Review of Historical Collapse Events at the Trench of the Chelungpu Fault Preservation Park

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The Chelungpu Fault Preservation Park is one of two museum in the world to retain the excavation site of the fault trench and one of the most important sites for recording the Chi-Chi earthquake during 1999/9/21. According to research, five paleoseismic events were recorded in this trench. Because of the reverse fault behavior, about 1-2 m uplifting from each event, the depth of the excavation of trenches is over 8 meters. It causes greatly increasing the chance of slope collapse in trenches. Since the opening in 2013, four large-scale collapses have occurred. Fortunately, they appeared at the footwall side of the north wall and didn't affect the display of fault trench. However, the small collapse of 2017/6/27 (~ 1.6m * ~ 1m area) was happened near the Chelungpu fault line and retaining facilities have been added. These collapsing events were all come with the torrential rain events of the previous month, and the recent collapse after 398 mm of the single-day rainfall at 6/3. After the 6/27 collapse, the highest groundwater record show only ~1m below the surface, but the regular range of groundwater level is 10-18 meters in depth. We conclude that there is a horizontal impermeable layer 3-4 meters underground, which easily accumulate groundwater and form a perched aquifer after heavy rain events. At present, ~1.5 metric ton water is discharged from the pumping system so that the wall of the trench is not wet and weak. Those events help us to better understand the relation between groundwater and collapse. We ensured that the trench can continue to be used for earthquake and active fault education.