Impact of applying tidal correction to marginal-sea bathymetry dataset

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The impact of different vertical datum adopted in bathymetric grid datasets, a difference between depths referred to the chart datum that roughly corresponds to the low-tide level and those referred to the mean sea level, on the performance of the tidal simulation covering the East China Sea and the South China Sea has been verified by conducting two numerical simulations using model bathymetries derived either from raw depths indicated in navigational charts or from converted depths which refer to the mean sea level. The conversion of the zero-depth level was made by referring to the tidal-correction offsets (z0) at nearby ports listed in tide tables issued by Japan, U.K., China and South Korea. It was found that the difference in M2 tidal amplitudes obtained by the numerical simulations were small at many regions including those adjacent to Japanese coasts, where z0 were mostly less than 1 m and the predicted M2 amplitude differences were generally smaller than 3 cm. In some areas where tidal amplitudes are large, e.g., along the west coast of the Korean Peninsula and the southwestern coast of the Borneo Island, the M2 amplitude difference ranged as large as tens of centimeters and some differences in the spatial pattern of tidal amplitudes were identified. By using the model bathymetry which has removed the tidal-correction offsets, the RMS difference between the model-predicted and observed M2 amplitudes has decreased by about 20 percent for the East China Sea case. It was also found that some global bathymetric grid datasets such as GEBCO 2019, which also incorporate sounding information derived from ENCs, currently does not consider the difference in vertical levels and a care must be taken when applying such bathymetry data to regions having large tidal amplitudes.

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