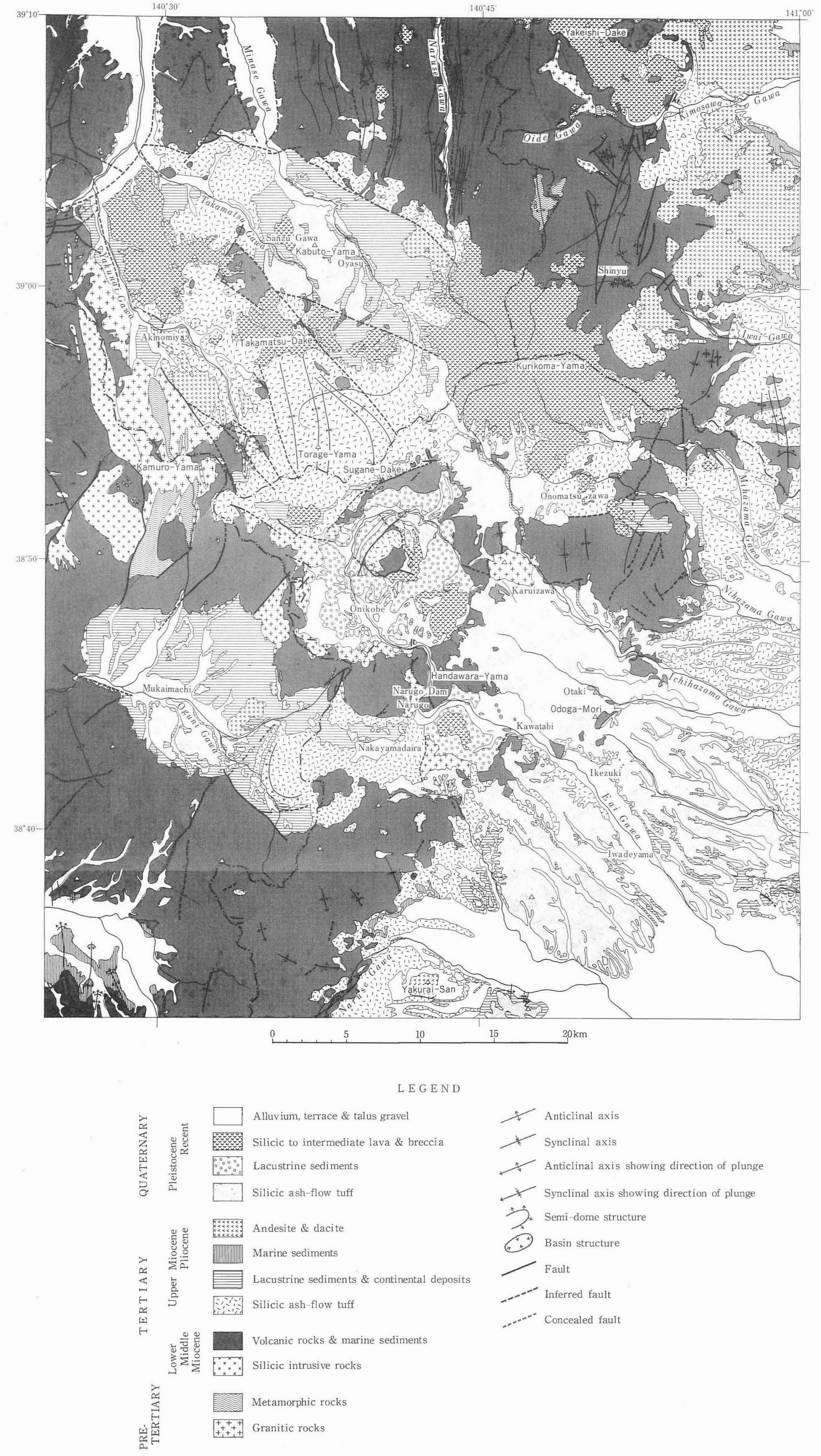
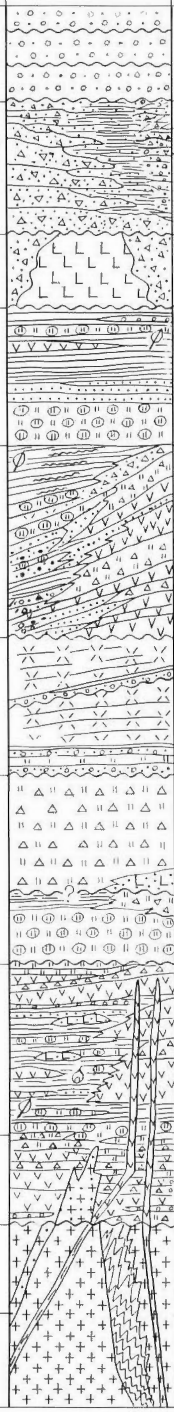


Fig. 3 Geologic map showing the geologic setting of the Onikobe caldera. (Simplified with minor revisions from the geological map of Kurikoma Geothermal Area by Research group for geological map of the Kurikoma Geothermal Area, 1986).



Age	Stratigraphic units (Thickness)	Schematic column	Lithology	Fossils	Isotopic & F.T. ages	Remarks	
Recent	Recent Sediments (0-100m)		River terrace gravel beds, locally cemented by sinter & limonite. Composite fan & talus gravel beds. Lacustrine black clay, conglomerate & sulfur beds (in Katayama).		14,000 B.P.		
Pleistocene	Onikobe Formation (0-100m)		Conglomerate, sandstone & thin-laminated siltstone with rare intercalations of diatomite beds.	*Diatom*		Caldera lake	Distension in the southeastern part (with minor normal faults, extension joints & clastic dikes).
	Kawaku-razawa Formation (0-100m)		Volcanic mud-flow deposits, enclosing white-altered pebbles & cobbles, and andesitic tuff-breccia (around Katayama). Mud-flow deposits & conglomerate with minor intercalations of siltstone & sandstone beds (between Kusaki-zawa Cr. & Miya-zawa Cr).		23,380±890 B.P. 24,970±1210B.P. >32,500 B.P.		
	Takahinata Rhyodacite (0-250m)		Lava dome & its debris, pyroxene-hornblende rhyodacite (SiO_2 72-73%). White-altered around Arayu.		0.35 Ma (1.5 Ma)		
	Miyazawa Formation (200-300m)		Conglomerate (only along margins of the caldera). Andesitic tuff, laminated siltstone & conglomerate. Andesite lava, quartz-bearing pyroxene andesite (very local & thin). Siltstone, massive to thin-laminated. Subaqueous pumice-flow deposits, composed mainly of white tubular pumice (SiO_2 69%) with minor banded pumice & gray pumice (SiO_2 58%). The pumices are pyroxene & hornblende rich. The deposits grade upwards to fine tuff.	*Carpinus* sp. *Fagus* sp. (Accretionary lapilli)			Uprise of Zanno-mori Block (2.5 x 3.0km) in the north-western part, resulting in the formation of the Zanno-mori Dome (with minor faults, slump structures & slide faults).
	Akazawa Formation (500-800m)		Siltstone & sandstone, thin-bedded & in places slumped. Dacitic tuff-breccia, pyroxene-hornblende dacite (SiO_2 68%) fragments in a pumiceous matrix (only around Katayama). Subaqueous pumice-flow deposits, composed of many eruption units (in northern part of the caldera). Andesite lava, massive & auto-brecciated commonly quartz-bearing pyroxene andesite (SiO_2 58-65%). Andesitic volcanic breccia. Andesitic pyroclastic-flow deposits, tuff-breccia & tuff. Debris-flow & mud-flow conglomerate.	*Betula maximowicziana* REGEL *Carpinus* sp. *Fagus* sp. *Fagus crenata* BLUME	(0.4±0.4 Ma) (1.8 Ma) 1.5±0.9 Ma (2.4±1.2 Ma)		Caldera collapse
Pliocene	Kitagawa Tuff (0-200m)		Ash-flow tuff, gray weakly welded to white pumiceous non-welded tuff, locally brownish. Hornblende-bearing pyroxene dacite (SiO_2 67-68% bulk, 71-73% pumice). Thin conglomerate, sandstone, siltstone, pumiceous tuff & fine tuff intercalations, beneath each cooling unit.	(Accretionary lapilli)	2.2~2.4 Ma 1.7~2.7 Ma	< Erosion >	Regional tumescence
	Torageyama Formation (0-800m)		Ash-flow tuff, mostly porous greenish gray pumiceous welded tuff but lower part of each cooling unit is dense black glassy welded tuff. Containing abundant lithic fragments. Biotite-hornblende-pyroxene rhyolite (SiO_2 75% in bulk). Rhyolite lava, green, compact, lower part auto-brecciated & locally developed lithophysae. Mud-flow conglomerate, various blocks in a gray ashy matrix (only in the northern rim). Massive silicic ash-flow tuff. Upper unit is white gray to pale green pumiceous tuff. Lower unit is purplish gray tuff with green pumice patches.	(Accretionary lapilli)	4.6±1.2 Ma 4.8±0.2 Ma (3.9±0.3 Ma)		Block-faulting
Miocene	Kanisawa Formation (400-1000m)		Distal facies of subaqueous rhyolitic ash-flow deposits, andesitic lapilli-tuff, rarely air-fall scoria beds, volcanic conglomerate, and sandstone. Siltstone & sandstone, in many places dark gray, carbonaceous, and massive. Andesite lava, massive, auto-brecciated & rarely hyaloclastic. Andesitic tuff-breccia. Rhyolite lava & tuff-breccia, commonly flow banded (only in the northern rim).	*Chlamys* sp. *Metasequoia occidentalis* (NEWB.) CHANEY	9.8 Ma	Shallow marine	
	Kamuroyama Formation (0-300m)		Andesite lava, commonly aphanitic & propylitized. Andesitic tuff-breccia, propylitized, rarely lapilli-tuff & tuff. Locally near the base, well-rounded pebble to cobble conglomerate intercalations.			< Erosion >	
Creta-ceous	Granitic Rocks		Hornblende-biotite granodiorite & tonalite, commonly medium grained, altered & cataclastic.		(52 Ma) 80 Ma 100 Ma		Mylonitization Orogeny
Paleo-zoic	Schist		Pelitic & psammitic low grade metamorphic rocks, e.g., muscovite-quartz-albite-chlorite schist & actinolite-chlorite-albite schist.			Marine	

Fig. 4 Stratigraphic table with a schematic stratigraphic column and some remarks on sedimentary environment and tectonism. (Slightly revised from YAMADA, 1986 a).

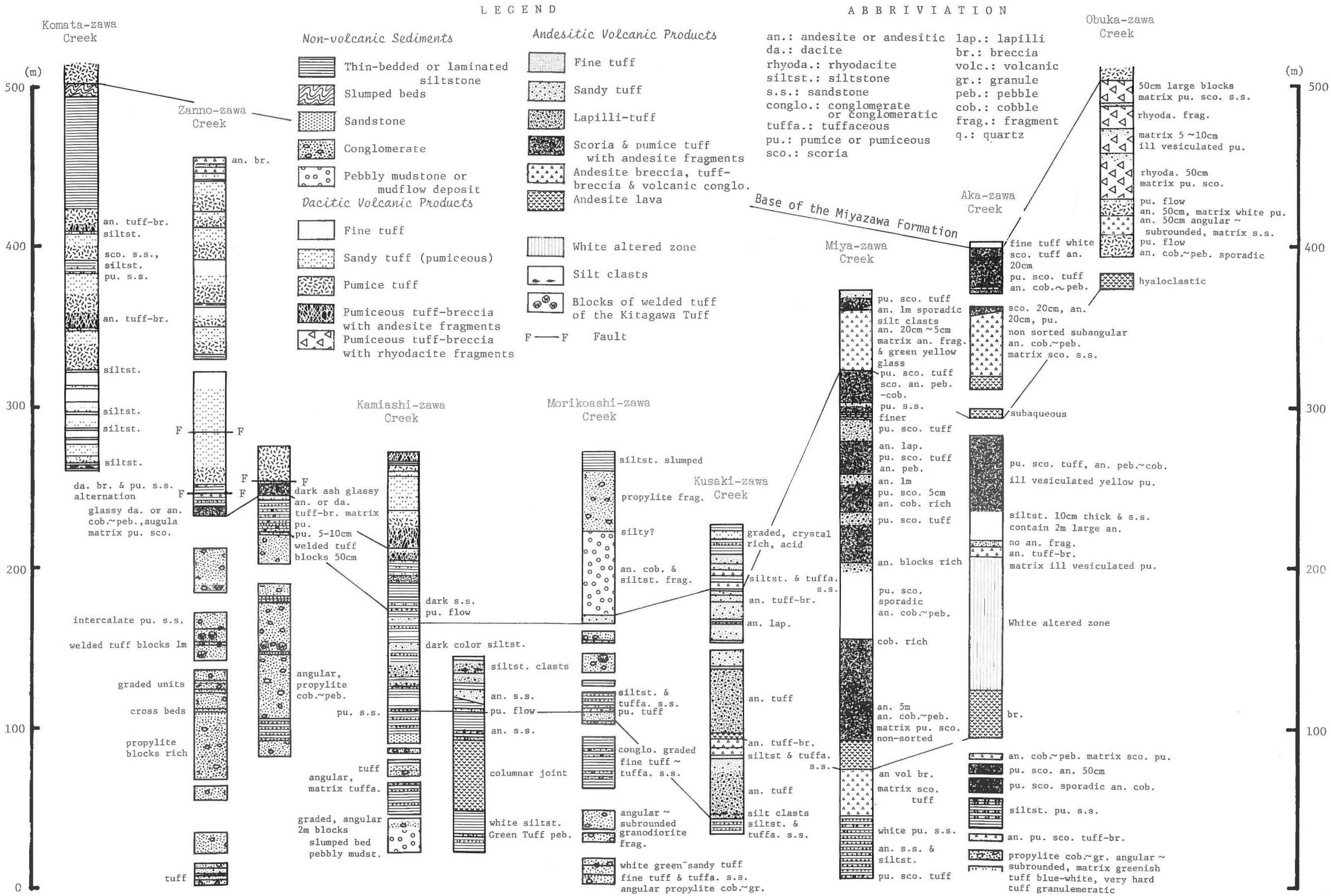


Fig. 8 Stratigraphic columnar sections of the Akazawa Formation measured along the creeks and their correlation.

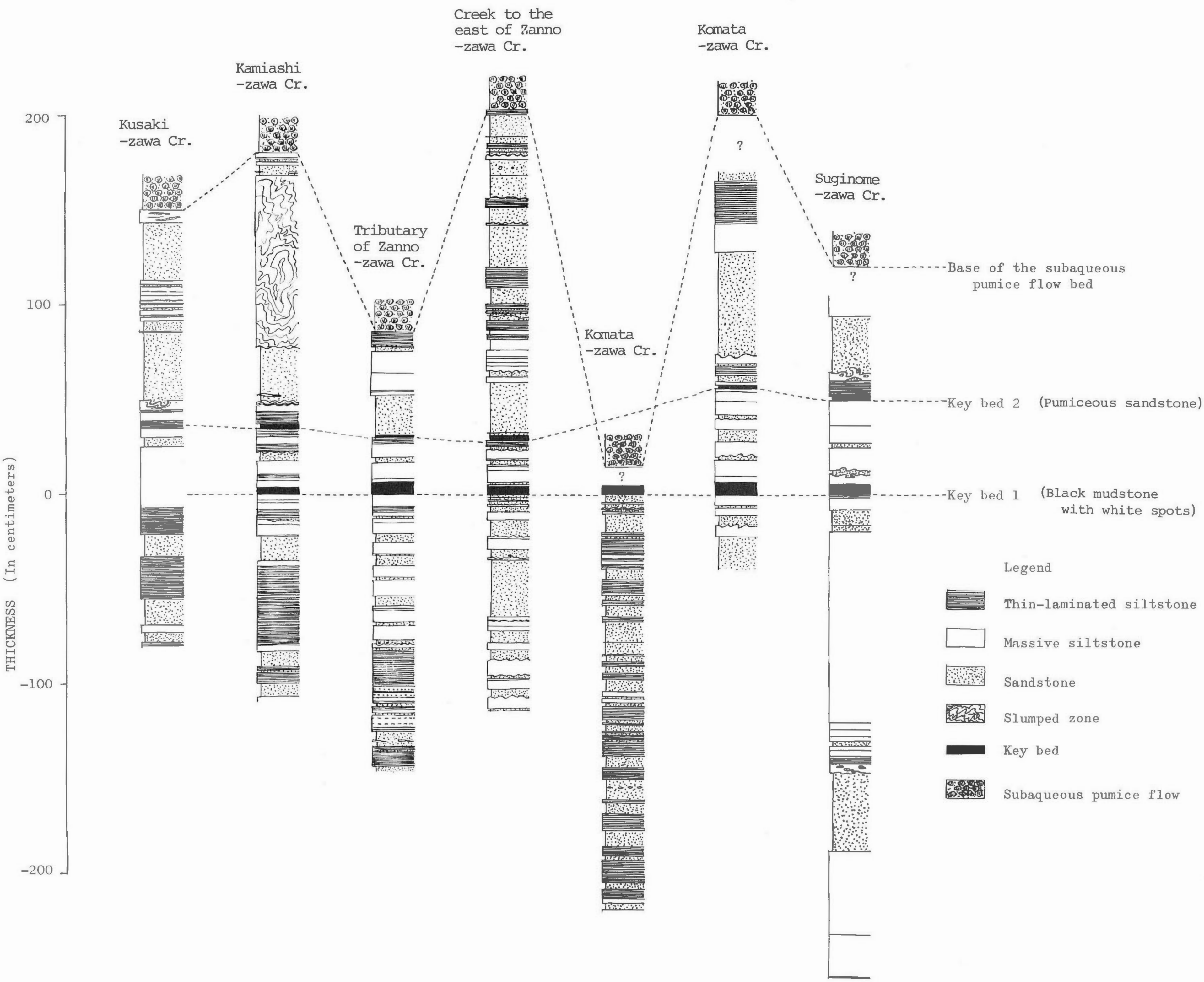


Fig. 11 Stratigraphic columnar sections of the strata beneath the subaqueous pumice-flow bed at the base of the Miyazawa Formation and their correlation. (After YAMADA, 1973). The base of Key bed 1 was taken as the datum plane (zero meter).

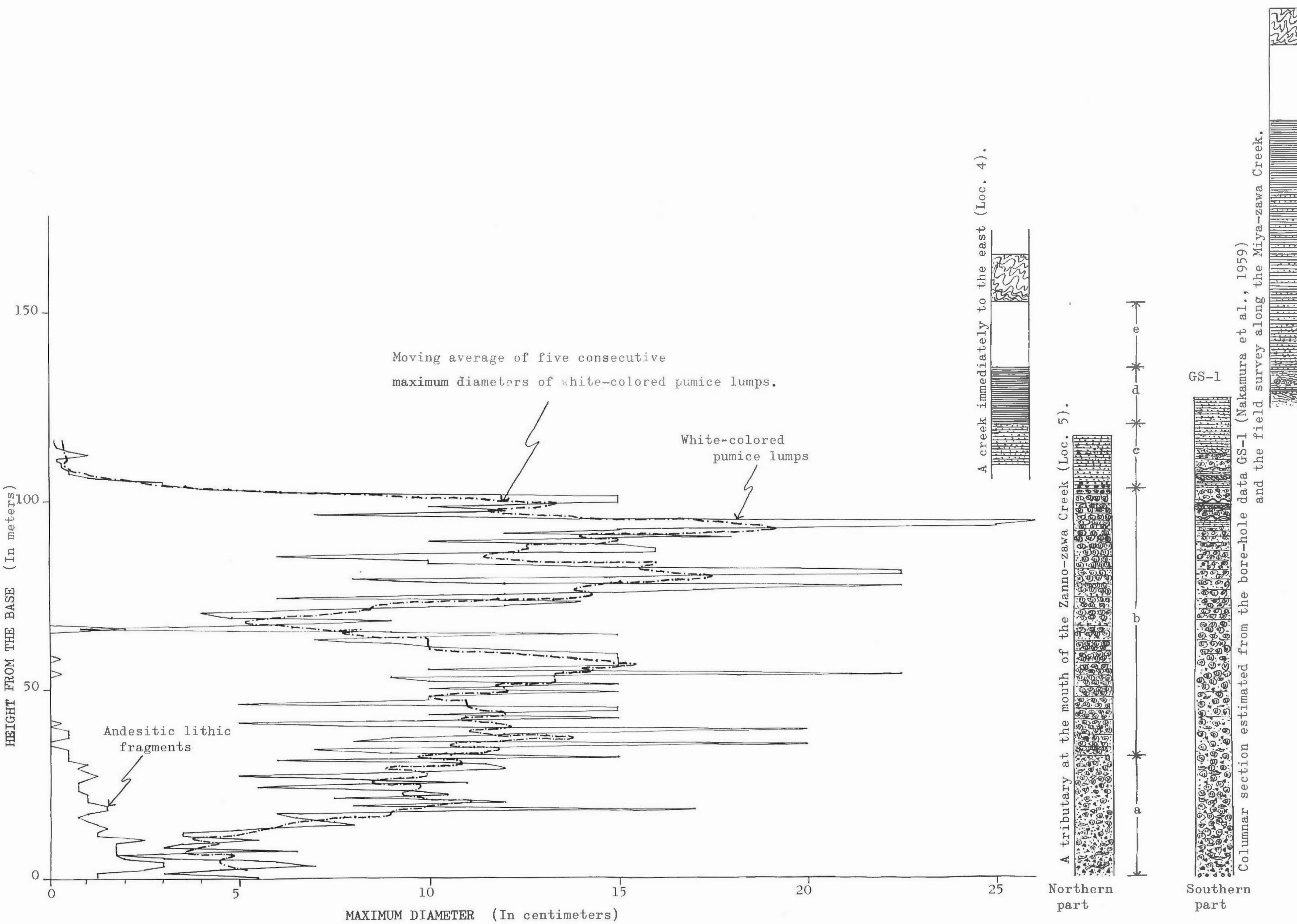


Fig. 12 Vertical facies change of the subaqueous pumice flow bed at the base of the Miyazawa Formation. (After YAMADA, 1973). a) Massive graded division, b) Parallel laminated pumice tuff division, c) Parallel laminated sandy pumice tuff division, d) Parallel laminated fine tuff division, e) Massive very fine tuff division.

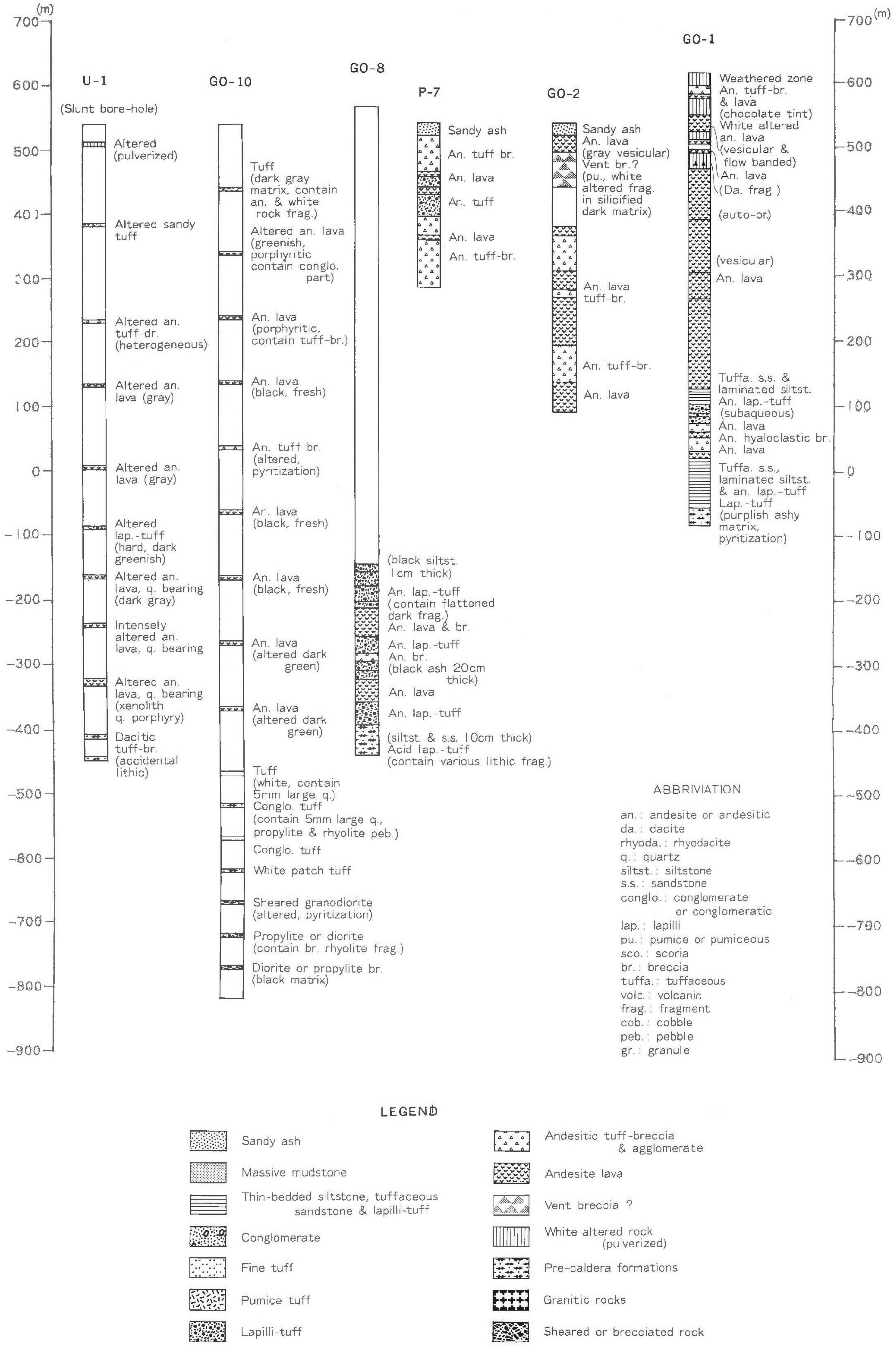


Fig. 14 Columnar sections of bore-hole cores. Localities of the bore-holes are shown in Figure 2.

a) Bore-holes drilled by Electric Power Development Co., Ltd.

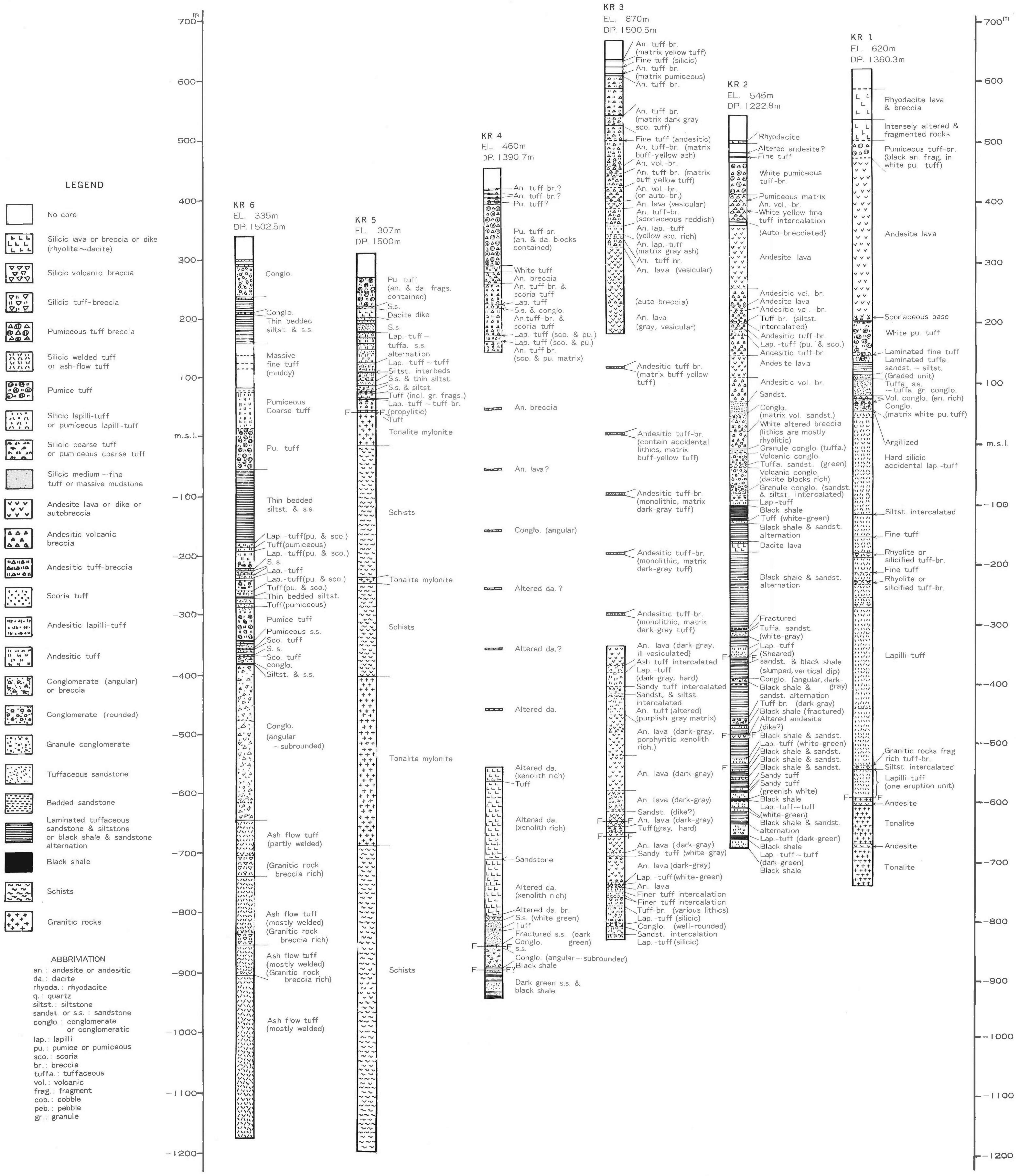


Fig. 14 b) Bore-holes drilled by the New Energy Development Organization.

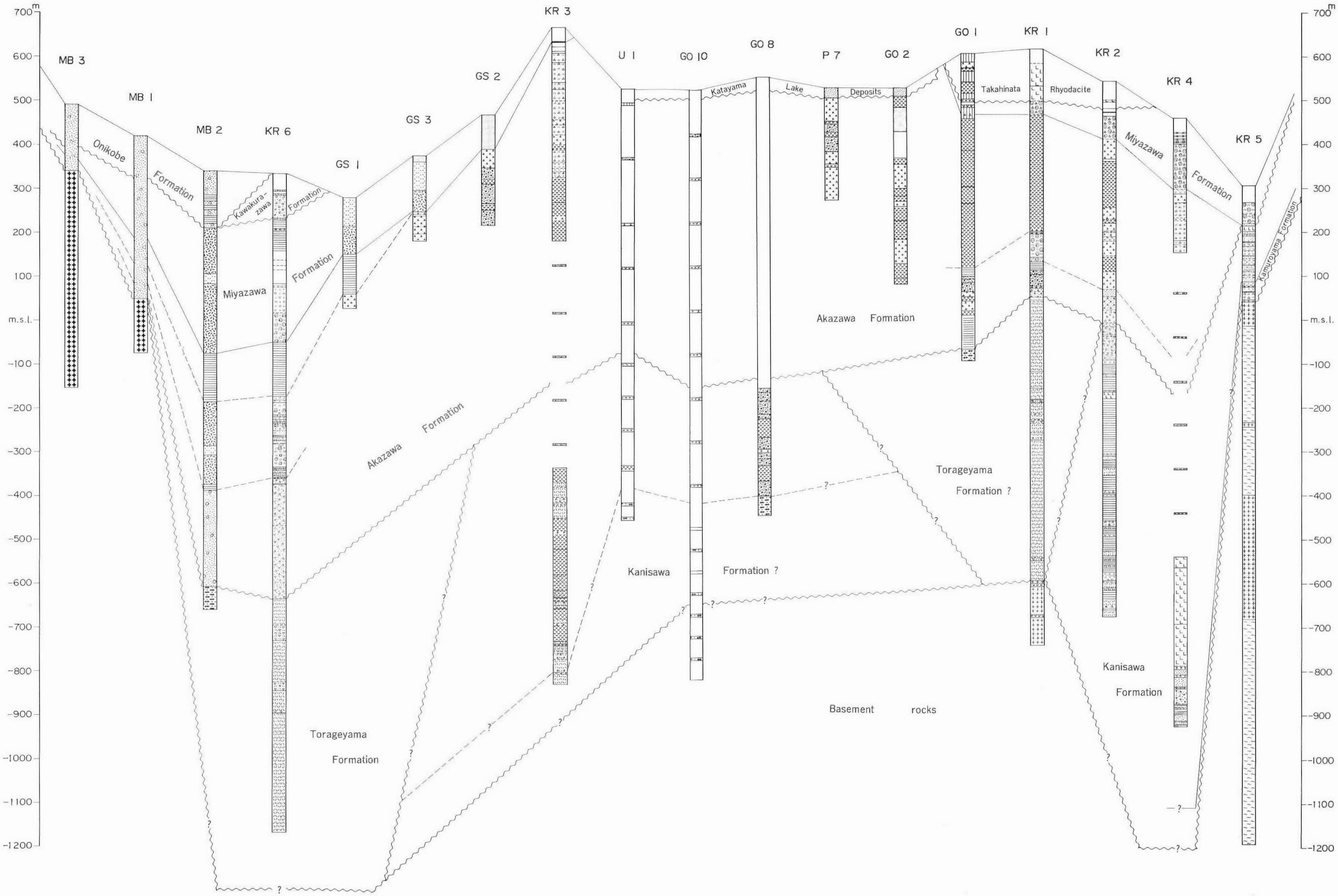


Fig. 15 Correlation of the columnar sections of bore-holes. Localities of the bore-holes are shown in Figure 2. (MB-1, MB-2, and MB-3 are based on the unpublished data of Mitsubishi Estate Co., Ltd. GS-1, GS-2 and GS-3 are based on NAKAMURA *et al.*, 1959 and 1961).

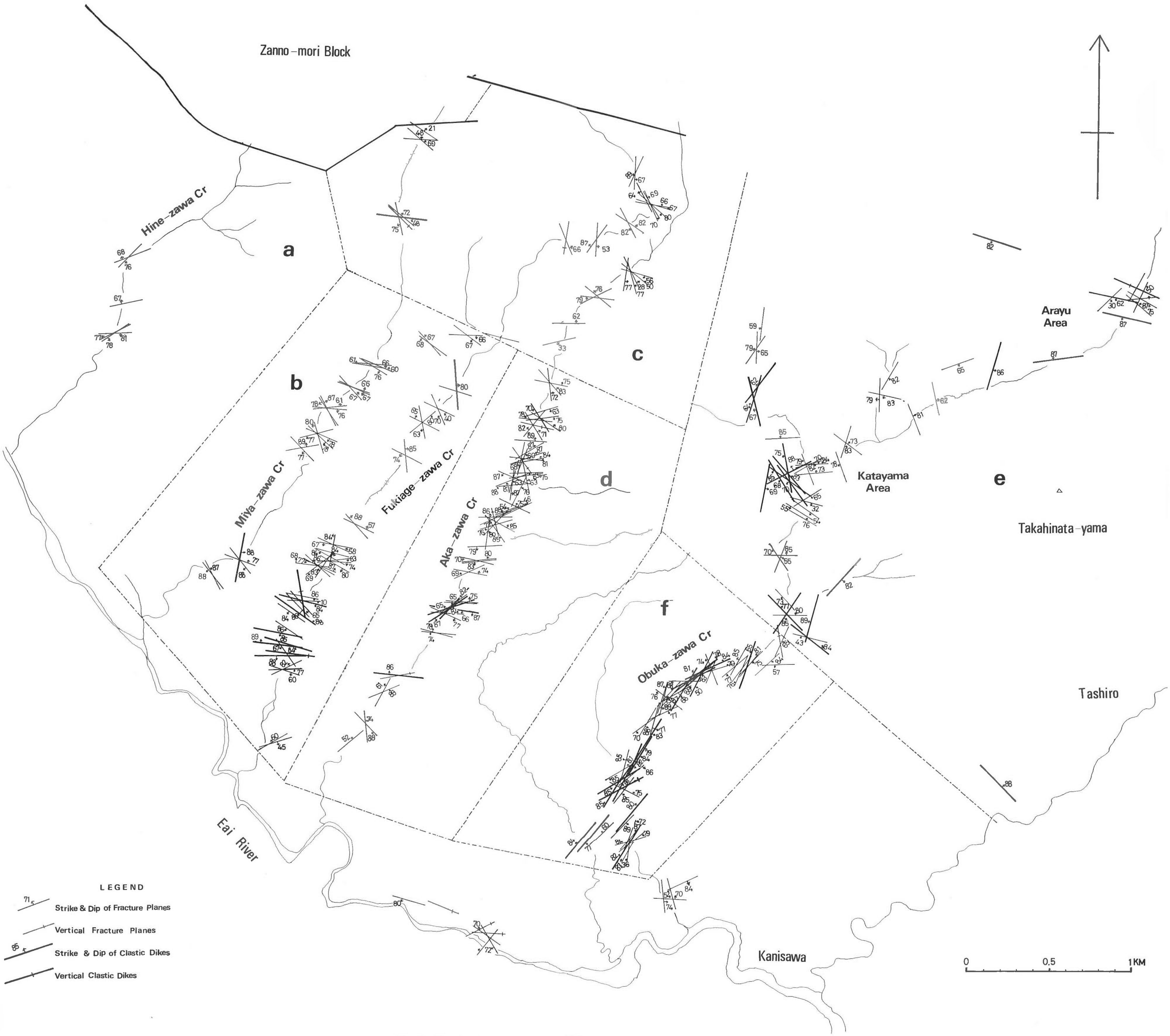
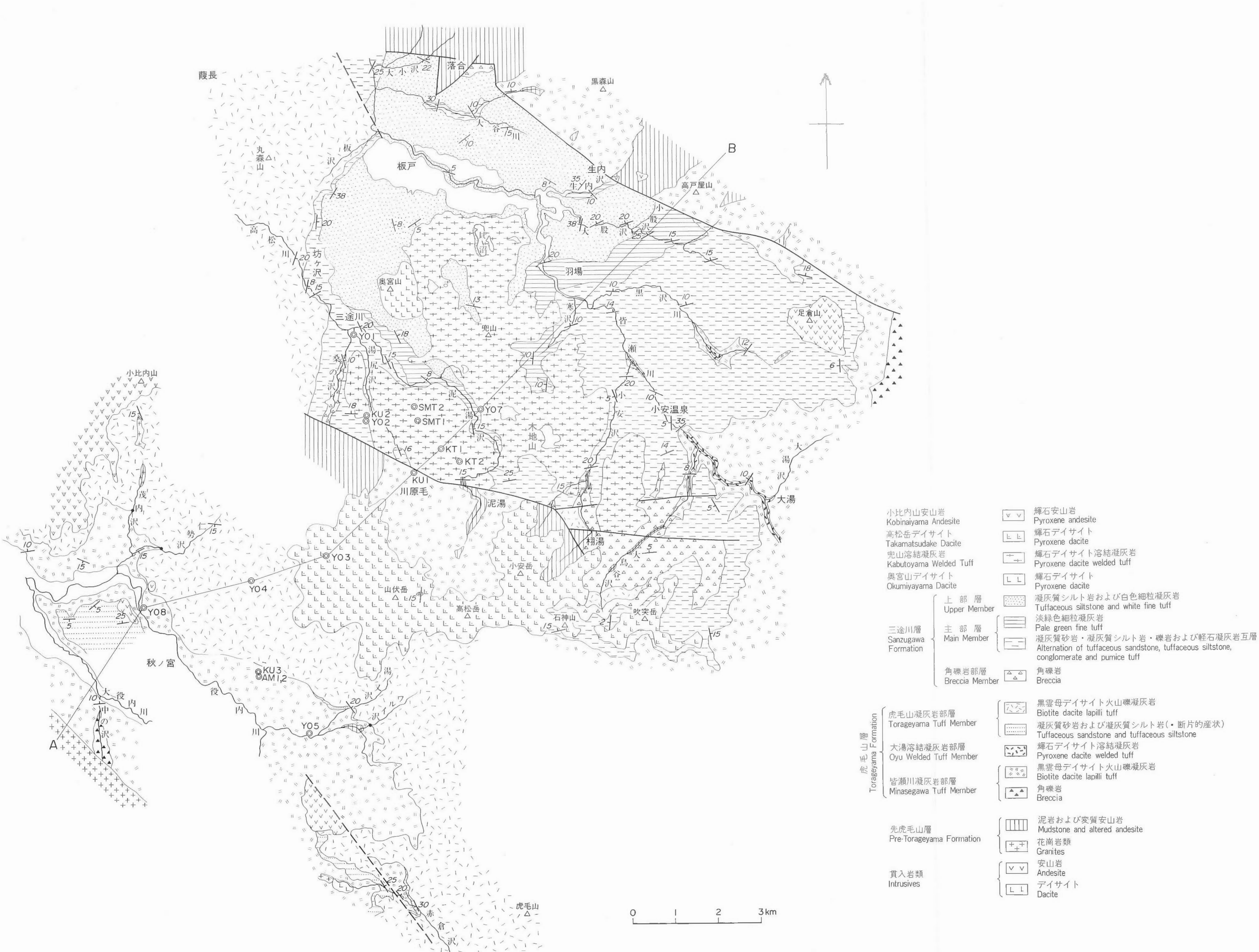
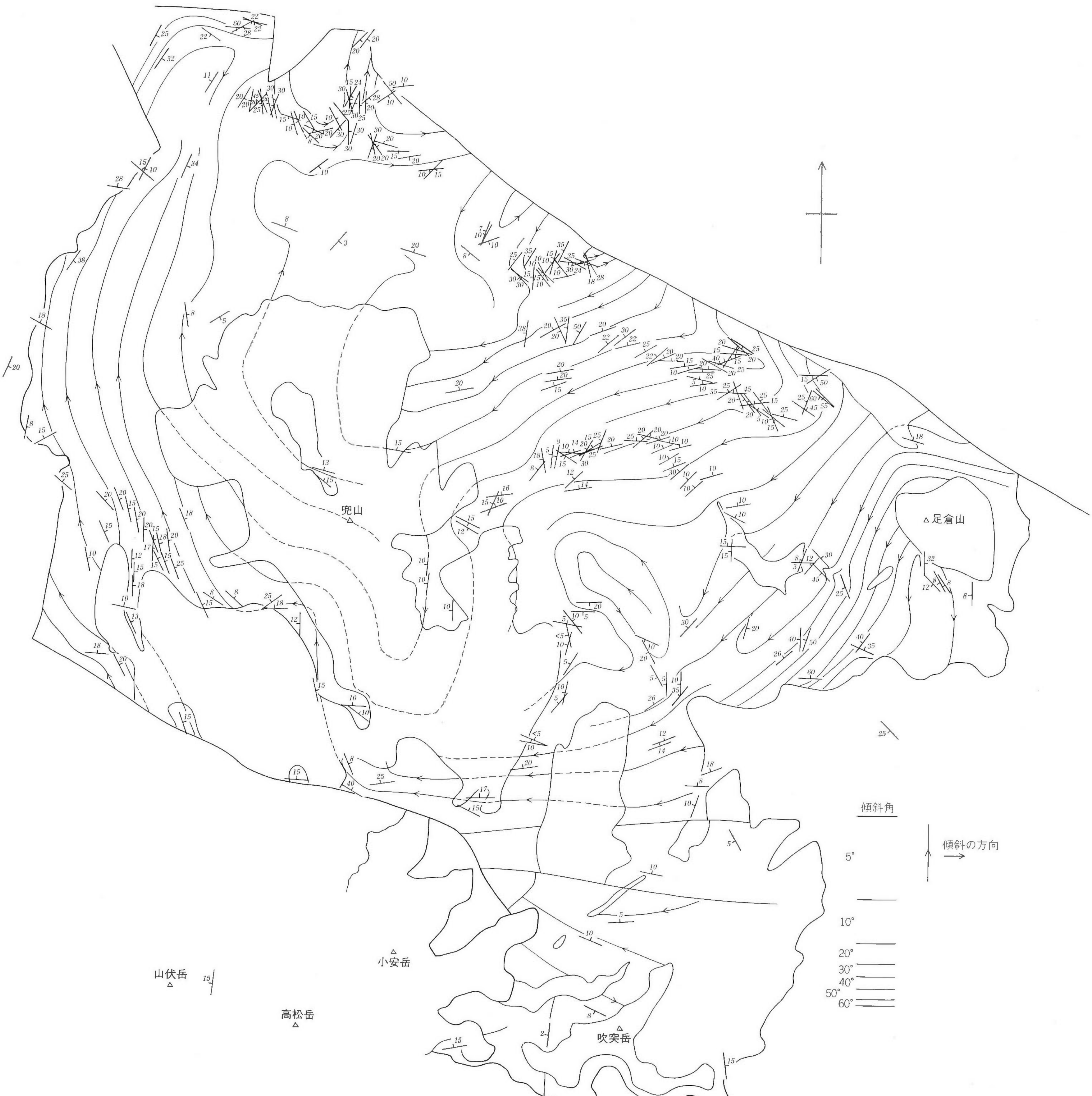


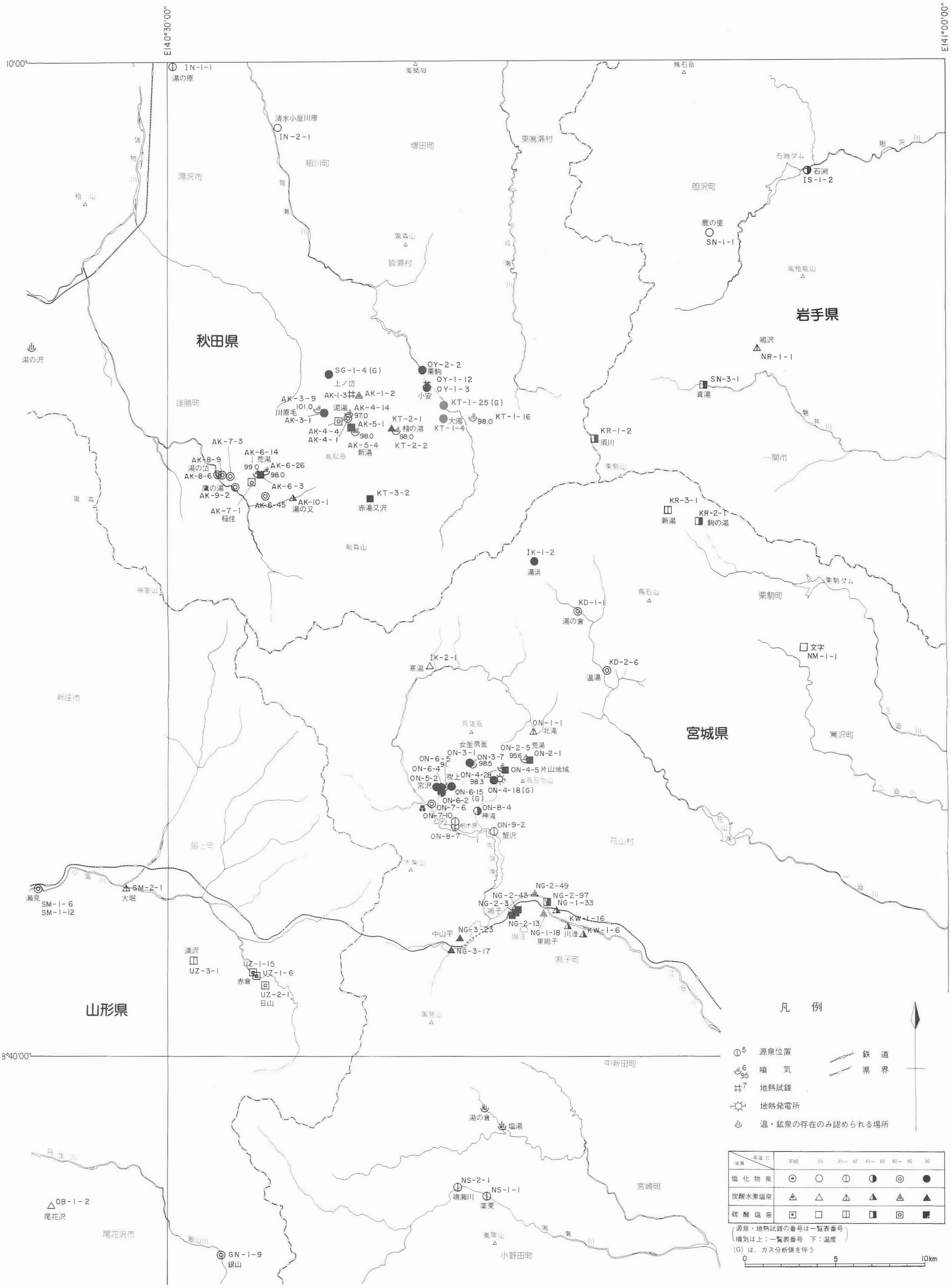
Fig. 23 Map showing the distribution of joints, minor faults, and clastic dikes in the southeastern part of the caldera. Fractures are so numerous that only the average directions of individual fracture sets in each outcrop are shown. (After YAMADA, 1986 a).



第2図 地質図.
Fig. 2 Geologic map.



第9図　皆瀬地域の三途川層の走向線図.
Fig. 9　Strike-line map of the Sanzugawa Formation in the Minase District.



第１図　栗駒地熱地域の温泉・地熱井の分布図（泉温，泉質等の記号は第１表及び第２表の番号に対応する）．

Fig. 1　Location of hot springs and geothermal wells in the Kurikoma geothermal area (Symbols for water temperature and chemistry are the same as in Tab. 1 and 2).