

# Rock and relief control on the landslide events triggered by 2024 Noto peninsula earthquake and their impact on drainage system development, a tentative report

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We examined the morphological characteristics (MC) and distribution trends of seismically induced slope failures (SF) by 2024 Eq. in Oku-Noto region (ON). We also conducted a similar study on the existing landslide masses (EL). Then, we discussed the impact of SF and EL on the watershed topographic systems. Methods: MC of SF were measured on ArcGIS using 2024 Earthquake slope failure Polygon Data and a 5m mesh DEM by GSI. For EL, the landslide distribution map of NIED was used and analyzed in the same way as SF. The geology was classified into several groups based on AIST's 1:200,000 geological map. The relations between MC of SF and EL, and location conditions given by the geology and slope direction were examined (Figs.1,2). The relations between SF and EL also examined. We conducted field survey to verify the validity of the interpretation of the above analysis and to examine fluvial response to SF. Results and discussion: Fig.1 shows MC of SF and EL. The distribution of the slope direction suggests slopes tend to develop in the direction perpendicular to faults and folds (Fig.2). SF develop mainly on south slopes, while EL north. Of the 2,076 EL, 308 have partly collapsed in 2024 earthquake. The toe of the landslide mass or a part of the scarp collapsed. SF can be divided into failures near the ridgeline and along the valley bank. The former is concentrated in the high relief areas having a large aspect ratio with a long downstream distance, and with dammed tributaries. The growth of the scarp and the protrusion of the lower part of the slope of EL suggest that reactivated part of EL by 2024 Eq. have been extending. The Machino and Kawarada Rivers, transverse valleys, develop wide valley plain on Miocene marine sediments. The Wakayama River is a longitudinal valley along the Hakumaizaka Fault with terrace surfaces, partly displaced vertically with lateral offset during 2024 Eq. All three rivers have steep slopes to their mouth, and riverbed and terrace sediments are mostly sandy silt with volcanic rounded cobbles, suggesting active lateral erosion and rapid discharge of the slope sediments into the sea. We plan to analyze slope deformation by adding our original data to SF and EL, to measure the age of blocked sediments and make a sediment movement model linking slope and fluvial processes.

Keywords: slope failure, landslide, drainage system, geomorphometry

Geology	area [km <sup>2</sup> ]	Existing Landslide Mass EL			Seismically Induced Slope Failure SF				
		number	distribution area ratio [%]	avarage area per unit [10 <sup>4</sup> m <sup>2</sup> ]	number	distribution area ratio [%]	avarage area per unit [10 <sup>4</sup> m <sup>2</sup> ]	aspect ratio length <sup>2</sup> /area	slope high/length [°]
Holocene deposits	66.9	4	0.07	1.25	25	0.12	0.28	2.03	27.5
Pleistocene terrace deposits	96.3	16	0.49	2.97	33	0.08	0.21	2.02	21.4
Miocene sedimentary rocks (fandelta - shallow marine)	315.5	854	21.04	7.77	609	0.67	0.27	2.87	34.3
Miocene siliceous and calcareous siltstone	129.1	479	22.10	5.96	338	1.17	0.33	2.44	31.2
Jurassic to Miocene volcanic rocks (rhyolite - andesite)	590.2	769	9.20	7.06	1071	0.82	0.27	3.59	32.6
Plutonic rocks (diorite, granite)	9.9	27	6.62	2.43	4	0.05	0.12	2.44	34.4

Fig.1 Morphological characteristics of both seismically induced slope failures, SF and existing landslide masses, EL.

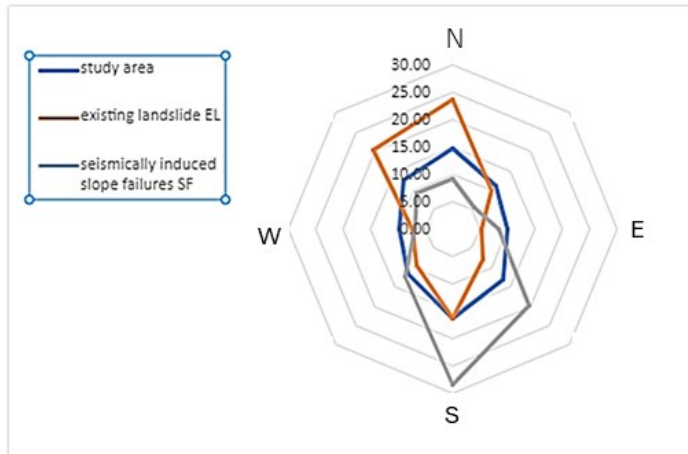


Fig.2. Distribution of the slope direction (area ratio). The directions of landslides and slope failures were given by the orientation on the major axis