

Surface changes over central Taiwan and Tibet from satellite altimetry

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This study explores the potential applications of satellite altimetry on measuring vertical surface changes. TOPEX/Poseidon (T/P) and its follow-on missions provide data for such applications. The first example is detection of vertical movement over central Taiwan, where Pass 51 of T/P travels through an area with a large subsidence rate (few cm/year). The area is part of the Chia-Nan Plain of Taiwan with a precise, high-resolution (5 m) DEM. Using retracked T/P waveforms over 1992-2002 for ranging corrections of T/P data, the estimated vertical movement rates over central Taiwan range from -35.8 to -54.0 mm /year, close to the values of -46.2 to -50.3 mm/year from repeated leveling. We apply the same retracking technique to T/P waveforms along Pass 155 over Tibet. Here the terrain is poorly known and the terrain slopes mostly exceed 2 degree, making slope corrections in radar ranging difficult. The vertical rates from T/P differ from the GPS values significantly, leading to an inconclusive result on T/P detection of surface change over such a terrain as Tibet. We will also demonstrate few examples on detecting glacier retreats over the Himalayas using satellite altimetry, with a preliminary comparison between height change (from altimetry) and gravity change (from the GRACE gravity mission).

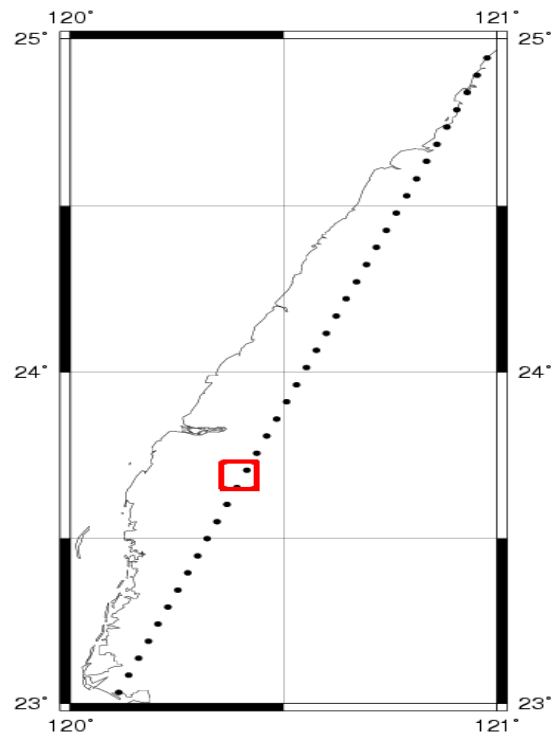


Figure 1. The ascending pass 051 of T/P passes through the southwestern Taiwan. The red square is selected as the study area with a large subsidence rate.

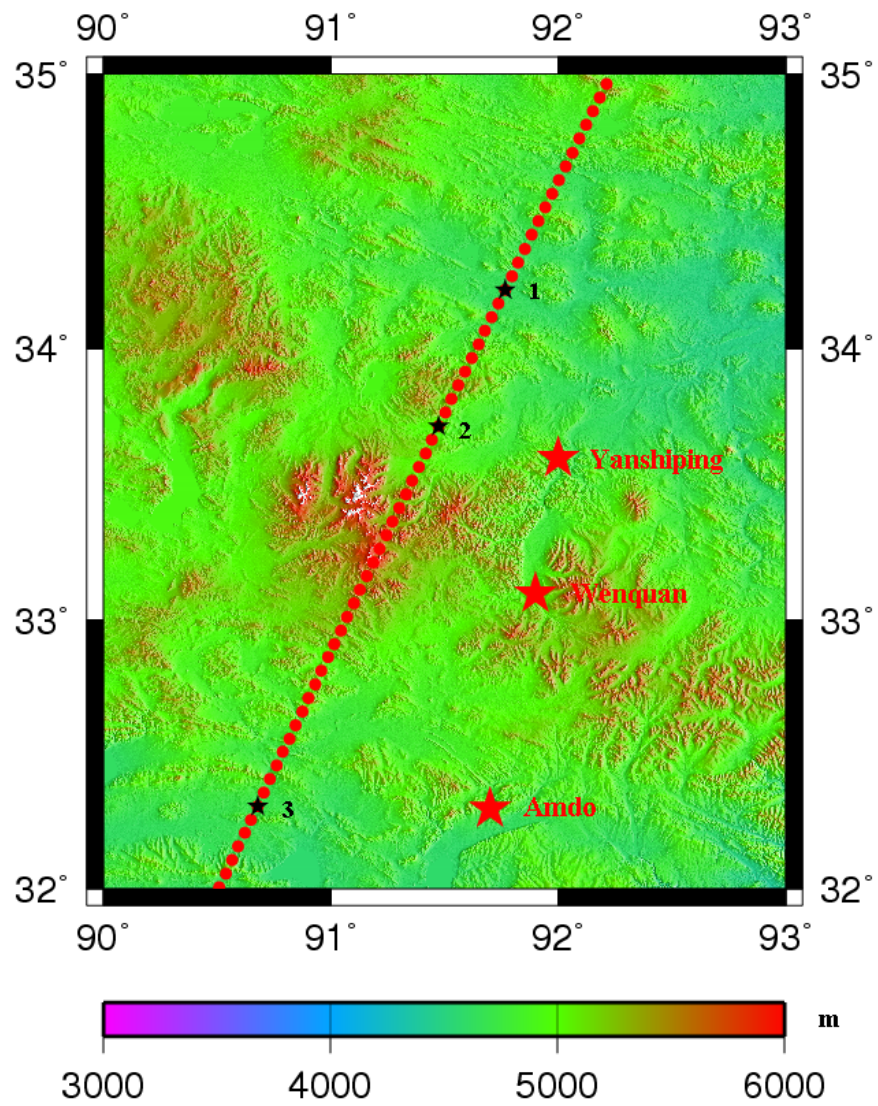


Figure 2. The T/P 155 Track with SRTM C-band DEM as background. The red stars express the location of GPS station and the black stars express the location of T/P 10Hz, that slope is lower than 2 degrees. The red circles indicate the location of 1-Hz track.