

ONI WATER REACTION ON EARTHQUAKE IN 2021

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Summary: It is known that variations of water level represent itself an integrated response of aquifer to different periodic as well as non periodic influences, including earthquake related strain generation in the earth crust. The article deals about detected anomalies at the Oni borehole, during preparation of strong earthquake, with long epicentral distance. For this purpose, were developed the data of water level for Oni borehole. Were registered the hidrodeformation anomalies caused by the earthquake preparation processes. As a result, have been identified precursory anomalies and has been confirmed high sensitivity to the geodynamic processes.

Key Words: hydrodynamic anomalies, seismic precursors.

Introduction

Our earlier studies on the relationship of water level anomalies in wells with earthquakes are presented in [1-7]. The article contain information about several hydrodynamic anomalies were observed during earthquake in Oni borehole.

Well coordinate: 42.573° N 43.437° E, Georgia, Caucasus.

Well parameters: Length 255 m, screen 70-250 m. Confined sub-artesian aquifer; fractured shale and basalts. Well's resonance period: $P=23.5$ sec.

The water level in Oni borehole was recorded every 1 minute. Device XR5-SE-M and program LogXR used.

Seven earthquakes are depicting on fig.1. The moment of the earthquake announced as the starting (zero) time. Graph time (x-axis) is in format HH:MM (Hours: Minutes). Y-axis is in cm.

Below is water reaction in Oni borehole on remote earthquakes in 2021.

Sensitivity of well

Station Oni reacted on earthquake with maximal distance 16123 km, Mag=8.1, Kermadec Islands, New Zealand.

Comparison of earthquakes Q1 and Q5 showed, that water reaction on quake with shorter distance (7866 km, H=60 km) may be later, than on quake with longer distance (8919 km, H=43 km).

Quakes Q3 and Q6 with equal magnitude $M=8.1$ and distance (16123 km, 12890 km) have reaction (5.76 cm, 3.63 cm) for depths (25 km, 60 km), so smaller depth gives more reaction.

It is possible to compare quakes Q1 and Q6 with the same depth (60 km).

Quakes Q2 and Q3 was almost at the same place (16084 km, 16123 km), Kermadec Islands, on different depths (49 km, 25 km) and magnitudes (7.4, 8.1). Water reaction here: 0.95 and 5.6 cm.

For quakes Q4 and Q7 with the same depth, 10 km, and double distances (4771 km, 10666 km) water reacted trice stronger (5.05 cm and 1.42 cm) on M=7.4, 7.2.

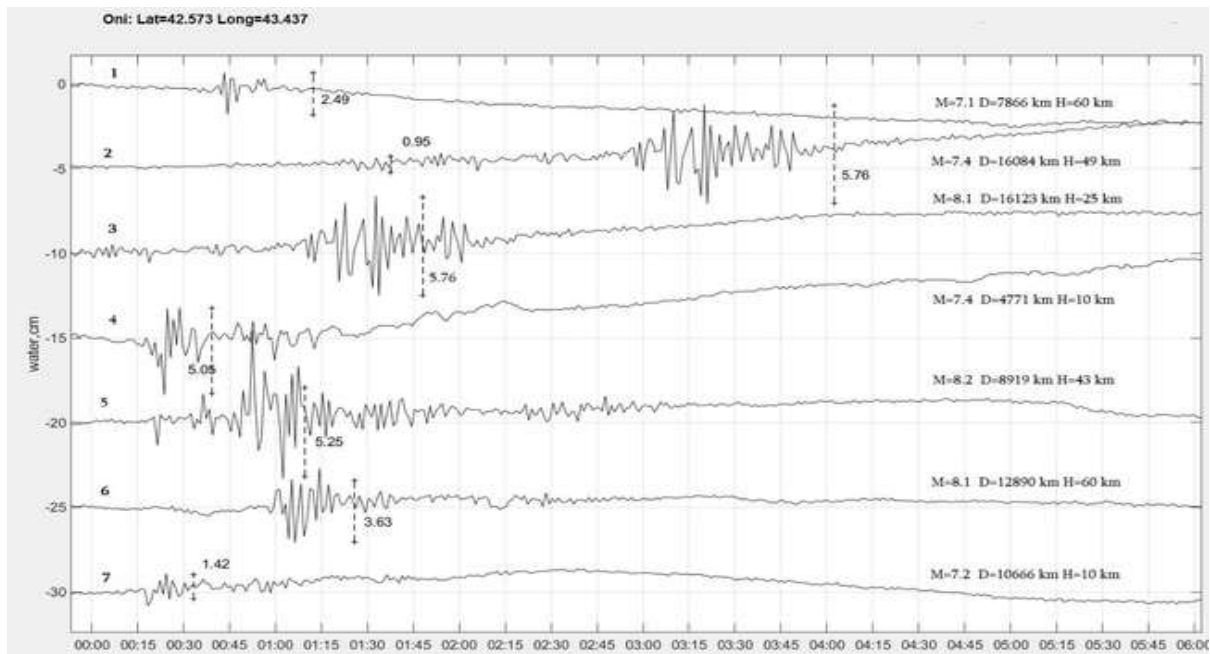


Fig.1. Oni, water reaction on the earthquakes in 2021. Earthquakes started at HH:MM=00:00

Table 1. Oni water reaction 2021

	Date	Magnitude	Distance, km	Depth, km	Azimuth	Earthquake's place	Water reaction, in cm
1	13/02/2021 14:07	7.1	7866	60	93.7	Near East Coast of Honshu, Japan	2.49
2	04/03/2021 17:41	7.4	16084	49	119.4	Kermadec Islands, New Zealand	0.95
3	04/03/2021 19:28	8.1	16123	25	119.3	Kermadec Islands, New Zealand	5.76
4	21/05/2021 18:04	7.4	4771	10	100.6	Southern Qinghai, China	5.05
5	29/07/2021 06:15	8.2	8919	43	82.8	Alaska, Peninsula	5.25
6	12/08/2021 18:35	8.1	12890	60	209.9	Southern Sandwich Islands Region	3.63
7	14/08/2021 12:29	7.2	10666	10	256.3	Haiti Region	1.42

Conclusion

Located in Georgia, Caucasus, the Oni well demonstrates high sensitivity to the distant earthquake of 2021.

Examples of earthquakes indicate an essential role of the depth of an earthquake: an earthquake depth of 60 km leads to a significant decrease in the amplitude of the reaction of water in the well, what is fixed as visual manifestation. For the first time, a strong earthquake was recorded for this well what was occurred in the Southern Hemisphere.

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