Online supporting information


Dai and Wang (1999) used the 2D natural neighbor interpolation algorithm of Watson (1999) to derive $S_1/S_2$ climatologies on a $4^\circ \times 5^\circ$ latitude-longitude mesh. To assess the applicability of this technique for gridding scattered pressure tide data (and ultimately substantiate our choice of multiquadric interpolation), we introduced the subset of 5337 ground truth estimates in the natural neighbor implementation that is available within MATLAB® and presumably matches Watson’s original C-code.

Amplitude and peak LST maps, constructed from separate interpolations of $a_n$ and $b_n$ onto a regular $1^\circ$ grid, are shown in Figs. 1 ($S_1$) and 2 ($S_2$) and exhibit large similarities to the MQI climatologies in terms of regional magnitude and phase variations. The general appearance is however impaired by small-scale distortions, which are particularly marked over oceanic areas and most likely echo observational uncertainties. This oversensitivity to imperfect input information relates to the natural neighbor method’s peculiarity of considering only directly adjacent data points for each newly interpolated site without incorporating estimates within a wider radius and without making allowance for errors in the initial scatter. Subsequent smoothing (as in fact applied by Dai and Wang, 1999) is thus an imperative measure but needs to distinguish between land and oceanic grid points and quite likely diminishes the fidelity of the interpolated fields. Moreover, planar natural neighbor implementations, such as Watson (1999) or the one used here, require special adaptations for spherical problems to avoid spurious interpolation results near the poles (cf. e.g. Fig. 1a).

![Figure 1: Diurnal surface pressure amplitudes (a) in units of (Pa) and local solar time of maximum pressure $T_{\text{max}}$ (b) in units of (h) as obtained from natural neighbor interpolation of 5337 station tide estimates.](image-url)
Figure 2: Semidiurnal surface pressure amplitudes (a) in units of (Pa) and local solar time of maximum pressure $T_{max}$ (b) in units of (h) as obtained from natural neighbor interpolation of 5337 station tide estimates.

References
