Loading and gravitational effects of the 2004 Indian Ocean tsunami at Syowa Station

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The 2004 Indian Ocean tsunami reached Syowa Station, Antarctica, in approximately 12.5 hours after the December Sumatra-Andaman earthquake. We have analyzed the tsunami signals of ocean bottom pressure gauges, broadband seismometers (STS-1) and a superconducting gravimeter (SG). The synthetic sea level variation of tsunami, and tilt and gravity changes induced by the tsunami were calculated and compared with the observations. The loading and gravity effects of the tsunamis were detected from the STS-1H (horizontal components) and the SG records at Syowa Station, respectively. The magnitudes of these effects are as follows. Root mean square (RMS) amplitudes of tilt effects are 6 and 10 microGal (10ˆ{-8} m/sˆ2) in NS and EW direction, respectively, obtained from 20 hour long STS-1 records at frequencies of 0.3 - 1.0 mHz. RMS amplitude of gravity effect is 0.2 microGal obtained from the SG records with the same length at frequencies of 0.1 - 0.2 mHz. RMS amplitudes of synthetics match those of observations well, though waveforms of synthetic and observation are not always in phase even in the case of modeling with detailed bathymetry.