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# Geological mapping and active tectonics of the Lichi Mélange from UAS HR DTM and PSInSAR (Eastern Taiwan)

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Taiwan is among the activest neotectonic place in the World as it is the result of the rapid collision of both Eurasian and Philippine Sea Plates, with an annual average convergence rate of more than 9cm.y-1. This active tectonic shortening generates the Taiwan relief which is characterized by two major mountain ranges: (1) the metamorphic Central Range from Eurasian continental origin, and (2) the eastern Coastal Range characterized by a volcanic Philippine Sea Plate affinity. In between both runs the crustal suture so-called the Longitudinal Valley Fault (LVF), 125km long and N020°E trending, which presents both inter-seismic (Champenois et al., 2013) and earthquake seismic crisis. Effectively it has been affected by 7 earthquakes (EQ) of magnitude larger than 5 within 43 days during the last 70 years: Oct.22, 1951 in Hualien M7.1-7.3, Nov25, 1951 in Chihshang M6.1 and in Yuli M7.3, Dec5, 1951 in Taitung M5.8, see Central Weather Bureau, 1952, or May20 1986 M 6.2 in Hualien, 2003 Mw6.8 in Chengkung, 2006 Mw5.9 in Taitung, 2013 Ruisui EQ, Feb.6 2018 Mw 6.4 Hualien EQ. Consequently, the detailed study of this major active seismic plate suture zone is a major concern for any Taiwan citizens.
We herein settle an UAS survey above the Longitudinal Valley Fault zone and the Lichi Melange (W part of the Coastal Range - E. Taiwan) and acquired 17483 high resolution photographs through 2 drones flying at 350 meters above ground level height, by total 23 flight missions, covering a total area of 195km2. After classical photogrammetric processing, we calculate the high resolution Digital Terrain Model (HR-DTM) of the studied area, (with a 10cm planimetric resolution and below 40cm vertical accuracy) and its immediate surroundings along a "buffer" zone of 2.5km. This UAS HR-DTM enables us through classical morphostructural interpretation to update the pre-existing geological map (e.g. CGS geological maps, Lin et al., 2009 ; Shyu et al., 2005, 2006, 2007, 2008) into much details. Moreover we mapped into much details also the tectonics structures of the Longitudinal Valley Fault and their evolution. Moreover, we use and combine this morphostructural interpretation with levelings, GPS and PSInSAR datasets (Champenois 2011, and Champenois et al., 2013) in order (1) to locate the active tectonic structures (faults and folds); (2) to characterize those using also field studies; and (3) to quantify them with various complementary geodetic measurements (e.g. Yu et al., 1997; Lee et al., 2008; Hsu et al., 2009; Huang et al., 2010, Zhang et al. 2018).
Moreover, several Sea cruises where settled North of the LVF and the Coastal Range in the Hualien vicinity order to extend tectonic structures at sea and better study the onshore/offshore geodynamic transition. They highlights deposits affected in a complex structural geometry which we interpret in the lights of both tectonic inversion associated with major landslides processes (Hsu S.-K., Lin L.-K., work in progress).