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Supporting Information for

A numerical study of tropical cyclone-induced sediment dynamics on the Australian North West Shelf

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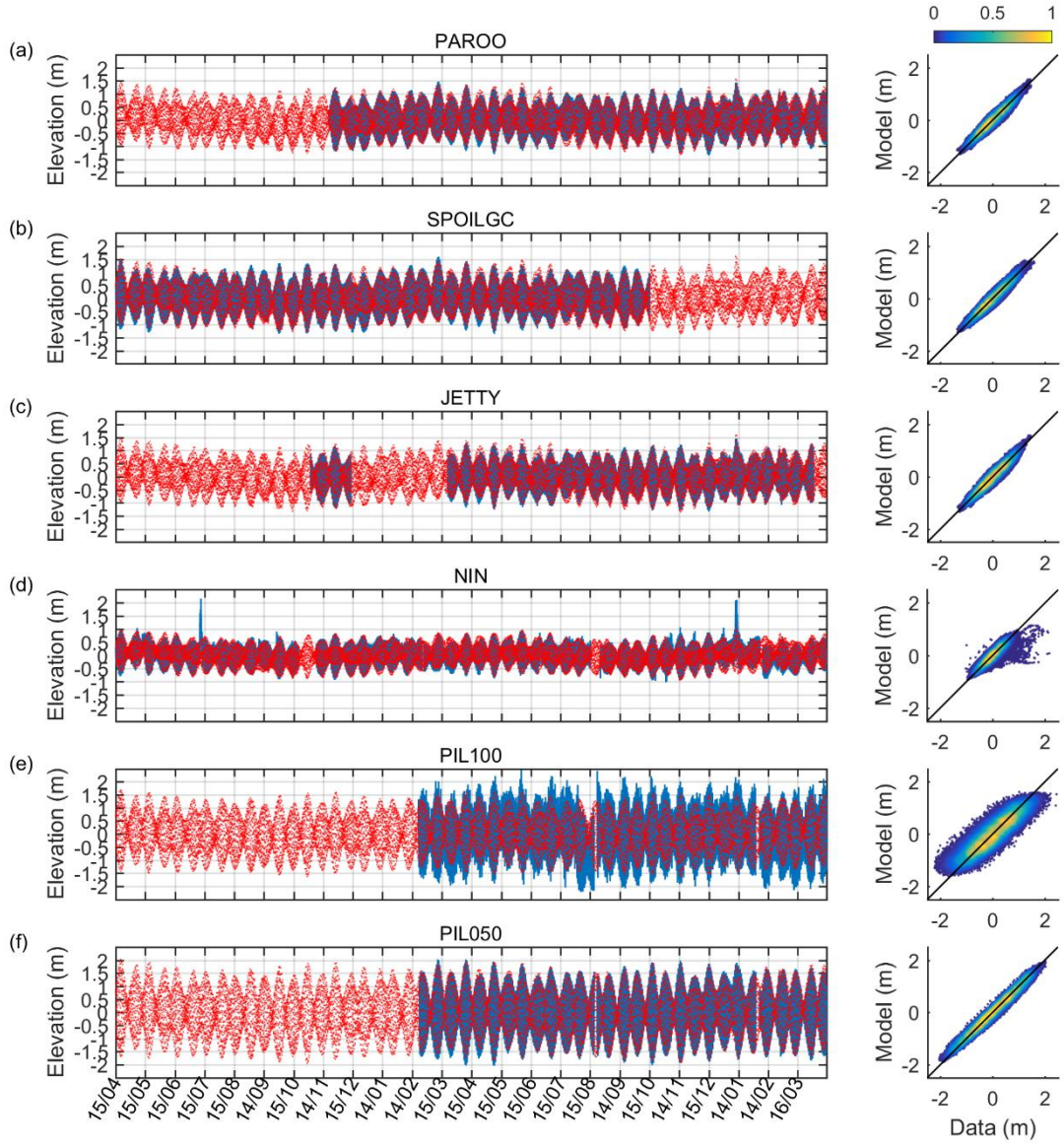

Figure S1. Comparison between hourly *in situ* (in blue) and modelled (in red) water elevation anomalies at 6 different locations. Right panels are scatter plots of model values against *in situ* values (colorbar indicates the point density).

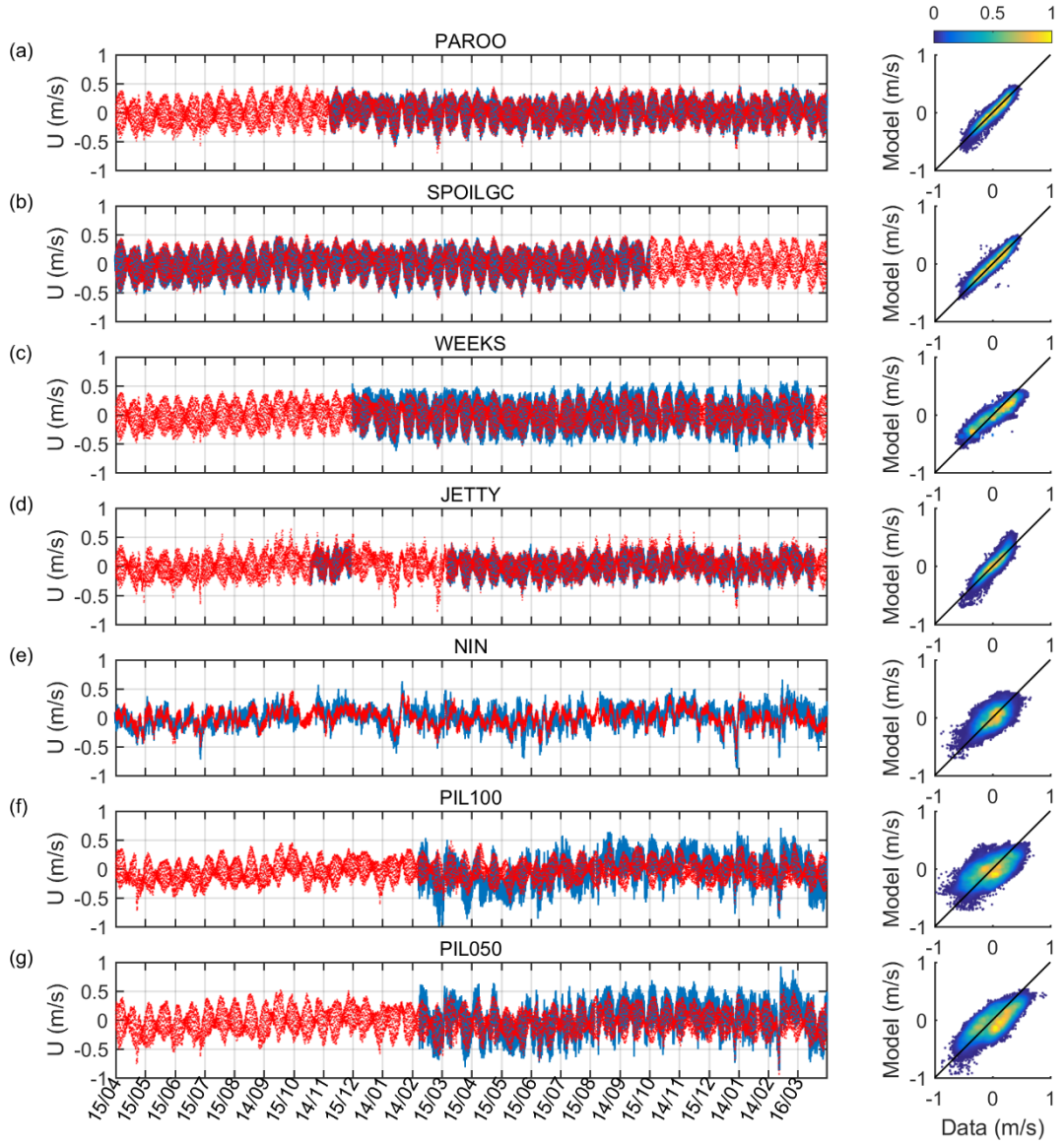

Figure S2. Comparison between hourly *in situ* (in blue) and modelled (in red) depth-averaged eastward current velocity at 6 different locations. Right panels are scatter plots of model values against *in situ* values (colorbar indicates the point density).

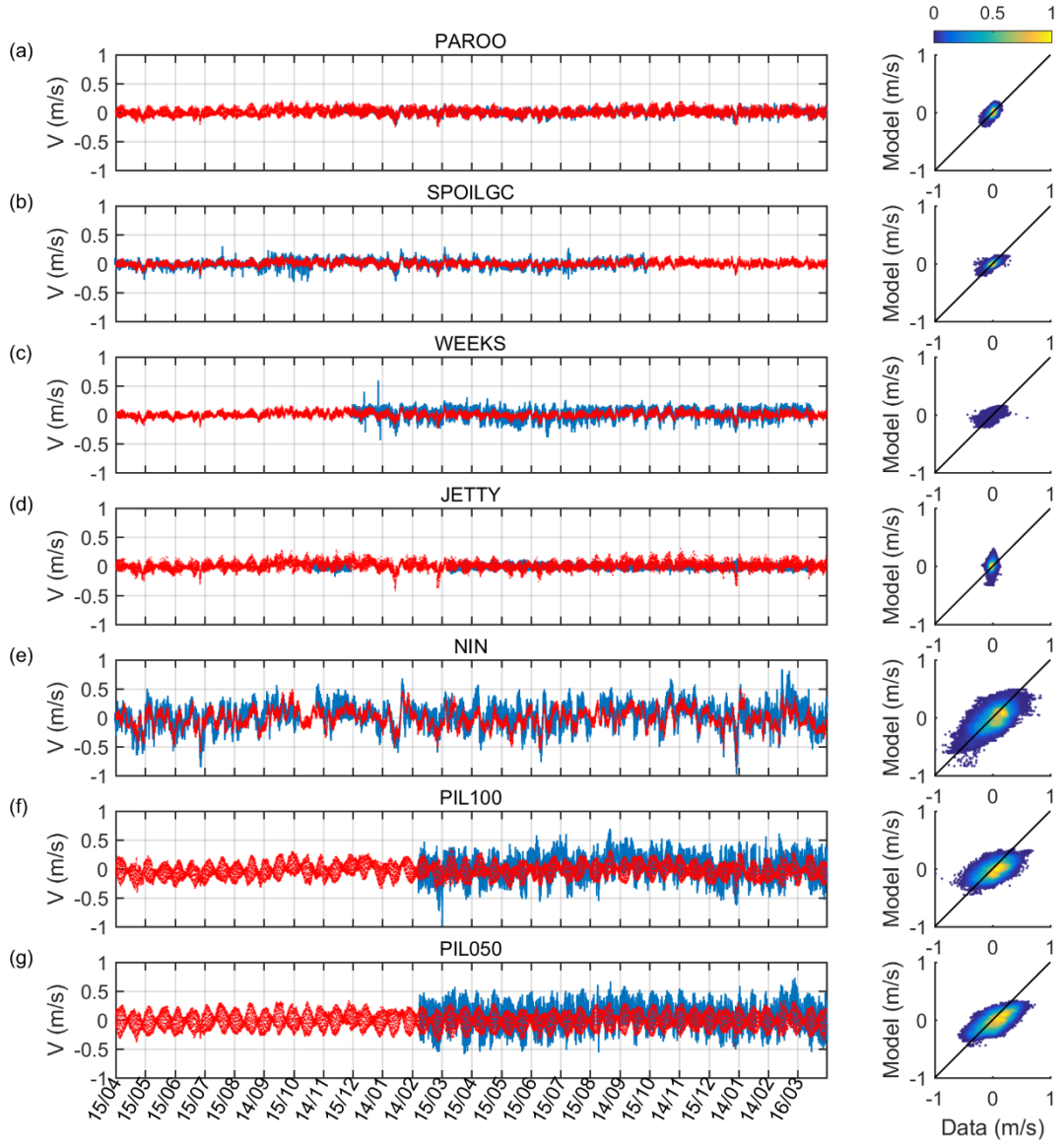

Figure S3. Comparison between hourly *in situ* (in blue) and modelled (in red) depth-averaged northward current velocity at 6 different locations. Right panels are scatter plots of model values against *in situ* values (colorbar indicates the point density).

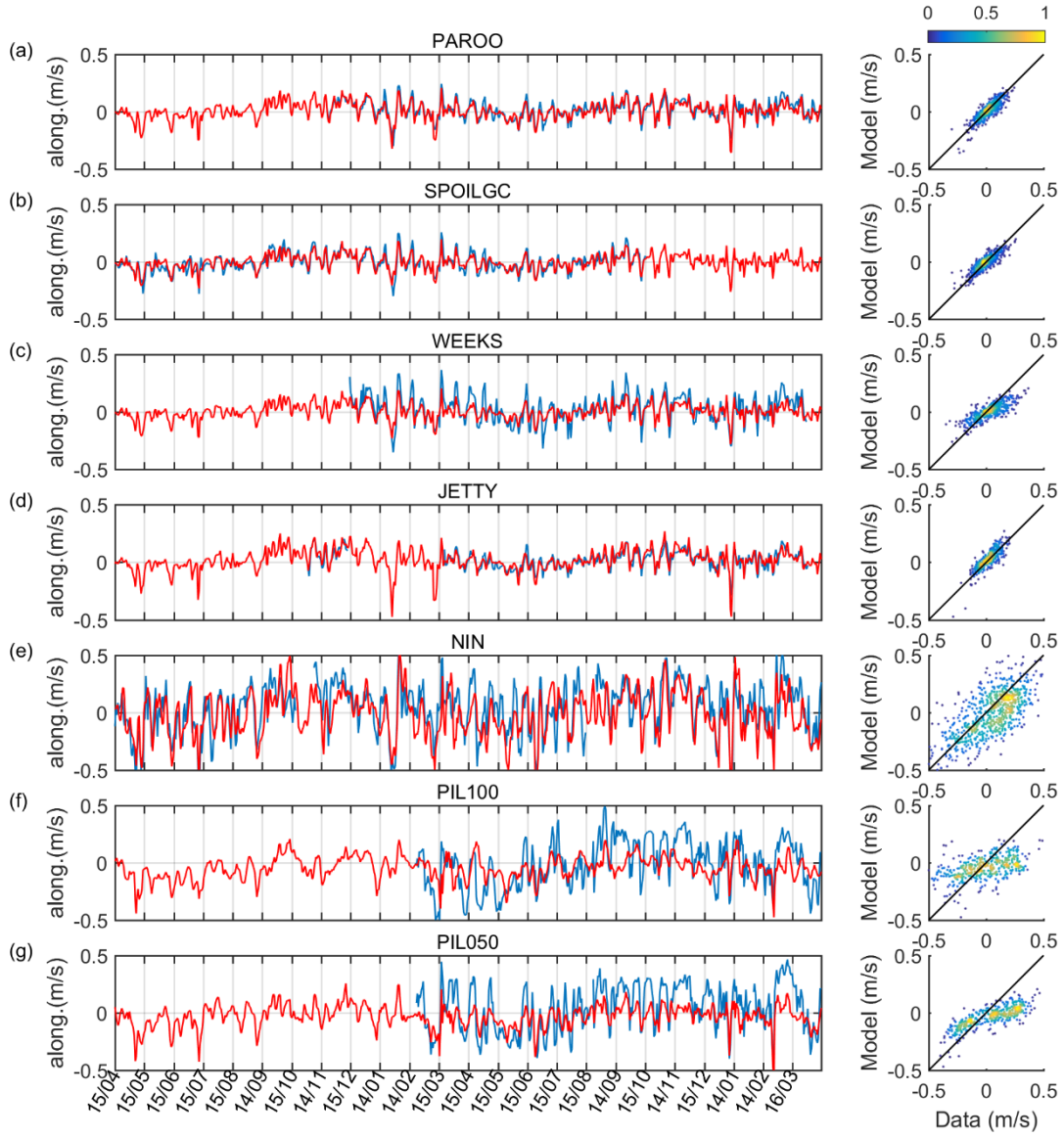

Figure S4. Comparison between daily-averaged *in situ* (in blue) and modelled (in red) depth-averaged alongshore current at 7 different locations. Right panels are scatter plots of model values against *in situ* values (colorbar indicates the point density).

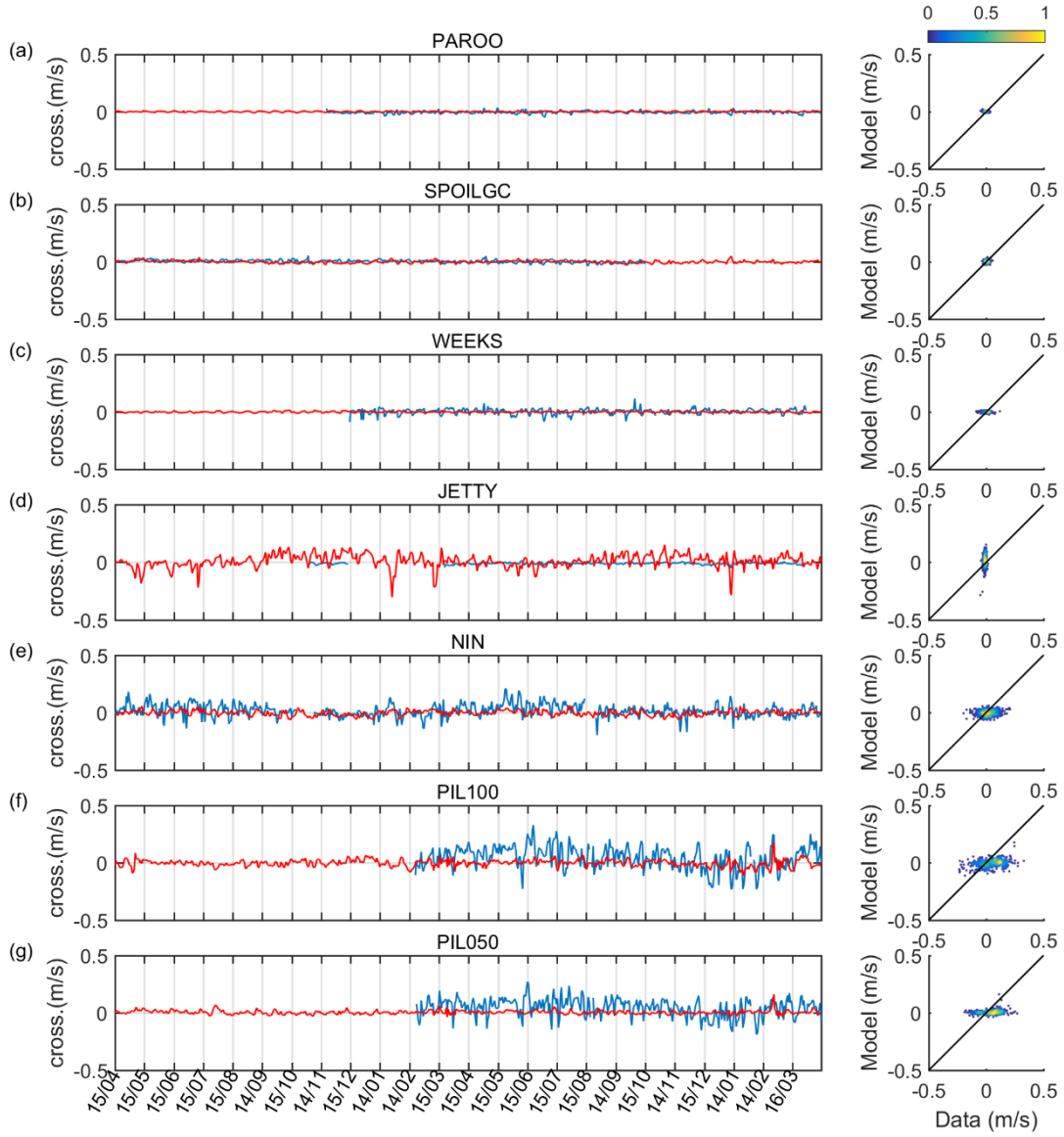

Figure S5. Comparison between daily-averaged *in situ* (in blue) and modelled (in red) depth-averaged cross-shore current at 7 different locations. Right panels are scatter plots of model values against *in situ* values (colorbar indicates the point density).

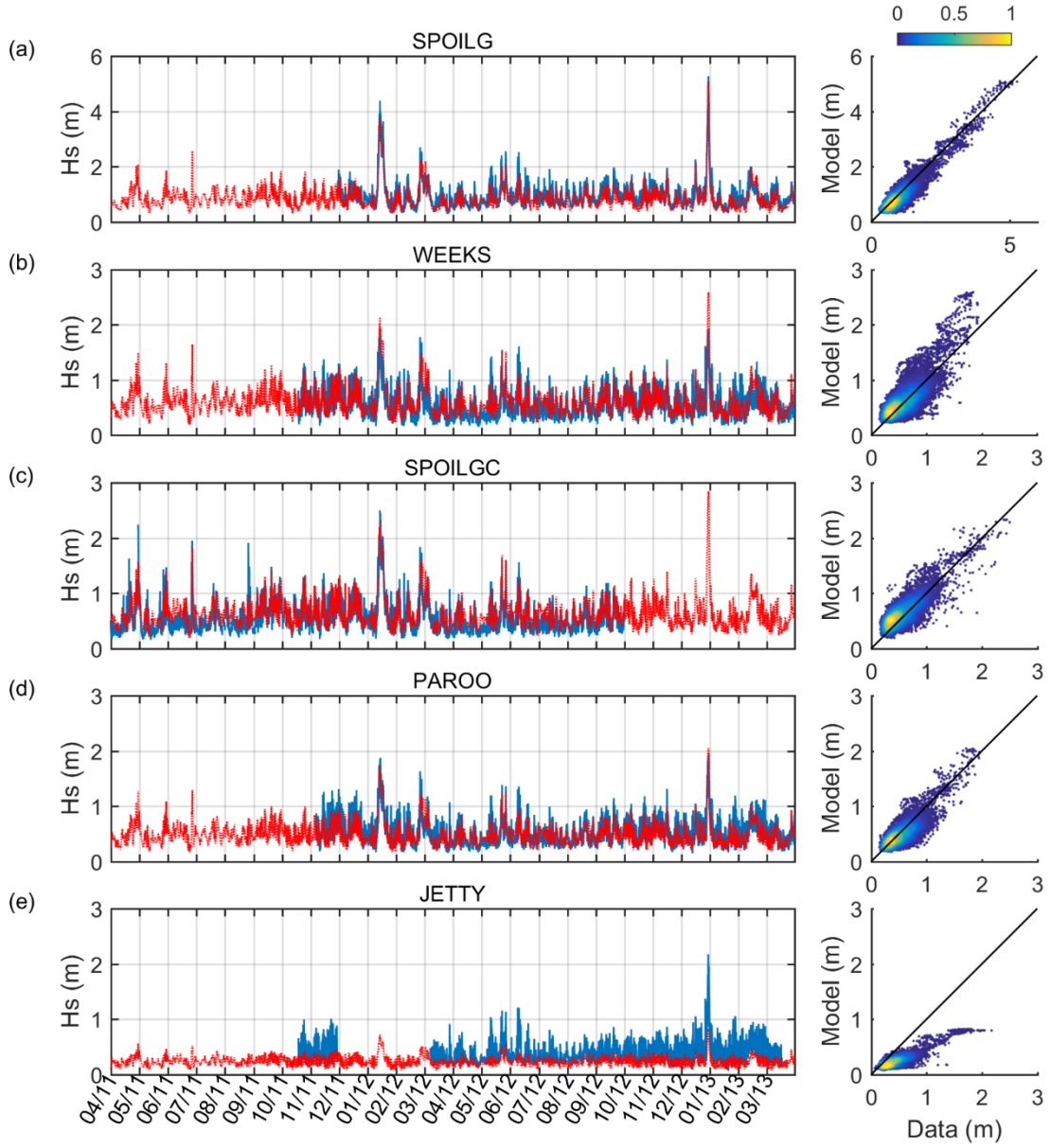

Figure S6. Comparison between hourly *in situ* (in blue) and modelled (in red) significant wave height at 5 different locations. Right panels are scatter plots of model values against *in situ* values (colorbar indicates the point density).

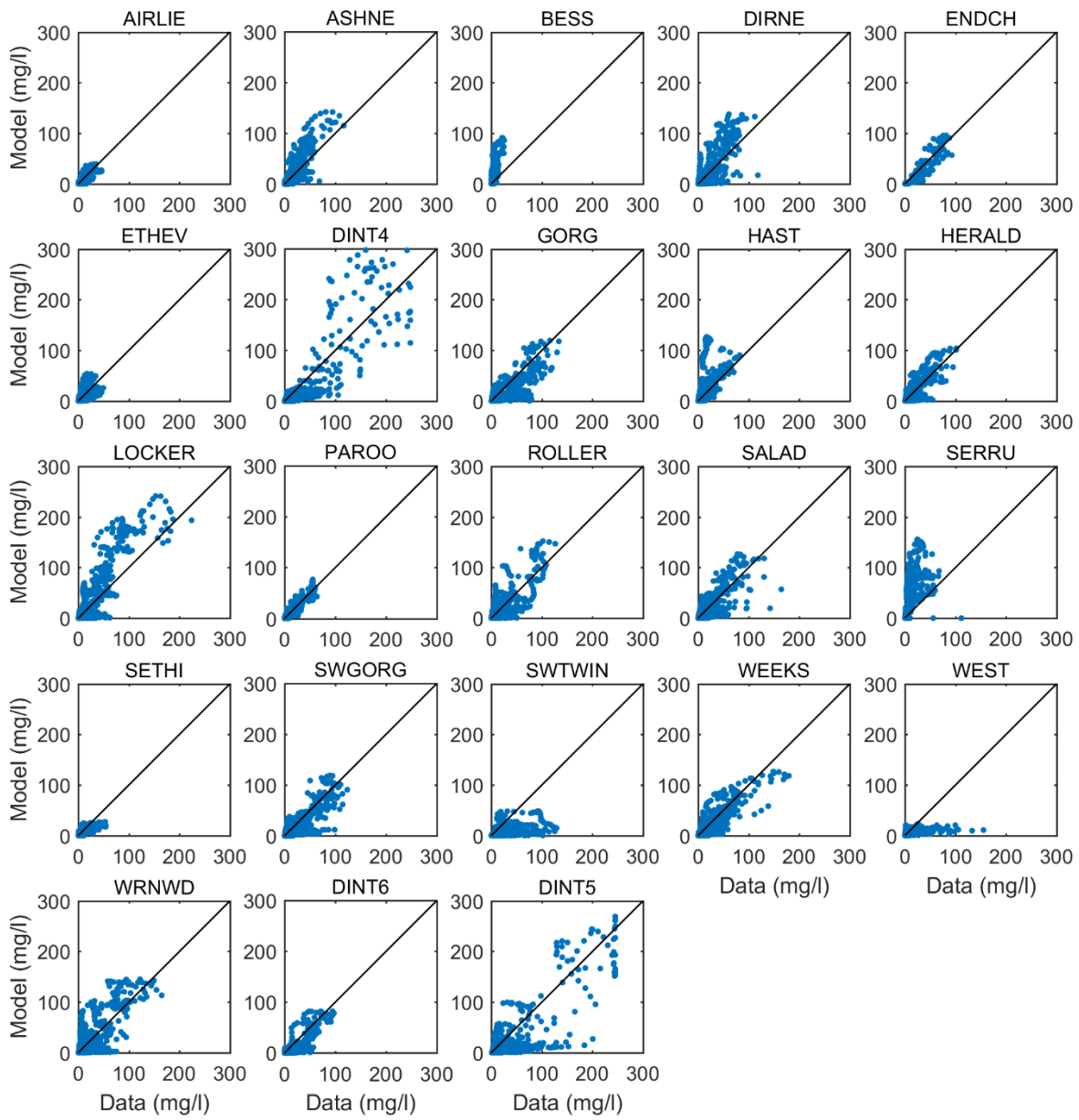

Figure S7. Scatter plots of modelled versus *in situ* bottom sediment concentration at 23 different locations indicated above each panel.

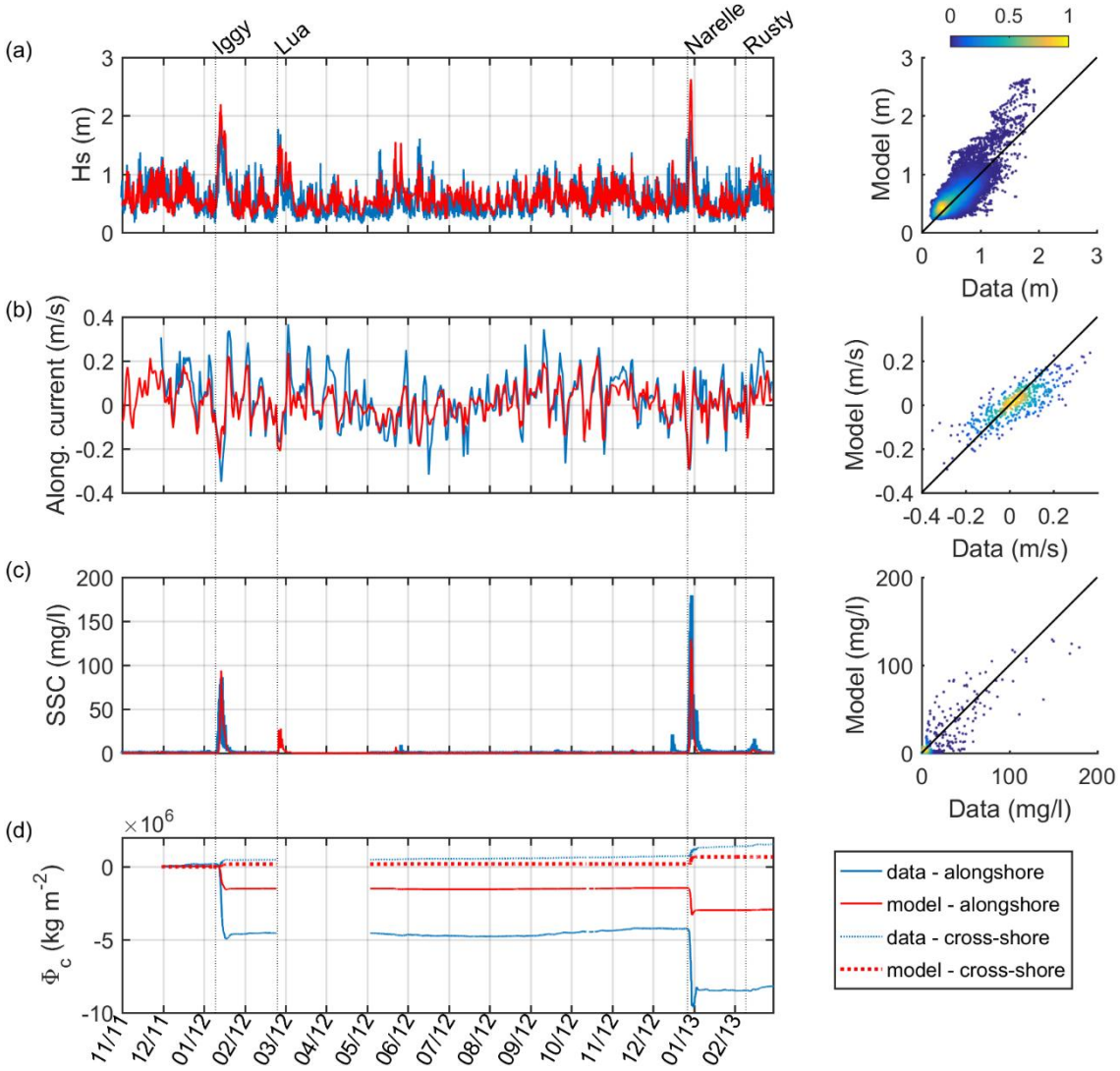

Figure S8. Comparison between hourly *in situ* data (in blue) and model results (in red) at WEEKS for (a) significant wave height, alongshore bottom current velocity (b), bottom sediment concentration (c), and cumulative alongshore and cross-shore bottom sediment fluxes (c). Right panels are scatter plots of model values against *in situ* values (colorbar indicates the point density).

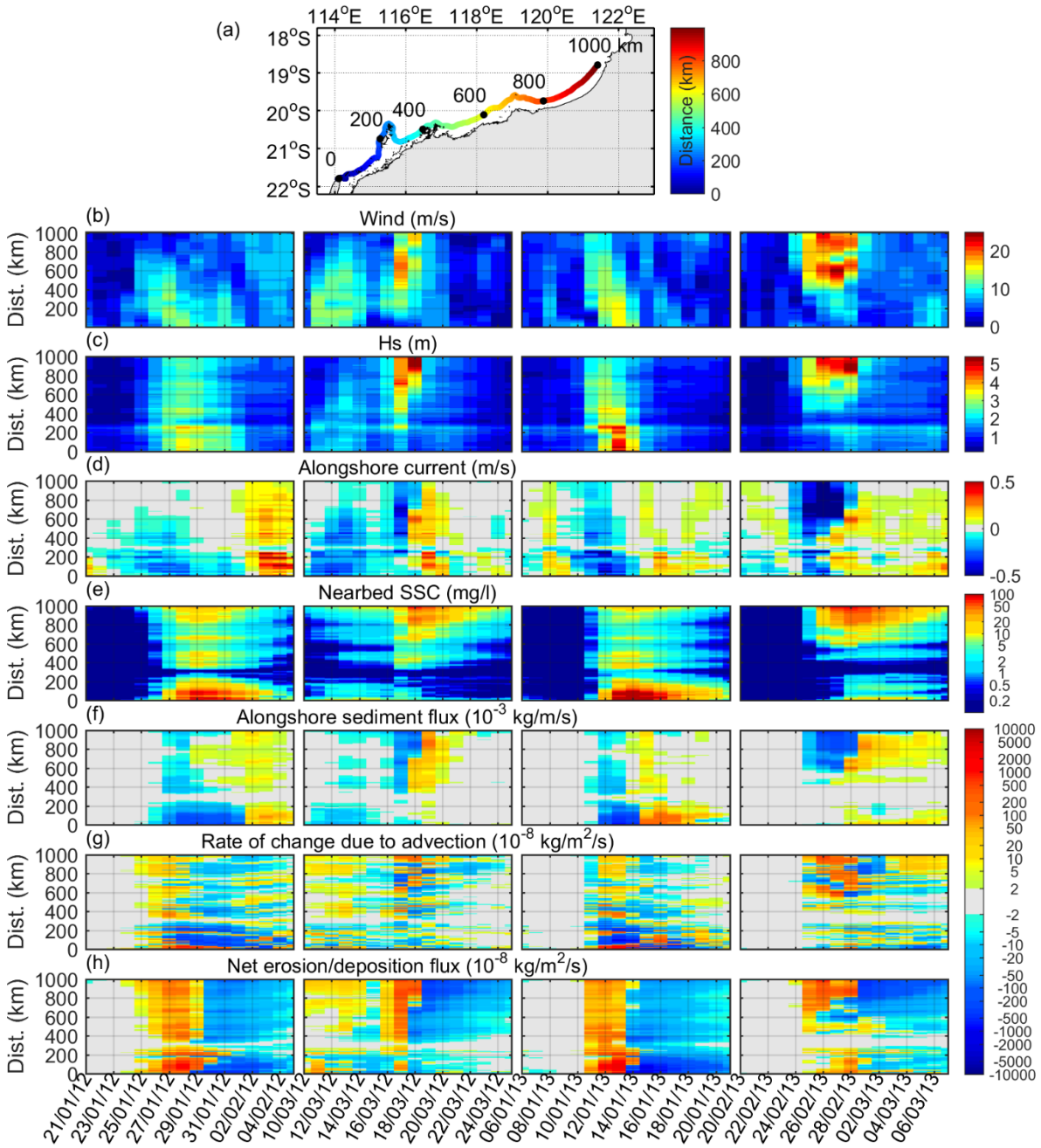

Figure S9. Sediment dynamics simulated by the model along the 20 m isobath showed on panel (a) during TC Iggy, Lua, Narelle and Rusty. Wind strength (b), significant wave height (c), alongshore current velocity (d), bottom sediment concentration (e) and depth-integrated alongshore sediment flux (f). Depth-integrated sediment concentration rate of change due to advection and diffusion (g) and net erosion/deposition flux (h). For each panel, the y-axis represents the distance along the 20 m isobath starting from the North West Cape as indicated by the color scale on panel (a). A logarithmic color scale is used for panels (e-h).

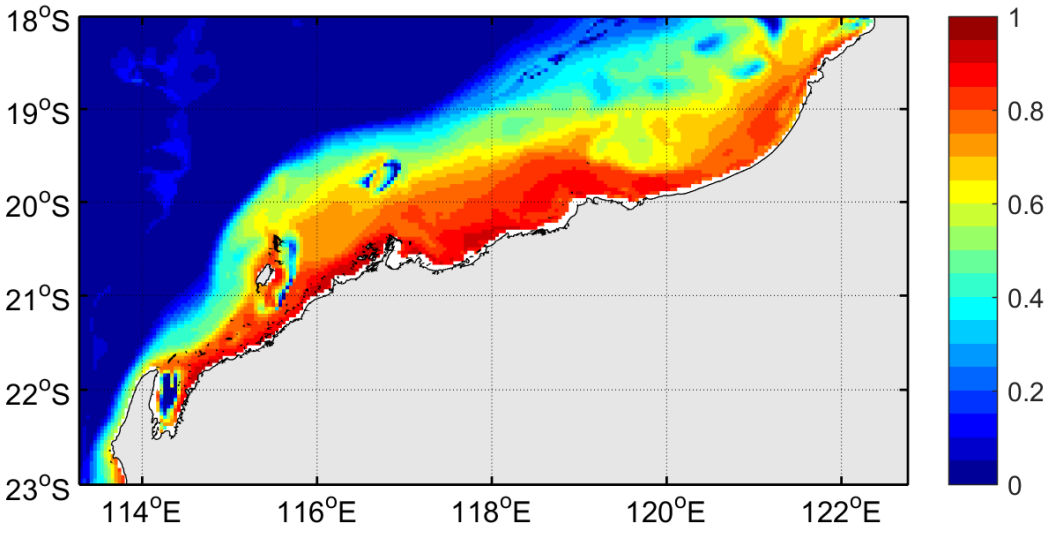

Figure S10. Correlation coefficient between daily-averaged alongshore current and wind.

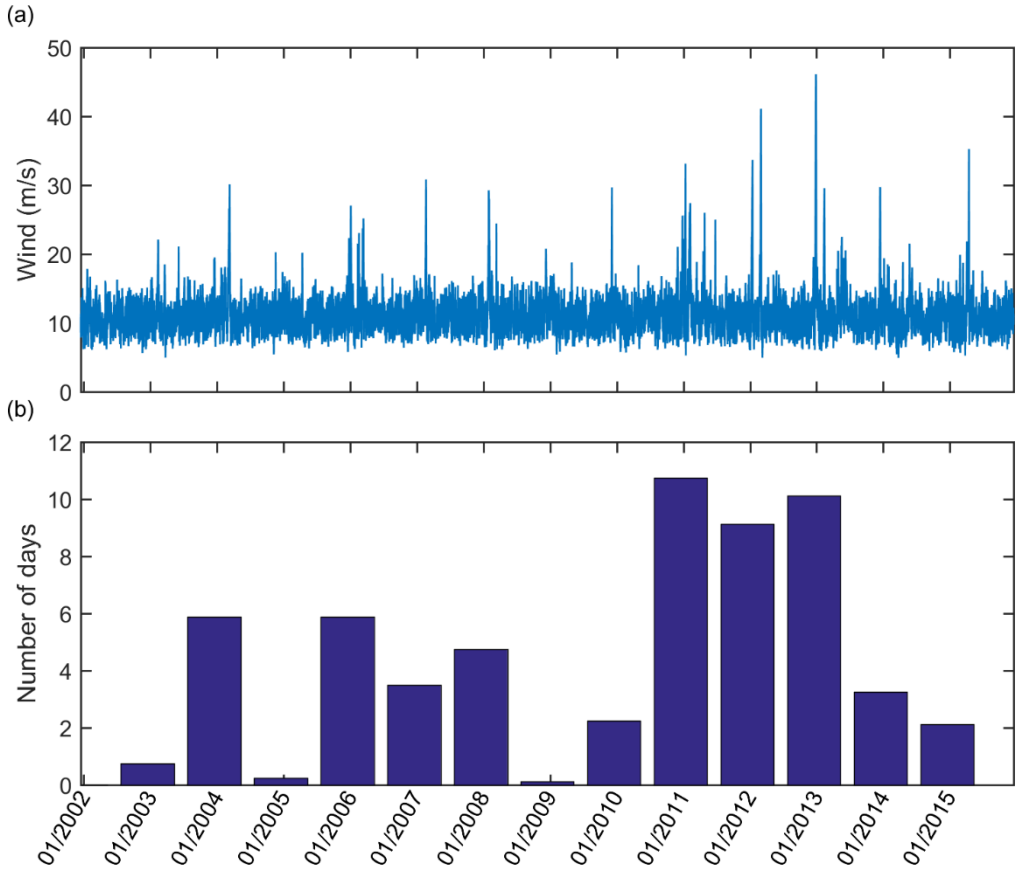

Figure S11. (a) Maximum wind strength (m s^{-1}) over the model domain for the period spanning 01/2012 to 12/2015. (b) Total number of days with the maximum wind strength over the model domain exceeding 20 m s^{-1} during each cyclone season.