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Fact Sheet as of 27 May 2009

Second nuclear test conducted by North Korea on 25 May 2009

On Monday, 25 May, the official news agency, KCNA, of the Democratic People's Republic of Korea (DPRK) announced its successful conduct of a second nuclear test: "The Democratic People's Republic of Korea successfully conducted one more underground nuclear test on May 25 as part of the measures to bolster up its nuclear deterrent for self-defence in every way as requested by its scientists and technicians." It further claimed that the test was safely conducted "on a new higher level in terms of its explosive power and technology of its control. The results of the test helped satisfactorily settle the scientific and technological problems arising in further increasing the power of nuclear weapons and steadily developing nuclear technology."

The International Monitoring System (IMS) of the Preparatory Commission (PrepCom) for the Comprehensive Nuclear-Test-Ban Treaty Organisation (CTBTO) as well as national seismic networks immediately recorded the seismic signals of an event that took place in the North East of the country. The U.S. Geological Survey (USGS) determined the event time as 00:54:43 UTC. The location is close to the first nuclear test. The seismic body wave magnitude is determined to be 4.7 according to the USGS, 5.3 according to the Japan Meteorological Agency and 4.5 based on the IMS seismic stations that were used by the International Data Centre (IDC) of the Provisional Technical Secretariat in Vienna. This is larger as compared to the value of 4.1±0.1 in 2006. Russia estimated a yield of 10-20 kt TNT[1]. This is on the high end of the scale. According to the assessment of Martin Kalinowski based on the IDC magnitude, this corresponds to an explosive yield of about 1.5 to 4.5 kt TNT equivalent with a most likely yield of 2.5 kt TNT. In 2006 the yield was unexpectedly low with an estimate of 0.5 to 0.8 kt TNT.

In his early statement on the announced North Korean nuclear test, Tibor Tóth, the Executive Secretary of the CTBTO PrepCom said: "Today's nuclear test claimed by the Democratic People's Republic of Korea (DPRK) constitutes a threat to international peace and security and to the nuclear non-proliferation and disarmament regime. I am gravely concerned by this action. In particular, it is a serious violation of the norm established by the Comprehensive Nuclear-Test-Ban Treaty (CTBT) and as such deserves universal condemnation."

Background

The Democratic People's Republic of North Korea (DPRK) had carried out a first nuclear test at Phunggye-ri on 9 October 2006[2]. The test site is located in the northeastern county of Kilju in the

[1] Alexander Drobyshevsky, a Russian Defense Ministry official, interview with RIA-Novosti on 25 May 2009.

[2] Kalinowski, M.B.; Ross, O.: Data analysis and interpretation of the North Korean nuclear test explosion of 9 October 2006. INESAP Information Bulletin No. 27, pages 39-43.
Kalinowski , M.B.; Ross, O.: Starke Indizien. Alles deutet auf einen Teilerfolg des nordkoreanischen Nukleartests http://inesap.org/sites/default/files/inesap_old/bulletin27/art12.htm vom 9. Oktober 2006. Physik Journal 5 (2006) Nr. 12, Dezember 2006, Seiten 17-19.

North Hamgyong province.

On Sunday, 5 April at about 11:30 a.m. local time, North Korea started a missile flight test from its launch site at Musudan-ri. This is located in the northeastern part of the country close to the coast. One week later, the U.N. Security Council (UNSC) passed a resolution that condemned this test. As a response, the North Korean government terminated the six-party talks, expelled the IAEA inspectors and announced that it would resume plutonium production. It demanded the UNSC to apologize for the rocket launch that was explained to have lifted a civilian satellite into space. Otherwise, North Korea would conduct a second nuclear test.

On 7 May, the South Korean newspaper Chosun Ilbo reported that, according to South Korean governmental officials, increased activity of personnel and vehicle movements were observed at the Phunggye-ri nuclear test site.

Seismic event

The CTBTO PrepCom published a press release with its initial findings from automatic data analysis based on the 23 primary seismic stations that received the signal (the test of 2006 was recorded by 13 stations).[3]The CTBT member states receive the raw data and more detailed analysis from the IDC. This will include the related waveforms recorded at 16 auxiliary seismic stations.

The USGS provides data on its homepage that is open to the public after the automatic analysis was reviewed by a seismologist:[4] The map in Figure 1 shows historic seismicity together with the location of the current event marked by a yellow star.

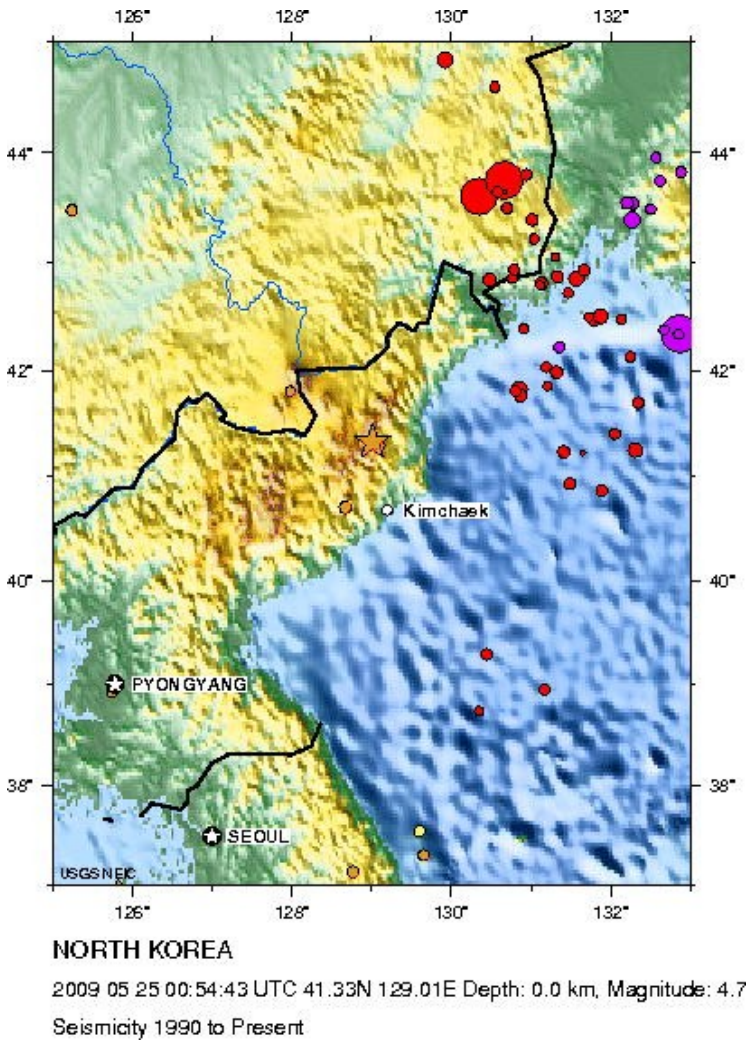

Figure 1: Seismic event of 25 May 2009 (yellow star) and historic seismicity since 1990 (circles color coded for magnitudes). Source: USGS

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[3] CTBTO Press Release: CTBTO's initial findings on the DPRK's announced nuclear test. Vienna, 25 May 2009. http://www.ctbto.org/press-centre/press-releases/2009/ctbtos-initial-findings-on-the-dprks-2009-announced-nuclear test/

[4] http://earthquake.usgs.gov/eqcenter/recenteqsww/Quakes/us2009hbaf.php

The tectonic summary of the USGS reads:[5]

„The shallow seismic event that occurred on 25 May 2009 at 00:54:43 UTC has been claimed as a nuclear test by North Korea, according to news reports. While the USGS cannot confirm that the recent event was a nuclear test, it was shallow and located in the vicinity of the October 2006 North Korean nuclear test (magnitude 4.3). "

Source characterization by the IDC of the CTBTO PrepCom:

A CTBTO PrepCom Press Statement explains that complex seismic signals were registered by 23 primary and 16 auxiliary seismic stations:[6] "CTBTO experts explained that they continued to study the signals detected by the seismic stations of the International Monitoring System (IMS). The seismic data seemed to be more complex than from typical explosions: The signals have been recorded by a larger number of IMS seismic stations. CTBTO experts concluded that the recorded signals contain distinct characteristics of an explosion. In addition, they also identified simultaneous signals with earthquake–like characteristics."

Seismic event details

	USGS	CTBTO PrepCom
Magnitude	4.7	4.52
Date-Time	May 25, 2009 at 00:54:43 UTC (09:54:43 am local time)	May 25, 2009 at 00:54:43 GMT (09:54:43 am local time)
Location	41.331°N, 129.011°E	41.2896°N, 129.0480 °E
Uncertainty	horizontal +/- 5.3 km	error ellipse with 860 km^2
Depth	not determined (fixed to 0 km by location program)	very close to the surface
Distances	75 km (45 miles) NNW of Kimchaek, North Korea 95 km (60 miles) SW of Chongjin, North Korea 180 km (110 miles) SSW of Yanji, Jilin, China 380 km (235 miles) NE of Pyongyang, North Korea	

Explosive yield estimations

Figure 4 shows a plot of historic weapons tests with the values for recorded seismic magnitude against the announced explosive yield.[7] A linear regression through these data gives the relation mb = 4.16 + 0.88 log Y with mb being the seismic magnitude and Y the exploive yield in kt TNT equivalent. The plot also shows the regression line of Syres & Ekstroem (mb = 4.262 + 0.973 log Y) that is valid for fewer data and positioned higher with a steeper slope. Based on the equation of Kalinowski & Roß (2006) and the IDC magnitude estimate of 4.52 and assuming a variance of 0.2, the explosive yield is in the range of 1.5 to 4.5 kt TNT equivalent with a most likely yield of 2.5 kt TNT. The equation of Syres & Ekstroem results in a best estimate of 1.8 kt TNT. If the USGS magnitude of 4.7 is used for the assessment, the range is from 2.5 to 7 kt TNT with 4 kt being the best estimate. Using the Japanese magnitude of 5.3, the yield might even

[5] http://earthquake.usgs.gov/eqcenter/recenteqsww/Quakes/us2009hbaf.php#summary

[6] CTBTO Press Release: Next phase in the analysis of the announced DPRK nuclear test. 27 May 2009.

[7] Kalinowski/Roß (2006) http://inesap.org/sites/default/files/inesap_old/bulletin27/art12.htm

be 20 kt TNT. In 2006 the yield was unexpectedly low with an estimate of 0.5 to 0.8 kt TNT.

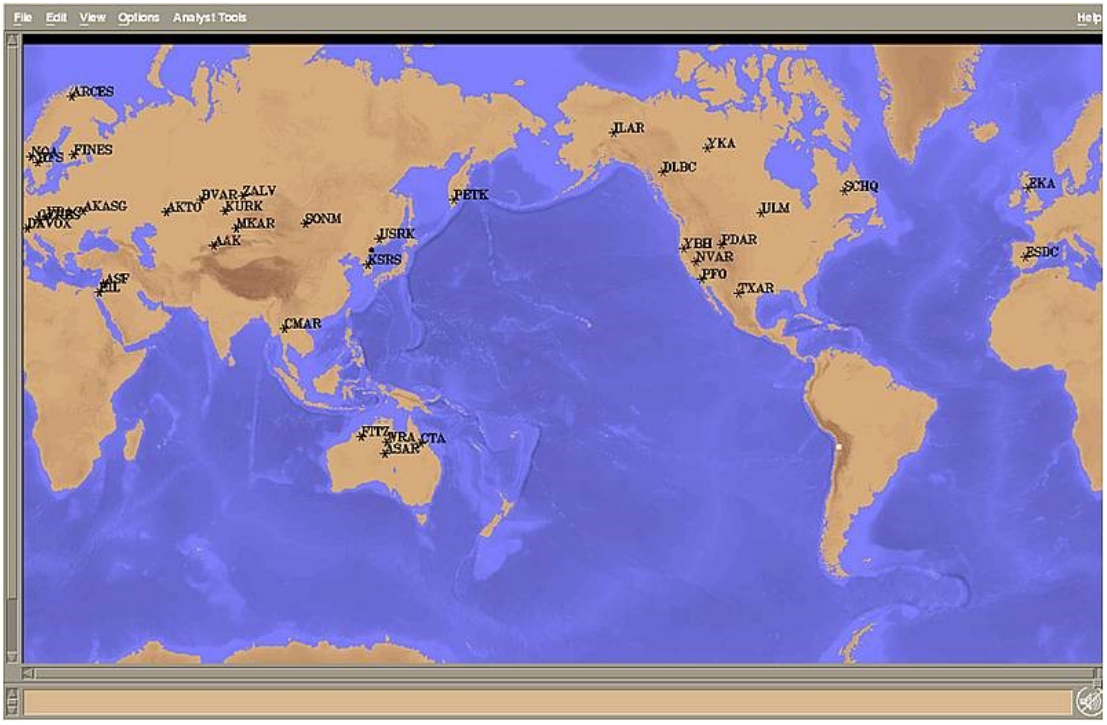

Figure 2: Location of all 23 primary and 16 auxiliary seismic stations that recorded the event on 25 May 2009. Source: CTBTO PrepCom

Figure 3: Comparison of the initial estimations of the origin of the 2006 and the 2009 announced DPRK nuclear tests. Source: CTBTO PrepCom, GoogleEarth

Conclusion

The nuclear physicist and peace researcher Martin Kalinowski concludes: “The DPRK has again violated the Nonproliferation Treaty. The second nuclear test is in strong contradiction to the UNSC Resolution 1718 of 14 October 2006 as well as against the global norm not to conduct any nuclear test explosions. The yield of about 2.5 kilotons TNT implies that the North Korea was more successful than at the first time in testing a first generation nuclear weapon. However, it is still short of the explosion energy released by the Hiroshima (15 kt TNT) and Nagasaki (22 kt TNT) bombs.”

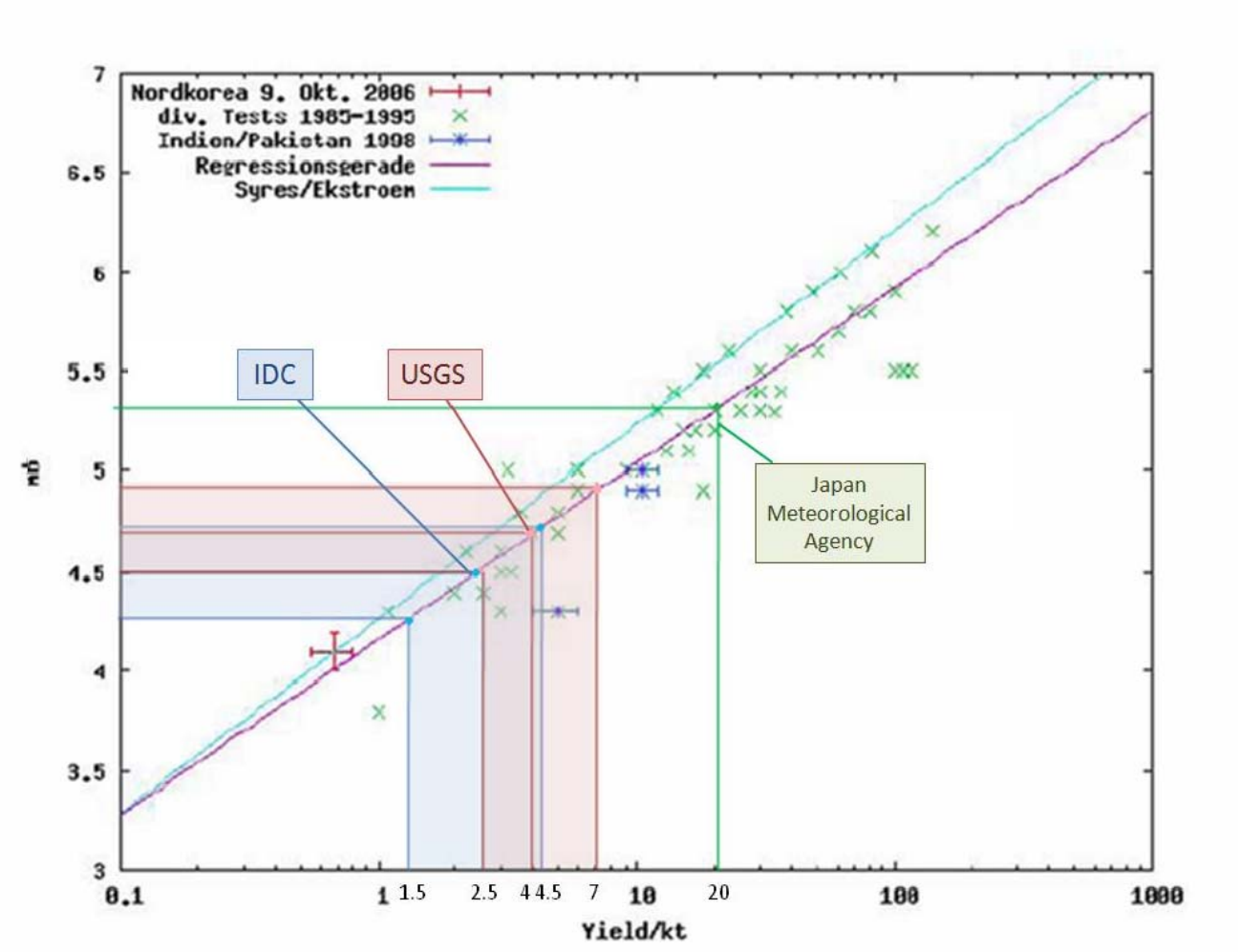

Figure 4: Nuclear tests with confirmed yield (in kt TNT equivalent) and measured body wave magnitude mb. The red cross marks the Northkorean test of 2006.