Cenozoic Tectonics and Paleogeographic Evolution: Insights from Southeast Tibet Plateau and Northern South China Sea Margin

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Tectonic processes strongly influence the drainage system for transportation of sediments and pose challenges in investigating dominant mechanisms and paleogeographic reconstructions. This study examines the Cenozoic tectonic and paleogeographic evolution of the Southeast Tibet Plateau (SETP) and its connection to sediment deposition in the northern South China Sea margin (NSCSM). Through a case study drawing parallels with the Himalayan region in the north of Pakistan as a source and the offshore Indus Basin as a sink, we aim to understand sediment transportation dynamics. Multiproxy data, seismic profiling, geophysical investigation, and numerical simulations are employed to quantify the impact of tectonic processes on sedimentation patterns in both regions. Badlands simulations and flexurally interpolated backstripping model the tectono-sedimentary evolution of the NSCSM, revealing the integrated response of surface processes and deep dynamics. The SETP is recognized as a source region, characterized by uplifts and erosion that supply sediments to the NSCSM. Tectonic and deep dynamics control basin architectures, which isostatically adjusted accumulation with the source region. Erosional events due to uplifts in the SETP, flexural thickness of lithosphere and dynamic topography significantly influence sedimentation changes in the NSCSM. A proposed conceptual model links the tectonic evolution of the SETP as a source to sediment deposition in the NSCSM as a sink, shedding light on the complex interplay between tectonic and sedimentary processes in these regions. Eocene is identified in this paper as a period of low deposition ascribed to its low source topography, thinned lithosphere, and extension. However, since the Oligocene, there has been an increase in the cumulative thickness of sediments, which has

strengthened the lithosphere, leading to the isostatic adjustment of the higher topography of SETP. In contrast, during the Miocene, the loss of the source-sink connection resulted due to the cessation of the SCS opening and intense magmatic activity. Subsequently, the rotation of the Philippine Sea Plate, Taiwan's orogeny, and the rise in SETP topography reactivated several pre-existing faults and weakened the lithosphere of NSCSM for offshore sedimentation.