Supporting Information for

Data-driven rolling model for global wave height

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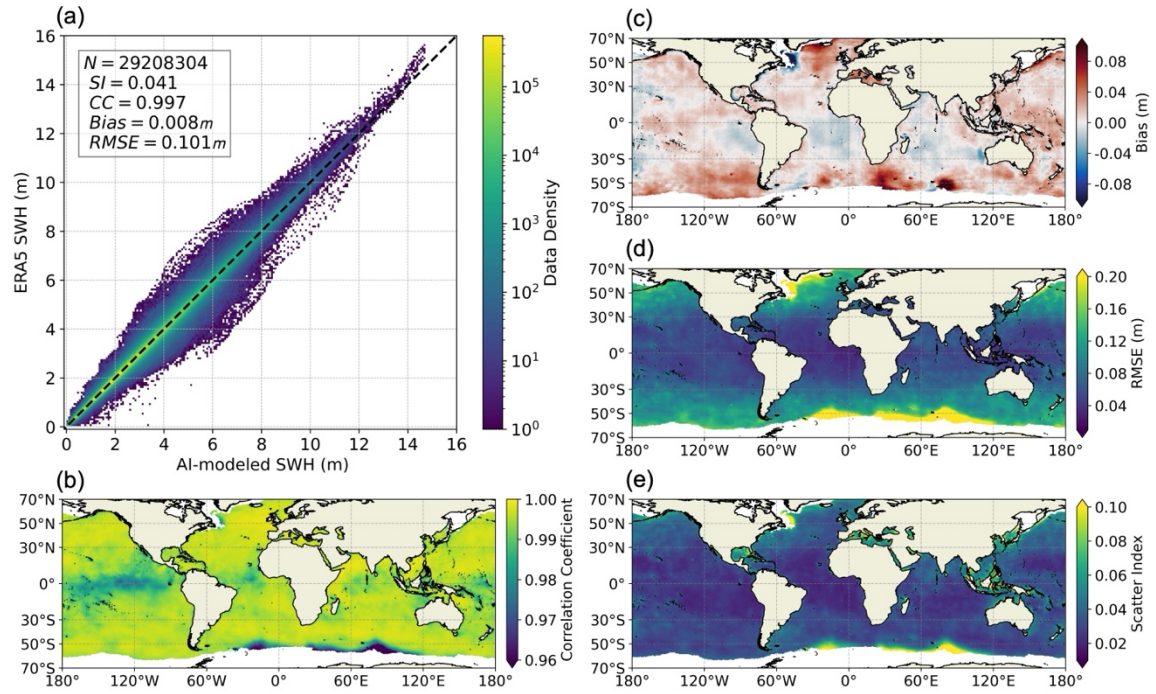**Additional Supporting Information**

Figure S1: Comparison between SWHs from the AI model for hindcast time of six hours and ERA5 in 2020. (a) The scatter plot between the SWHs from the two datasets. (b-e) The global spatial distributions of CC, bias, RMSE, and SI, respectively.
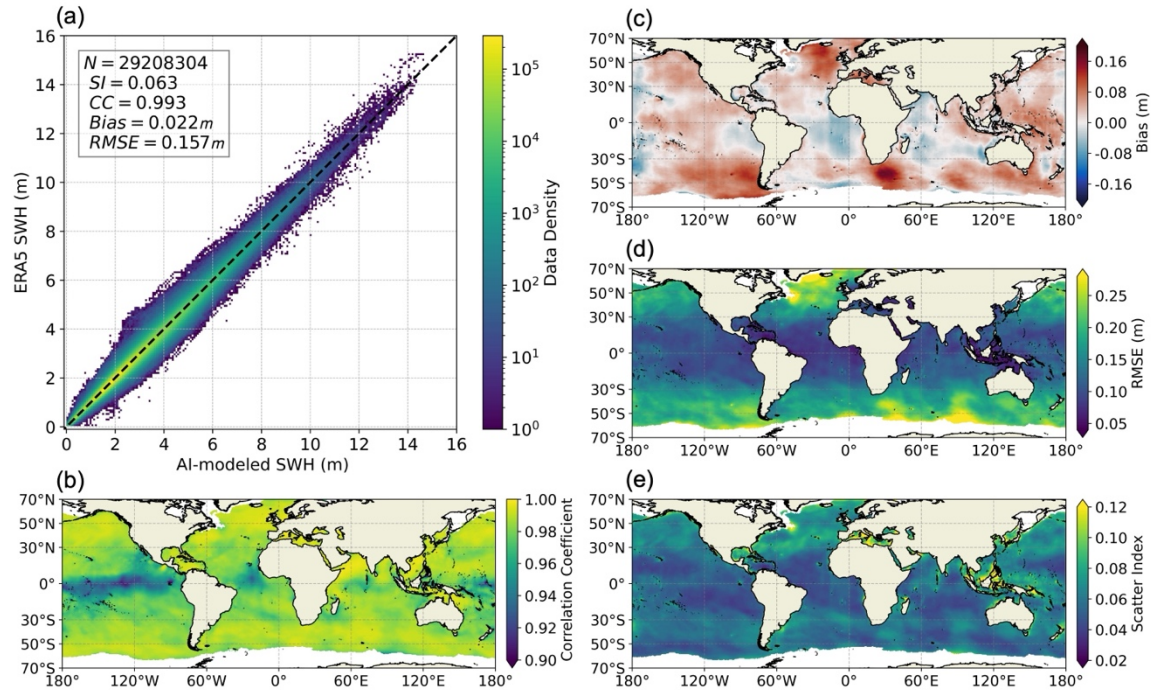

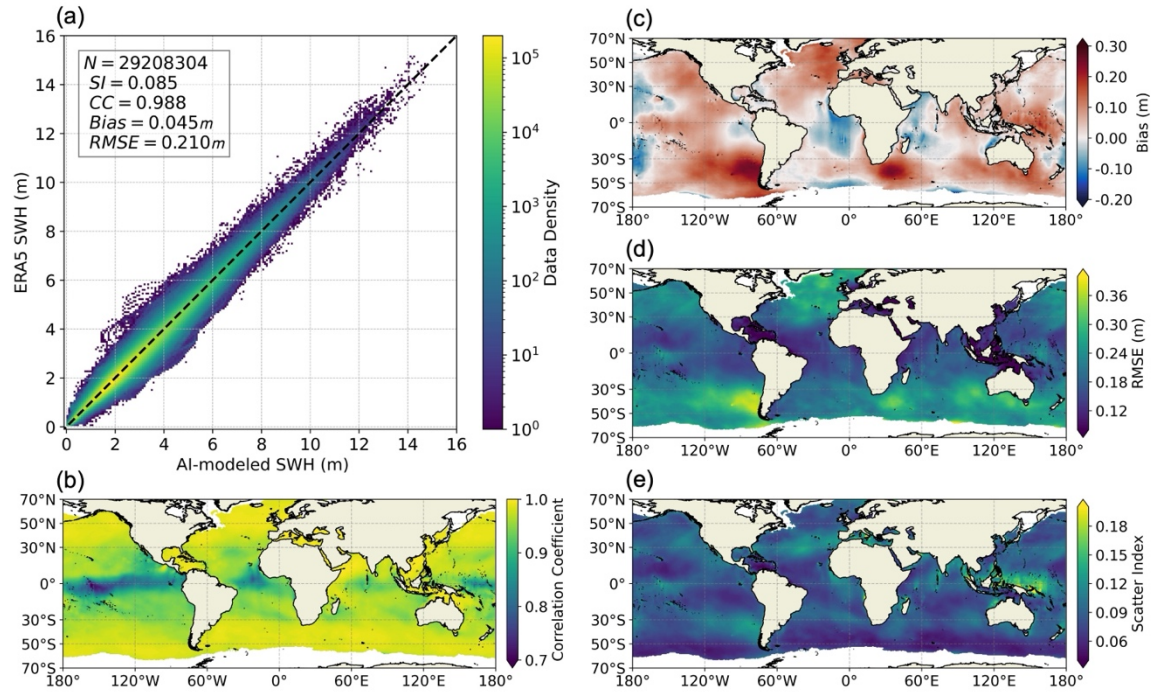**Figure S2: The same as Fig. S1, but for hindcast time of 24 hours.**

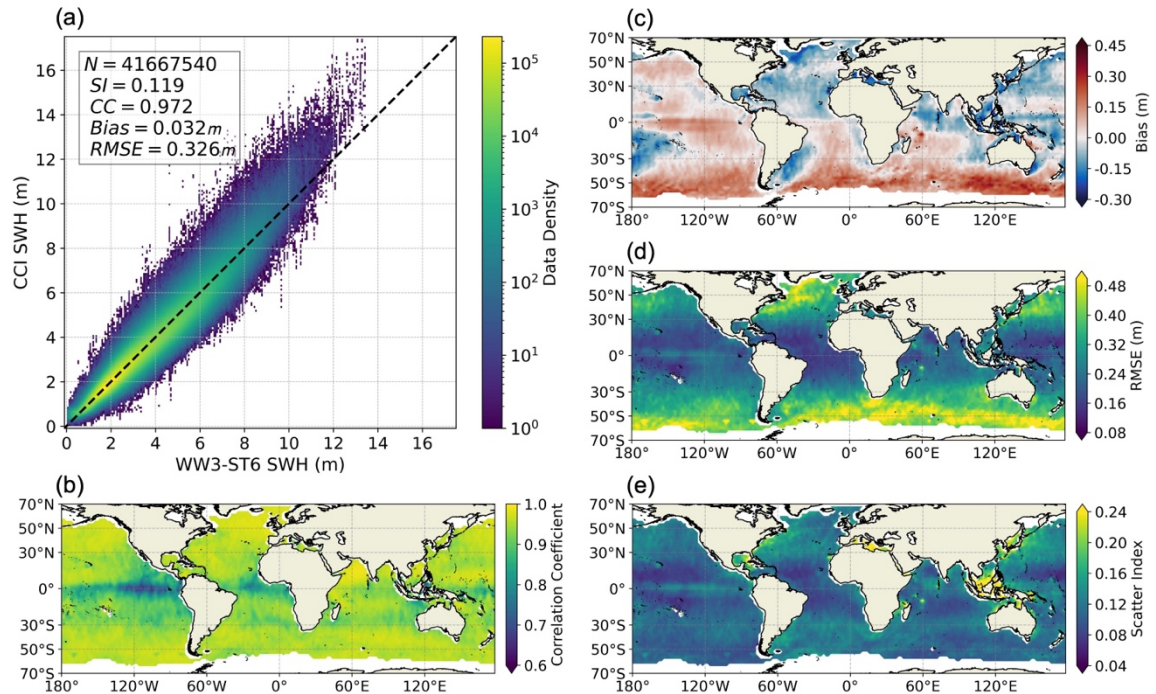**Figure S3: The same as Fig. S1, but for hindcast time of 72 hours.**

Figure S4: The comparison between SWHs from the WW3-ST6 numerical wave model and CCI-sea state in 2020 for global ocean. (a) The scatter plot between the SWHs from the two datasets. (b-e) The spatial distributions of CC, bias, RMSE, and SI, respectively.
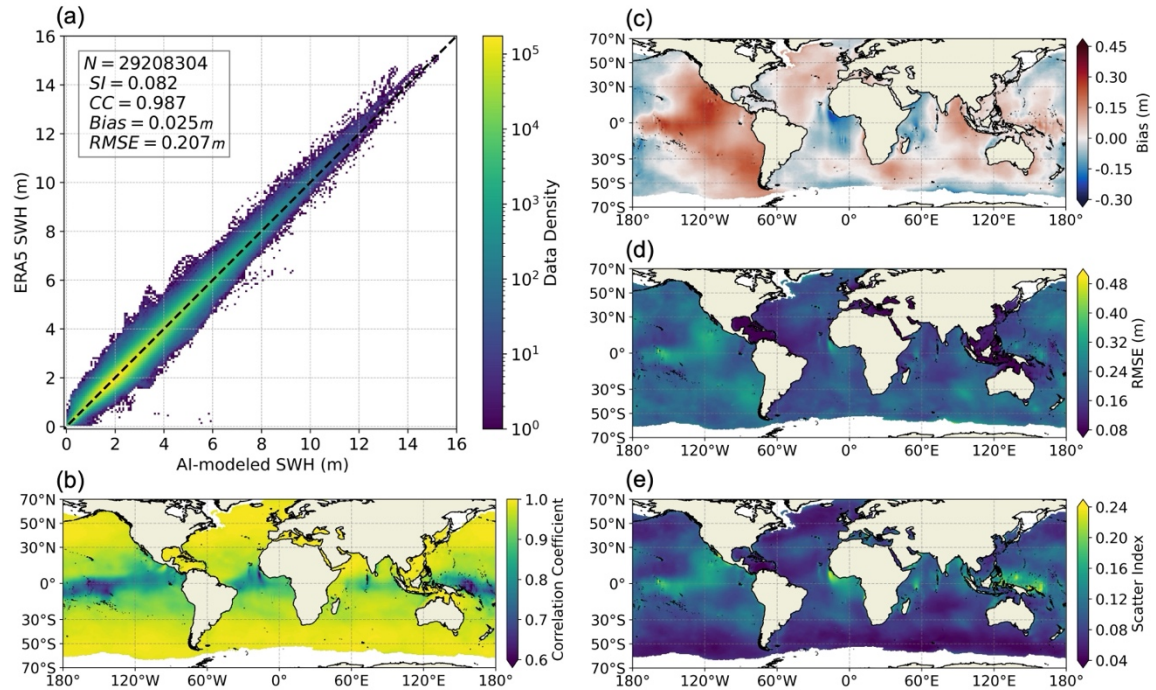
Figure S5: Comparison between SWHs from the AI model for hindcast time of 240 hours (when the errors are stable) and ERA5 in 2000. (a) The scatter plot between the SWHs from the two datasets. (b-e) The global spatial distributions of CC, bias, RMSE, and SI, respectively.

Movie S1: Comparison between SWHs from the AI model and ERA5 for the global ocean in 2020 as an animation. The AI model starts to run using a rolling simulation strategy from 01-Jan-2020 00:00:00. The upper panel shows the evolution of ERA5 SWH fields, the lower panel shows the corresponding AI-modeled SWH fields without using data assimilation.

Movie S2: The same as Movies S1. but the AI model uses data assimilation.