

Evaluation of the Tectonic Stability of Singapore Based on Sirent (Local GNSS Permanent Network)

Rui Fernandes, Durairaju Raju and Victor Khoo

KEY WORDS: Applications in Geosciences on Local and Regional Scales

ABSTRACT:

Singapore is an island-state located on the Southern end of Malay Peninsula nearby equator. The island extends 41.8km ENE–WSW and 22.5 km SSE–NNW with a total area of 707km². In 2006, SLA (Singapore Land Authority) initiated the installation of a CORS (Continuously Operating Reference Station) GNSS (Global Navigation Satellite System) network, called Singapore Satellite Positioning Reference Network (SiReNT), which contains presently six stations collecting data all over the entire territory of Singapore. The GNSS systems were not changed since the initial installation, which guarantees consistent time-series of positions, extending now for already five years for the initial five stations of the network. In addition, there is an IGS (International GNSS Service) station (NTUS) operating in Singapore since the late nineties. In this work, we use the available to investigate the present-day kinematics of the Singaporean territory both internally and with respect to the tectonic settings of the region. Internally, we investigate the observed internal relative movements in order to conclude if they represent real local tectonic movements, both horizontal and vertical, or if they are caused by the site characteristics, like monument instability. On a regional level, we focus on the tectonic settings of the region. Singapore is considered to be located on the Sunda tectonic plate. This tectonic plate contains most part of the South East Asia region, including most of the Malay Peninsula, Borneo, Sumatra, and Java. It is considered one of the most active tectonic regions of the world since its plate boundaries accumulates large differential motions with respect to the other tectonic units in the region. We verify if the current published models for the angular velocities of the Sunda plate truly represent the observed motions of the Singaporean stations.