Estimation of upper ocean thermal structure in the western North Pacific Ocean by remote sensing

利用遙測估計西北太平洋上層海洋溫度結構

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Abstract

Lack of the information on upper-ocean thermal structure is one of the identified major reasons causing unsatisfactory typhoon intensity forecast. Therefore it is critical to study the relationship between upper-ocean thermal structure typhoon intensity change. This study uses a two-layer reduced gravity ocean model (TLM_NWPO), TOPEX/Poseidon and JASON-1 sea surface height anomaly data, TRMM/TMI sea surface temperature data and climatological ocean data estimate upper-ocean thermal structure in the Northwest Pacific Ocean. The estimated profiles were validated by 2258 co-located and near co-incident in situ profiles from the Global Temperature and Salinity Profile Program (GTSPP) and the ARGO floats. It is found that the two-layer reduced gravity model is not always applicable in the entire NWPO; depends on location and month. The 'safe zones' where the TLM_NWPO can accurately use are defined. It is encouraging to find that most category-4 and 5 typhoons intensify in the 'safe zones', thus we can apply the estimated profiles to study its association with typhoon intensity change.

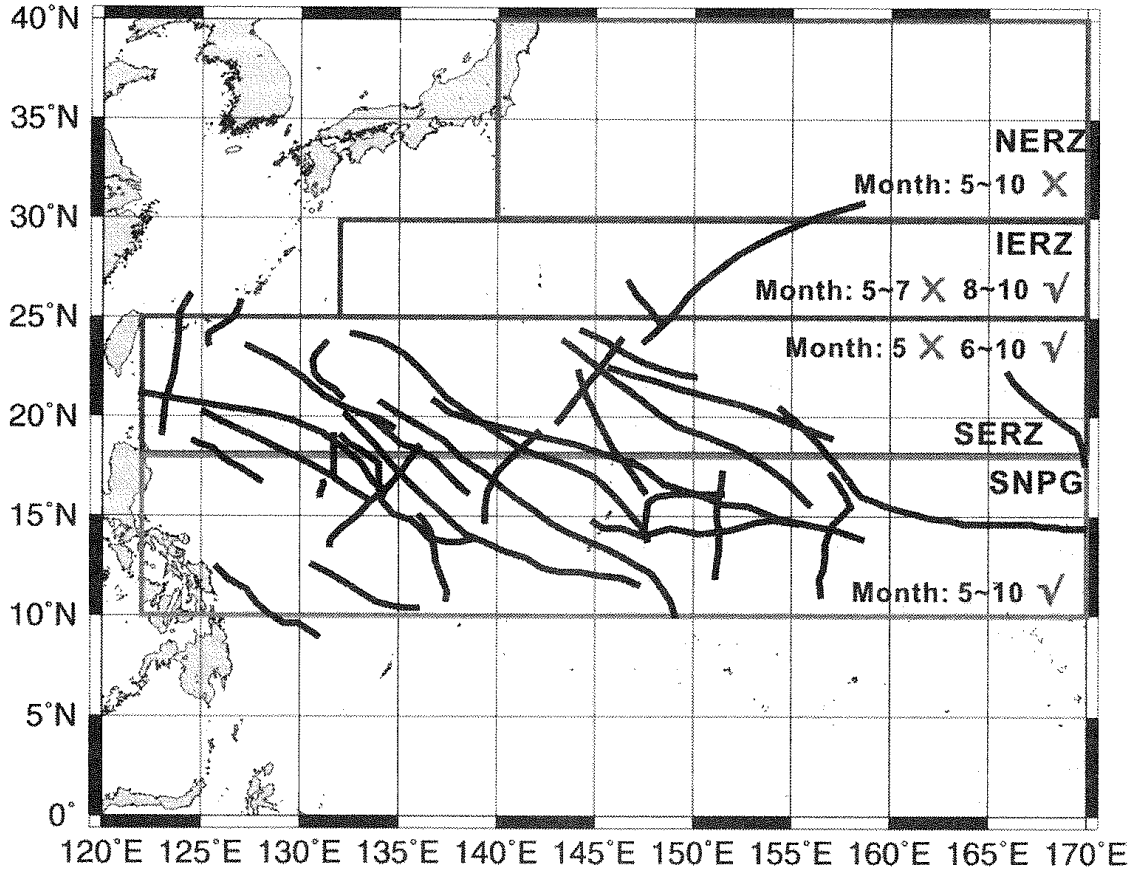

Figure 1: 'Safe zones' of TLM_NWPO in the NWPO. NERZ is an 'unsafe zone', IERZ and SERZ are 'semi-safe zones' which depend on month, and SNPG is a 'safe zone' in all summer season. The black tracks are the intensification location of 33 intense and super typhoons in six years (1999~2004).