



Supplement of

Data-driven rolling model for global wave height

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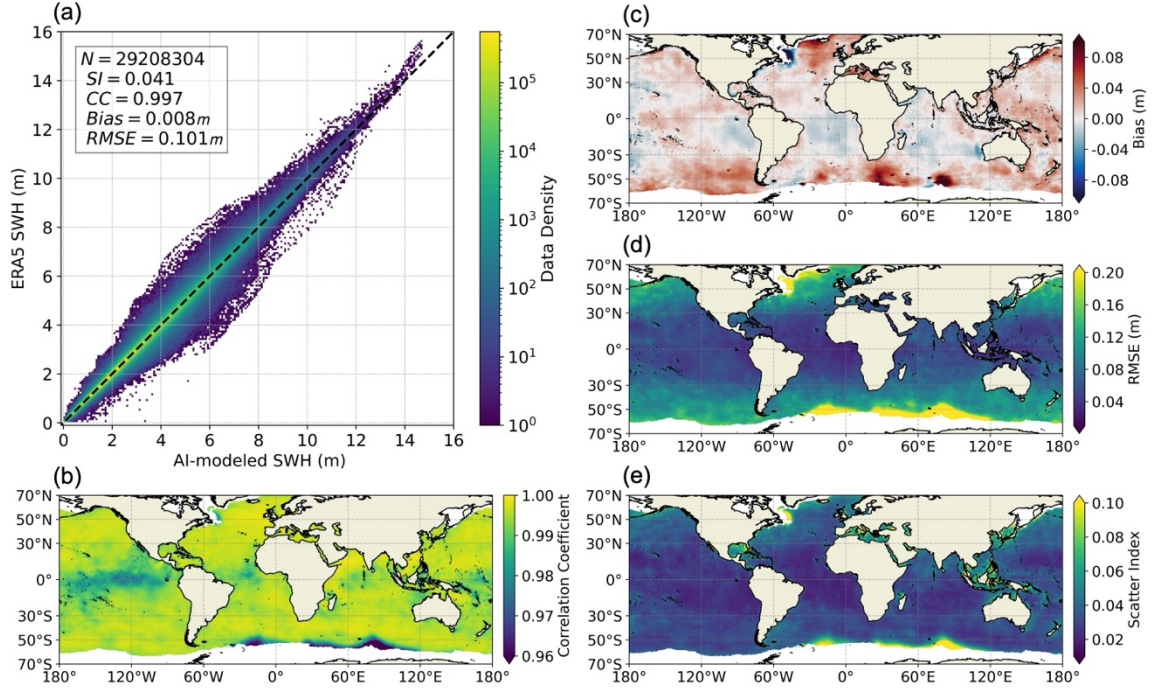


Figure S1: Comparison of SWHs from the AI model (without data assimilation) at 6-h hindcast time with ERA5 for the year 2020. (a) The scatter plot between the SWHs from the two datasets. (b-e) The global spatial distributions of CC, bias, RMSE, and SI, respectively.

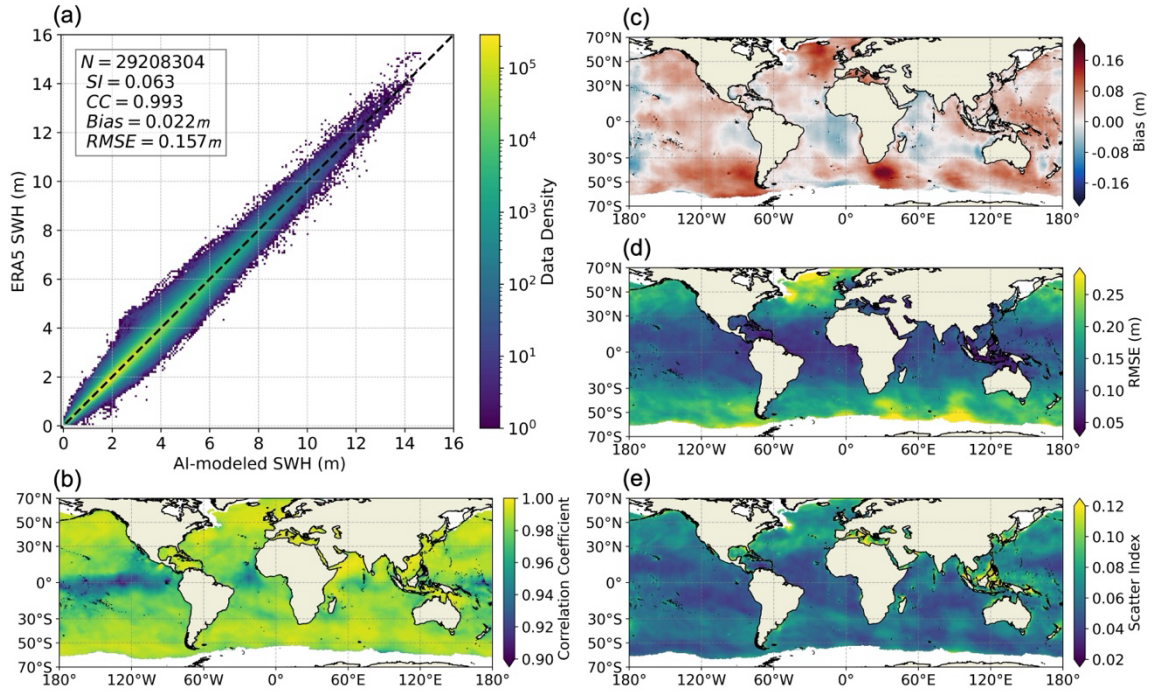


Figure S2: The same as Fig. S1, but for hindcast time of 24 hours.

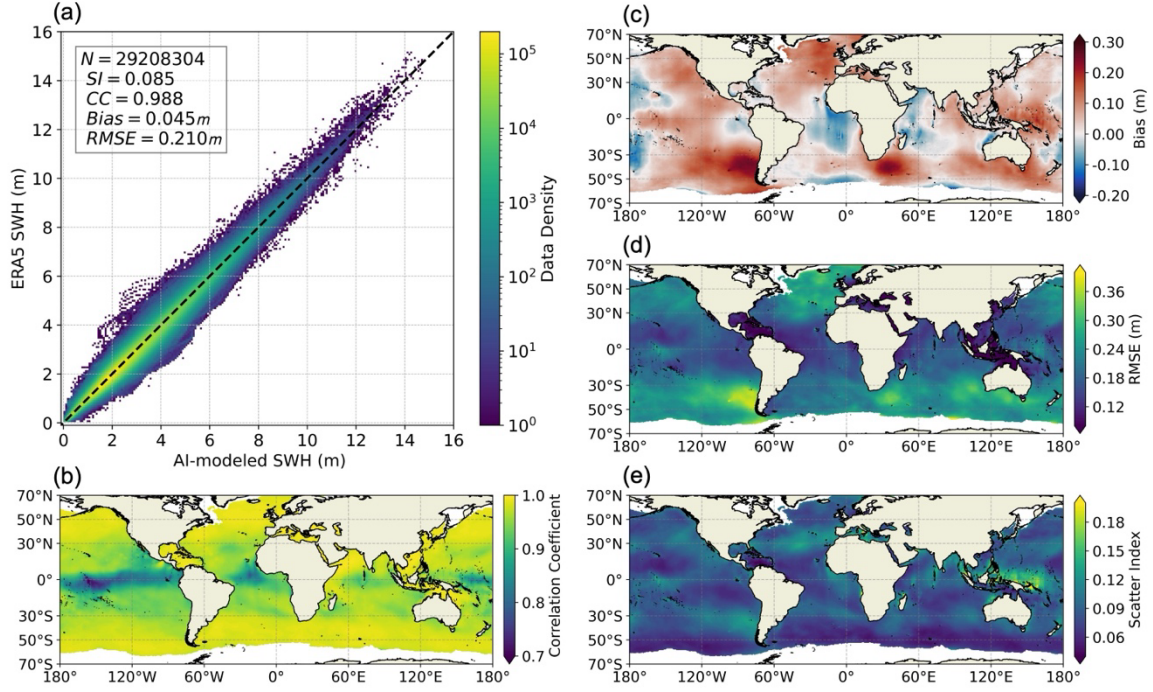


Figure S3: The same as Fig. S1, but for hindcast time of 72 hours.

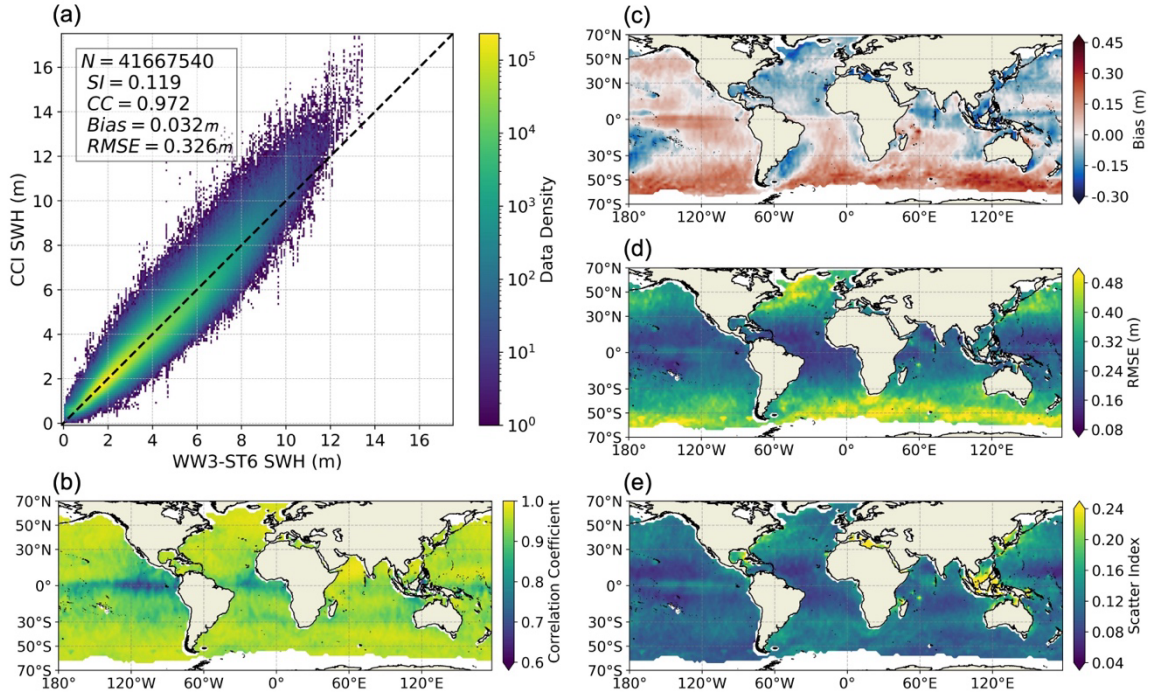


Figure S4: The comparison between SWHs from the WW3-ST6 numerical wave model and CCI-sea state in 2020 for global ocean. (a) The scatter plot between the SWHs from the two datasets. (b-e) The spatial distributions of CC, bias, RMSE, and SI, respectively.

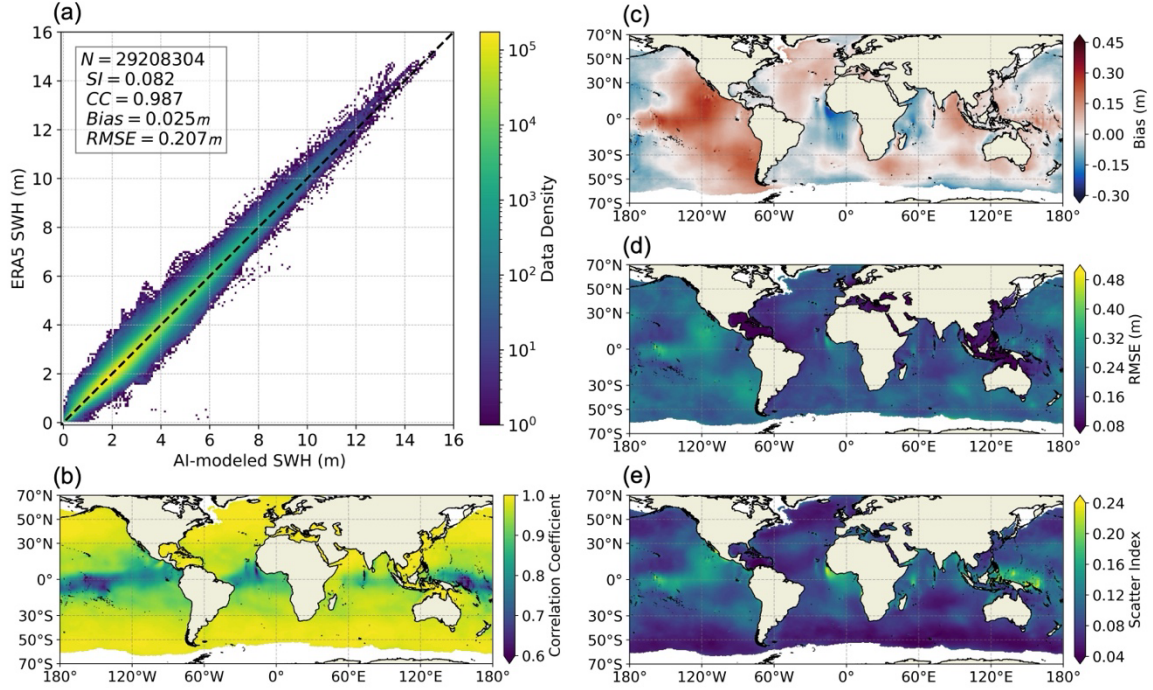


Figure S5: Comparison of SWHs from the AI model (without data assimilation) at 240-h hindcast time (when the errors are stable) with ERA5 for the year 2000. (a) The scatter plot between the SWHs from the two datasets. (b-e) The global spatial distributions of CC, bias, RMSE, and SI, respectively.

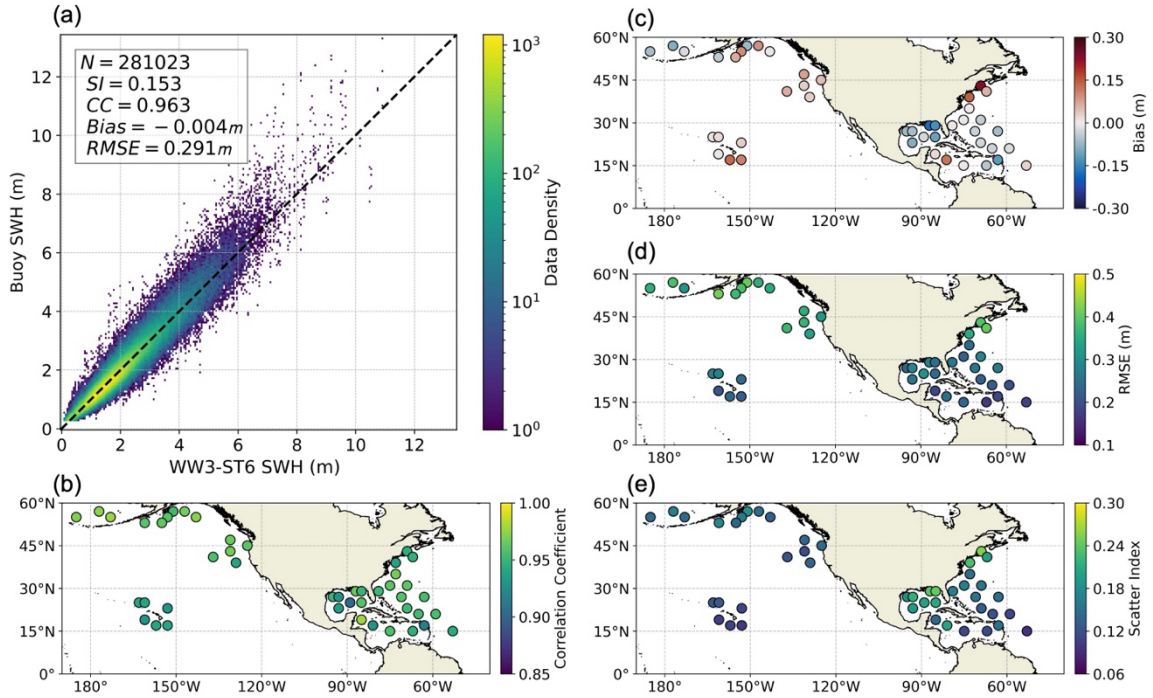


Figure S6: The comparison between SWHs from the WW3-ST6 numerical wave model and NDBC Buoy in 2020 for global ocean. (a) The scatter plot between the SWHs from the two datasets. (b-e) The spatial distributions of CC, bias, RMSE, and SI, respectively.

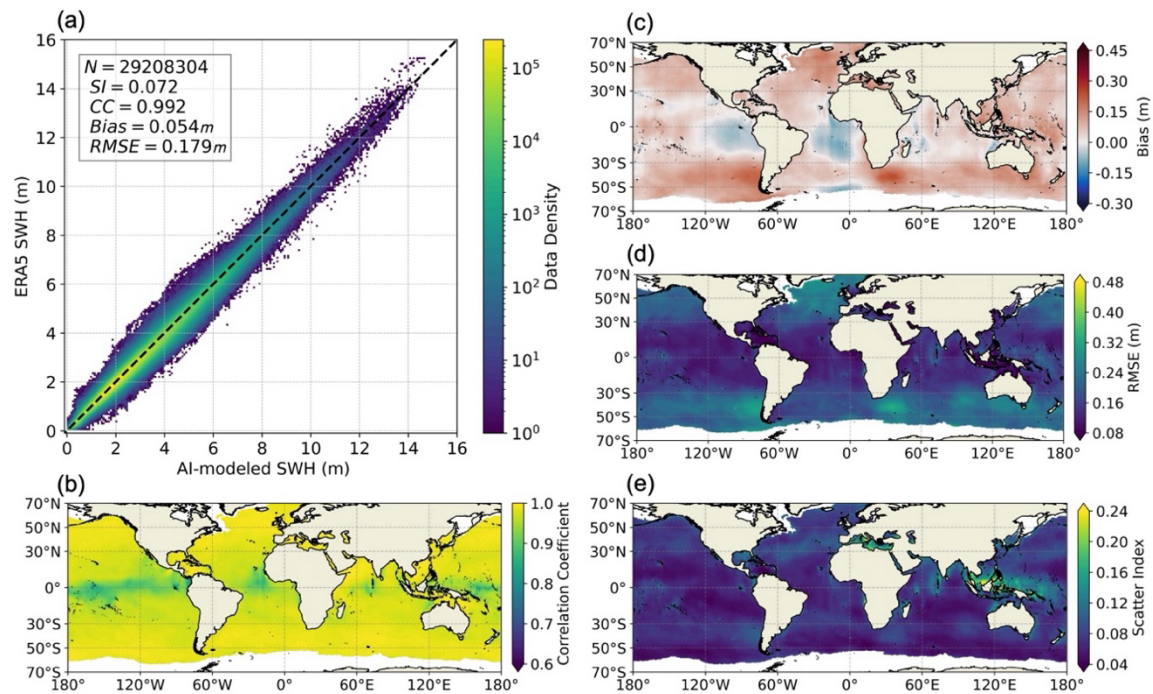


Figure S7: Comparison of SWHs from the AI model (with data from CCI-Sea State assimilated every six hours) at 240-h hindcast time (when the errors are stable) with ERA5 for the year 2020. (a) Scatter plot between the SWHs from the two datasets. (b-e) Global spatial distributions of CC, bias, RMSE, and SI, respectively.

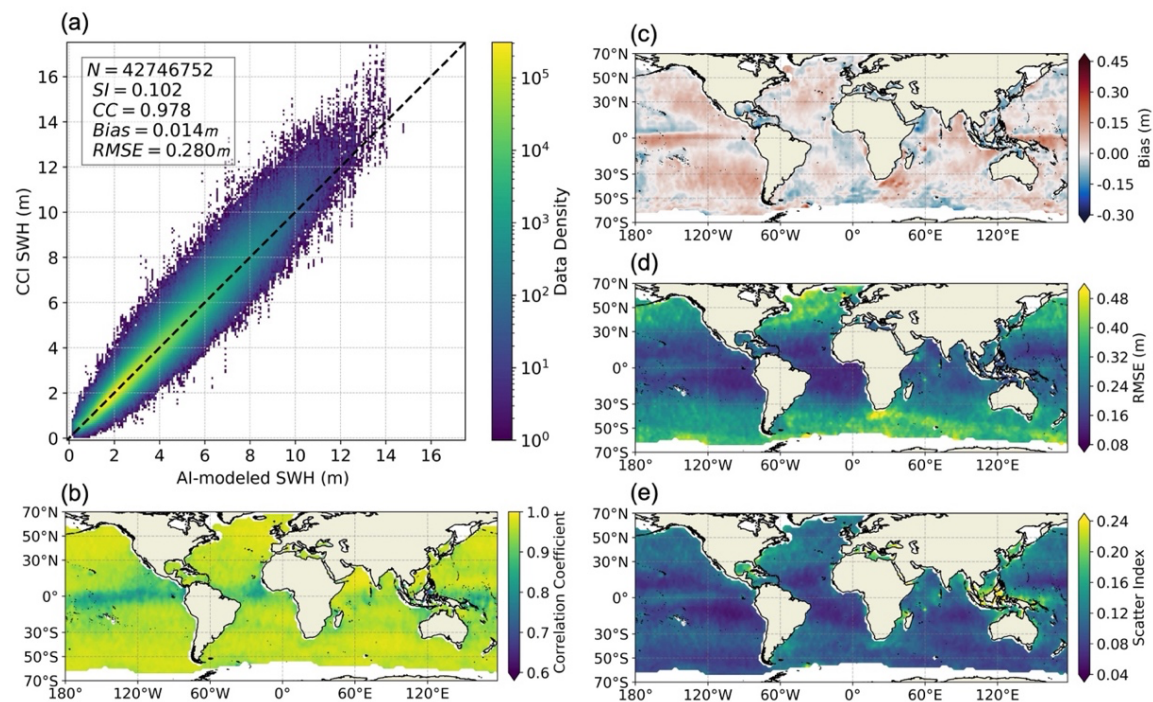


Figure S8: The same as Fig. S7, but the comparison is with the CCI-Sea State dataset.

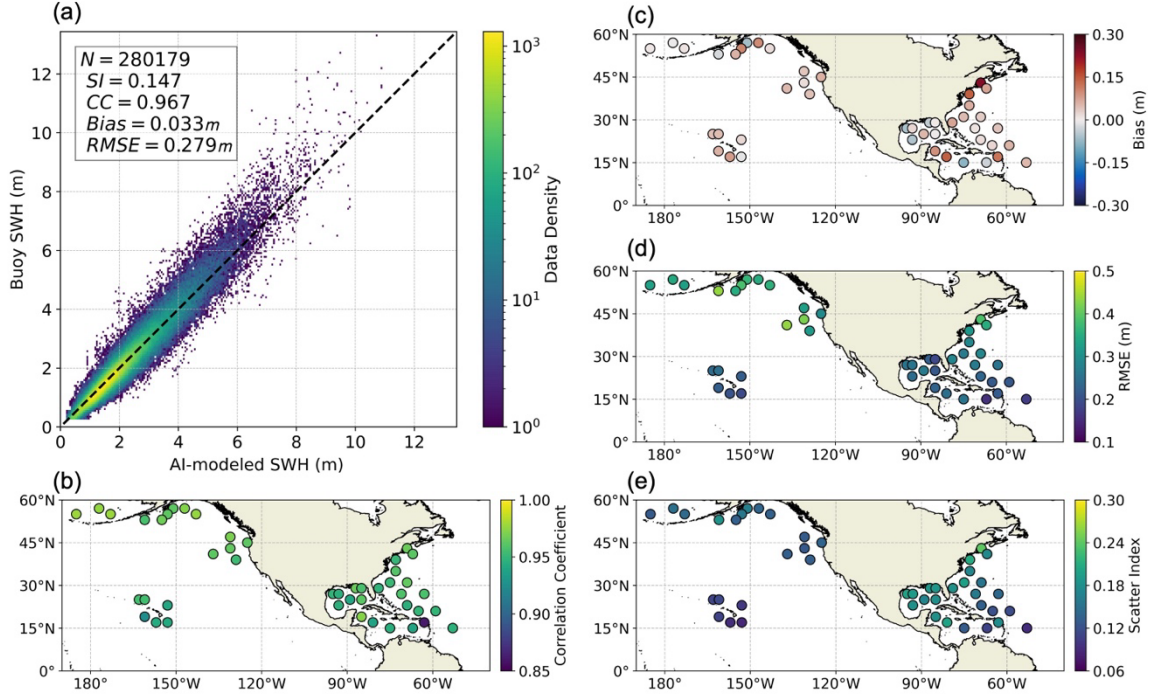


Figure S9 The comparison between SWHs from the AI model (with data from CCI-Sea State assimilated every six hours) and NDBC Buoy in 2020 for global ocean. (a) The scatter plot between the SWHs from the two datasets. (b-e) The spatial distributions of CC, bias, RMSE, and SI, respectively.

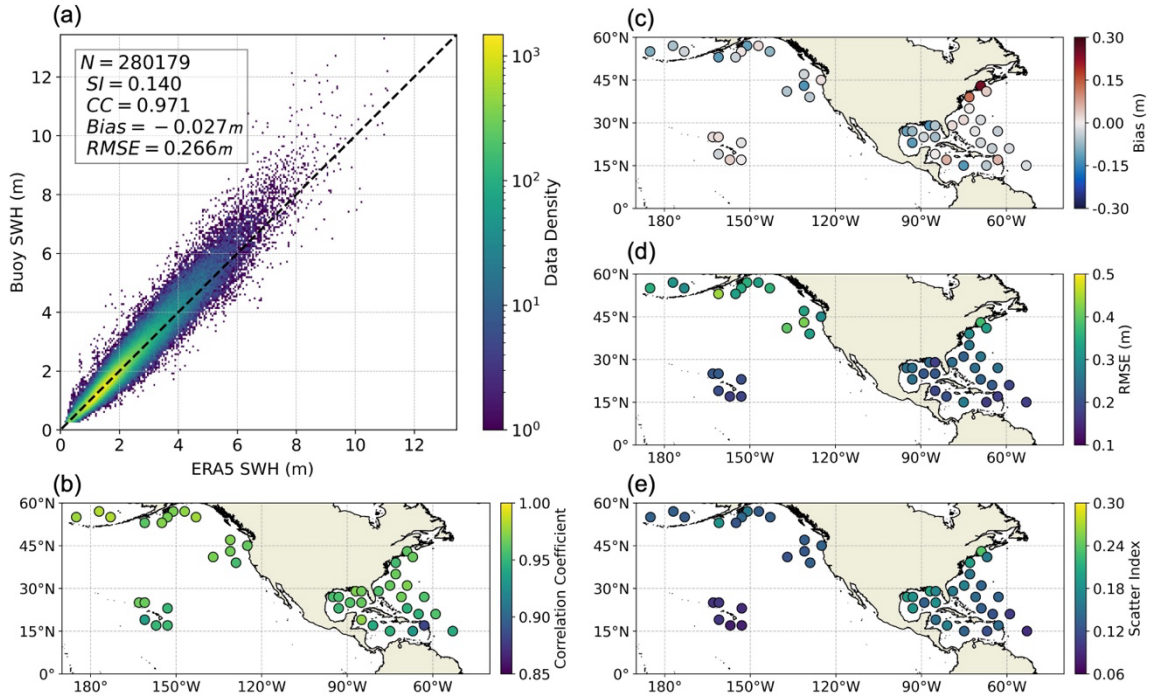


Figure S10: The same as Figures S6 and S9, but the comparison is between the ERA5 and NDBC Buoy

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.