## Study of the regional earth system under climate change and human activities in the Greater Bay Area

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The Guangdong–Hong Kong–Macau Greater Bay Area (GBA) is one of the fastest developing river basin-ocean continuum systems in the world. Ensuring the GBA's sustainable development requires a healthy and resilient environment as determined by the sustainability of the interlinked spheres that compose the regional earth system (RES), including the lithosphere (land, river basin), the hydrosphere (coastal ocean and river), the atmosphere, and the biosphere (living things). This presentation introduces an unprecedented effort under an Areas of Excellence project (https://earthhk.hkust.edu.hk/), funded by Hong Kong Research Grant Council, for investigating the interactions among natural forcing, human activities, and climate change in the regional earth system. By integrating interdisciplinary perspectives and advanced methodologies of observation and simulation in the RES, this project aims to provide comprehensive knowledge and science-based mitigation strategies via the human-RES integrated *digital twin* to safeguard the environment and development of the GBA and present a case study for similar bay area worldwide.