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Solitary wave effects north of Strait of Messina.

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We present new results from a joint ocean-acoustic modeling study of solitary wave generation in the Strait of Messina, propagation in the Tyrrhenian Sea and subsequent shoaling in the Gulf of Gioia. The nonhydrostatic 3D EULAG model is used for the oceanographic predictions. The simulations are initialized from measured temperature and salinity profiles, derived from the October 1995 survey of the Messina region, and forced by the existing semidiurnal tidal magnitudes obtained from a barotropic tidal model. Parameter sensitivity studies are performed. The predicted solitary wave trains are compared with CTD chain measurements. The model results and data are examined through a wavelet analysis. The wavelengths are tracked by the spines (maximum intensity for each wavelength) at various times. From the slope of the variations, phase speeds are derived as a function of wavelength. For the parameters extracted from CTD measurements and existing tidal conditions, phase speed distribution for wavelengths ranging from about 0.6 m to 1.6 km are obtained. The model predicted phase speed magnitudes range from .85 m/s to .93 m/s. The phase speeds derived from data range from .77 m/s to .88 m/s. The model predicted phase speeds wavelength have similar trends to the phase speed derived from data. Calculations of the acoustical field are conducted, along the solitary wave propagation path, with the parabolic (PE) acoustical model.