SIGN ANALYSIS OF NORTH KOREAN UNDERGROUND NUCLEAR EXPLOSION

On 25 May 2009 at 00:54:43 UTG North Korea conducted underground detonation of nuclear device test of approximately 20 kilotons in power (Block 1 of Composite Scheme). The similar tests were made on 9 October 2006 and international experts estimated them as unsuccessful. The 4.7M 2009 explosion has been registered by the worldwide earthquake detection stations. The seismogram from the Vladivostok station is given in Block 2 of the Scheme. The parameters of the seismic event are as follows: 25.05.2009 – 0054 – (41.3; 129) – 4.7 – 0 – North-East North Korea.

A seismotectonic response of the underground nuclear explosion has been detected by proton and electrotelluric anomalies at the KOSMOMETEOTEKTONIKA station, Petropavlovsk- Kamchatsky (Block 3.1) and at the Kakioka station, Japan, Honshu (Block 3.2) as well as by cloud seismic indicators (Blocks 4-9). Note the quasi-synchronism of the anomalies registered at widely spaced stations in Petropavlovsk-Kamchatsky and Honshu. The analysis of nuclear test signs appeared in the litho-atmo-ionosphere showed a certain analogy with that of earthquake (EQ) pending that confirms the similarity in mechanism of their triggering. Let us consider the category of cloud seismic indicators. The response of cloudiness to underground nuclear tests has been studied by L.I. Morozova [1, 2]. The 2006 North Korean nuclear explosion was studied by her in [2]. After L.I. Morozova “The dynamics of after-explosive cloud anomalies reflects specularly the dynamics of anomalies when EQ pending” [1, p. 102]. The analysis of the 2009 underground nuclear explosion enabled a new category of square-shaped cloud structures to be revealed (Images 5, 6). The mechanism of such cloud structures formation on the basis of the solutions for intensification modes in the model of electrothermal breakdown of lithosphere is proposed in [3]. Note that within the cloud structure (B) seen in image 5, there is an area tracing a lithospheric block by shape that is activated as the result of seismotectonic effects of underground nuclear explosion. The formation of both cloud structure (C) and cloud seismotectonic indicator (A) in space images 7-9 revealed in the fog field in IR region is accounted for same reason. Lifetime of cloud structure (A) is ~6 hours. At 09:00 a.m. it traced clearly the fracture section in coastal zone (image 9). The length of the side of the “Thermal crystal” square with its vertex being in the underground nuclear explosion centre, was ~110km at the moment its most active occurrence. $M = \ln 110 \sim 4.7$ was derived from the formula of potential magnitude of seismic event which coincided surprisingly with that of the underground nuclear explosion. There is a real possibility of operational estimation of nuclear blast power in terms of seismic energy.

The response to the nuclear blast made at 00:54:43 UTG and registered at the electrotelluric variation (telluric currents) station, Kakioka, Honshu (Diagram 3.2) at 00:59 UTG was also surprising. Nearly at one time there was registered the response at the proton measurement station in the KOSMOMETEOTEKTONIKA school in Petropavlovsk-Kamchatsky (Diagram 3.1). To analyze the relation between these signs and nuclear explosion requires more in-depth study. There is no doubt that the induced effects took place there.

Note that after the underground nuclear explosion, several EQs occurred in Primorye Territory, Kamchatka, Taiwan, and Hokkaido which are commonly called as induced seismicity:

1. 25.05.2009 – 1959 – (52.8; 159) – 4.8 – 80 – Kamchatka
2. 26.05.2009 – 1011 – (27,6; 140,3) – 4.8 – 472 – Bonin
3. 26.05.2009 – 1031 – (42; 142,2) – 4.7 – 59 – Hokkaido
4. 26.05.2009 – 1204 – (43,9; 135,6) – 4.7 – 300 – Primorye
5. 26.05.2009 – 2227 – (21,6; 119,6) – 4.9 – 21 – Taiwan

It should be noted that after the North Korean nuclear test of 09.10.2006, the 09.10.2006 – 0530 – M4.2. EQ took place in Primorye Territory as well.

There is no question that the further study of the 2009 North Korean nuclear test responses will give many unexpected results in terms of their lith-atmo-ionospheric appearance. The same situation took place after the Chernobyl Disaster. At that time the cloud structures were distinguished in the RESURS-01 images on 26 April 1986 ~ 10 hours later the explosion [4]. Just at the same time there was revealed the ionospheric anomaly by the very long wave signal measurements at 16 kHz in radio path “Rugby (England) – Kharkov” passing through the Chernobyl territory. The GPS-technologies allow for determining even slight ionospheric effects associated with underground nuclear tests. Such data will well supplement the integrated description of nuclear explosion responses in geospheres

CONCLUSIONS

1. The similarity of the litho-atmo-ionospheric responses to underground nuclear explosions with EQ pending signs was confirmed.
2. The category of square-shaped cloud structures confirming the theoretical model of their formation was determined.
3. The proton and electrotelluric responses to underground nuclear explosions were registered at remote stations.

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