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## ***Interactive comment on “Statistical properties of coastal long waves analysed through sea-level time-gradient functions: exemplary analysis of the Siracusa, Italy, tide-gauge data” by L. Bressan and S. Tinti***

### **Anonymous Referee #2**

Received and published: 7 October 2015

The manuscript describes a new method to analyze properties of the sea-level signal in the long-wave range. The method is based on computing instantaneous sea level slope, sea level, the background slope and the control function. The method is first deduced, and then applied to the Siracusa tide gauge station data. Methods is well explained, and its applicability, advantages and disadvantages satisfactorily discussed.

I have only minor comments.

It is a bit confusing to use "sea level" for both measured sea level and sea level re-

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constructed from IS. You should make some kind of a distinction, for example use RSL (reconsturcted sea level) or something similar.

Siracusa station seems to have very small oscillations in a long-wave period (a few cm). Have you considered applying the method to station with larger oscillations and with truly extreme events? (e.g. Mazara de Vallo in Sicily).

2.1. Longwave functions. What is the length of Dis, Tis, Dsl, Tsl, Dbs and Tbs periods chosen for analysis?

4. Spectral analysis. "with high energy spectra in winter months" I would say from Figure 4 that high energy spectra is concentrated in months March to May.

5. Spectral analysis of the longwave functions. Statement "Second, spectral peaks in the window 4-120 min are the same as the ones of the ordinary sea level average PSD" is not entirely correct. According to Figure 6, power spectra of the long-wave sea-level function SL misses two peaks on periods from 5 to 10 minutes, and energy of remaining two peaks at periods of 4 to 5 minutes is much smaller than original energy. This should be commented upon.

Figure 1. Not all lines are explained in Figure caption. What is blue line in top panel, and what is red line? I assume that blue line are 5-second sea level measurements, and red perhaps filtered sea level or estimated sea level? Also in the bottom panel, there is only one line, while caption suggests that there should be two.

Figure 3, 5, and 6. I suggest changing legend to say: "Total", "May 2011 - April 2012", "May 2012 - April 2013".

Figure 7. It seems that SL spectra shown in this figure resembles original sea level spectra much more than the SL spectra shown in Figure 6.

Other than these, I have no more comments, and recommend the manuscript for publication.

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Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 3, 5247, 2015.

**NHESSD**

3, C1932–C1934, 2015

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