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Reaction of the Geomagnetic Network on the Earthquakes Preparation Process in Georgia

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ABSTRACT

In terms of geodynamic, Georgia is one of the most active region. The macro structural factor here is represented by the contact with the Arabian and Eurasian tectonic plates, which in addition to the geological diversity of the area conditions the high seismicity of mentioned region. The article represents the observations of following seismic processes such as: geomagnetic field and low frequency electromagnetic radiation (VLF).

Key Words: Geomagnetic anomalies, seismic event precursors.

Introduction

The stationary observation of magnetic field is carried out at two stations: Dusheti geomagnetic observatory (Lat. 42.088° N, Lon. 44.701° E) and seismological station Oni (Lat. 42.573° N, Lon. 43.437° E) which are located on the highly seismologically active areas.

During a long period of observation there have been identified individual cases in which stations Oni and Dusheti reacted to the earthquake preparation process [1-4]. In order to show the mentioned fact and the data analyze in general there is given three Month period bellow as an example (March-May, 2019).

Data analysis

During the mentioned period several medium earthquakes occurred in our region (M<5). It turned out that all earthquakes (except one) did not have any remarkable geomagnetic effect. Only earthquakes of 4th March and 16th May, 2019 showed the synchronized reaction on the both stations (Fig. 1, 4, 7, 10).

We observed the synchronized reaction on earthquake of 4th march, 2019 , (M 3.7). the epicenter was located on 250 km and 166 km from Dusheti and Oni stations correspondingly.

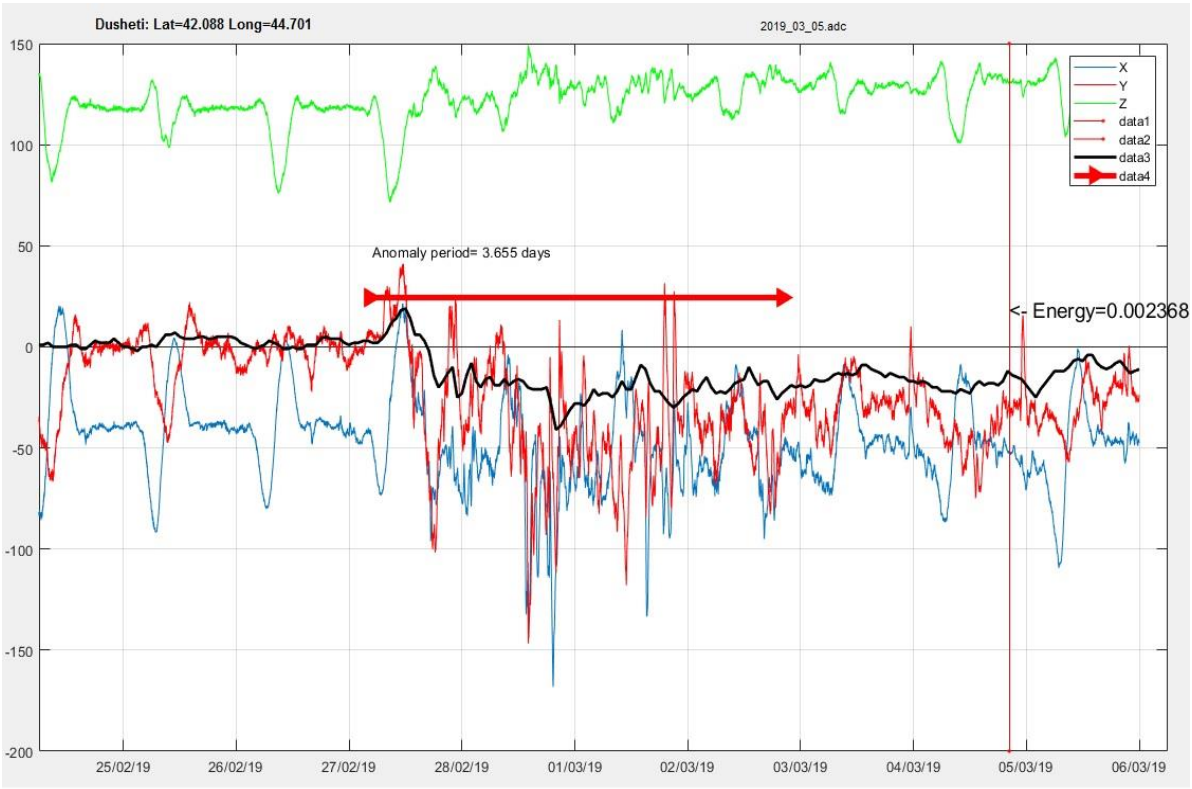

Fig.1. Variation of VLF index and X, Y, Z components of the magnetic field, Dusheti.

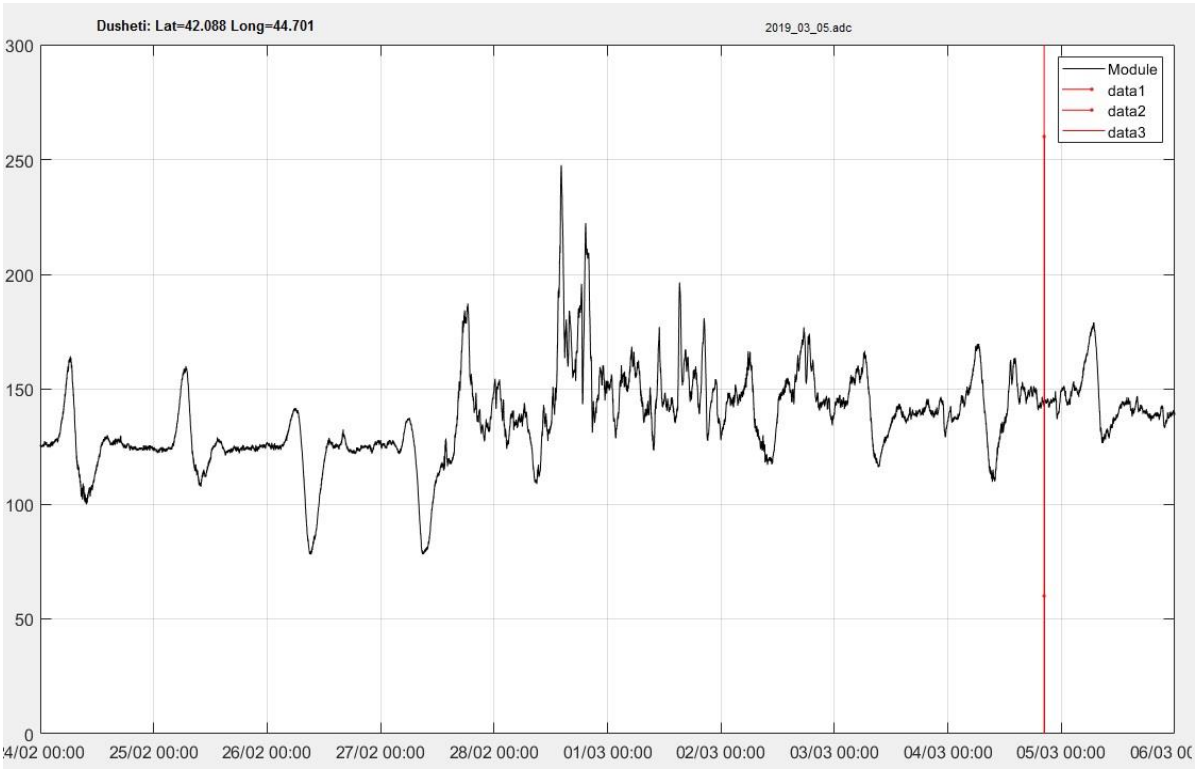

Fig. 2. Variation of the module value, Dusheti

Fig. 3. Variation of VLF index and X, Y, Z components of the magnetic field, Oni.

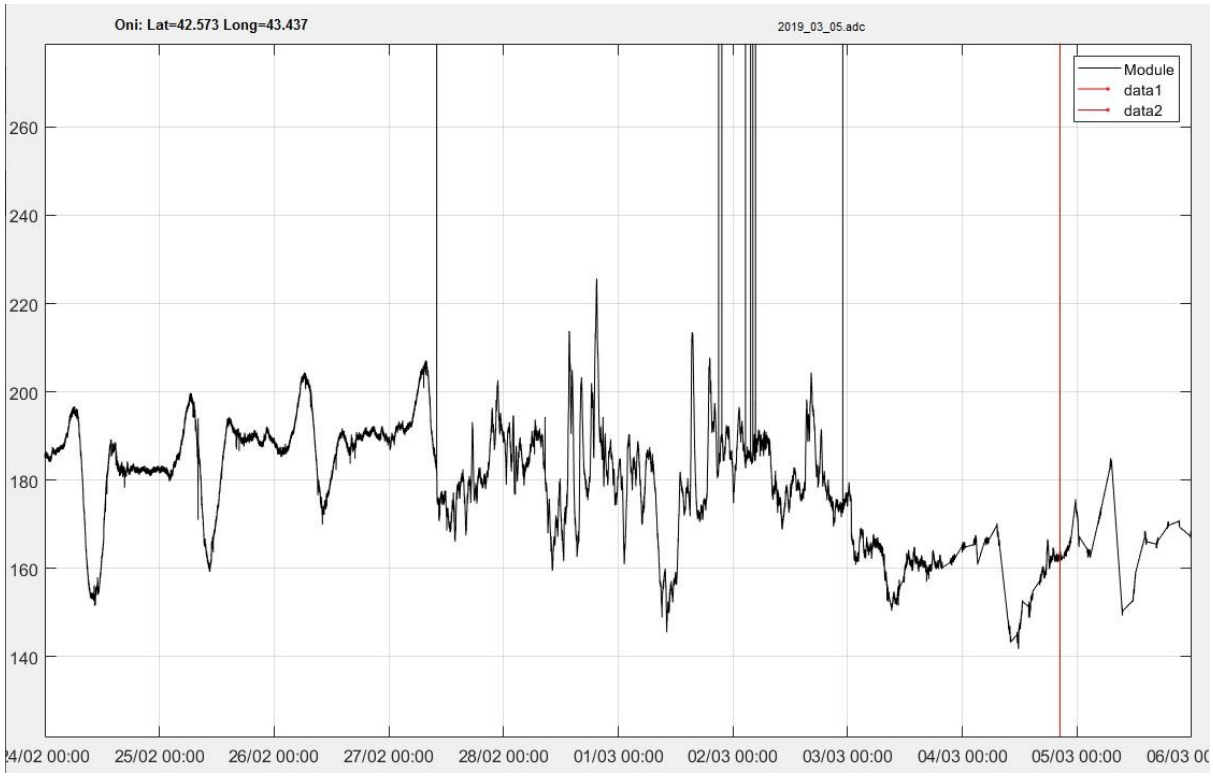

Fig.4. Variation of the module value, Oni.

The synchronized reaction was observed also on earthquake of 19th May, 2019 , (M 3.5; Depth 2 km). The epicenter was located on 130 km and 94 km from Dusheti and Oni stations correspondingly.

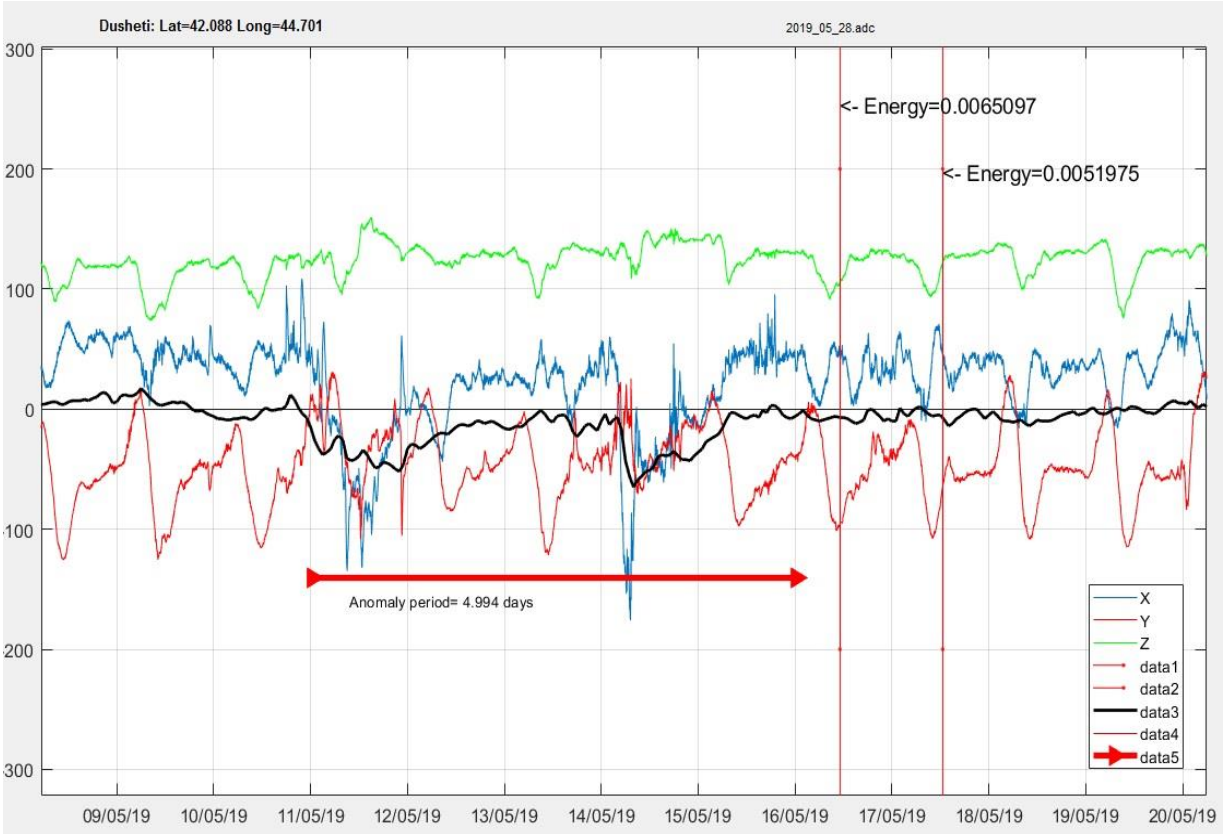

Fig.5. Variation of VLF index and X, Y, Z components of the magnetic field, Dusheti.

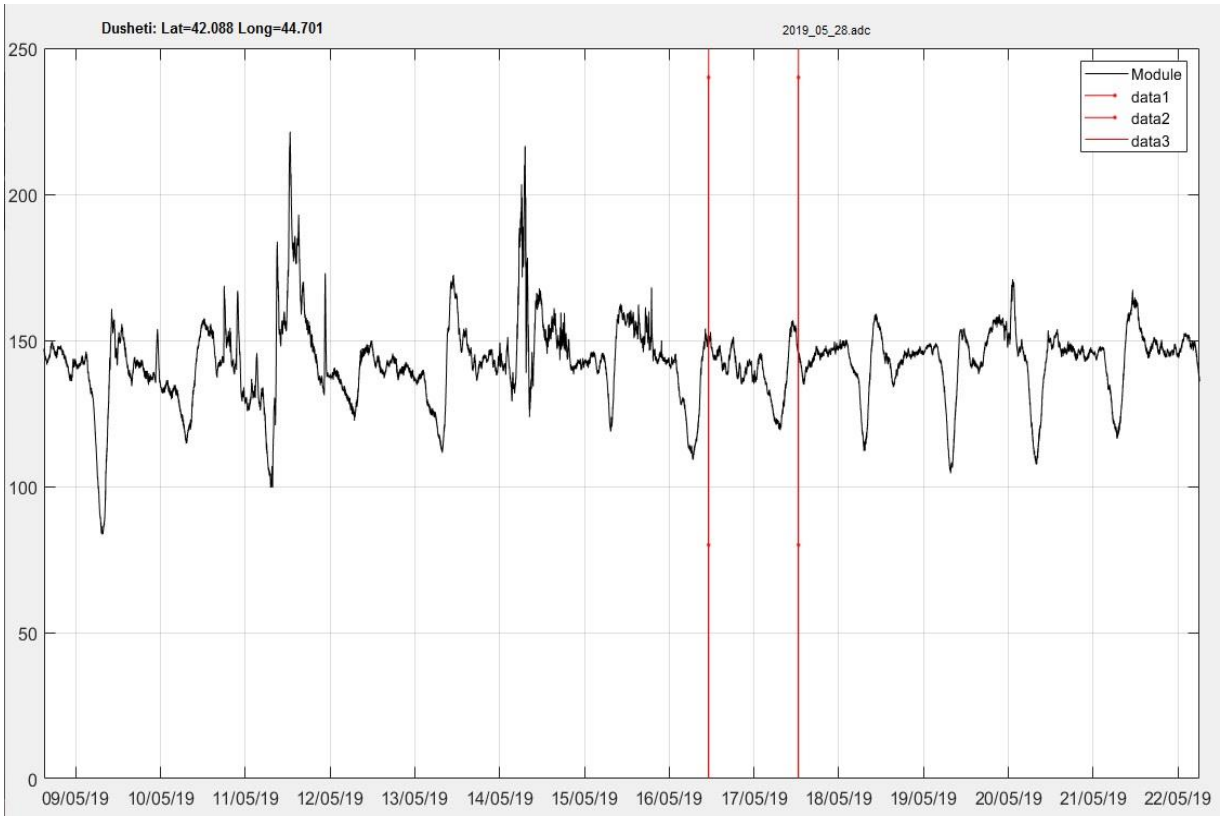

Fig. 6. Variation of the module value, Dusheti.

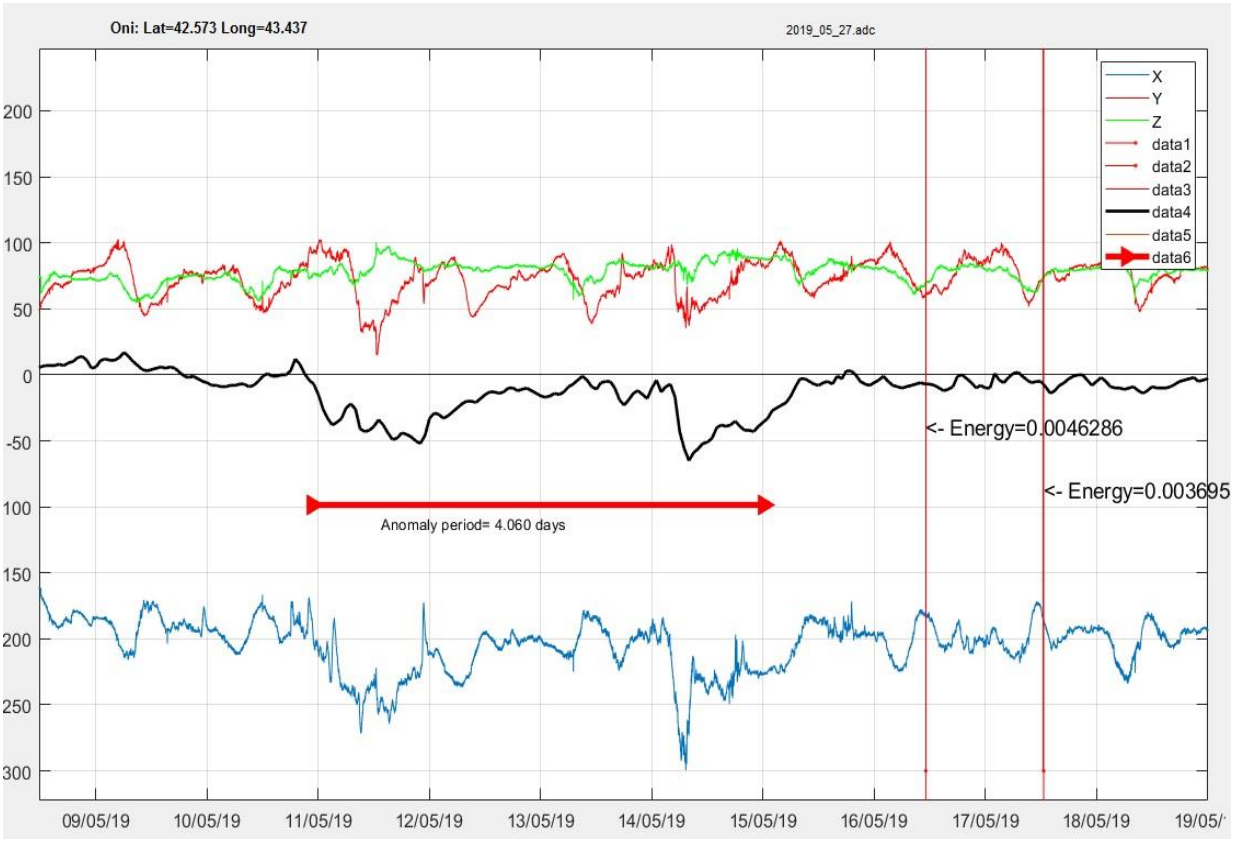

Fig. 7. Variation of VLF index and X, Y, Z components of the magnetic field, Oni

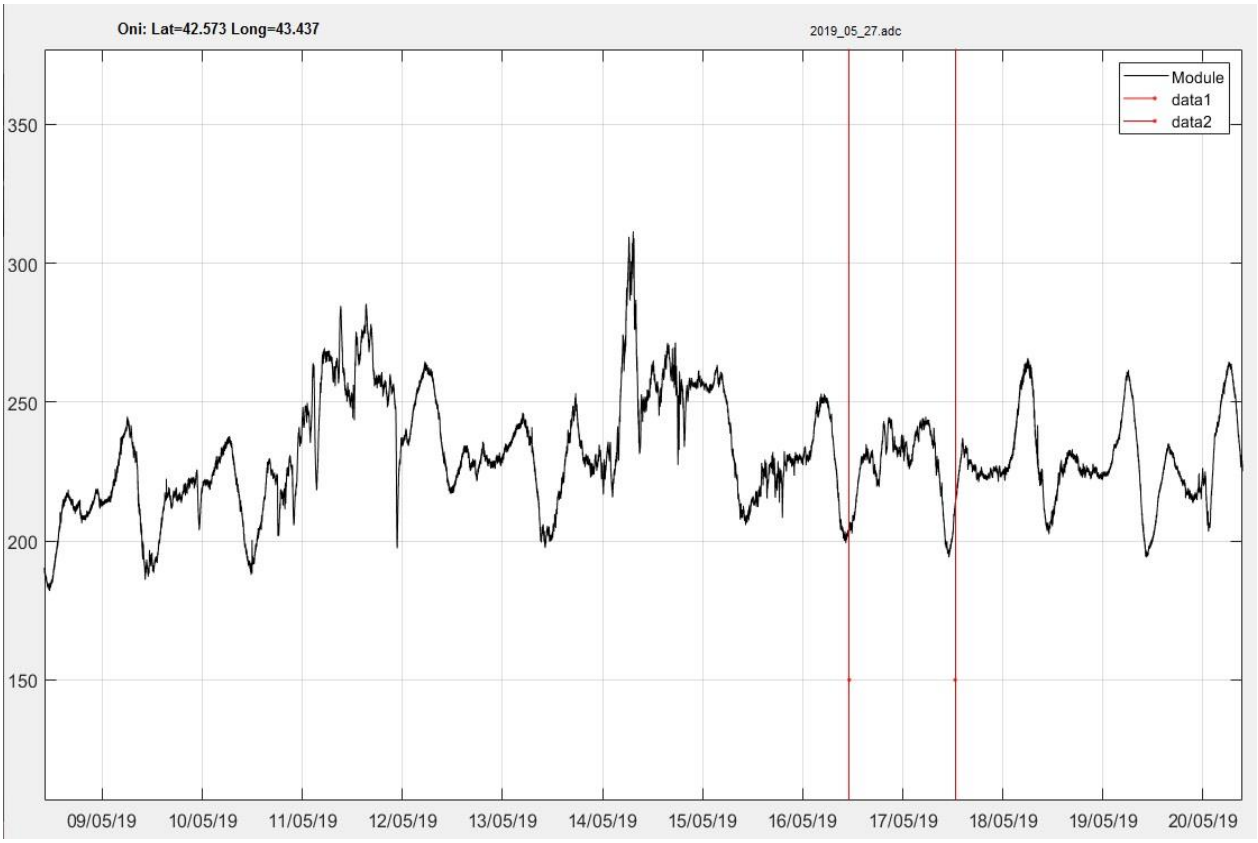

Fig. 8. Variation of the module value, Oni.

Conclusions

Fig. 1, 3, 5, 7 shows the VLF index and the trend of X, Y, Z components of variable geomagnetic field at both stations. Despite the fact that the sensitivity of magnetometers differ from each other, we observe the synchronism of pulsations. But should be mentioned that according to the VLF index we observe the effect of global magnetic source, which covers remarkable period of time before the earthquake.

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გეომაგნიტური ქსელის რეაქცია მიწისძვრის მომზადების პროცესზე საქართველოში

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რეზიუმე

გეოდინამიკური პროცესების არაცალსახობის თვალსაზრისით საქართველო მიეკუთვნება ერთ- ერთ განსაკუთრებულად რთულ რეგიონს. მაკრო სტრუქტურული ფაქტორი აქ არის არაბეთისა და ევრაზიის ტექტონიკური ფილების კონტაქტი, რასაც ემატება ლოკალურ გეოლოგიური სტრუქტურული მრავალფეროვნება, თუმცა ყველა ეს ადგილი გამოირჩევა მღალი სეისმურობით. სტატიაში წარმოდგენილია სეისმური პროცესების მომდინარეობის ისეთ ინდიკატორებზე დაკვირვება როგორიცაა: გეომაგნიტური ველი და მეტად დაბალი სიხშირის ელექტრომაგნიტური გამოსხივება (მდს).

Реакция геомагнитной сети на процессы подготовки землетрясений в Грузии

Т. Дж. Джимшеладзе, Г.И. Меликадзе, Г.Н. Кобзев, М.С. Девидзе, Р.А. Гогуа, Т.Г. Матиашвили, Н.Т. Гогуадзе, Э.В. Чиквиладзе, А.Ш. Чанкветадзе, Н.А. Капанадзе, К.Ш. Курцикидзе

Резюме

С точки зрения геодинамики Грузия является одним из наиболее активных регионов. Макроструктурный факторздесь представлен контактом с Аравийской и Евразийской тектоническими плитами, что в дополнение к геологическому разнообразию района обуславливает высокую сейсмичность указанного региона. В статье представлены наблюдения следующих сейсмических процессов таких как: геомагнитное поле и низкочастотное электромагнитное излучение (ОНЧ).