

## Supporting Material

**Appendix A** Location information and time series of model-simulated water elevation at the six reference stations shown in Fig. 3. The Scituate harbor tide station location is 42.199367 °N, -70.719978 °E, very close to reference station C.

Table A-1

---

Name	Latitude (°N)	Longitude (°E)	CR Depth (m)	HR Depth (m)
A	42.2028	-70.7161	4.91	5.85
B	42.20568	-70.723167	1.00	1.10
C	42.199314	-70.720078	4.35	4.65
D	42.202183	-70.724174	1.03	1.35
E	42.192390	-70.721443	1.16	1.33
F	42.207077	-70.718079	-1.79	-1.79

---

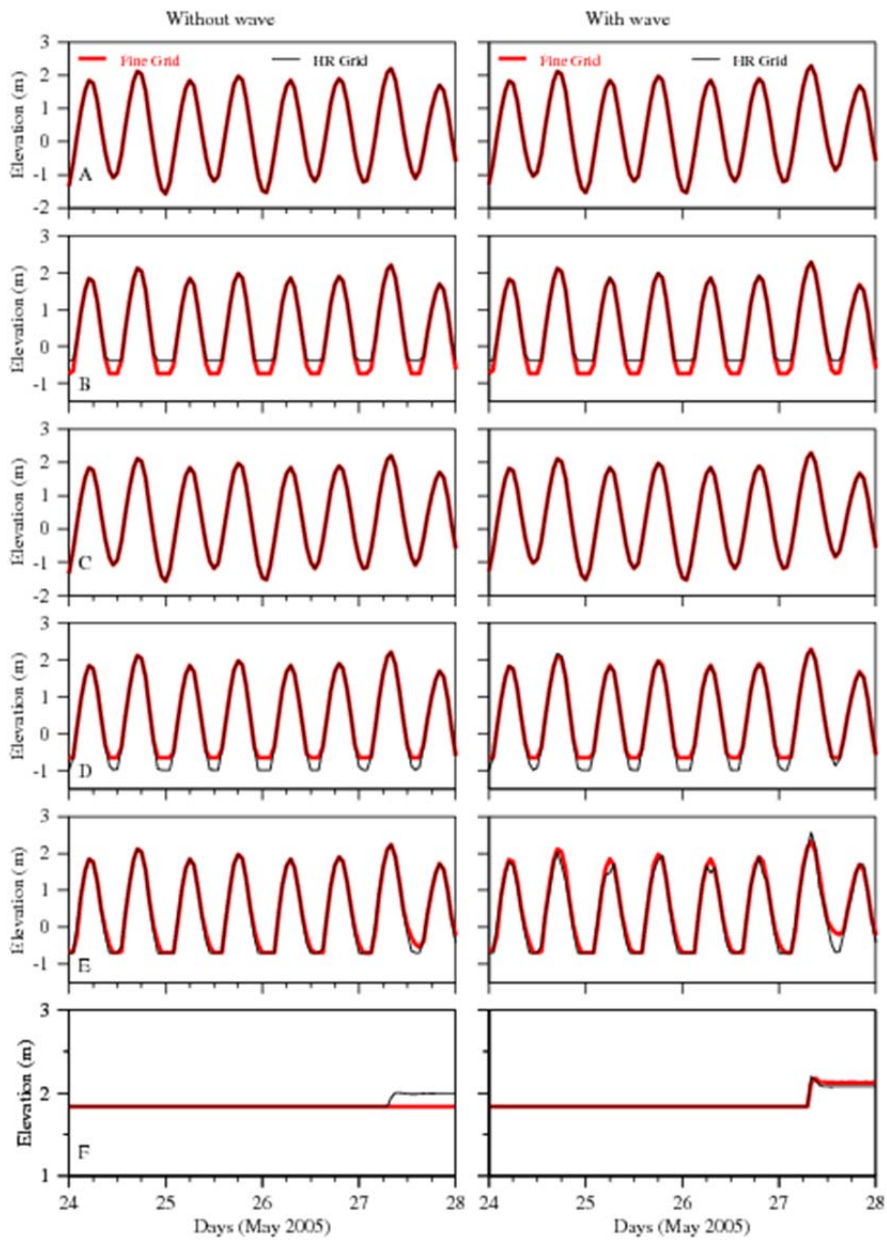


Fig. A-1 Water elevation time series at stations A-F. Left and right column shows results without and with wave-current interaction respectively. The CR and HR grid results are shown in red and black respectively

**Appendix B** Time series of volume transport through transport sections A (a1-a2), B (b1-b2) and C (c1-c2). The peak (primarily tidal) transport through the harbor entrance section B is  $\sim 250$   $\text{m}^3/\text{s}$ , corresponding to  $\sim 25$   $\text{cm}/\text{s}$ . Note: Positive transport for section A is towards land; for section B is westward into the harbor; for section C, northward out of the marsh.

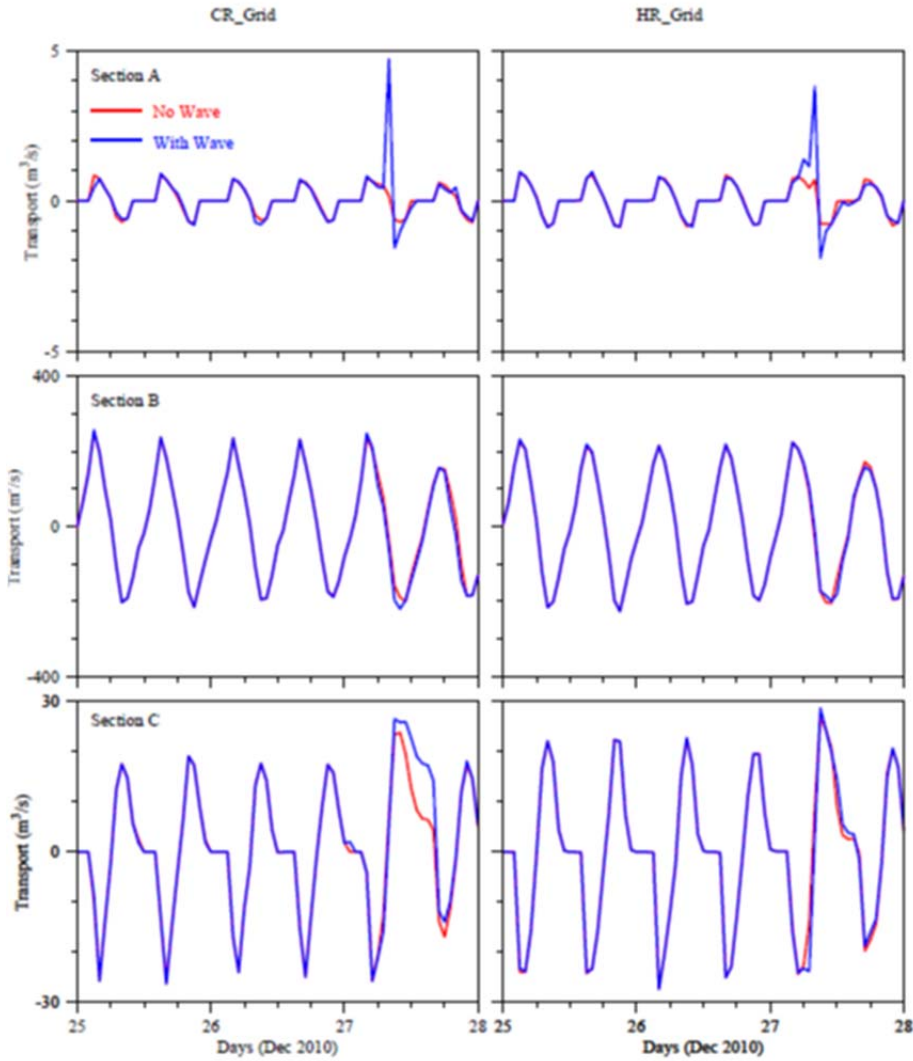


Fig. B-1 Time series of volume transport through transport sections A, B, and C.

**Appendix C** Maps of surface current at Dec. 27 08 GMT. Note change in current speed arrow from 50 cm/s (upper panels) to 1 m/s (lower panels). Left panels: CR-grid; right panels: HR-grid. Top row: wave field without wave-current interaction; Bottom row: wave field with wave-current interaction.

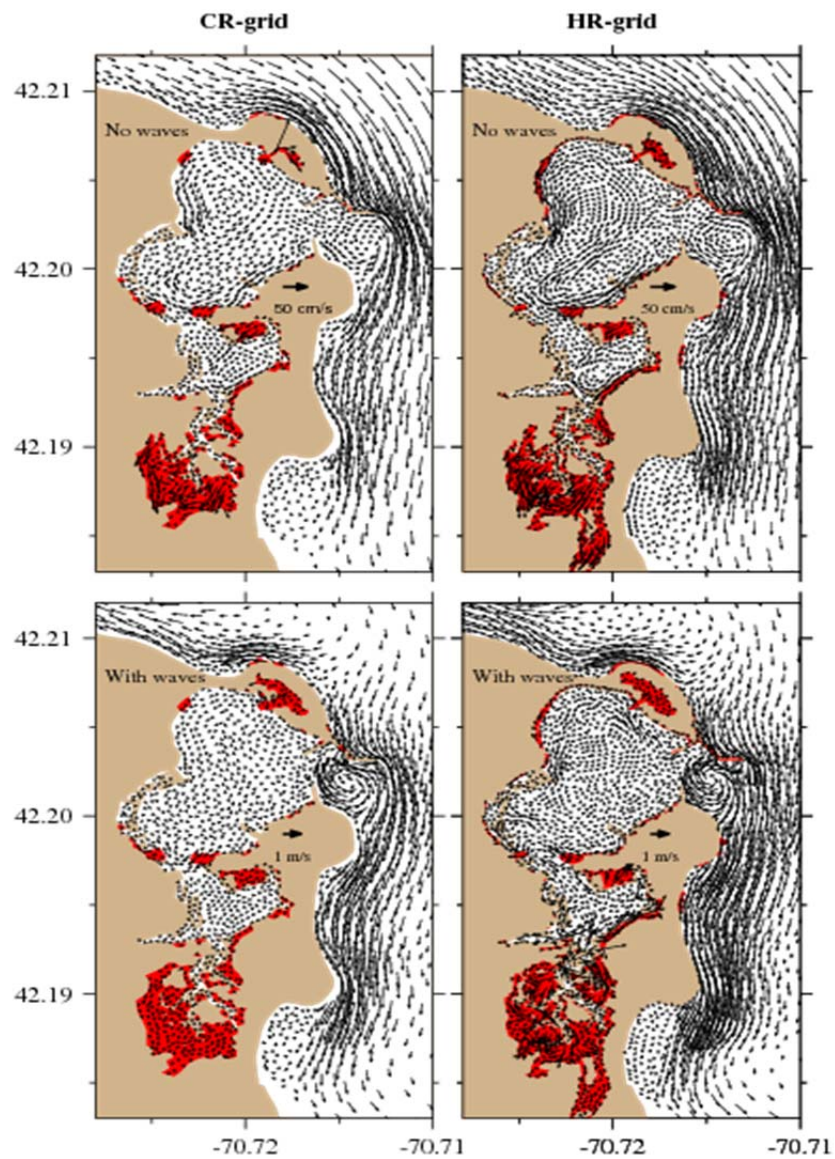


Fig. C-1 Maps of surface current at Dec. 27 08 GMT for both CR and HR simulations without and with wave current interaction.

**Appendix D** Maps of depth-averaged wave radiation stress on Dec. 27 simulated with the HR grid with wave-current interaction.

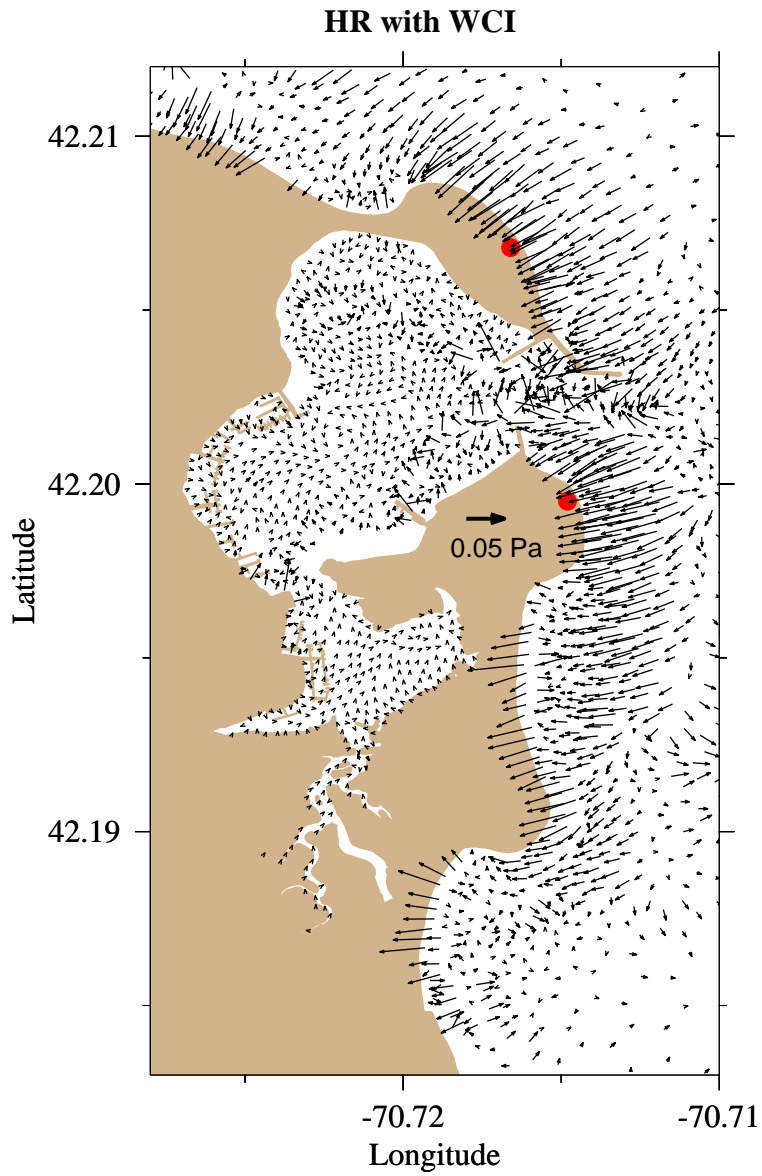


Fig. D-1 Maps of depth-averaged wave radiation stress at Dec. 27 08 GMT simulated with the HR grid with wave-current interaction. Unit: Pa

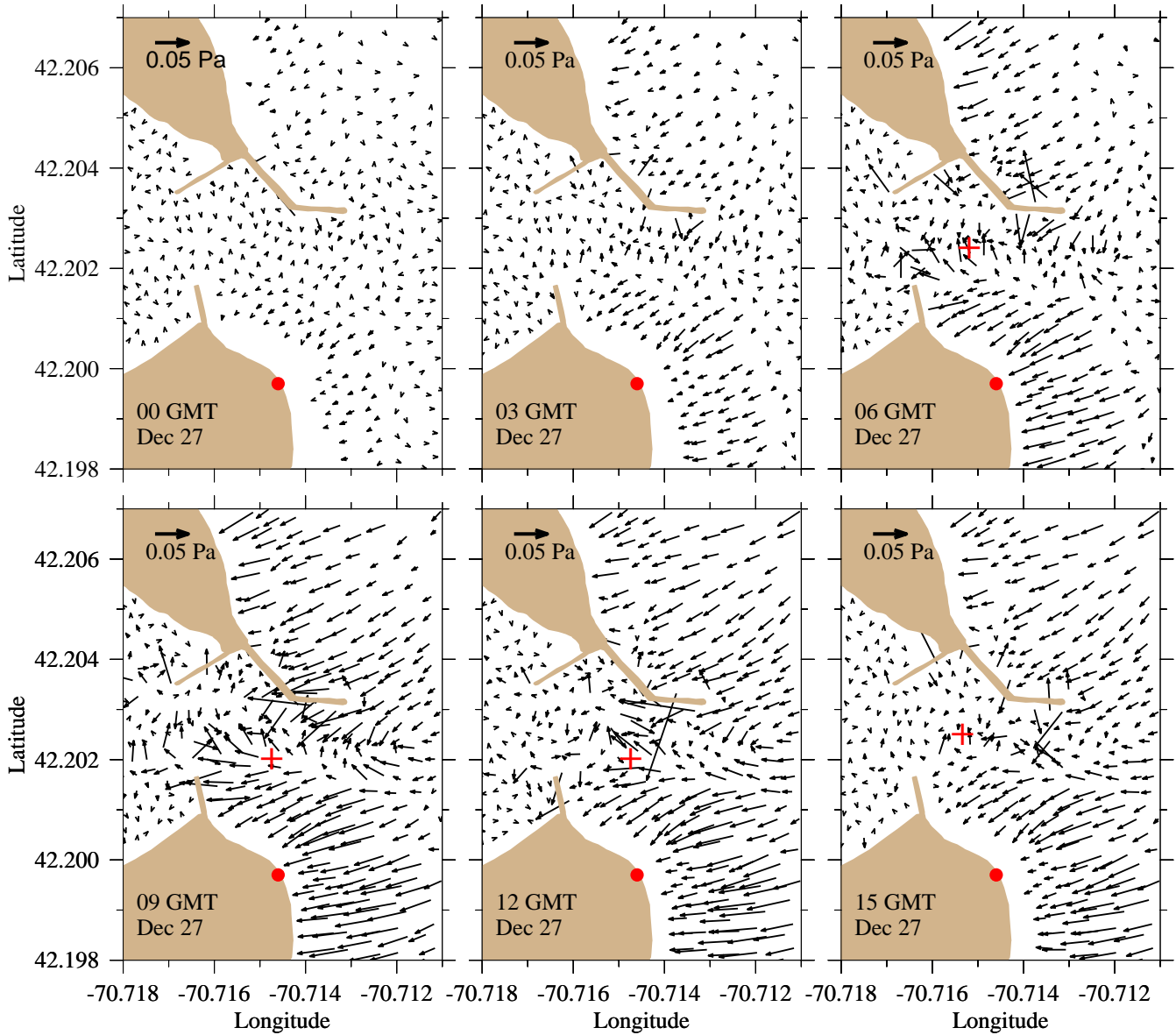


Fig. D-2 Sequence of maps of depth-averaged wave radiation stress in and near the harbor entrance for the HR-grid case with wave-current interaction for Dec. 27 00 GMT, 03 GMT, 06 GMT, 09 GMT, 12 GMT and 15 GMT. The model-simulated first high tide on Dec. 27 occurred at 7:20 GMT. The stagnation point on First Cliff is indicated by a red circle in each map and the approximate center of the clockwise eddy in the entrance zone is shown by red cross. Unit: Pa.