# Lessons Learned from the CTBT and NWFZs: A Blueprint for Stability on the Korean Peninsula

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## INTRODUCTION

The relationship between the Democratic People's Republic of Korea (DPRK) and the Republic of Korea (ROK) have undergone unprecedented developments within the first months of 2018, which has spurred cautious optimism towards the possibility of a denuclearized Korean Peninsula in the near future. In the Panmunjom Declaration, both states affirmed that they are empowered to determine the future of the Korean Peninsula "on their own accord". Given this pact, progress in denuclearization of the Korean Peninsula should also be developed primarily within the auspices of this bilateral partnership. In this regard, creating a Korean Peninsula Nuclear-Weapons-Free Zone (KPNWFZ) would take advantage of this momentum between the two countries and simultaneously draw on lessons from decades of history in the development of such zones.

The formation of a KPNWFZ would also bring a series of "firsts" for NWFZs. In addition to becoming the first bilateral NWFZ, this would be the first zone to encompass a state that has developed and tested a domestic nuclear program in its own region. This fact necessitates a strong emphasis on and codification of strict verification measures in a KPNWFZ, both for testing and weapons dismantlement. The International Monitoring System (IMS) has served as a de facto verification measure for nuclear testing, can continue to serve in this role, and should be codified within the zone treaty.

For more than half a century, nuclear-weapons-free zones (NWFZs) have remained enduring threads in the disarmament and nonproliferation fabric. Since the Treaty of Tlatelolco established the first NWFZ in a populated area in 1967, the geographical coverage of these zones has steadily expanded and currently encompasses around 56 percent of the earth's surface, including virtually the entire Southern Hemisphere. Their aggregate membership now totals 115 States, or 60 percent of United Nations member states – a further testament to their international influence and growing reach. As expressions of collective security and regional unity, NWFZs

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advance disarmament objectives by outlawing nuclear weapons and constraining the operations of nuclear-weapon States (NWS) within a specified geographic area. Beyond delegitimizing nuclear weapons as instruments of security, NWFZs erect additional barriers to nuclear proliferation, underpinning NPT commitments and reinforcing the international safeguards system. In essence, they are verifiable and enforceable confidence-building measures (CBMs), as both legal mechanisms for zonal states to assure neighbors of their peaceful nuclear activities and regional frameworks for mutual security.

Although much has been written about the contribution of NWFZs to disarmament and nonproliferation objectives as well as the strengths and weaknesses of particular zones, their contribution to the Comprehensive Nuclear Test Ban Treaty (CTBT) and its verification system – the International Monitoring System (IMS) – has been largely overlooked. This paper explores that intersection and focuses on the role these regional zones play in entrenching the provisions of the CTBT and enshrining anti-testing norms. NWFZs not only codify comprehensive testing prohibitions for zonal members, but wall off entire regions from the nuclear testing programs of NWS through legally-binding protocols. One can even argue that, as operable treaties, NWFZs carry more legal weight and act as regional placeholders for the CTBT pending its entry-into-force. Zonal treaties thus underpin and broaden comprehensive non-testing commitments as well as represent regional nodes in the CTBT's international non-testing regime.

In analyzing the legal and normative linkages between the CTBT and NWFZ, this paper uses the historical case studies of the South Pacific and Central Asia zones. For both regions, the legacy of pervasive testing provided a catalyst for the establishment of zonal treaties and shaped the structure of the treaties' testing prohibitions. Like the international anti-testing norm, the progression of NWFZ provisions has followed a dialectical arc from the Treaty of Tlatelolco to the SPNFZ to the CANWFZ, with each more explicit and detailed than the last. In fact, the regional anti-testing norm has at times outpaced the international one and even served as a template for testing prohibitions in multilateral agreements. An additional source of linkage between NWFZs and the CTBT is the role middle powers play in advancing anti-testing principles at the regional and international levels. Australia and Kazakhstan, which served as

territorial laboratories for NWS to test and develop their nuclear arsenals during the Cold War, spearheaded the establishment of their respective zones and have also been long-standing, active proponents of the CTBT.

By tracing the development of testing prohibitions in the South Pacific and Central Asia, this paper will offer prescriptions for how anti-testing norms and the verification regime created by the CTBT can facilitate and reinforce NWFZs past and future, including the potential denuclearization of the Korean Peninsula. An example of how data received from the CTBTO, satellite imagery, and declassified materials can be used to verify and analyze DPRK nuclear test details will be discussed, and its implications for confirming future denuclearization on the Korean Peninsula will be examined. Finally, the role of verification technology as a TCBM will be highlighted, and an examination of recent developments on the Korean Peninsula will be analyzed and demonstrated to be the implementation of a gradual reduction in tension strategy, underpinned by an ironclad verification, which has strong potential to lead to both the denuclearization of and lasting peace on the Korean Peninsula.

## SOUTH PACIFIC NUCLEAR-FREE ZONE

### *Historical Background*

In the early decades of the Cold War, the Pacific offered a distant laboratory for nuclear weapon states to test and develop their arsenals away from the public eye and free from major political repercussions. Using remote territories or colonies, the United States, the United Kingdom, and France detonated over 250 nuclear devices, leaving large swaths of the Pacific uninhabitable due to extensive radiation.[2] Although the U.S. and U.K. ceased all nuclear testing in the area in 1963, France commenced an extensive atmospheric testing program in French Polynesia in 1966. The French tests would become a major pressure point in 1973 when the South Pacific Forum (SPF) issued a joint declaration calling for the immediate end to French

[2] Matthew Lippman, "The South Pacific Nuclear Free Zone Treaty: Regional Autonomy Versus International Law and Politics," *Loy L.A. Int'l & Comp. L. Rev.* 109 (1988): 111.

testing, which had produced widespread radioactive fallout. Shortly after the condemnation, Australia and New Zealand won interim rulings from the International Court of Justice (ICJ) protecting the two countries from further French testing. The ICJ's legal action along with France's intention to ratify the Partial Test Ban Treaty (PTBT) led to the cessation of atmospheric testing in the South Pacific in 1974. Nevertheless, less than a year later, France commenced underground testing at Mururoa Atoll, an island in French Polynesia.

A confluence of events in the mid-1970s intensified efforts to reduce nuclear dangers and establish a NWFZ in the South Pacific. The continuation of French testing coupled with the legacy of U.S. and British test programs spurred diplomatic efforts to conclude a regional treaty and shield the region from nuclear contamination. Other nuclear operations in the region, such as port calls by nuclear-armed vessels, further galvanized anti-nuclear sentiment at the domestic level and was a target in the disarmament agenda of left-leaning governments. Lastly, microstate nationalism was building, leading to a groundswell of decolonization that diminished French and British influence in the region.[3] Against this shifting backdrop, a South Pacific NWFZ proposal sponsored by New Zealand, Fiji, and Papua New Guinea in late 1975 was approved by the United Nations General Assembly (110 to 20, with 20 abstentions). While the resolution did not explicitly cite nuclear testing as an impetus for forming the zone, it stressed the "importance of keeping the South Pacific region free of nuclear contamination."[4]

Despite the resolution's strong backing at the UN and unanimity for the zone within the SPF, the SPNFZ initiative was shelved for more than seven years as right-of-center governments came into power in Australia and New Zealand. Although states in the region still opposed French tests, SPF communiqués made no mention of the NWFZ proposal from 1977 to 1982.[5] Nevertheless, the lull in regional disarmament efforts quickly ended in 1983 when Robert Hawke, a Labor Party politician, was elected Prime Minister of Australia. In a departure from the policy of its conservative predecessor, the Hawke government pursued a vigorous disarmament and nonproliferation agenda at the international and regional levels. In international fora, Hawke

[3] Paul F. Power, "The South Pacific Nuclear-Weapon-Free Zone," *Pacific Affairs* 59.3 (1986): 461-462.
[4] United Nations General Assembly Resolution 3477 (XXX), adopted December 11, 1975.
[5] Power, "The South Pacific Nuclear-Weapon-Free Zone," 463.

pushed for the conclusion of a comprehensive test ban treaty (CTBT) as a means of placing clamps on the arsenals of NWS and curbing nuclear proliferation.[6] A longtime standard-bearer of the CTBT, Australia under Hawke's leadership launched a diplomatic offensive to renew negotiations on the treaty in the Conference on Disarmament (CD) and supported a 1984 UNGA resolution calling for a nuclear testing freeze. In the face of growing Cold War tensions and deadlocked talks at the CD, however, efforts to advance a CTBT stalled in the mid-1980s.[7]

Although the Hawke government's nuclear diplomacy hit snags at the international level, it found success on the regional one. In the summer of 1983, Australia revived the SPNFZ initiative and presented to the SPF a draft framework as the basis for zonal negotiations. In addition to noting the "wide agreement on the general principles of the [SPNFZ] as submitted by Australia," the subsequent SPF communiqué issued a condemnation of continued French testing in the South Pacific as well as endorsed the conclusion of a multilateral treaty that would "outlaw all forms of nuclear testing by all States in all environments."[8] For Hawke's government, spearheading the establishment of a SPNFZ would not only bolster Australia's regional standing, but also dovetail with its disarmament activities at the international level, such as generating progress on the CTBT. Importantly, Canberra viewed its management of the regional diplomatic process as a further credential for its international profile as an activist middle power in the area of disarmament and nonproliferation.[9]

The SPNFZ initiative picked up steam following Australia's proposal at the 1983 SPF meeting. The election of David Lange as New Zealand's Prime Minister in 1984 quickened the pace of the initiative, as the new Labour government in Auckland along with Canberra lobbied for swift regional action and the conclusion of a treaty. From November 1984 to June 1985, a SPF working group chaired by Australia hashed out a draft treaty based on principles and parameters agreed at the forum's meeting in Tuvalu. Early and often in the negotiations,

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[6] Teresa Mannix, "World Should Listen: Hawke," *The Canberra Times*, August 27, 1983, 14.
[7] Bill Goodall, "Commitment 'clear and strong': Australia 'leads' test ban efforts," *The Canberra Times*, June 9, 1984, 9.
[8] "The South Pacific Forum Meets in Canberra: The Forum communiqué," *The Canberra Times*, August 31, 1983, 31.
[9] Michael Clarke, Stephan Fruhling and Andrew O'Neil, *Australia's Nuclear Policy: Reconciling Strategic, Economic and Normative Interests* (New York: Routledge, 2015), 102.

imposing constraints on French testing and protecting the South Pacific from nuclear contamination were driving forces behind the zone's creation. Achieving a comprehensive testing ban remained a common thread among the South Pacific States even as sharp disagreements emerged over other issues in the zone's negotiations.[10] The question of port visits and transit by nuclear-armed vessels was especially contentious, as many of the Melanesian States advocated for a ban of such activities while others – led by Australia – promoted a sovereign-rights stance. Those states in the region that advocated for a more expansive treaty, such as Vanuatu, Solomon Islands, Nauru and Papua New Guinea, also proposed a missile testing prohibition, either through a protocol enjoining NWS not to conduct tests or by including delivery systems in the zone's definition of nuclear explosive devices. Even though Pacific island states had long opposed Soviet and Chinese missile testing in the region and there was unanimous support for a nuclear testing ban, the SPF rejected the proposal on the grounds that a missile testing prohibition was unverifiable and legally unworkable. Several states, including Australia, also cited concerns that outlawing missile tests would discourage NWS from supporting the zone and acceding to its protocols.[11]

Ultimately, Australia's stewardship of the diplomatic process proved pivotal, as it strove to reconcile differing views and find a middle ground for the zone. Throughout the negotiations, Canberra strove to keep the discussions within the parameters of the original framework, often resisting attempts to broaden the zone's scope. Beyond forming a consensus within the SPF, Australia also worked to tailor the zone to preserve Western security architecture in the South Pacific and alleviate the concerns of the United States. A key component of Canberra's SPNFZ diplomacy, in addition to structuring the zone itself, was lobbying the five NWS to support the zone's various protocols.[12] In the end, this balancing act of forging consensus among regional states on one hand and petitioning extra-regional powers on the other largely defined the political

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[10] Grey Fry, "The South Pacific Nuclear-Free Zone: Significance and Implications," paper delivered to the Conference on the Future of Arms Control held at the Australian National University in August 1985.
[11] Michael Hamel-Green, "The Rarotonga South Pacific Nuclear-Free Zone," in *The Pacific: Peace, Security & the Nuclear Issue* ed. Ranginui Walker and William Sutherland (London: Zed Books, 1988), 99.
[12] Andrew O'Neil, "Australia and the South Pacific nuclear free zone: a reinterpretation," *Australian Journal of Political Science* 39.3 (2004): 576.

exercise leading up to and following the zone's conclusion. This balancing act clearly holds lessons for a potential NFZ on the Korean Peninsula, as the ROK and the DPRK must come to some type of consensus on their own, but also seek the support of extra-regional powers, who are often at odds with one another, and ensure that these States back a consensus effort to create a KPNFZ.

*The Treaty of Rarotonga*

On August 6, 1985, the fortieth anniversary of the Hiroshima bombing and less than two years after Australia launched its SPNFZ proposal, SPF States convened in Cook Islands to establish the Treaty of Rarotonga. The pact marked the second NWFZ formed in an inhabited area and was a testament to the growing appeal of regional disarmament initiatives. In its communiqué officially endorsing the Treaty of Rarotonga, the SPF drew a direct link between the formation of the zone and the "deep wish of all Forum members" of irreversibly ending nuclear tests in the South Pacific. The statement also advocated for the "early conclusion" of the CTBT, further reinforcing the region's commitment to anti-testing norms.[13] For South Pacific States, however, the Treaty of Rarotonga amounted to more than just an expression of regional aspirations or dedication to international principles; the zone represented both a legal constraint and a vehicle for political pressure against French testing in the region.[14]

Patterned largely off the Treaty of Tlatelolco, the main provisions of the SPNFZ prohibit the State parties to the zone from developing, manufacturing, acquiring, testing, or allowing nuclear weapons to be deployed within their territorial boundaries. The Treaty of Rarotonga, however, differs from its Latin American counterpart in important ways that both widen and narrow the scope of the zone's restrictions. It explicitly bans peaceful nuclear explosions (PNE), providing some clarity on the issue of PNEs after India's test in 1974. The Treaty of Rarotonga also prohibits members of the zone from dumping or assisting non-parties in dumping any nuclear waste or other radioactive materials at sea anywhere in the zone. Despite these

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[13] "Sixteenth South Pacific Forum Communiqué," August 5-6, 1985. http://www.forumsec.org/resources/uploads/attachments/documents/1985%20Communique-Rarotonga%205-6%20Aug.pdf

[14] Paul Malone, "Forum set to sign N-free treaty," *The Canberra Times*, August 7, 1985, 3.

improvements, the SPNFZ regressed in certain ways from the Treaty of Tlatelolco and has been classified as a "partial" and "modest" NWFZ by some observers.[15] Most significantly, it explicitly permits each State party to decide on transit of nuclear-armed ships and aircraft in its territory – a move designed to mitigate the concerns of the United States. Compared to the Latin American zone, the SPNFZ also contains watered down non-use guarantees by NWS and a less robust control system.[16]

Yet, setting aside these various credits and debits, the Treaty of Rarotonga represented a critical juncture in the evolution of nuclear testing prohibitions at the regional and international levels. It marked the first disarmament and nonproliferation treaty to ban any nuclear explosive device in all environments, a comprehensive prohibition that reflected the Hawke government's determination to conclude an international CTBT.[17] In the regional context, the SPNFZ built on the Treaty of Tlatelolco's non-testing provision but refashioned it to reflect the history and political dynamics of the South Pacific. In addition to covering PNEs, the Treaty of Rarotonga devotes an entire article to its testing ban, providing it with greater legal weight and clarity than its Tlatelolco equivalent. For verification of the non-testing provision, the zone does not establish a formal mechanism as it does for IAEA safeguards, though Australia and New Zealand both possessed seismic monitoring networks for the detection of nuclear tests, which serve as CBMs for this provision.[18] Australia, in fact, had long been a pioneer of testing verification technologies, participating in multilateral monitoring activities and advocating for deeper verification engagement in international fora.[19] On top of its legal and technical contributions to the international non-testing regime, the South Pacific zone reaffirms the Partial Test Ban Treaty (PTBT) in its preamble, further strengthening the normative linkage between regional and multilateral testing prohibitions.

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[15] Fry, "The South Pacific Nuclear-Free Zone: Significance and Implications," 62; Michael Hamel-Green, "The South Pacific – The Treaty of Rarotonga," in *Nuclear Weapons-Free Zones*, ed. Ramesh Thakur (London: Macmillan Press, 1998), 56.
[16] Toshiki Mogami, "The South Pacific Nuclear Free Zone: A Fettered Leap Forward," *Journal of Peace Research* 25.4 (Dec. 1988): 415.
[17] Hamel-Green, "The Rarotonga South Pacific Nuclear-Free Zone," 99.
[18] Fry, "The South Pacific Nuclear-Free Zone: Significance and Implications," 69.
[19] "Australia has role in nuclear-test exercise," *The Canberra Times,* January 20, 1983, 8.

In its efforts to straightjacket the nuclear operations of the five NWS, the Treaty of Rarotonga codifies significant constraints against testing programs. Under Protocol 1, the SPNFZ binds the three metropolitan powers with territories in the region – France, Britain, and the United States – to apply the treaty's comprehensive testing prohibition within these territories. As both a political statement and legal check, the SPNFZ drafters deliberately stretched the geographical boundaries of the zone to cover French Pacific territories.[20] Protocols enjoining NWS to implement treaty provisions in zonal territories is a common feature in NWFZs, but where the Treaty of Rarotonga differentiates itself is in its last protocol. Under Protocol III, all NWS are obligated to undertake "not to test any nuclear explosive device anywhere within the South Pacific Nuclear-Free Zone." Unique to NWFZ treaties, the inclusion of a blanket prohibition through a protocol stretched the geographical boundaries of the non-testing provision for NWS to cover the entire zone. Whereas the testing prohibition in the operative section of the treaty only applies to the territorial boundaries of zonal members, the geographical scope of Protocol III encompasses the zone's international waters and airspace. Its broad wording and legal implication reflect the topographical realities of the South Pacific, a region with a vast expanse of ocean and little landmass. More broadly, though, the inclusion of Protocol III constituted the first legally-binding, comprehensive testing prohibition in all environments applied to NWS. Thus, although confined geographically to the South Pacific, the provision represented a leap forward in the evolution of anti-testing norms.

*Conclusion*

Together with its operative text and protocols, the Treaty of Rarotonga's non-testing framework set an important legal precedent and provided a lever for political pressure against the testing programs of the NWS. Given its ongoing test program, France initially refused to support the zone, leading to greater condemnation for its activities in the South Pacific. Despite Australian efforts to mold the Treaty of Rarotonga and its protocols in a way that accommodated U.S. strategic concerns, the Reagan administration also rebuffed the zone. Part of the U.S. government's calculus for not signing the protocols was a tacit acceptance of France's testing

[20] Ibid, 115.

program, which contributed to the West's overall nuclear deterrent.[21] Even with the unwillingness of the western powers to back the SPNFZ, the conclusion of the treaty shined a brighter light on France's testing in the South Pacific and on the U.S. political sheltering of its ally. In multilateral fora, such as the United Nations General Assembly, CD, and NPT Review Conferences, South Pacific states pressured the NWS to accede to the protocols and often grouped such statements with condemnations of French activities as well as support for a CTBT.[22] Once France terminated its testing program in 1996, the Treaty of Rarotonga's Protocol III provided a legally-binding mechanism for France to demonstrate its commitment to permanently closing its test program.

Since sealing off the South Pacific from nuclear testing, the Treaty of Rarotonga has served as a legal template for the non-testing provisions in other NWFZs. The African and Central Asian NWFZ treaties, established in regions that bear the scars of nuclear testing, built on their South Pacific predecessor and followed the formula of devoting an entire article to the testing prohibition and separate protocol for NWS. As the first disarmament instrument to codify a comprehensive test ban, the Treaty of Rarotonga helped shape efforts at the multilateral level to conclude a CTBT. Its conclusion provided not only a boon to anti-testing norms by codifying the aspirations of a region, but also a dress rehearsal for Canberra's international testing diplomacy. Long a champion of a CTBT, Australia spearheaded the effort to finalize the treaty in the 1990s, as it tabled the draft text at the CD that formed the basis of the final treaty and then sponsored the UNGA resolution opening the CTBT for signature. Lastly, the South Pacific remains a central node in the CTBT's verification network, housing dozens of IMS that are among the first to detect and diagnose DPRK nuclear tests.

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[21] Don Oberdorfer, "U.S. Rebuffs Treaty For Pacific Nuclear-Free Zone," *The Washington Post*, February 6, 1987.
[22] A/40/PV.7; A/40/PV.70.

## CENTRAL ASIAN NUCLEAR-WEAPONS-FREE ZONE

The Central Asian Nuclear Weapons Free Zone (CANWFZ) constitutes one of the most significant victories in disarmament and nonproliferation regime. In the aftermath of the dissolution of the Soviet Union, Kazakhstan possessed the fourth largest nuclear arsenal in the world, consisting of over 1,400 strategic weapons and an unknown number of tactical nuclear weapons.[23] Yet, by 1995, all strategic and non-strategic nuclear weapons were transferred to Russia, and by the end of 2005, the CANWFZ had been officially established. This timeline of establishment is significantly shorter than that of the SPNWFZ.

*Reasons/factors contributing to the establishment of a CANWFZ*

Revisionist histories of Kazakhstan's transfer of nuclear weapons claims that this action was done purely on moral grounds. For example, the President of Kazakhstan, Nursultan Nazarbayev, wrote in a 2012 article to the New York Times that one of Kazakhstan's first acts as a sovereign nation was to give up nuclear weapons because of their humanitarian consequences. [24] However, this history ignores the role that former US Secretary of State James Baker and Russian President Mikhail Gorbachev played in ensuring that all former Soviet states transferred their nuclear weapons back to Russia. Prior to the 1995 transfer of all nuclear weapons to Russia, the Kazakh president Nazarbayev stated several times that Kazakhstan would possess nuclear weapons as long as Russia possessed nuclear weapons.[25]

Rather than being driven by security concerns, the genesis of the CANWFZ was rooted in environmental concerns about the region. Environmental issues such as uranium mining, radioactive waste storage, and the degradation of the Aral Sea were all exacerbated after the collapse of the USSR. Concern over these ecological issues were manifest in the 28 February 1997 Almaty Declaration, in which the five presidents of Kazakhstan, Kyrgyzstan,

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[23] Joseph Cirincione, Jon B. Wolfsthal, Miriam Rajkumar, Deadly Arsenals: Nuclear, Biological, and Chemical Threats, (Washington, DC, Carnegie Endowment for International Peace, 2005), p. 365.
[24] Nazarbayev, Nursultan. What Iran Can Learn From Kazakhstan. March 25, 2012. New York Times. https://www.nytimes.com/2012/03/26/opinion/what-iran-can-learn-from-kazakhstan.html?_r=2&
[25] Hoffman, David. Kazakhstan Keeping Nuclear Arms, Repuglic's President Tells Baker. Washington Post Foreign Service. December 17, 1991. Accessed via the George Washington University National Security Archives.

Turkmenistan, Tajikistan, and Uzbekistan first expressed their support for a nuclear-weapons free zone in Central Asia. The short Almaty Declaration expresses concerns over environmental issues ten times and only mentions national security once.[26]

Another main contributing factor for the CANWFZ was the unilateral declaration of the creation of a nuclear-weapons-free Mongolia. The Mongolian government made this declaration in 1992 and the Mongolian Parliament ratified this law in 2000. The law prohibits the deployment or transit of nuclear weapons within the territory of Mongolia. This declaration contributed to the establishment of the CANWFZ by galvanizing political momentum on nuclear weapons free zones in the region.

*Negotiations*

Following the 1997 Almaty Declaration, the 1997 Preparatory Committee to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) supported the creation of a CANWFZ.[27] Later that year, a Working Group met in Tashkent, Uzbekistan and issued a statement reaffirming the creation of a CANWFZ and the establishment of an expert advisory group.

Negotiations continued in 1998, when the five Central Asian states met in Bishkek, Kyrgyzstan. During the Bishkek conference, States agreed to the basic elements of the CANWFZ, discussing the need for environmental remediation in any potential agreement. The Bishkek conference also reinforced the role that advisory experts played in the negotiations.[28] Japan also helped to further negotiate the text at a conference hosted by the UN Regional Center for Peace and Disarmament in Asia and the Pacific in Sapporo, Japan in 1999.

In 2000, the United Nations General Assembly (UNGA) endorsed Resolution 55/33W, which was sponsored by the five Central Asian states and encouraged the work that had been done in creating a NWFZ in Central Asia and called for further work with the five Nuclear

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[26] Almaty Declaration, 14 March 1997. United Nations General Assembly A/52/112. http://www.un.org/documents/ga/docs/52/plenary/a52-112.htm
[27] 1997 Preparatory Committee to the 2000 Review Conference to the NPT. https://unoda-web.s3-accelerate.amazonaws.com/wp-content/uploads/assets/WMD/Nuclear/2000-NPT/pdf/CHAIRPCI32.pdf
[28] Parrish, Scott. *Prospects for a Central Asian Nuclear-Weapon-Free Zone*. Nonproliferation Review, 2001.

Weapons States on drafting an agreeable protocol.[29] Later that year, the NPT Review Conference final document endorsed the creation of a CANWFZ and reaffirmed UNGA Resolution 55/33W. [30] In September of 2002, a UN Expert Group held meetings in Samarkand, Uzbekistan to discuss the draft text. The text that was produced at the Samarkand meeting was nearly identical to the final CANWFZ. On October 8, 2002, UNODA organized a consultative meeting with the ten relevant parties to facilitate dialog on a protocol on negative security assurances.

On February 5, 2005 the CANWFZ was adopted by the five Central Asian states in Tashkent, Uzbekistan. This final version of the treaty differed from the draft produced at the Samarkand meeting in two points. First, the treaty was modified so that only the five Central Asian states could accede to the zone. This inclusion may have relieved Russia's fears that the zone would grow, limiting its freedom of action within the region. Second, a low- and medium-level radioactive waste transportation clause was added, allowing for waste to be moved throughout the zone in accordance with IAEA guidelines.[31]

The final text of the treaty reaffirmed the CTBT both in the preamble and by copying the CTBT's central testing prohibitions into Article V of the CANWFZ. Other NWFZs have also reaffirmed the normative test ban regime in a variety of ways. For example, the Treaty of Rarotonga directly references the LTBT in its preamble. Similarly, Protocol II of the Treaty of Pelindaba notes "the objective of concluding a treaty banning all nuclear tests."[32] Article V of the Treaty of Pelindaba, which prohibits testing within the African zone, provides essentially the same three prohibitions that are reinforced within the CTBT, which was undergoing negotiations when the Treaty of Pelindaba opened for signature.

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[29] United Nations General Assembly Resolution 55/33W, sponsored by Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan.
https://gafc-vote.un.org/UNODA/vote.nsf/91a5e1195dc97a630525656f005b8adf/57b8e7a532dea6058525698300588da6?OpenDocument

[30] 2000 NPT Review Conference Final Document, Article VII and the Security of Non-Nuclear Weapons States, Paragraph 14.

[31] Central Asia Nuclear-Weapon-Free-Zone (CANWFZ. Nuclear Threat Initiative. April 30, 2018.
http://www.nti.org/learn/treaties-and-regimes/central-asia-nuclear-weapon-free-zone-canwz/

[32] Treaty of Pelindaba, Protocol II

The CANWFZ was signed by the five Central Asian states on September 8, 2005 at the Semipalatinsk test site in Kazakhstan. The Soviet Union had conducted over 450 nuclear tests at this site, and the political symbolism of signing the CANWFZ at a former test site was significant. While China and Russia both supported the zone, it was not supported by France, the United Kingdom and the United States due to concerns about the Collective Security Treaty. A major point of concern during the entire series of negotiations was the 1992 Tashkent Collective Security Treaty. Three of the five Central Asian states are parties to the Treaty, and Russia interprets the treaty as allowing the forward deployment and transit of nuclear weapons through all States parties. Initially, Kazakhstan, Kyrgyzstan, and Tajikistan wanted the CANWFZ to explicitly state that it did not affect previously concluded treaties.[33] In the end, the language of the Treaty does not directly address the matter. The three non-supportive NWS expressed concern that the Treaty did not directly address whether it preceded other international security agreements. In 2007, Kyrgyzstan and Uzbekistan submitted their instruments of ratification. Tajikistan and Turkmenistan both submitted their ratifications in 2008. While Kazakhstan ratified the CANWFZ Treaty in October 2008, their instrument of ratification was not deposited until February 2009, which caused the Treaty to enter into force.

*Conclusions and lessons for today*

At a wider international level, the negotiations of the CANWFZ strengthened the norm against nuclear testing after significant degradation during the previous ten years. In the aftermath of the US Senate failure to ratify the CTBT in 1999, the Democratic People's Republic of Korea's first nuclear test in 2006, and the collapse of the 2005 Review Conference, the success of the CANWFZ brought much needed progress, both symbolic and tangible, to a withering nonproliferation regime.

As Inter-Korean relations have progressed, there have been renewed calls for a NWFZ on the Korean Peninsula. The Panmunjom Declaration for Peace, Prosperity and Unification of the Korean Peninsula directly notes that "South and North Korea confirmed the common goal of

[33] Parrish, Scott. *Prospects for a Central Asian Nuclear-Weapon-Free Zone*. Nonproliferation Review, 2001.

realizing, through complete denuclearization, a nuclear-free Korean Peninsula." Additionally, several states at the Nuclear Non-Proliferation Treaty Preparatory Committee of 2018 have reiterated calls for a NWFZ in the region.

Given these recent calls, a potential nuclear weapons free zone on the Korean Peninsula could benefit from the history of the negotiations of the CANWFZ as well as some of the Treaty of Semipalatinsk's articles. A future KPNWFZ could, for example, include an article pertaining to environmental remediation of the legacy of nuclear weapons production. Inclusion of an article similar to this could spur economic assistance for environmental cleanup.

A future KPNWFZ should pull relevant strengths from each of the preceding NWFZ. A summary of possible advantages from the five existing NWFZ is provided below. In addition to these strengths, a KPNWFZ should also consider highlighting the role that the CTBT's IMS play as a verification system against nuclear testing in the Korean region, as well as around the world.

| **NWFZ Treaty** | NWFZ Strengths | Korean Peninsula Context |
|---|---|---|
| *Tlatelolco* (1967) | OPANAL (Regional Control System) | Verification, TCBM |
| *Rarotonga* (1985) | Ballistic Missile Negotiations, Strengthened Testing Prohibitions | Possible Ballistic Missile Test Free Zone, Inclusion of Protocol Against Testing |
| *Pelindaba* (1996) | Verification of Dismantled Nuclear Weapons and related Facilities | Verified Dismantlement of All Facilities by IAEA |
| *Bangkok* (1997) | Port Calls, Strengthened NSA's preventing weapons from being launched by SLBM's within the zone | Strengthened Transit Restrictions |
| *CANWFZ* (2006) | Environmental Remediation clause | Economic and Environmental Assistance |

## CASE STUDY: IMS DATA & SOCIETAL VERIFICATION

Developing and implementing an effective verification system on the Korean Peninsula is the key to lay the essential foundations for ultimate denuclearization of the region, especially in the interim before the institution of an official verifications regime. The International Monitoring System (IMS) has been an irreplaceable asset as a de facto verification measures and should be codified in the KPNWFZ in this capacity. Data from the IMS has been invaluable in the analysis of North Korea's nuclear capabilities, providing the technical basis for open-source analysts to assess the development of nuclear weapons on the Peninsula.. Shortly after the DPRK's largest and most recent nuclear test, researchers at the James Martin Center for Nonproliferation Studies (CNS) used this open-source data to construct a 3D model of the Punggye-ri Nuclear Test Site[34], which provided valuable insights to the public discussion on how to move forward with a potentially nuclear-armed North Korea.

36 IMS stations out of 321 located globally can currently provide seismic data on North Korean activities. Seismologists who triangulated the epicenters of the six nuclear tests did so by combining this data collected from varying distances[35]. In order to optimize the accuracy of geolocating these explosions, the authors of this report highlight the importance of maximizing the number of stations that can record such data; the more sensors that collect the data, the higher the accuracy of the location estimates. The authors demonstrate this point with the noticeable discrepancy in confidence between the location estimate for the 2006 nuclear test and subsequent tests. While they are confident that the later tests are geolocated within 150m of their true epicenters, the discrepancy between estimated and true location of the 2006 test is "much more significant"[28] due to the smaller number of IMS stations in 2006.

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[34] Becker, Rachel. "Take a 3D Tour of North Korea's Nuclear Test Site, thanks to open source intelligence." April 15, 2017. Retrieved at: https://www.theverge.com/2017/4/15/15311116/north-korea-dprk-nuclear-test-site-punggye-ri-3d-model-cns-nti .

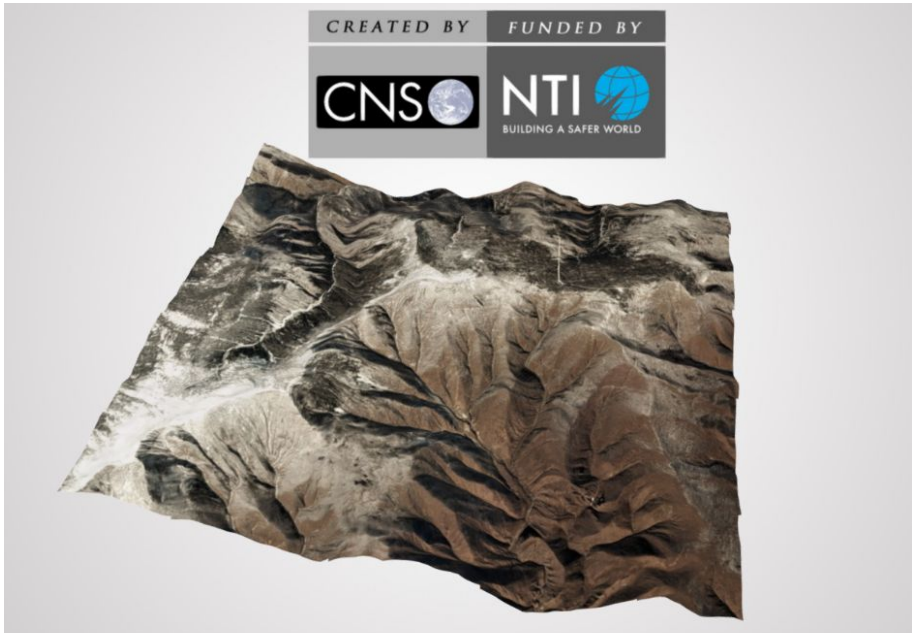
[35] Gibbons, F.J., Pabian, F. et al. "Accurate Relative Location Estimates for the North Korean Nuclear Tests using empirical slowness corrections". October 5, 2016. Retrieved at: https://academic.oup.com/gji/article/208/1/101/2452669#92451798

Geolocating the series of seismic events revealed that they cluster in Mount Mantap. Once the area of interest was identified, open-source analysts used satellite imagery to find tunnel entrances, removed earth, and other evidence of military activities in the mountain range. The combination of the seismic data and satellite imagery further confirmed the location of North Korea's nuclear test site in Mount Mantap.


Seismic data from IMS stations also allow analysts to estimate the yield of the tested nuclear devices. The CTBTO published the estimated yield for each of North Korea's six nuclear tests in a report soon after the DPRK's latest test[36]. By combining the estimated epicenters, estimated yields, and topographical data, we created a 3D model of the test site:

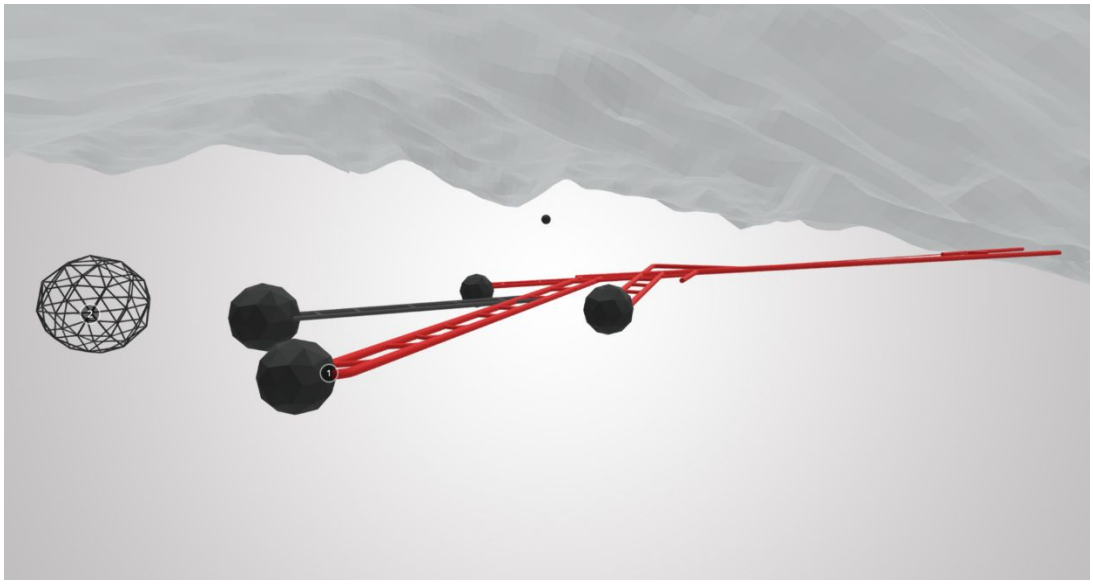
[36] Comprehensive Test Ban Treaty Organization. "Technical Findings". September 7, 2017. Retrieved at: https://www.ctbto.org/the-treaty/developments-after-1996/2017-sept-dprk/technical-findings/

**Lessons Learned from the CTBT and NWFZs:**
**A Blueprint for Stability on the Korean Peninsula**




*Source: SketchFab: James Martin Center for Nonproliferation Studies (CNS), Nuclear Threat Initiative (NTI)*

The model displays the relative sizes and location of each nuclear test within Mount Mantap:



*Source: SketchFab: James Martin Center for Nonproliferation Studies (CNS), Nuclear Threat Initiative (NTI)*

Constructing the model in a virtual space yielded some remarkable findings. First, we were able to assess the most likely layout of the tunnel system.


*Source: SketchFab: James Martin Center for Nonproliferation Studies (CNS), Nuclear Threat Initiative (NTI)*

In the process of recreating the tunnels, the layout became increasingly familiar. After scouring declassified databases of other nuclear test sites, we found that Punggye-ri tunnel layout almost perfectly mirrors "P-tunnel" at the U.S. Nevada Test Site. The sketch below is a blueprint for P-tunnel with the estimated Punggye-ri tunnels modeled in red. In fact, since the DPRK buries and spaces its nuclear tests much like the U.S., tt is not difficult to believe that the DPRK would use easily available, declassified U.S. information to develop its own nuclear program.

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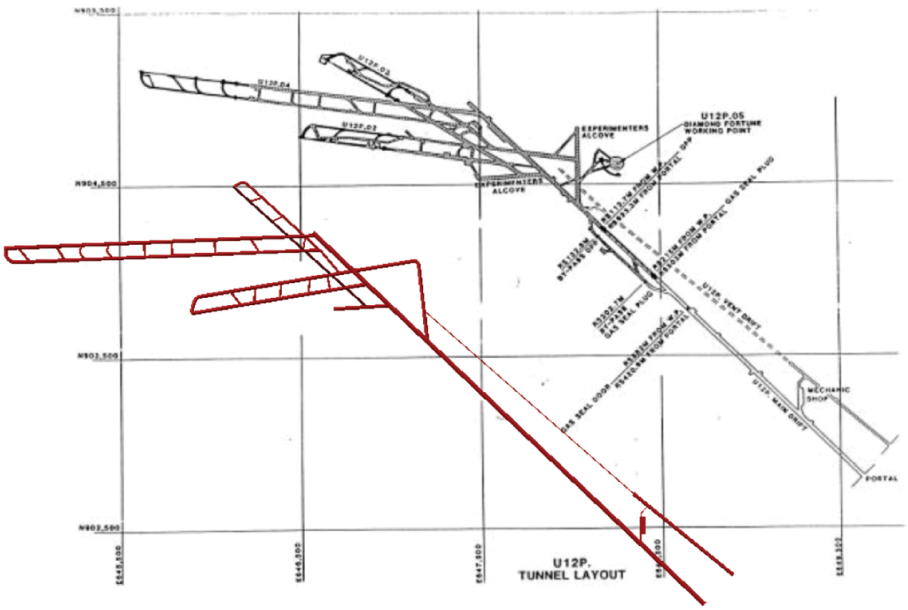
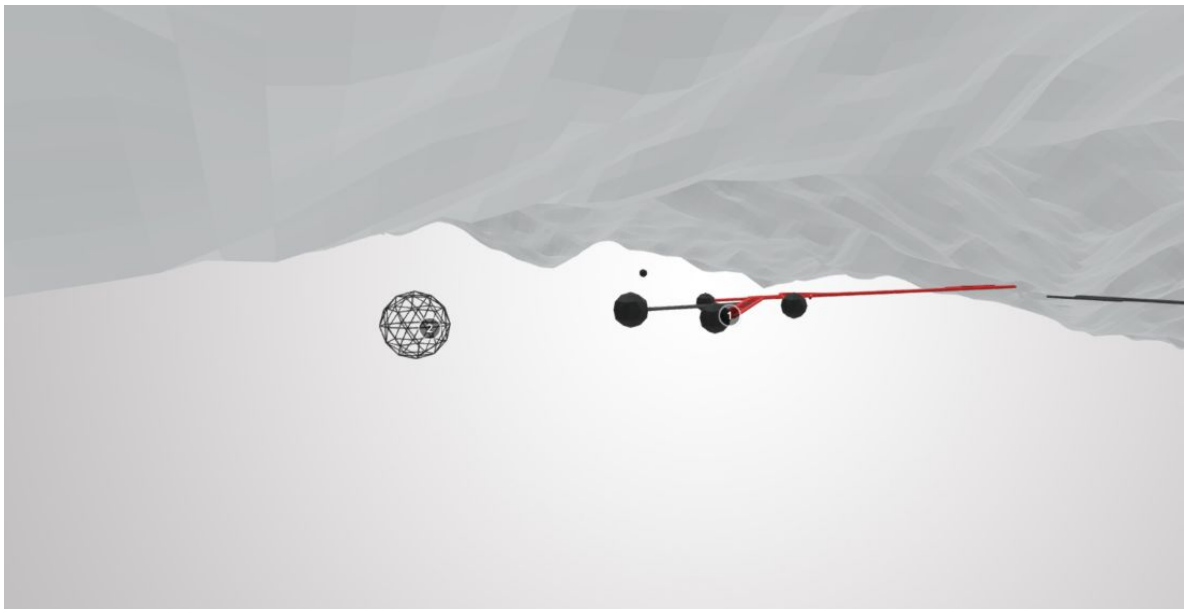



Additionally, by visualizing the size of each explosion within the topography of the mountain, we can see that there is plenty of space within Mount Mantap to conduct many more tests and can contain the detonation of a device with a yield as high as 350 kt. Number two (2) below depicts a 350 kt explosion.



*Source: SketchFab: James Martin Center for Nonproliferation Studies (CNS), Nuclear Threat Initiative (NTI)*

**Lessons Learned from the CTBT and NWFZs:**
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## A PATH FORWARD: IMPLICATIONS FOR THE KOREAN PENINSULA

Clearly, the open-source data available to researchers around the world has the potential to provide an extraordinarily detailed look into the highly technical aspects of the nuclear tests carried out by the DPRK. The data from 36 IMS stations, which provided information on estimated yields and epicenters, in addition to topographical data collected from satellites enabled researchers to create a 3D model of the Punggye-ri Nuclear Test Site, which was then further detailed using imagery analysis and open source information. The results were quite astounding, and perhaps most meaningfully, were able to be shared with the international community – States parties, NGOs, IGOs, and the public alike – because all conclusions were drawn from open source data.

This extraordinary capability to analyze nuclear testing infrastructure based on measurable, observable, and verifiable data has clear political implications for the Korean Peninsula and beyond. Such powerful verification capability assures that any nuclear test carried out by the DPRK (or any other State, for that matter) would be measured by at least one CTBTO IMS station. This concept – that no critical nuclear test could go undetected – ought to reassure States that verification of compliance with a test ban, de facto or de jure, due to a NWFZ or the entry into force of the CTBT, would be effective. The inability of the DPRK to "cheat undetected" on a potential future agreement, or the ability to verify any non-testing provision, addresses a major fear of many States parties, who have long expressed concern that due to the past history of failed negotiations with the DPRK, and the proliferation that has resulted, any new negotiations or agreements would simply repeat an old pattern.

These widespread concerns of DPRK noncompliance, the rapid development and testing of nuclear weapons and ballistic missiles within the last two years, and the escalation in rhetoric from many involved States turned the situation on the Korean Peninsula into a crisis. The UN Security Council met 12 times in 2017 explicitly to discuss the DPRK. US senior policymakers discussed potential options to ameliorate the situation, and even considered a "bloody nose strike" designed to target DPRK leadership and nuclear facilities. Most in 2017 described the

situation on the Korean Peninsula as intractable, and many characterized it as the single greatest threat to international peace and security.

The escalating crisis on the Korean Peninsula and the perceived stalemate suddenly began to shift at the dawn of 2018, when Kim Jong Un gave his annual New Year's Day address. Since then, both the ROK and the DPRK have taken a series of extraordinary steps constituting a gradual reduction in tensions between the two States that seemed near impossible mere months before. While some have been quick to dismiss the most recent developments as another round of talks that will ultimately fail but grant Kim Jong Un possible UN sanctions relief in the meantime, the verification capability made possible by technological advancement since the last round of talks arguably serves to underwrite the fragile confidence that began to form a few months ago, and provide a basis upon which trust, and a gradual reduction in tensions, can be built.

Just last week, the historic Panmunjom Declaration was signed on 27 April 2018 between ROK President Moon Jae-In and Kim Jong Un. This progress in five short months was made possible by a long series of small steps taken by both the DPRK and the ROK, each of which can be characterized as a TCBM that assisted in facilitating the development of the GRIT strategy between the two nations. The significance of the role of TCBMs in ameliorating this crisis, and the important reality of effective verification underwriting this step-by-step rapprochement, is visible when one considers the timeline of events beginning with the 1 January 2018 New Year's Address by Kim Jong Un. This timeline reveals a series of escalating transparency and confidence building measures, all effectively verifiable, that each side put forth. From the reopening of the military-to-military hotline on 3 January, to the agreement to cooperate during the Olympics on 17 January, to the agreement of an inter-Korean summit on 6 March, to the announcement of a leader-to-leader telephone line on that same day, each step forward represents a building block toward increased transparency and confidence that made last week's historic summit possible. The increasing demonstrations of confidence as the months progressed indicated that each side responded positively to the initiative taken by the other, thus achieving the gradual reduction in tension and the gradual increase in confidence necessary to arrive at the

point of inter-Korean negotiations wherein denuclearization and an end to the armistice were actively discussed.

Soon after the inter-Korean summit and the Panmunjom Declaration, the ROK indicated that the DPRK would close and dismantle the Punggye-ri Test Site and also that the DPRK had invited foreign experts to view the shutdown of the facility. If Kim Jong Un chooses to follow through with this promise, the assessments we made through IMS data and our 3D model provides a basis for what we can expect to be closed, removed, or deconstructed at the site. It remains to be seen whether this concrete step on the path toward denuclearization is taken, but its potential once again demonstrates the powerful verification capacity underwriting the latest political developments, and the strong link between such a verification capacity and the potential establishment of a KPNWFZ.

## CONCLUSIONS

Previous nuclear-weapon-free zones formed when dialogues on denuclearization were built upon by a series of steps that served as transparency and confidence building measures. However, the denuclearization of those zones/determination of those NWFZs as such was fundamentally different from the potential denuclearization of the Korean Peninsula because the Korean Peninsula contains a State who tested on their own territory in a way that previous zones did not. In this respect, concerns over noncompliance with a potential KPNWFZ are significantly elevated in comparison to previously established zones, and as such, certain steps were required in order to get to the point of dialogue on denuclearization. These steps include effective verification, baseline TCBMs, and an application of GRIT strategy. In the case of the Korean Peninsula, the CTBTO IMS stations serve as this effective verification, while the actions taken by the ROK and the DPRK since the beginning of the year constitute baseline TCBMs and a gradual reduction in tensions.

Clearly, the effective verification provided by the CTBTO IMS stations combined with the lessons learned from previous NWFZs provide a roadmap for forward progress on the

Korean Peninsula. The denuclearization of the Korean Peninsula would underpin and reinforce the disarmament and nonproliferation (DNP) regime of which the NPT is the cornerstone, and would also underwrite and re-strengthen anti-testing norms. This has proven true in the previous establishment of NWFZs around the world, and is a powerful step toward many long standing DNP goals, including the entry into force of the CTBT, the establishment of additional NWFZs, and the ultimate goal of total elimination of nuclear weapons. In an examination of history, it is clear that the CTBTO and the NWFZs reinforce each other and the DNP regime, and thus the establishment of a KPNWFZ holds great potential, not just for regional peace and security, but ultimately for the advancement of international disarmament and nonproliferation and the improvement of international peace and security. Let us hope that it happens.