



Analyzing vertical structures of internal solitary waves in the northeastern South China Sea by use of seismic oceanography data

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In the northeastern South China Sea near the Dongsha Atoll, numerous seismic oceanography sections are used to identify internal solitary waves (ISWs) and analyze their amplitude vertical curves. These mode-1 ISWs occur on the upper continental slope, in water depth between 263 m and 740 m, with maximum amplitudes ranging from 34.6 m to 127.6 m. We compare their observed amplitude vertical curves with the theoretical results defined by the eigenfunctions and find two different situations as follows:

The first one is that the observed ISW amplitude vertical curve shows a common good agreement with the theoretical result. The eigenfunctions can well describe the vertical distribution of the ISW amplitude versus water depths. The ISW amplitude starts from zero at the sea surface, then increases with water depths and reach the maximum at a certain depth, after that the amplitude begins to decrease, and reduces to zero finally at the “bottom”. The “bottom” represents the ISW extension depth, not necessarily the seafloor. The second situation is that the observed vertical curve may not be perfectly consistent with the theoretical result because of the topography effects. The ISW interacts intensely with the continental slope and its amplitude does not decrease to zero when it gets close to the seafloor.