

3 GEOLOGY

The epicentral area consists of Neogenic and Quaternary deposits (Figure 3.1 and 3.2). Neogenic formations are Araya, Kawaguchi, Ushigakubi, and Shiroiwa, Unuma formations from bottom to top. In the Shinano River Lowland, the thickness of Neogenic sediments is more than 5000m. These formations are overlain by Pleistocene terrace deposits, which are covered by Holocene alluvium. These Neogenic formations and Quaternary deposits overlay the pyro-clastic volcanic basement rocks. The Quaternary deposits generally consist of clay, silt, sand and gravel.

The Neogenic formations are heavily folded and their anticline and syncline axes are aligned NE-SW. The Shinano River flows through the syncline axis and Tokamachi, Ojiya and Nagaoka are situated in the Shinano valley. Another syncline, which has similar trends, is to the east, and Sumon, Koide, Yamato and Muikamachi towns are located on this syncline, along which Uono Stream of Shinano River flows. The anticline and synclines axes are tilted to NE. Uono stream changes its flow direction from NE to NW at Koide town and joins Shinano River nearby Kawaguchi town. This segment of the stream seems to follow a sinistral fault segment, which starts from Yuno valley and extends to Kashiwazaki. The strikes of the known faults, which have a main trend of NE-SW, are similar to the folding axes.

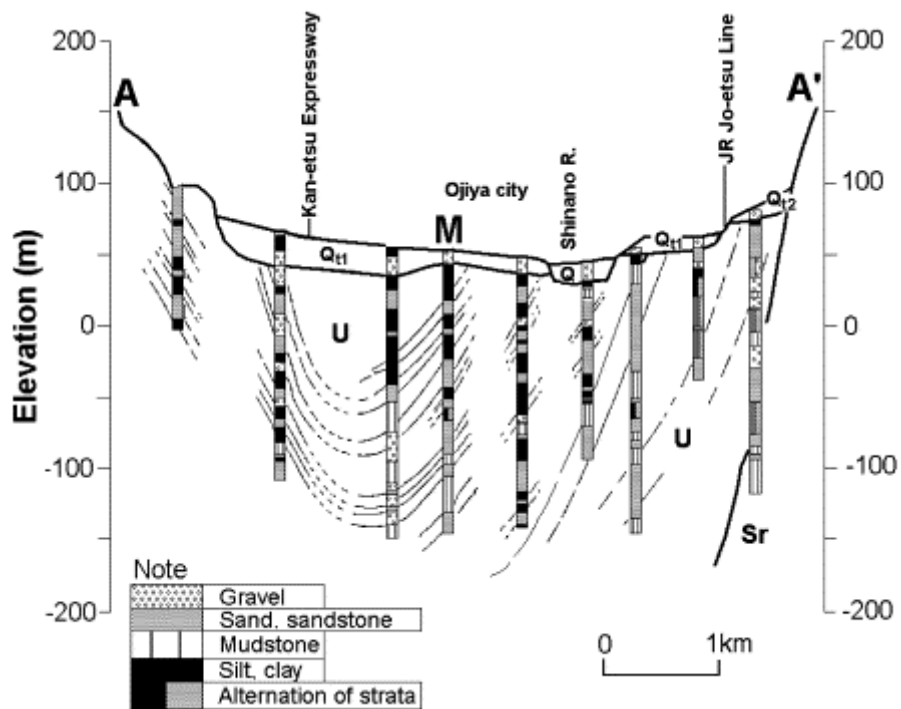
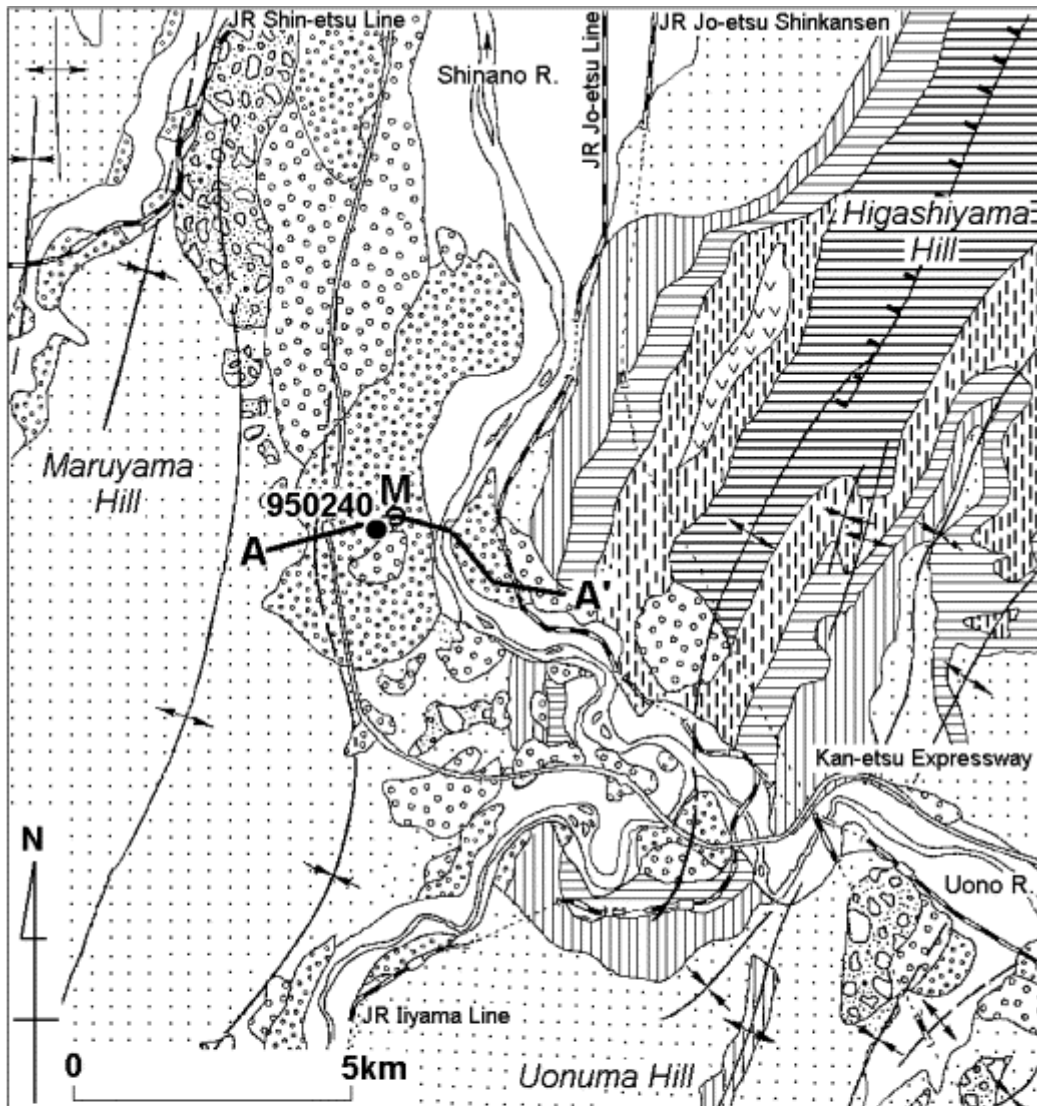


Figure 3.1: A geological cross section nearby Ojiya (from Sato et al. 2001)



Geologic age		Sediment	Landform	
Quaternary	Holocene	Alluvium	Plain	↗ Anticlinal axis
		Holocene terrace deposits	Terrace	
	Pleistocene	Lower terrace deposits		
		Middle terrace deposits		
Neogene	Pliocene	Uonuma Formation	Hills	↘ Synclinal axis
		Shiroiwa Formation		
		Ushigakubi Formation		
		Andesite		
		Kawaguchi Formation		
		Araya Formation		
Miocene	Araya Formation		↖ Fault	

Figure 3.2: Geology nearby Ojiya (from Sato et al. 2001)