



A stand-alone tidal prediction application for mobile devices

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It is essential for people conducting fishing, leisure, or research activities at the coasts to have timely and handy tidal information. Although tidal information can be found easily on the internet or using mobile device applications, this information is all applicable for only certain specific locations, not anywhere on the coast, and they need an internet connection. We have developed an application for Android devices, which allows the user to obtain hourly tidal height anywhere on the coast for the next 24 hours without having to have any internet connection. All the necessary information needed for the tidal height calculation is stored in the application. To develop this application, we first simulate tides in the Taiwan Sea using the hydrodynamic model (MIKE21 HD) developed by the DHI. The simulation domain covers the whole coast of Taiwan and the surrounding seas with a grid size of 1 km by 1 km. This grid size allows us to calculate tides with high spatial resolution. The boundary conditions for the simulation domain were obtained from the Tidal Model Driver of the Oregon State University, using its tidal constants of eight constituents: M2, S2, N2, K2, K1, O1, P1, and Q1. The simulation calculates tides for 183 days so that the tidal constants for the above eight constituents of each water grid can be extracted by harmonic analysis. Using the calculated tidal constants, we can predict the tides in each grid of our simulation domain, which is useful when one needs the tidal information for any location in the Taiwan Sea. However, for the mobile application, we only store the eight tidal constants for the water grids on the coast. Once the user activates the application, it reads the longitude and latitude from the GPS sensor in the mobile device and finds the nearest coastal grid which has our tidal constants. Then, the application calculates tidal height variation based on the harmonic analysis. The application also allows the user to input location and time to obtain tides for any historic or future dates for the input location. The predicted tides have been verified with the historic tidal records of certain tidal stations. The verification shows that the tides predicted by the application match the measured record well.