

## Earthquakes in Korean Peninsula Associated with North Korean Underground Nuclear Tests

Kim Tai-Jin\*

Professor of Chemical Engineering, The University of Suwon

Nuclear testing has often been used as an indicator of scientific and military strength, and many most nuclear weapons states publicly declared their nuclear status by means of a nuclear test. North Korea conducted five underground tests at the Punggye-ri nuclear test site. Underground testing causes seismic activity of a magnitude that depends on the yield of the nuclear device and the composition of the medium. It is interesting to note that earthquake magnitudes at epicenters were always greater than those of the underground nuclear test site at Punggye-ri of North Korea ; First test (M3.9) while Kuril Islands of Russia (M8.1), Second test (M4.5) while Yunnan of China (M5.7), Third test (M4.9) while Kamchatka of Russia (M8.3), Fourth test (M4.8) while Kaotsiung (M6.4) of Taiwan and Kumamoto (M7.0) of Japan, and Fifth test (M5.03) while Gyeongju (M5.8) of South Korea, whose epicenters are all composed of Cretaceous granites. The underground nuclear test site of Punggye-ri is also covered with Cretaceous granite. Therefore, the constructive interference in resonance among the same materials might cause the enhanced frequency for higher seismic energies and earthquake magnitudes according to the Einstein-Planck relation. Underground testing

refers to nuclear tests conducted under the surface of the earth with various depths (350~1,000 m) of Mt. Manthap (2,205 m) at the Punggye-ri . In 1976, the United States and the USSR agreed to limit the maximum yield of underground tests to 150 kt with the Threshold Test Ban Treaty. Number of earthquake events ( in Korean Peninsula during 1990 to 2016 along with financial support to North Korea by South Korean Governments were summarized in Table 1.

Table 1 informed several findings such as : There were 15 earthquakes during 1992 in Korean Peninsula. There were frequent earthquakes after North Korean refusal International Atomic Energy Agency (IAEA) special inspection in 1993 (22 events), especially in 1996 (39), 2001 (43), 2002 (49) during the Government of Kim Dae-Joong. It was evident that North Korea has already established the nuclear weapon capability in 1993 and stabilized in 1996 while such a capability was enhanced by the timely financial support from Kim Dae-Joong. During The Six-Party Talks in 2003 (38 events) and 2005 Joint Statement in 2005 (39), there were still enhanced earthquake events. After the first underground nuclear test in 2006 (55 events), 2007 (57), and 2008 (55), there were abrupt increases of earthquakes regardless of the full financial support of 1,797 million USD (59%) from

---

\*Corresponding author: Contact No. 010-2480-8294  
E-mail: tjkim@suwon.ac.kr

Table 1. Number of earthquake events ( in Korean Peninsula during 1990 to 2016 from Korean Meteorological Administration and financial supports from South Korean Governments to North Korea.

Financial Support from South Korea in Million USD (%)	Year	Government	Number of earthquake event	Underground nuclear test by North Korea
-	1990	Roh Tae-Woo	15	
	1991		19	
	1992		15	
Net 49				
284 (9)	1993	Kim Young-Sam	22	Refusal IAEA inspection
	1994		25	
	1995		29	
	1996		39	
	1997		21	
Net 136				
(23)	1998	Kim Dae-Joong	32	
	1999		37	
	2000		29	
	2001		43	
	2002		49	Uranium enrichment withdrawal from NPT
Net 190				
1,797 (59)	2003	Roh Moo-Hyun	38	Six-Party Talks
	2004		43	
	2005		39	Joint Statement
	2006		55	<b>First test</b>
	2007		57	Agreement to disable Yongbyon facilities
Net 232				
214 (7)	2008	Lee Myung-Bak	55	Verification failure
	2009		82	<b>Second test</b>
	2010		45	
	2011		68	
	2012		64	
Net 314				
57 (2)	2013	Park Geun-Hye	136	<b>Third test</b>
	2014		77	
	2015		61	
	2016		50	<b>Fourth test</b>
	2016		602	<b>Fifth test</b>
Net 926				
Total 3,043 (100)	1990 - 2016	6	1,847	

Roh Moo-Hyun. The financial support (82%) from both the Governments of Kim Dae-Joong (23%) and Roh Moo-Hyun (59%) pour the gasoline over the burning fire place of North Korean nuclear weapons capabilities due to their negligences of North Korean intention of having the nuclear weapons, which threatens the neighboring countries such as China, Russia, USA, Taiwan, Japan, South Korea, and even North Korea itself due to induced earthquakes. During the Presidencies of Lee Myung-Bak and Park Geun-Hye, North Korea threated South Korea with 4 times of the underground nuclear tests and more than 36 times of long-range ballistic missile launches, presumably their small financial supports ; Lee Myung-Bak (7%), Park Geun-Hye (2%). North Korea has continued its nuclear weapon capability according to their initial plan regardless of The Six-Party Talks or IAEA inspection. There were earthquakes more than 30 yearly events during the Presidencies as follows. Kim Young-Sam (year of 1993 (22 events), 1994 (25), 1996 (39), 1997 (21)) **Net (136)**, Kim Dae-Joong (1998 (32), 1999 (37), 2001 (43), 2002 (49)) **Net (190)**, Roh Moo-Hyun (2003 (38), 2004 (43), 2005 (39), 2006 (55), 2007 (57)) **Net (232)**, Lee Myung-Bak (2008 (55), 2009 (82), 2010 (45), 2011 (68), 2012 (64)) **Net (314)**, Park Geun-Hye (2013 (136), 2014 (77), 2015 (61), 2016 (50, 602)), **Net (926)**.

North Korean intension to have nuclear weapons

was facilitated by the financial support (23%) of Kim Dae-Joong and critical one (59%) of Roh Moo-Hyun to allow times of the underground nuclear tests by North Korea. 48% earthquake events during 1990 to 2016 has occurred in 4 years Presidency of Park Geun-Hye with continuous increase since 1993 of North Korea refusal of IAEA special inspection which might be the time North Korea began to develop the nuclear weapon. Strategically, North Korea has never given up the development of the nuclear bomb capability through withdrawal from the NPT although North Korea pretended tactically to agree with The Six Party-Talks and disable Yongbyon facilities without verification. Financial supports during Kim Dae-Joong and Roh Moo-Hyun have enhanced the North Korea nuclear bomb capability, which was in contradiction with their initial strategy of “Sunshine Policy”. Wrong policy by South Korean Governments during Kim Dae Joong and Roh Moo-Hyun facilitated the instability in the Korean Peninsula.

It is therefore necessary to check the trends of annual earthquake events in Korean Peninsula prior to supporting North Korea financially. It is most likely that President Park Geun-Hye did right choices to minimize the financial support within 2 percent for prevention from North Korean underground nuclear weapons tests.