

Report on the paper  
**"High-frequency Internal Waves, High-mode Nonlinear Waves and KH  
Billows on the South China Sea's Shelf Revealed by Marine Seismic Observation"**  
by Linghan Meng et al.

### Summary

This paper aims at identifying the structure of nonlinear motions (internal solitary waves) responsible for mixing on the shelf and slope of the South China Sea using marine seismic observations. As clearly stated in the introduction of the paper, the structure and formation mechanisms of these motions have been already identified in numerical simulations and the challenge here is to perform a similar analysis from field measurements using seismic data.

### Comments and recommendation

The analysis performed by the authors is interesting, as it allows to quantify the mixing induced by internal solitary waves and related motions from seismic observations. The bibliography is abundant and it is clearly demonstrated how the work in the paper differs from, and goes beyond, previous works published in the literature. My main comments relate to the writing of the paper. The conclusion in this respect is poorly written and effort should be made to summarize the novelty of the results with respect to the literature. The paper also needs to be tightened. At many instances indeed, adjectives such as "strong" (e.g. l. 25) "relatively small" (l. 191), "large and medium-scale" (l. 365), etc. are used. These terms should be made quantitative or the authors should say strong/small etc. with respect to what.

**To my opinion this paper deserves to be published after these comments, and the other ones below, have been taken into account in a revised version**

### Other comments

#### 1. Introduction

- l. 28: explain what "shoaling" means
- l. 34: what do you mean by "critical depth"?
- l. 35: "reversing polarity to form elevated waves": this is not clear, please explain better (or refer to a sketch in a published paper)
- l. 36: "dispersion continues to form elevated waves": hard to understand if "elevated waves" is not explained.
- l. 45: references are needed after "through numerical simulations".
- l. 50: "we attempt to use" -> change into: we use
- l. 51: "we were fortunate to observe" -> change into: we were able to observe.

#### 2.1 Seismic data acquisition and processing

This is a very technical section and one reference (at least) is requested, for instance at the end of the second paragraph, on l. 65.

- l. 59: "red solid line" -> black solid line, actually.

#### Caption of Figure 1

The caption should be understandable by the reader, which is not the case here. Indeed:

- "the line 25" should be explained or a reference to the line of the paper where this is explained should be provided.
- the difference between the "magenta" and the "red" colors is not easy to see -> use another colour for magenta (orange for instance).
- what does mean "calculated to have a seabed slope": is it just the calculation of the slope which yields this value of  $\gamma$ ?
- About this parameter  $\gamma$ : there is a confusion between the angle and the slope (equal to the tangent of the angle) which are both denoted by  $\gamma$ . Thus "seabed slope  $\gamma = 1.08^\circ$  (0.018)" should be replaced by "seabed angle  $1.08^\circ$  (associated with the slope  $\gamma = 0.018$ )".

### **Caption of Figure 2**

Which quantity is displayed in each panel? Is it the isopycnal displacement? This should be said.

Also, avoid writing "F-K" spectrum and write explicitly "frequency-horizontal wavenumber spectrum".

### **Section 4.2**

l. 373: what do you mean by "global instability"?

l. 381 and 384: "diapycnal mixing of the order of  $10^{-4}$ ", "the order of  $10^{-3}$ ": add physical unit.

l. 388: "HISW" has not been defined previously.

### **Conclusion**

As indicated in the first general comment above, the conclusion is poorly written and should be rephrased following my comment.