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Climatic and tectonic records of the last 13,000 years in marine sediment off the East coast of Taiwan

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The island of Taiwan is subject to high seismicity (22 Mw>7 earthquakes in 100 years), and a particularly extreme climatic and atmospheric context (~4 typhoons/year). These conditions present a significant hazard, making the island a relevant field for the study and recording of extreme tectonic and climatic events. On land, erosion processes dominate, and sedimentary records are often scarce and/or incomplete. Offshore, deposits linked to turbidity currents of co-seismic or climatic origin provide longer and more complete archives (Late Quaternary). The following work is based on three marine cores collected eastward from Taiwan in distal turbiditic systems (EAGER oceanic cruise). The cores sample two basins of the Ryukyu forearc (Nanao and East Nanao) and the ridge separating them (Nanao ridge). The Nanao basin is directly fed by the canyons connected to Taiwan, while East Nanao collects overflows of turbidity currents from the first basin, along with a secondary supply from the Ryukyu slope. Three types of gravity deposits can be observed : A) classic turbidites, B) amalgamated turbidites, and C) pluri-metric "megabeds" consisting of turbidites topped by an homogenite, only in the Eastern basin, located downstream of the turbiditic system. Through statistical analysis of XRF data, grain size and microscope observations of the gravity deposits, multiple sedimentary contents were identified. The gravity deposits are mainly terrigenous (metamorphic grains, mica, plant debris…). Some deposits, however, are almost exclusively biogenic (foraminifera, spicules…) accompanied by grains of quartz. These two distinct compositions correspond to, respectively : the metamorphic geology of the catchment basins on the east coast of Taiwan and the more carbonate-rich platform and slope of the Ryukyu arc, mostly devoid of terrigenous material further east from Taiwan. The variety of sedimentary facies among event deposits highlights different types of triggers for instabilities and turbidity currents. We distinguish 1) typhoon-induced erosion and discharge of terrigenous material from Taiwan's catchment basins, deposited as classic turbidites following hyperpycnal flows, and 2) co-seismic destabilization of Taiwan or Ryukyu platform and slope sediment, often deposited as amalgamated turbidites or megabeds. 14C dating was either performed on foraminifera collected in hemipelagic deposits, or where insufficient amount of foraminifera was available, performed on wood fragments within turbidites. Accumulation rates range between 10 m/kyr in the proximal basin and 1.8m/kyr in the distal one. We estimate an event every 36 years to 197 years respectively. On the Nanao ridge, age models show a rapid change in supply rates from 3.8 to 0.8 m/kyr at ~10 kyrs, suggesting a non negligible paleoceanic or paleoclimatic control on sediment deposition in the area. Ongoing work on bulk and clay

mineralogy, as well as quantification of major elements via ICP-MS, aims to accurately trace the provenance of each gravity deposit, and provide insights on the precise trigger: major typhoon-induced flood from Taiwan ; earthquakes in the vicinity of Taiwan or at the Ryukyu plate interface.

Keywords: Taiwan; Earthquakes; Typhoons; Sedimentary cores; Turbidites