

## ***Interactive comment on “The evolution of Mode-2 nonlinear internal waves over the northern Heng-Chun ridge south of Taiwan” by S. R. Ramp et al.***

**Anonymous Referee #1**

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General comments:

High mode NLIWs in the ocean have drawn more interests in recent years. Mode-2 waves were sporadically reported in the northern SCS from both observations and numerical simulations. In this article, Ramp et al studied the generation and evolution of some mode-2 NLIWs in the northern Luzon Strait. Robust evidence from multiple observational methods and a 3D numerical model is shown on the occurrence of such high mode NLIWs in this region. Energy budget surrounding the region where mode-2 waves were observed is calculated and it shows that this is a highly dissipative area. The paper is well written and results shown are interesting and fit the scope of Ocean Science. I believe it will add new knowledge to our understanding of high mode NLIW

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dynamics. I do not see any major issues of the article but some minor comments are listed below.

Specific comments (minor):

Page 244, lines 4-8: I do not think it necessary to give the exact geographic location and detailed bathymetry information in an abstract.

Page 246, line 24: NLIWI program?

Page 246, line 25: 20.5

Page 247, line 3: It would be nice to give a brief introduction on the 'concave' and 'convex' mode-2 NLIWs and also give a few more words on the observation of mode-2 waves further west in the northern SCS, e.g., Yang et al. (2009,2010)

Fig. 1: explain AW, AC, AE, etc in the caption; please also consider adding a zoomed-in panel on the bathymetry (making a figure with 2 by 2 panels?) near the observational site, as the authors described the complexity of the bathymetry around this region, but this could be hardly seen in panel a. Also, later the authors mentioned the potential multiple sources for the generation of mode-2 NLIWs, and this could give some impression on that.

Page 250, line 17: changes

Page 250, line 21 and elsewhere: there are 'two' middle panels

Page 255, lines 19-20: indicate that a convex or concave mode-2 wave has a similar surface signature to a mode-1 elevation wave.

Page 257, line 2: opposing 'eastward' tide?

Page 258, lines 14, 16, 19: no shading is seen in the table.

Equation (1): the second '=' should be '+'

Page 259, lines 8-9: (Nash et al., 2005)?

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Page 265, line 2: two 'AC' stations.

Page 266, line 28: I think that this 72% is calculated relative to the value at AW; is this appropriate?

Page 267, lines 8-11: please make it clear that the discussion here is on the Froude number, not the steepness parameter.

Page 267, line 21: the reference does not appear in the reference list.

Page 269, line 6: time series 'of' station data

Page 270, lines 13-15 & Page 274, line 2: is the stratification shown favorable for the generation of mode-2 NLIW, or is it because of mode-2 NLIW that creates such stratification? I remember Yang et al. (2010) discussed conditions favorable for the generation of mode-2 convex/concave solitary waves. Could the authors check this?

Page 270, lines 20-21: if not too much work, is it possible to check in the model if this is the case?

Page 270, line 24: does the model contain Kuroshio?

Page 273, lines 2-6: once again, is it possible to check this in the model, e.g., by calculating a 2d map of barotropic-to-baroclinic conversion rate?

Fig. 5 caption: against 'latitude'

Fig. 15 caption: the last sentence should appear earlier, e.g., in Fig. 2

Fig. 16: 'snapshots'; please consider adding some arrows in the panels showing the direction and magnitude of barotropic tide to aid viewing.

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Interactive comment on Nonlin. Processes Geophys. Discuss., 2, 243, 2015.