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Results from two years of superconducting observations at the Hsinchu (HS) station, Taiwan

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The Hsinchu (HS) superconducting gravimeter (SG, serial No. T48) station is a newly established site in the Global Geodynamics Project (GGP). Simultaneous observations of T48, three FG5 absolute gravimeters and GPS at four stations are studied. GPS shows few mm/year of horizontal and vertical motions around HS. The calibration factor and drifting rate of T48 are -75.944±0.070 μgal/V and 0.597±0.705 μgal/year. Both the SG and absolute gravity records contain a trend of about 2 μgal/year. The ocean tide gravity effects (OTGEs) were estimated from NAO.99b, FES2004 and CSR4.0, and their amplitudes agree with the SG observations at the sub-μgal level, but their phases differ from the observations up to 10º. The Newtonian effect of ocean tide contributes 20% to the total OTGE at HS, and it is larger at islands in the Taiwan Strait. The inelastic body tide model of DDW is more consistent with the SG observations than the elastic model. Modeled gravity-atmosphere admittances based on an exponential distribution of air mass explain well the observed admittances. The average gravity-atmosphere admittance during typhoons is 30% larger than that in a non-typhoon time. A list of co-seismic gravity changes from T48 caused by earthquakes over 2006-2007 is given for potential studies of fault parameters. The modeled effects of atmospheric pressure, ground water, soil moisture, and polar motion explain the FG5 observed gravity trend to 0.50 μgal/year. Seasonally, the groundwater-induced gravity change contributes the most to the SG residual gravity, but its phase leads the latter by 63 days.