Solid Earth Discuss., 6, C920–C923, 2014
www.solid-earth-discuss.net/6/C920/2014/


Solid Earth
Discussions
Open Access



# *Interactive comment on* "Features of the Earth surface deformations in Kamchatka peninsula and their relation with geoacoustic emission" *by* I. A. Larionov et al.

**G. P. Gregori (Referee)**

giovanni.gregori@idasc.cnr.it

Received and published: 10 September 2014

Comments to the paper

Journal: SE Title: Features of the Earth surface deformations in Kamchatka peninsula and their relation with geoacoustic emission Author(s): I.A. Larionov et al. MS No.: se-2014-60 MS Type: Research Article

The paper describes ground phenomena either potentially correlated with earthquakes (foreshock, co-seismic, or aftershocks) or not, recorded in Kamchatka.

Soil deformation are measured by an interferometric device.



Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

Acoustic emission is monitored by four “directed broadband piezo-ceramic hydrophones installed in covered artificial pools of $1 \times 1 \times 1$ m3 size”.

Several plots show (1) the time variation of soil deformation $\varepsilon$, (2) its time derivative, and (3) acoustic emission in four different frequency bands.

The use of hydrophones ensures an excellent acoustic continuity between hydrophone and ground, due to the excellent acoustic conductivity of water.

Note that the time derivative of soil deformation is equivalent to apply a filter to the time series of soil deformation, inside some reasonably wide frequency band associated with the time interval between two subsequent records.

That is, all records refer to vibrations of ground inside different frequency bands.

The paper is certainly interesting, as it focuses on some aspects of soil physics that in general are very often forgotten.

In this respect its peculiar prize is the fact that it stresses the need to monitor simultaneously acoustic emissions in different frequency bands (this is very unusual in the literature).

A limit, however, is that the most interesting features concerning the behaviour of a solid material are likely to occur at even higher frequencies (tens to hundreds of kHz). Nevertheless, this is an excellent starting point.

At page 5 the authors specify that “geoacoustic disturbances occur during numerous sign-changing rock shifts of different amplitude”. Indeed, this is what has to be expected, as crystalline bonds yield only when the solid material changes its geometry and configuration.

In addition, the authors claim that figures 9 and 10 refer to seismically quiet periods.

This concept ought to be emphasized. Indeed, a distinction ought to be made between (1) normal and quiet phenomena that reflect an almost steady state of stress cross-



SED

6, C920–C923, 2014

ing through the crust in some given area, and (2) a seismic event. A seismic event requests that a suitable local tectonic setting is such as to originate an accumulation of elastic energy inside some suitable "energy reservoir" that is eventually going to be released into an earthquake. But, this phenomenon is completely different compared to a "smooth" almost steady and more or less time-varying crustal stress.

This same comment applies to figure 11. Indeed, I feel confident that no real annual variation can be detected, rather a multiannual variation (I refer to the concept of "crustal storm" that we evidenced in a 9 year data series recorded in central Italy, as we published a few years ago).

That is, these measurements are relevant independent of their eventual correlation with seismic activity, as the two kinds of phenomena deal with completely different primary drivers, although crustal stress, under particular circumstances, can eventually result to be the critical trigger for an earthquake.

I add a list of a few minor misprints.

Figure 3 – Units – what means c-1 indicated in the figure?

Page 4, line 7 , the text "In the course if investigation of geoacoustic emission it was determined that anomalies" should be "In the course of investigation of geoacoustic emission it was determined that anomalies occur"

Page 4, line 12, could you better specify what you mean by "energy class K = 13.8"? I mean that usually earthquake magnitude is specified. The authors ought, perhaps, to specify some information for the reader who is not familiar with their "class K".

Page 4, line 18 "pieso-ceramic" should be "piezo-ceramic"

Page 4, lines 29-30 "The area of disturbances is marked by a rectangle (Fig. 5) and is shown in Fig. 6 in detail." I do not understand what the authors mean. What "rectangle"?



SED
6, C920–C923, 2014

Page 5, line 8, “rate that geoacousic” should be “rate that geoacoustic”

In general some minor smoothing ought to be recommended for the English editing.

In addition, I did not check the reference list and its style.

(With my congratulations to the authors)

Giovanni P. Gregori

---

Interactive comment on Solid Earth Discuss., 6, 2401, 2014.