

Change Through Bilateral Treaties: An Actor-based Approach to Nonproliferation and CTBT
Ratification

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1 Overview

1.1 Nuclear Weapons: The Status Quo

Ever since the atomic bombings of Hiroshima and Nagasaki, the global nuclear threat has been rapidly growing. With an increasing number of countries invested in nuclear weapons research and testing, the global nuclear threat has skyrocketed over the past few decades. While several treaties have limited the positioning and launching of nuclear weapons, countries continue to develop and test nuclear weapons.

Nuclear weapons have two major direct consequences: the initial blast and the aftereffects of the nuclear radiation. While the initial blast can cause immense property damage and loss of life, the resulting nuclear radiation can render thousands of square miles of land uninhabitable and produce serious and potentially deadly health effects on affected victims. The consequences of these weapons has already been displayed by the Hiroshima and Nagasaki bombings, in which over 200,000 people perished¹, and many more were affected by radiation caused as a result of the detonation. Skin cancer and similar health complications were a common effect of the bombings. Nuclear weapons have the potential to not only instill fear in the civilians of a country but coerce them to act against their will, creating unfair advantages and reigns of terror. William Perry, the former United States Secretary of defense, emphasized the catastrophic potential of nuclear weapons, predicting that even a credible threat of nuclear war can cause chaos and anarchy in a peaceful nation.

1.2 The Current Nuclear Threat

The current nuclear threat has escalated to new and unprecedented levels. The development of more powerful and efficient weapons combined with growing international tensions has resulted in the strategic positioning of thousands of nuclear weapons worldwide. The corresponding deadlocks and stasis between nations has heightened current global nuclear vulnerability. While Russia has the most nuclear warheads, totaling 7,000, the United States follows close behind with 6,800 warheads². Although China is far behind, possessing 260 warheads, studies have proven that the detonation of as few as 100 warheads could create a devastating and potentially deadly nuclear winter³.

Currently, there exist four major areas of concern. China, India, and Pakistan are gridlocked in a nuclear standoff, with each country possessing hundreds of functional nuclear weapons. Both India and Pakistan are currently wary of each other, and tensions between India and China have escalated over the past decade. Growing tensions between Pakistan, India, and China could potentially result in a war directly or indirectly involving nuclear weapons. The second major

¹ National Science Digital Library, "The Atomic Bombings of Hiroshima and Nagasaki," AtomicArchive.com, accessed March 27, 2017, http://www.atomicarchive.com/Docs/MED/med_chp10.shtml.

²"Nuclear Arsenals," International Campaign to Abolish Nuclear Weapons, accessed March 27, 2017, <http://www.icanw.org/the-facts/nuclear-arsenals/>.

³ Ryan Rastegar, "How Many Nukes Would It Take to Render Earth Uninhabitable?," Global Zero, last modified July 9, 2015, accessed March 27, 2017, <http://www.globalzero.org/blog/how-many-nukes-would-it-take-render-earth-uninhabitable>.

area of concern is the relationship between China and the United States, both nations with UN veto power. A current risk of China potentially reassembling nuclear weapons is present, and with souring political tensions, nuclear threats could ensue. The third area of concern is the Middle East. Although Middle Eastern countries currently do not possess large arsenals of nuclear weapons, an increasing interest in nuclear research has raised red flags about the region. Israel is in the process of researching and developing nuclear arms for protection against radical Islamic groups. In addition, rising tensions between Middle Eastern countries could potentially result in the development of new nuclear weapons, and given the current volatile and violent situation, could result in nuclear war. Finally, the current nuclear threat is explosive due to the ongoing atomic weapons program and aggressive stance of North Korea.

This work discusses the prevention of nuclear proliferation by the use of test ban treaties. Centered around the Comprehensive Test Ban Treaty, this paper will highlight the major concerns in each of the high-risk regions of interest and propose a unique test ban solution focusing on broad global precedents and specific regional implementations to prevent the development and proliferation of new nuclear weapons. While the CTBT itself has yet to be implemented as eight specific states have not signed the treaty, the policies highlighted in the treaty will ensure a decrease in the global nuclear threat.

2 The Comprehensive Test Ban Treaty

2.1 Overview and Key Articles

The Comprehensive Nuclear Test Ban Treaty (CTBT) is a legally binding global ban on nuclear explosive testing for all of its recognized states-parties. Created and opened for signing in 1996, the treaty involves two critical provisions to ensure that signed countries ensure a universal moratorium on nuclear development. While the first provision aims to restrict the vertical proliferation of nuclear technology in NPT-recognized nuclear weapons states (China, France, Russia, United Kingdom, and the United States), the second is focused on restraining the horizontal proliferation of nuclear weapons to nations that currently do not possess nuclear technologies. For context, the two primary obligations of states-parties are replicated verbatim from Article I below.

(Article 1.1) Each State Party undertakes not to carry out any nuclear weapon test explosion or any other nuclear explosion, and to prohibit and prevent any such nuclear explosion at any place under its jurisdiction or control.

(Article 1.2) Each State Party undertakes, furthermore, to refrain from causing, encouraging, or in any way participating in the carrying out of any nuclear weapon test explosion or any other nuclear explosion.

The first provision of the CTBT prevents states with established nuclear weapon capabilities from developing advanced technologies via the use of highly enriched uranium (HEU) that is exclusively used for military capabilities. As it would be overly ambitious and politically impossible to request the NPT-recognized nuclear states to eliminate their arsenal, the CTBT strives to limit the potential for a modernization arms race between countries that have the

resources and political power to catalyze a second Cold War. The second provision, although primarily created with the intent to constrain regional arms races in Asia, hopes to disincentivize all non-nuclear weapon states from creating arms programs. The treaty instills a multifold deterrent against the proliferation of nuclear weapons: states that attempt to develop a nuclear arsenal would be forced to do so without the support of the international community and at the risk of condemnation as well as weapons failure.

2.2 Structure and Status of the CTBT

The CTBT text consists of a preamble, seventeen articles, two annexes, and a Protocol with two annexes. The preamble outlines the importance of the treaty; although certainly important in 1998, the core tenets of the treaty are even more crucial in today's world with the United States and Russia pursuing aggressive modernization strategies.

Article I discusses the premises of the treaty, with the two provisions outlined above recognizing the different types of nuclear countries and defining restraints to optimally restrict international proliferation. It further prohibits all states parties from carrying out or encouraging nuclear explosions (whether for peaceful or nefarious motives). The second article discusses the establishment of the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) in Vienna to ensure successful implementation and cooperation between states-parties. Articles III and IV define national and international implementation measures, with a verification regime comprising of an International Monitoring System, an International Data Center, on-site inspections, and confidence-building measures to ensure compliance. Articles V and VI detail procedures to manage disputes about principles and implementation procedures in the treaty, and Article VII describes the amendment process. The remainder of the articles and the two annexes detail minor stipulations regarding signature and ratification of the treaty as well as the 44 states that must sign the treaty for it to take effect. The final protocol statements define the specific functions and implementation procedures regarding the confidence building measures and international monitoring network that ensure states-party compliance.

The CTBT was adopted by the UN General Assembly on September 10, 1996 and was signed by 71 states (including five of the eight contemporary nuclear states). As of October 2016, 166 states have ratified the CTBT, and 17 states have signed but not yet ratified the treaty. Since eight of the states specified in Annex 2 as required signatories before implementation have not yet signed the treaty, the treaty is currently not in effect. Of the Annex 2 states -- defined as those with nuclear power or research reactors during CTBT negotiations from 1994 to 1996 -- China, Egypt, Iran, Israel, and the United States have signed but not ratified the treaty, and India, North Korea, and Pakistan have not yet signed it. Considering the current political climate in the United States as well as the aggressive posturing from the North Korean military elite, it is reasonable to assume that the treaty will likely remain in stasis for an extended period of time.

So far, approximately 2,050 nuclear weapon testings have been conducted in various environments (underground, underwater, in space or atmosphere) worldwide.⁴ Since the signing

⁴ Larry Gilman, "Comprehensive Test Ban Treaty," in *Encyclopedia of Espionage, Intelligence and Security*, ed. K. Lee Lerner and Brenda Wilmoth Lerner (n.p.: Gale, 2004), <http://link.galegroup.com/apps/doc/CX3403300172/GIC?u=harker&xid=81b10aac>.

of CTBT began in 1996, approximately eleven nuclear tests have been conducted so far: two by India, two by Pakistan and approximately seven by North Korea.⁵ Figure 1 illustrates the benefits of CTBT signatures on the reduction of worldwide nuclear testing; although many countries have yet to ratify the treaty, their signature stood as a symbolic reaffirmation of the non-testing policy.

2.3 Individual Actors and their Commitment

The CTBT suffered a major setback in October 1999 when the U.S. Senate failed to ratify the treaty with a 48-51 vote.⁶ In spite of strong sentiments about CTBT's critical role in stopping nuclear proliferation, concerns about national security and sovereignty due to reduced deterrence power that would result from lack of nuclear testing, partisan conflict, and intraparty factions led to the treaty's defeat in the Senate. The directors' reverted their initial endorsement of the stewardship program to a warning that "if the U.S. scrupulously restricts itself to zero-yield tests while other nations may conduct experiments with yield upto the threshold of international detectability, we will be at an intolerable disadvantage."⁷ Labeling the treaty as "dangerous", a unilateralist approach over cooperative internationalism resulted in not taking a leap of faith in the efficacy of the treaty. U.S. holds the key to the Entry into Force of the CTBT. Overcoming some of the challenges and concerns of a permanent legally binding treaty by introducing a ten year escape clause, an allowance for some limited nuclear testing, and less demanding procedures for calling challenge inspections might have had a different outcome to the ratification status.

India's decision not to sign the CTBT in 1996 was a combination of its stance on nuclear disarmament and its national security concerns.⁸ India has throughout insisted that the CTBT should include a ban of all explosive tests, should be linked to ultimate elimination of all nuclear weapons in a time bound framework, and found the entry into force article coercive and illegal. India has so far refused to sign the treaty and Pakistan will not sign until India signs. China has signed the treaty but is sure to ratify if the U.S. were to ratify the treaty.

For decades North Korea has used nuclear weapons to achieve its political objectives. It has expelled international inspectors and withdrawn from arms control talks. It continues to conduct nuclear testing driven by its motives for political deterrence against the U.S. military presence in the region and the U.S. security umbrella to South Korea and Japan. North Korea has been under UN Security Council sanctions since its first nuclear test in 2006 which was unanimously condemned as "reprehensible act, which destabilizes regional security".⁹ North Korea has said that it will continue its nuclear program as long as U.S. maintained "its stance of aggression" and

⁵ Ibid.

⁶ Terry L. Deibel, "The Death of a Treaty," *Foreign Affairs*, September 2002, <http://link.galegroup.com/apps/doc/A90404186/GIC?u=harker&xid=00d2d2a3>.

⁷ Ibid.

⁸ Arundhati Ghose, "Negotiating the CTBT: India's Security Concerns and Nuclear Disarmament," *Journal of International Affairs* 51, no. 1 (1997), <http://link.galegroup.com/apps/doc/A54117817/GIC?u=harker&xid=473562e9>.

⁹ "Nuclear Disarmament: Will President Obama's Efforts Make the U.S. Safer?," *CQ Press* 19, no. 34 (October 2, 2009): N.p., CQ Researcher Online.

refuses to sign the CTBT.

2.4 Benefits and Harms of the Treaty

The CTBT is designed to advance the nuclear disarmament of countries worldwide. It outlaws all nuclear detonations to discourage nuclear weapons testing and development and outlines the creation of the CTBTO, an organization whose purpose is to regulate the implementation of the treaty. The treaty prevents the potential health detriments and environmental issues caused by nuclear testing. All member states are also given free access to all information from the IMS to ensure all countries are adhering to the treaty. In order for the CTBT to enter into force, all participating countries must ratify the treaty. The countries that have not yet ratified are concerned about the inability to detect violations of the treaty, the fear that some countries may become militarily dominant, as well as the inter-regional conflicts between some countries. As of now there is no guaranteed system to enforce the prohibition of nuclear detonations thus creating the worry that a country would be able to test and develop nuclear weapons in secret. Currently, the nuclear deadlock between India and Pakistan has resulted in neither country signing the CTBT. The treaty, with its unilateral method, does not address regional discord.

3 Proposed Policy

Although the CTBT has taken a critical pioneering step in addressing global concerns regarding the proliferation of nuclear weapons, its numerous problems regarding both efficient implementation and regional enforcement leave much to desire. The proposed policy in this work addresses these concerns by including a general multilateral treaty with uniform global principles for states-parties as well as geopolitical region-based accords and individual bilateral treaties to handle the increasingly complicated situations of today's era. This section will detail the multiple facets of the proposed policy by focusing on two types of actors in our contemporary world: rational and irrational actors. Specifically, rational actors are those that make predictable decisions based upon a utilitarian calculus while irrational actors engage in subjective decision-making procedures, perhaps without regard for the welfare of their citizens.

3.1 Middle East (Rational)

Middle Eastern proliferation stems from two major concerns: the first of which is horizontal proliferation concerns due to security stemming from other regional conflicts like the Sunni-Shia proxy war and the Arab-Israeli conflict, and the second concerning government instability and the danger of non-state actors and access to loose nuclear material.

However, before analyzing methods to stop these forms of nuclear destabilization, it is crucial to analyze the status quo. Currently, the only nuclear state in the Middle East is Israel, with a speculated 80 nuclear weapons which it claims are a necessity to supplement its conventional military inferiority to surrounding Arab nations for national security purposes. Iran, Egypt, Saudi Arabia, the UAE, Turkey, and Jordan all have peaceful nuclear programmes.¹⁰ Of those

¹⁰ Karl Vick, "The Middle East Nuclear Race Is Already under Way," TIME, last modified March 23, 2015, accessed March 27, 2017, <http://time.com/3751676/iran-talks-nuclear-race-middle-east/>.

countries, many have expressed support for a Nuclear Free Zone (NFZ), rendering their peaceful nuclear programs without risk to general regional stability.¹¹ On the other hand, Saudi Arabia, Iran, and Israel pose the greatest threat to horizontal proliferation. While the nuclear deal with Iran has assuaged some concerns about regional proliferation, it is by no means a set-and-done issue. The Sunni-Shia conflict and continued nuclear and ballistic weapons development mean that while Iran may not be a nuclear state in the status quo, it has the potential to be one in the future, especially given geopolitical concerns about regional hegemony. In response to this, Saudi Arabia has disavowed nuclear weapons for the time being, but maintains its stance that a nuclear Iran would mean a nuclear Saudi Arabia, which funded Pakistan's nuclear program and has secured a deal to procure nuclear weapons if need be.¹² Thus, while the Sunni-Shia proxy conflict continues unabated throughout the region, the threat of it going nuclear poses the greatest threat to the Middle East and its long-term security. To disarm Saudi Arabia and Iran, a regional cooperative framework is necessary, mediated by the impartial GCC countries who share ties to both countries as well as the globally-respected Organization of Islamic Countries (OIC) and other regional and global NGOs to create bilateral accords which inhibit the possibility of nuclear conflicts in the Middle East. Such accords will be difficult, but in a post-Cold War world, the incentives for nuclear development are especially low for Iran given the state of sanctions and international affairs, and thus neither it nor Saudi Arabia will pursue nuclearisation in all likelihood, paving the way for a potential NFZ. CTBT ratification is an essential first step to achieve this outcome, in which both parties would disavow the use and development of nuclear weapons instead of holding off on ratification to keep options open as they do right now.

The Israel issue, unlike Saudi Arabia and Iran, is much more difficult to be solved with international actors due to the country's distance from geopolitical institutions that unite the rest of the Middle East. Israel's proliferation stems from before the end of the Cold War, and originates with security concerns about invasion by surrounding Arab countries--in essence providing a deterrent to conventional and nonconventional attacks.¹³ While these concerns have been assuaged in recent times due to growing stability in the region and support from the U.S., even the Iron Dome system is insufficient to completely discourage the Israeli nuclear weapons program. To solve concerns about the country's nuclear program, the U.S. should encompass Israel under its nuclear umbrella, taking the final step in formalizing a bilateral military alliance and accepting the costs to its soft power in the Middle East in the name of nonproliferation; of course such a policy should function concurrently with an expansion in NATO's Ballistic Missile Defense (BMD) systems and their Iron Dome counterparts in Israel, which would benefit from continued American military aid. These factors combined might very well prove insufficient to sway the current hard-line Israeli government and security apparatus, but such a dual-pronged solution provides the best hope for disarmament or at least diminishing the threat of provocative and potentially pre-emptive strikes by Israeli forces and the potential for any

¹¹ "Middle East Nuclear-Weapon-Free Zone," Federation of American Scientists, last modified 2013, accessed March 27, 2017, https://fas.org/programs/ssp/nukes/ArmsControl_NEW/nonproliferation/NFZ/NP-NFZ-ME.html.

¹² Con Coughlin, "The Saudis Are Ready to Go Nuclear," The Telegraph, last modified June 8, 2015, accessed March 27, 2017, <http://www.telegraph.co.uk/news/worldnews/middleeast/saudi-arabia/11658338/The-Saudis-are-ready-to-go-nuclear.html>.

¹³ Robert Einhorn and Richard Nephew, *The Iran Nuclear Deal: Prelude to Proliferation in the Middle East?*, May 31, 2016, accessed March 27, 2017, <https://www.brookings.edu/research/the-iran-nuclear-deal-prelude-to-proliferation-in-the-middle-east/>.

regional conflict to go nuclear. When implemented concurrently with Iran-Saudi accords, much of Israel's concerns will come to rest, and given the upcoming election that threatens to oust Netanyahu in favor of the liberal Tzipi Livni, such a cohesive strategy would signal the end of uncertainty after over a decade of questions on proliferation.

To clarify the role of the CTBT, for nations like Iran, Saudi Arabia, and Israel, non-ratification remains strictly political, with these countries abstaining from formally signing and ratifying the treaty despite abiding by all of its provisions banning nuclear tests. An elimination of incentives for nuclearization would contribute significantly towards security among rational nation-states in the region, and would achieve a much more significant goal of denuclearization predicated on the rhetorical victory of ratification.

Meanwhile, threats of dirty bombs and radioactive leakage come from more stateless entities like Syria, Iraq, Yemen, and Libya which continue to suffer from a lack of governmental authority and continuing insurgency. Solving for these security concerns would prove significantly more difficult than state-based proliferation, as a crumbling national apparatus and the remnants of Cold War-era nuclear programs combined create a dangerous situation that could be exploited by any number of groups. Truth be told, there are very few ways to accurately detail the threat of radioactive contamination and enriched uranium exportation, and even fewer ways to stop it. Former Soviet countries like Ukraine, Moldova, and Georgia have long struggled with conundrums like these in the aftermath of dismantling their nuclear programs, and solutions have been scanty even with the presence of a reliable and continuous authority. Rather, some mixture of impartial international organization, like the IAEA, combined with military authority from countries like the U.S. or a more multilateral UN Security Council would go a long way to establishing a system of teams and operations to locate and decontaminate such radioactive sites, co-opting the idea of a Safe Zone for Refugees which has been proposed in Syria and expanding it to under-threat nuclear sites. In truth, this threat requires much more detail than can be comfortably provided here and as more solutions develop, international and regional organizations ought to take heed while they focus on quelling insurgency and radicalization in the status quo: after all, there is no fear of dirty bombs if there are no disgruntled insurgent groups on the ground to take the loose uranium in the first place.

3.2 Southern Asia (Rational)

The arms control policies of the countries in the region of South Asia have been driven by the triangular dynamic relationships between India, Pakistan, and China. India and Pakistan have fought three wars - in 1947, 1965, and 1971 with close calls in 1986 and 1990.¹⁴ To this date, the tensions between the two countries remains unresolved. On the other hand, India has worked hard to improve its relations with China. But fear of neighbors as they pose security threats can lead to a costly and dangerous nuclear arms race in this region similar to the U.S.-Russia arms race which ended with the Cold War. Each country's stance on nuclear proliferation is a result of different political and economic factors leading to strategic decisions corresponding to national security perceptions. Pakistan's more military-controlled government thus maintains a greater

¹⁴ John D. Holm, "The CTBT and Nuclear Disarmament- The U.S. View," *Journal of International Affairs* 51, no. 1 (1997), [puffin.harker.org/login?url=http://link.galegroup.com/apps/doc/A54117818/GIC?u=harker&xid=5fd355cb](http://link.galegroup.com/apps/doc/A54117818/GIC?u=harker&xid=5fd355cb).

claim to nuclear weapons, and as the predominant Muslim nuclear power the continuation of its program is highly significant. India, on the other hand, has a significant conventional forces advantage and thus maintains its arsenal only as a deterrent against Pakistan's, winning international support for its policy including a recent endorsement to join the Nuclear Suppliers Group (NSG).

Due to this bilateral standoff, however, neither nation has signed the CTBT. With no timeline on total elimination of nuclear weapons, the standstill on reductions of nuclear stockpiles from the U.S. and Russia, and the modernization of nuclear weapons by the U.S. and Russia into smaller and more precise warheads, there exists a huge risk to the non-nuclear countries of dominance by nuclear weapon countries; this is yet another force that drives the upkeep of Indian and Pakistani nuclear arsenals. Using existing frameworks for India-Pakistan dialogue like those used to ensure crucial water infrastructure and border security between the countries, a bilateral dialogue for defusing tensions and de-nuclearizing can be attained. Incremental progress is the only real hope to de-escalate tensions, which just like in regions like the Middle East, stem from conventional rather than nuclear motivations. This dialogue will be crucial in achieving general conflict de-escalation, CTBT ratification, and eventual nuclear reduction with the help of third party mediators like the UN and others.

3.3 China and the United States (Rational)

A CTBT signatory who has not ratified the CTBT, China is currently reassembling and modernizing its nuclear arsenal. In 2016, China was estimated to possess between 183 and 260 stockpiled nuclear warheads, including about 150 nuclear-capable land-based ballistic missiles and 48 sea-based ballistic missiles.¹⁵ In addition, its bomber aircraft are suspected to be capable of deploying nuclear weapons, although their nuclear mission at present is at best secondary.¹⁶ Even though development of new nuclear warheads has ceased, China continues to produce warheads tested before the CTBT was signed and renovate existing warhead-carrying missiles.¹⁷ As of 2011, it was conducting “‘subcritical’ experiments,” which the CTBT does not explicitly forbid, at former test sites in order to “support ongoing stockpile stewardship.”¹⁸ Meanwhile, in 2016, the Chinese military upgraded a single-stage intermediate-range ballistic missile, the DF-3A, to a medium-range ballistic missile, the DF-21, and is expected to upgrade other one-stage or two-stage missiles to carry multiple independently targeted reentry vehicles (MIRVs) in the near future.¹⁹

China explains its hesitation to ratify the CTBT as one facet to its overarching geopolitical rivalry with the United States. China's priorities, according to the official line, are to “enhance survivability and maintain a credible minimum nuclear deterrent,” that is, use its arsenal to

¹⁵ Hans M. Kristensen and Robert S. Norris, "Chinese nuclear forces, 2016," *Bulletin of the Atomic Scientists* 72, no. 4 (June 2016): 205, accessed March 5, 2017, <http://www.tandfonline.com/doi/pdf/10.1080/00963402.2016.1194054?needAccess=true>.

¹⁶ *Ibid.*, 210.

¹⁷ House Armed Services Subcommittee on Strategic Forces, *Nuclear Weapons Modernization in Russia and China: Understanding Impacts to the United States*, H.R. Doc. No. 112, 1st Sess. (2011) (ProQuest).

¹⁸ *Ibid.*

¹⁹ Kristensen and Norris, “Chinese nuclear,” 207.

prevent nuclear attacks from any other country.²⁰ However, this purpose is intrinsically tied to its fear of its military falling behind the U.S. Seeing that the United States persuaded the United Kingdom and France to ratify the CTBT only to itself fail to ratify the treaty, China suspects that the U.S. simply wants to “ensure the overwhelming superiority of its nuclear arsenal, both in quantity and quality.”²¹ Thus China insists that the U.S. ratify the CTBT first, lest the U.S. renege once again on ratifying and thereby overrun China’s nuclear defenses.²²

Given the U.S.’ role in keeping China from ratifying the CTBT, a solution to China’s refusal to ratify must be bilateral. As a first step, China and the U.S. should agree on an end to the testing and development of new nuclear weapons. If the China-U.S. geopolitical rivalry has cooled sufficiently for both parties to further cooperate, they may then decide on how and when to cease modernization and begin disarmament. Success of a China-U.S. treaty depends critically on how willing both countries are to cooperate in general, not just on nuclear matters. Although both countries may try to implement a treaty while tensions are high, success is ensured only if both choose to adhere to it. Conversely, such a bilateral treaty may catalyze the resolution of China-U.S. geopolitical tensions.

3.4 Russia and the United States (Rational)

Although Russia has ratified the CTBT, escalating Russia-U.S. nuclear modernization remains a major concern for nonproliferation. Part of Russian-U.S. mutual nuclear concerns stems from their competitive arsenals, similar in number and quality. Russia’s nuclear arsenal is the only one in the world that rivals that of the United States in numbers.^{23,24} Furthermore, as a result of recent tensions in Ukraine and Syria, relations between Russia and the U.S. have declined to their lowest point since the Cold War, prompting Russia to modernize its arsenal aggressively.²⁵ Like China, as recently as 2011 Russia has been conducting subcritical tests not officially prohibited under the CTBT.²⁶ Certainly Russia has a precedent for conducting subcritical tests even after ratifying the CTBT: since the early 2000s, Russia has been conducting experiments at Novaya Zemlya.²⁷ Given the difficulty of detecting subcritical tests using CTBT mechanisms, it is

²⁰ Lu Yin, "How to approach nuclear modernization?: A Chinese response," *Bulletin of the Atomic Scientists* 71, no. 3 (May 2015): 9, Academic Search Complete.

²¹ Zukang Sha, "The Entry into Force of the CTBT: The Chinese Perspective," European Leadership Network, last modified August 24, 2014, accessed March 5, 2017, http://www.europeanleadershipnetwork.org/the-entry-into-force-of-the-ctbt-the-chinese-perspective_1790.html.

²² Ibid.

²³ Hans M. Kristensen and Robert S. Norris, "Russian nuclear forces, 2016," *Bulletin of the Atomic Scientists* 72, no. 3 (May 2016): 125, accessed March 5, 2017, <http://www.tandfonline.com/doi/pdf/10.1080/00963402.2016.1194054?needAccess=true>.

²⁴ Hans M. Kristensen and Robert S. Norris, "United States nuclear forces, 2016," *Bulletin of the Atomic Scientists* 72, no. 2 (April 2016): 63, accessed March 5, 2017, <http://www.tandfonline.com/doi/pdf/10.1080/00963402.2016.1194054?needAccess=true>.

²⁵ Steven Pifer, ed., *Nuclear Modernization, Arms Control, and U.S.-Russia Relations*, October 25, 2016, accessed March 5, 2017, <https://www.brookings.edu/research/nuclear-modernization-arms-control-and-u-s-russia-relations/>.

²⁶ House Armed Services Subcommittee on Strategic Forces, *Nuclear Weapons Modernization in Russia and China: Understanding Impacts to the United States*, H.R. Doc. No. 112, 1st Sess. (2011) (ProQuest).

²⁷ Michael Jasinski, Cristina Chuen, and Charles D. Ferguson, "Russia: Of Truth and Testing," *Bulletin of the Atomic Scientists* 58, no. 5 (September/October 2002): 60, Academic Search Complete.

reasonable to assume that Russia has been continuing these tests in today's hostile climate.²⁸

One strategy that has worked so far to promote arms reduction is Megatons to Megawatts, a program from 1992 to 2014 in which Russia sent warheads to the United States for deenrichment from highly enriched uranium (HEU) to lower enriched uranium (LEU) and subsequent reuse in nuclear power plants.²⁹ In the process, Russia successfully shed about 20,000 warheads.³⁰ Although reimplementing a similar program would not directly address the issue of illicit tests, it would reduce pressure to conduct them as part of modernization by removing the weapons from the picture in the first place. In the near future, at the nearest opportunity of Russia-U.S. cooperation, both countries should negotiate a bilateral agreement to continue disarmament and slow modernization. This agreement might also catalyze cooperation in other spheres.

3.5 North Korea (Irrational)

As of 2017, North Korea has not signed the CTBT and continues to develop and test nuclear weapons. Currently possessing an estimated 13 to 21 nuclear weapons, Kim Jong Un, dictator of North Korea, plans to equip an arsenal of nuclear weapons by the end of 2017. The authoritative and tyrannical nature of Kim Jong Un classifies North Korea as an irrational actor, negating the feasibility of a standard treaty or pact. The only feasible solutions to alleviating tensions in North Korea involve peace negotiations and lenient nuclear treaties. Since major treaties such as the CTBT, backed by logical reasoning shall have minimal effect on North Korea, a simple peace talk or call should help to alleviate tensions. In addition, refraining from angering the dictator of North Korea is the most effective way to avoid a global nuclear calamity.

4 Conclusions and Looking Forward

These policy suggestions are meant to move forward a currently stagnant effort at nuclear disarmament by taking a regional approach to a universal issue. By allowing separate regions freedom to dictate their own specifics in order to address any individual concerns while keeping to an umbrella set of rules, the treaty becomes a more feasible method at promoting worldwide nuclear disarmament.

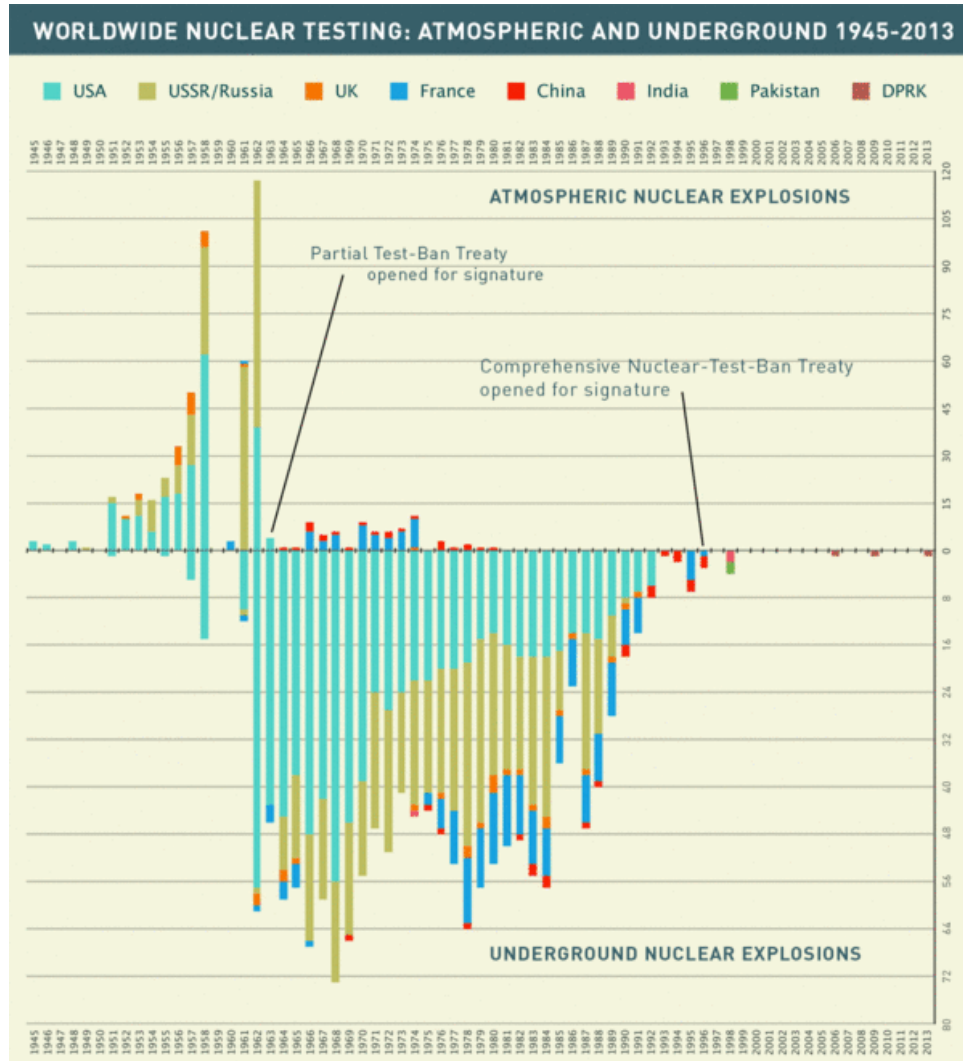
²⁸ House Armed Services Subcommittee on Strategic Forces, Nuclear Weapons Modernization in Russia and China: Understanding Impacts to the United States, H.R. Doc. No. 112, 1st Sess. (2011) (ProQuest).

²⁹ Christodoulos Kaoutzanis, "'Megatons to Megawatts': A Mega-Player of U.S. Nuclear Enrichment," *Georgetown International Environmental Law Review* 24, no. 1: 2, LexisNexis Scholastic Edition.

³⁰ "The end of 'Megatons to Megawatts,'" *Nuclear Engineering International* 59, no. 714 (January 2014): 6, General OneFile.

5 Figure Listing

Figure 1. A depiction of the worldwide nuclear testing rates with respect to the signature dates of the Partial Test-Ban Treaty and the CTBT.



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