Supplementary Information for 'Interannual response of reef islands to climate-drive variations in water level and wave climate'

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This supplementary file contains:

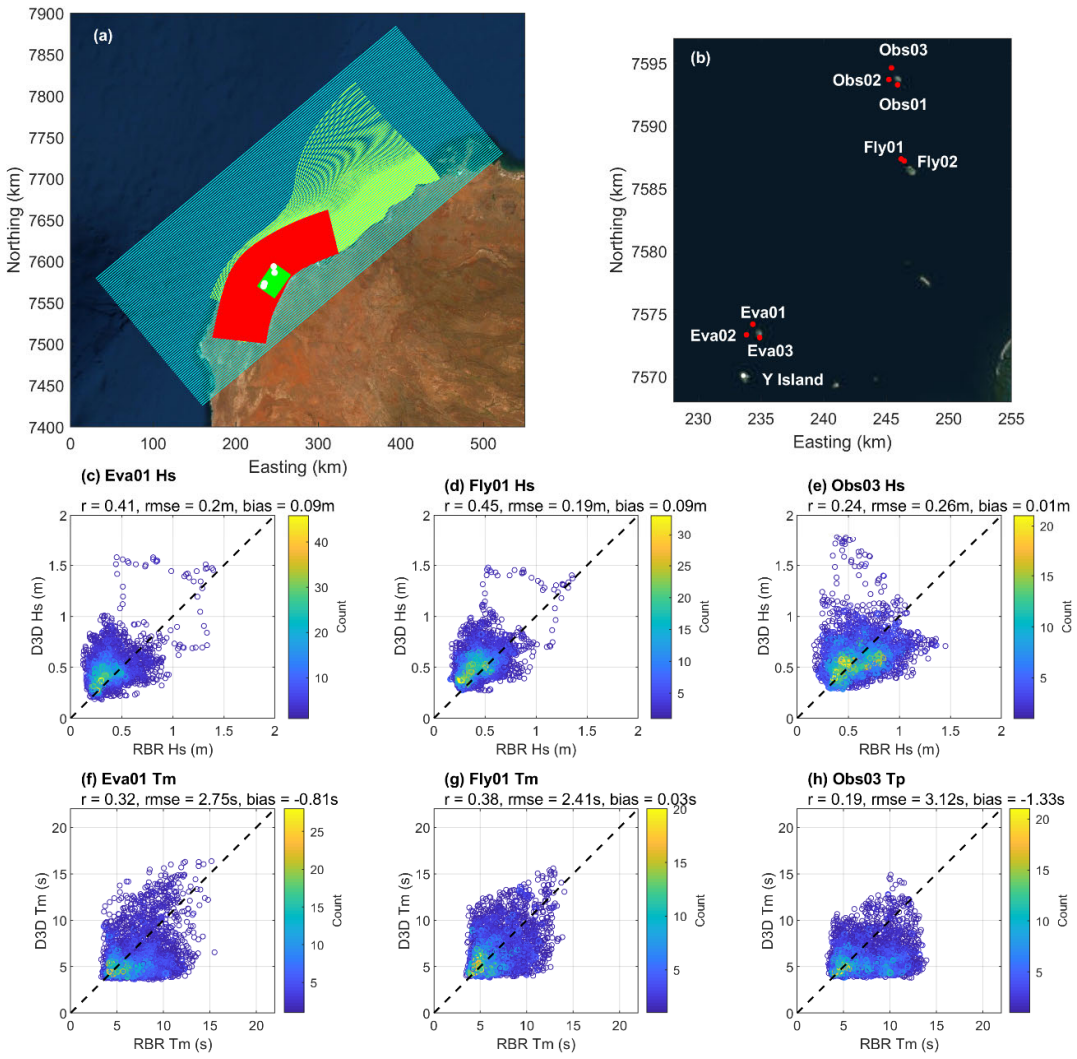

Figure S1. Validation of the numerical wave-circulation model (Delft3D-SWAN) using in situ RBR pressure sensor data from April 2018 to November 2018. Coordinates in (a) and (b) are UTM Zone 50, GDA 1994. Summary statistics of the model error are displayed above each panel (c-h), including the correlation coefficient (*r)*, root-mean square error (*rmse*), and bias.

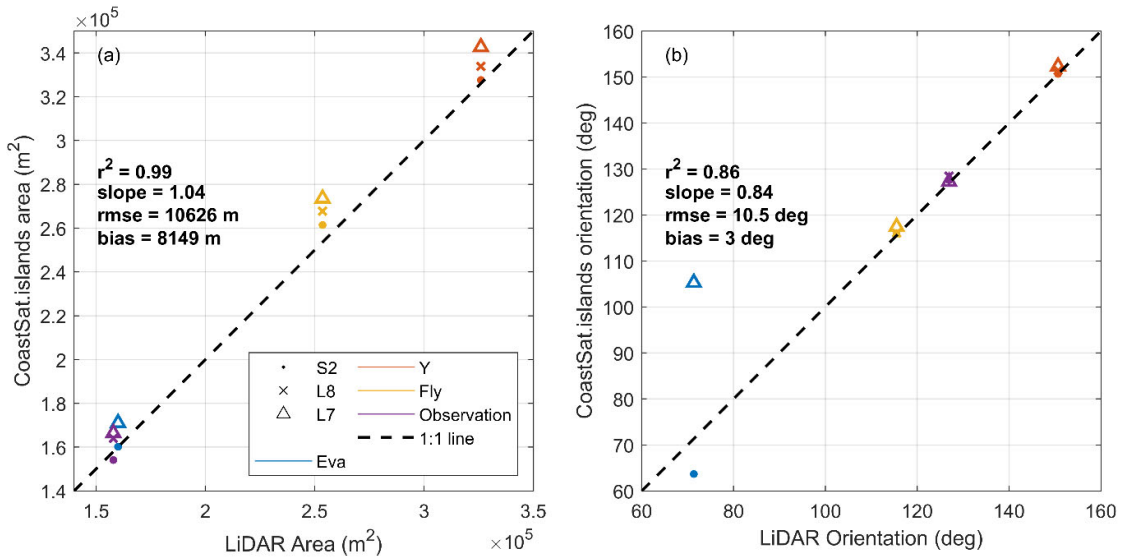

Figure S2. Comparison of LiDAR-derived and satellite-derived reef island areas (a) and orientations (b). Satellites are differentiated by symbols, where 'dot' corresponds to Sentinel-2, 'x' corresponds to Landsat-8, and triangles correspond to Landsat-7. Islands are differentiated by colors, where Eva is shown in blue, Y in orange, Fly in yellow, and Observation in purple. Black dashed line represents the 1:1 line.

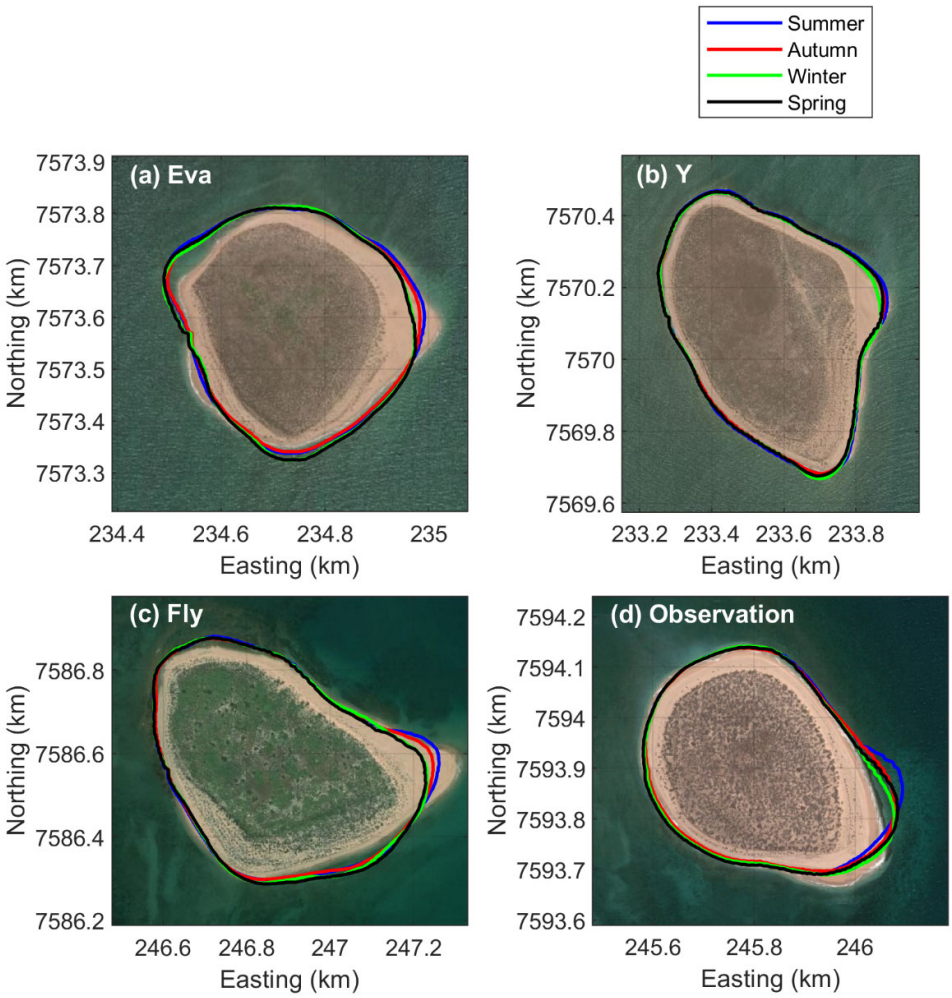

Figure S3. Seasonal planform geometry at (a) Eva, (b) Y, (c) Fly, and (d) Observation island. Seasons were defined following southern hemisphere convention with summer (December, January, February), autumn (March, April, May), winter (June, July, August), and spring (September, October, November). Shoreline positions represent the seasonally averaged position over the entire 20-year study period.

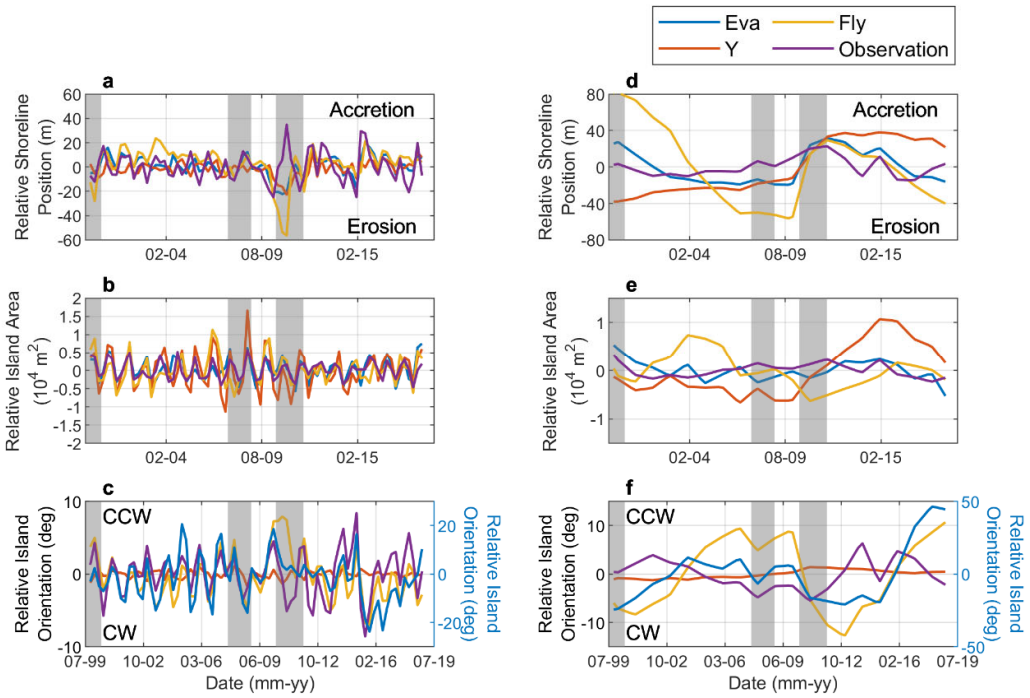

Figure S4. Seasonal and interannual variability of reef island morphology. (a-c) Seasonal variability for (a) shoreline position, (b) island area, and (c) island orientation. (e-g) Interannual variability for (d) shoreline position, (e) island area, and (f) island orientation. For (a) and (d), data is for a representative transect from the southeastern (~140° from North) side, where positive indicates accretion and negative indicates erosion. 140° transect was used as it shows indicative shoreline change across all four islands. For (c) and (f) positive denotes counter-clockwise rotation (CCW) and negative denotes clockwise (CW) rotation and right-hand axis is for Eva Island. In panels, blue line represents Eva Island, orange line is Y Island, yellow line is Fly Island, and purple is Observation Island; grey shading denotes La Niña events, classified as periods when MEI is less than -1. All variables are referenced to the 20-year average (same reference as Figure 6 in the main manuscript).

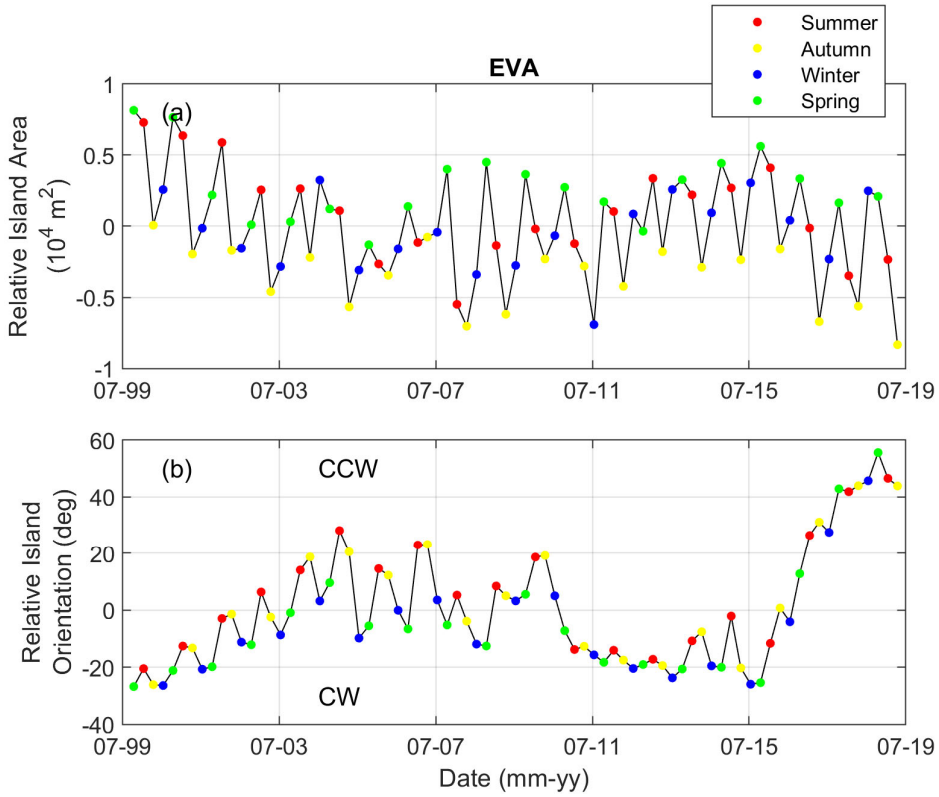

Figure S5. Seasonally-average (a) area and (b) orientation at Eva Island. Red denotes summer, yellow denotes autumn, blue denotes winter, and green denotes spring. Panels (a) and (b) correspond to blue lines in Figure 6f and Figure 6g in the main text.

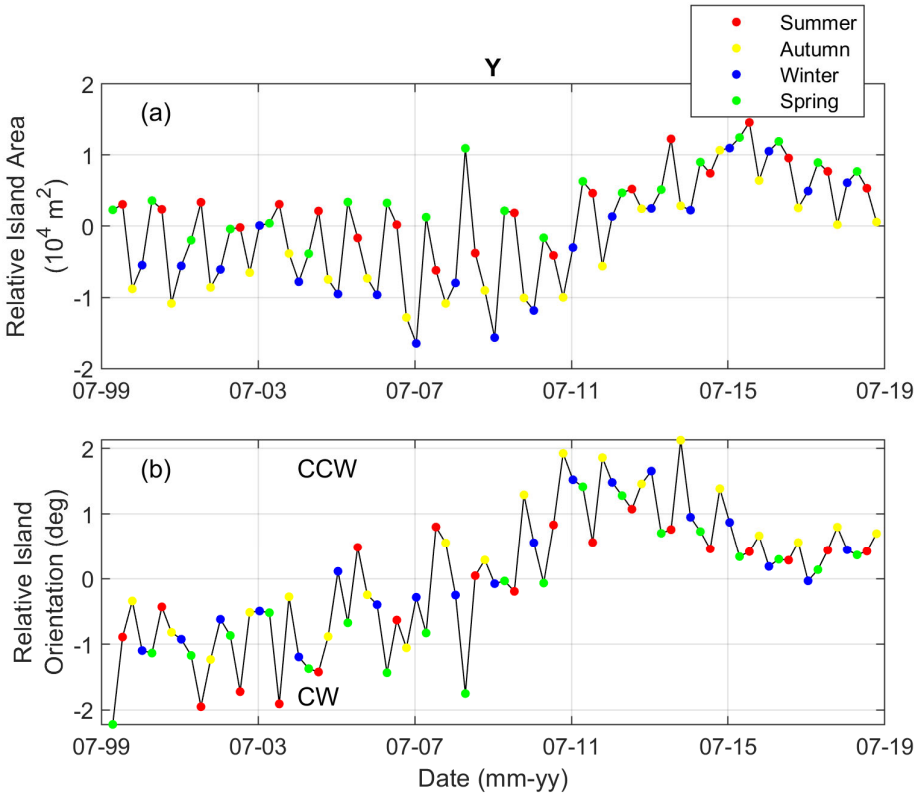

Figure S6. Seasonally-average (a) area and (b) orientation at Y Island. Red denotes summer, yellow denotes autumn, blue denotes winter, and green denotes spring. Panels (a) and (b) correspond to orange lines in Figure 6f and Figure 6g in the main text.

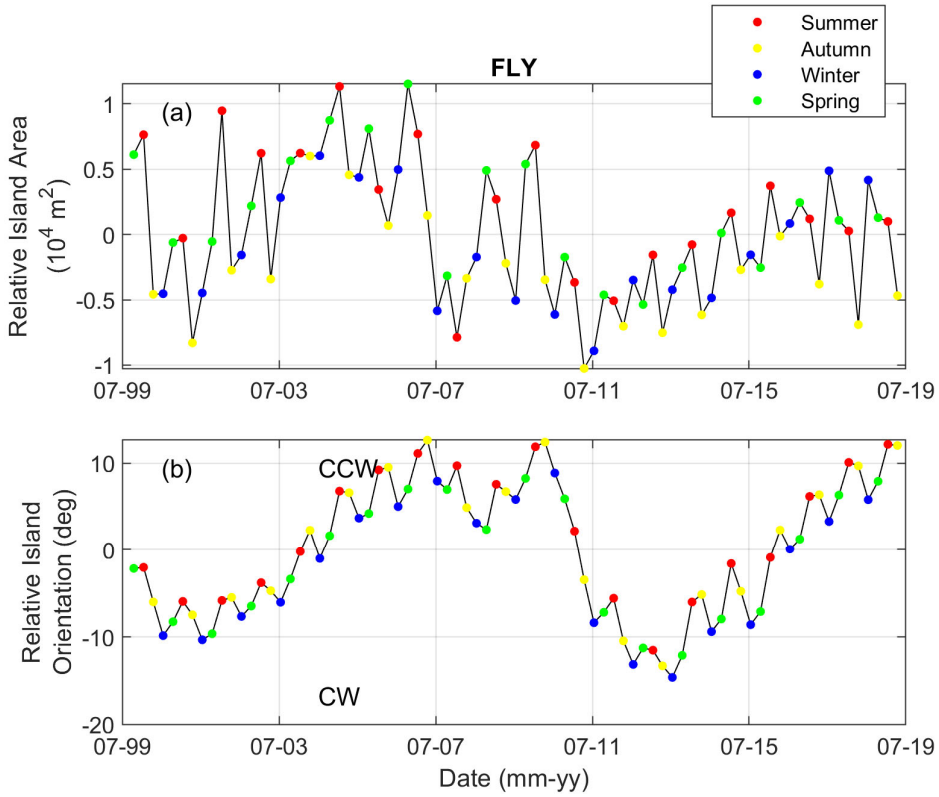

Figure S7. Seasonally-average (a) area and (b) orientation at Fly Island. Red denotes summer, yellow denotes autumn, blue denotes winter, and green denotes spring. Panels (a) and (b) correspond to yellow lines in Figure 6f and Figure 6g in the main text.

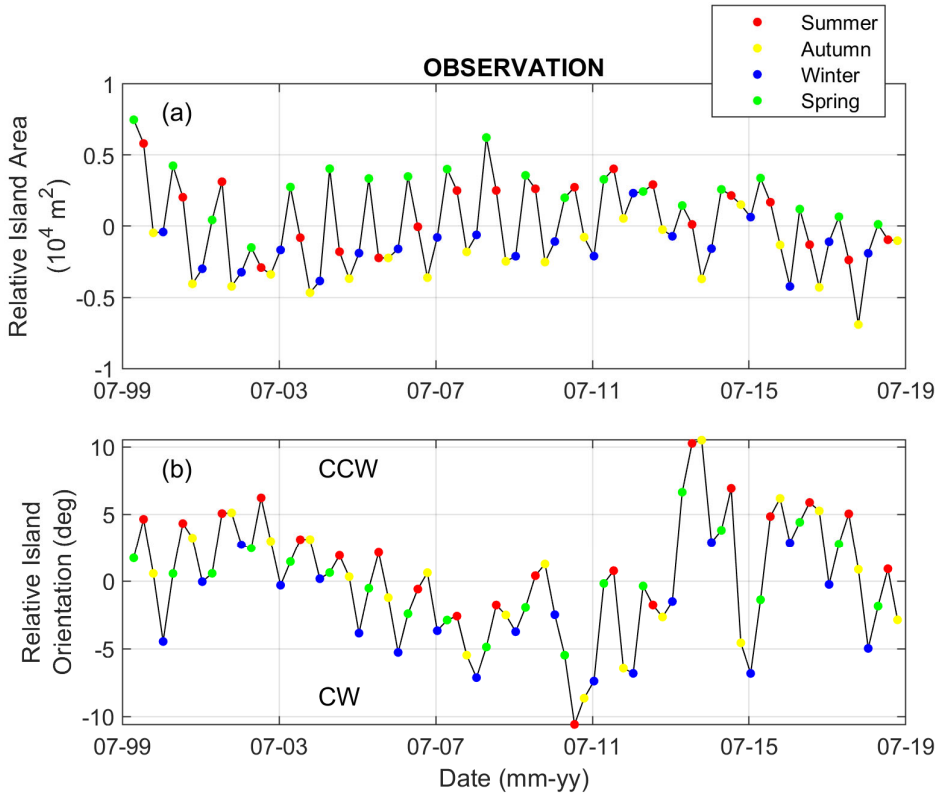

Figure S8. Seasonally-average (a) area and (b) orientation at Eva Island. Red denotes summer, yellow denotes autumn, blue denotes winter, and green denotes spring. Panels (a) and (b) correspond to purple lines in Figure 6f and Figure 6g in the main text.