Observation of dynamic fine structure in ocean using pre-stack seismic data

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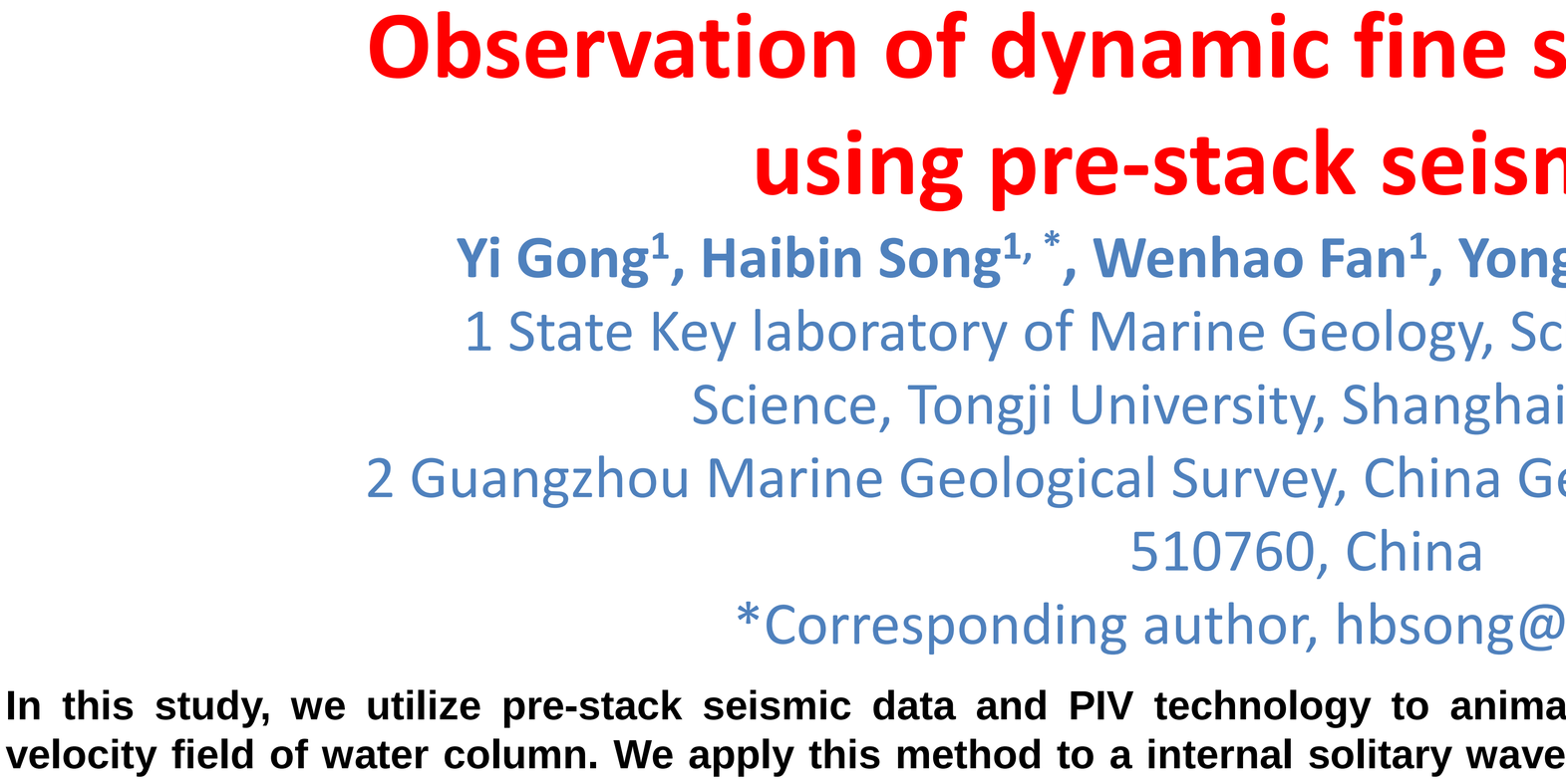
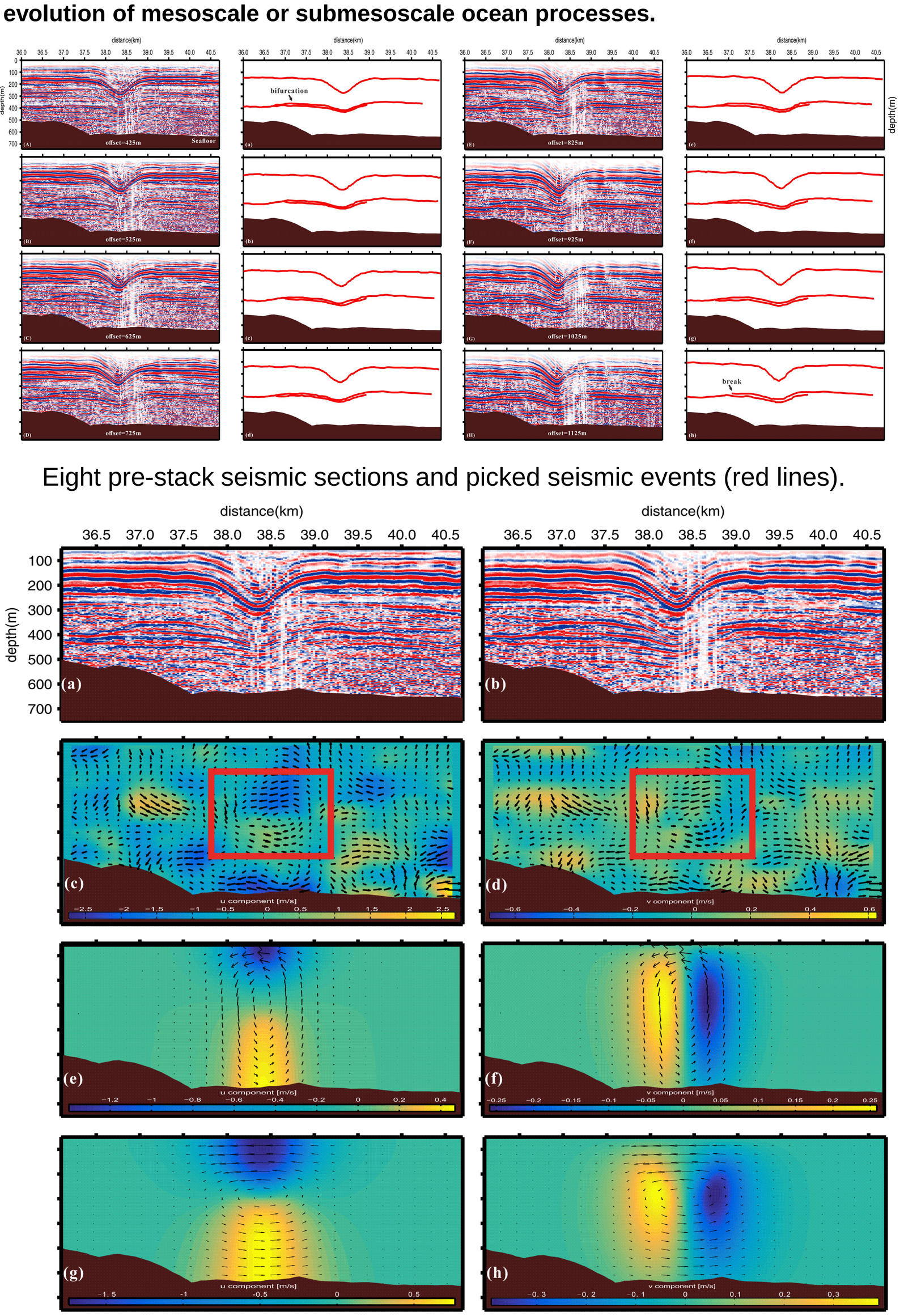
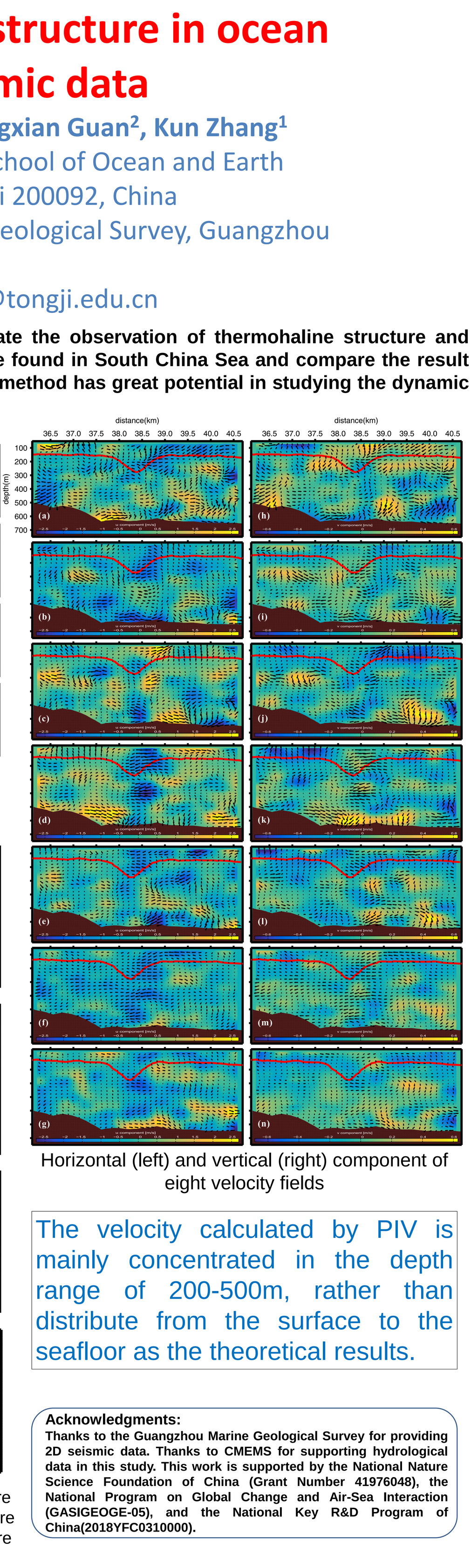
In this study, we utilize pre-stack seismic data and PIV technology to animate the observation of thermohaline structure and velocity field of water column. We apply this method to a internal solitary wave found in South China Sea and compare the result with theory. Our method visualize the wave induced velocity successfully. This method has great potential in studying the dynamic evolution of mesoscale or submesoscale ocean processes.



Eight pre-stack seismic sections and picked seismic events (red lines).



Comparing our method with theory. (a) and (b) are pre-stack seismic sections. (c) and (d) are horizontal and vertical component of velocity field calculated by PIV technology. (e) and (f) are horizontal and vertical component of velocity field calculated by KdV equation. (g) and (h) are horizontal and vertical component of velocity field calculated by DJL equation.



Horizontal (left) and vertical (right) component of eight velocity fields

The velocity calculated by PIV is mainly concentrated in the depth range of 200-500m, rather than distribute from the surface to the seafloor as the theoretical results.

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