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昭和基地周辺の詳細海岸線データの作成および海洋荷重潮汐の計算

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Detailed Coastline Data around Syowa Station, Antarctica, and Calculation of the Oceanic Tidal Loading Effects

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Abstract

In order to improve the accuracy of the estimated oceanic tidal loading effects at Syowa Station, and some of bared areas along Lützow-holm Bay, Antarctica, we made a detailed coastline data set. The coastline data, grid size of which corresponds to so-called 4 th mesh (1.5″×2.25″ grids) of the GOTIC2 software, are read from 1/25,000 scale maps around Syowa Station over a 1.5 degrees by 1.5 degrees area. Using this data set and the NAO.99b ocean tide model, we calculated oceanic tidal effects for gravity (GV), radial displacement (RD), and horizontal displacement (HD) at Syowa Station and nearby areas. At Syowa Station, obtained amplitudes and phases of M2, S2, O1, and K1 waves for GV are (2.302 μGal, 351.38 deg.), (1.585 μGal, 1.39 deg.), (2.504 μGal, 349.14 deg.) and (1.953 μGal, 352.33 deg.), respectively. The amplitude of RD and HD at Syowa Station are 56 mm and 14 mm, respectively, while the relative amplitudes of RD and HD between Syowa Station and Skalen, one of the GPS observation sites at the bared areas, are 8 mm and 1.3 mm, respectively. Newly estimated gravity effects will allow us to get accurate tidal admittance for the superconducting gravimeter observations at Syowa Station. The result also shows that the oceanic tidal effects on VLBI and/or GPS observations are not negligible, if the observation points are near the sea.

1. はじめに

南極の昭和基地は，世界でも数少ない総合的な測地観測拠点のひとつであり，現在，超伝導重力計観測，絶対重力測定，VLBI観測，GPS観測，海洋潮汐連続観測などが行われている（澁谷，2001）．近年，これらの観測精度は格段に向上しており，例えば，超伝導重力計は，1 nGal（1 nGal＝10^{-11} m/s^2）以上の検出感度，数μGal/year以下の器械ドリフトと，高分解能，長期の安定性を兼ね備え，そのデータはδファクターの緯度依存性に関する研究，地球内部の粘性に関する研究，コア・マントルカップリングに関する研究など，従来予想されなかった広範な研究分野で利用されるようになっ

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