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Science Diplomacy as a tool of international politics: the power of "soft power"

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SCIENCE DIPLOMACY AS A TOOL OF INTERNATIONAL POLITICS: THE POWER OF 'SOFT POWER'

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Abstract: Science and Technology (S&T) have historically been used by countries as tools of hard power, especially in military and economic contexts. Contrary to a strategy that uses S&T as a hard power tool, Science Diplomacy (SD) is an alternative form of using S&T in bilateral and multilateral interactions; one in which soft power predominates. Relying on examples of the foreign relations of the United States - one of the most developed countries in terms of S&T and SD - this article shows how SD has unified countries and has been employed as a strategy that assists diplomats in interpreting technical knowledge, supports scientists in negotiating multilateral projects, and, most importantly, promotes alliances between countries. The paper is divided in three main sections: in the first part, we present a brief summary of the intellectual history of the concept of SD, introducing and defining it and we discuss why countries invest in it. In the second part, we analyze to what extent S&T played a central role in re-establishing bilateral relations or in promoting more peaceful negotiations between the U.S. and Cuba, North Korea, Russia, and selected Muslim countries. In the third section, we offer our concluding remarks.

Key-words: Science Diplomacy; International Cooperation; Science and Technology

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I. Introduction

In this article, we show how SD has unified countries and has been employed as a strategy that not only assists diplomats in interpreting technical knowledge and supports scientists in negotiating multilateral projects, but that also promotes alliances between countries. In the introduction, we present the ongoing theoretical debate on SD and other related concepts being discussed among political scientists and international relations scholars. The goal is to situate the reader in the current debate, providing the conceptual tools for the analysis of the cases presented in the second part.

a) S&T and International Affairs

Only few studies in Political Science and International Relations (IR) have addressed the question of how Science and Technology (S&T) affect relations between States. Among those who work with this topic, the tendency is to emphasize the importance of S&T in contexts of scientific and technological development, war, the Economy, and trade relations (NOBLE, 1977; ANCARANI 1955; MALLIK, 2004). Contrary to the work of these scholars, this paper explores the contexts of policy and politics, arenas somewhat forgotten by a considerable number of scholars. Despite SD has been increasingly used as a foreign policy strategy, it has been barely studied in IR scholarship.

The first attempt to chart the relationship between S&T and international affairs was conducted by Eugene Skolnikoff in his book called 'The Elusive Transformation: Science, Technology and the Evolution of International Politics' (1993). One of his central preoccupations was to approach the relation between a state's principle of sovereignty and S&T, considering that the latter would be undermining the former (POPOLO, 2016). In his 2002 article (SKOLNIKOFF, 2002), the author does not add any information; he makes the same arguments, which does not bring original answers to the questions about SD. On the one hand, this perspective can be useful to analyze contexts such as American foreign policymaking in the areas of nuclear proliferation. On the other hand, however, these issues are likely to be less interesting in the current context of a rapidly changing international scenario, in which other actors have a presence and S&T are key topics for (peaceful or not) relations among states (POPOLO, 2016).

Another attempt to investigate IR and S&T was Caroline Wagner's 2002 article where she develops a new taxonomy of international collaboration in science. The author, as Skolnikoff

does, argues that science is continuously undermining the fundamental principle upon which foreign policy is based, i.e, sovereignty. However, she does not contribute substantially to the understanding of this complex relationship, neither she presents answers to the phenomena of SD. Weiss (2005; 2015) provides comprehensive analysis of the relationship between S&T and IR, however it is superficial in the sense that it does not emphasize the challenges, difficulties and limitations of such an approach. The main criticism is that the author does not bring elements from Science and Technology Studies into the world of IR.

In addition to these efforts, there are other attempts across the fields of applied policy making or the study of individual policy areas to chart the relations between international affairs and S&T. Some recent approaches are from the areas of conflict resolution (AUSUBEL; KEYNAN, 2001), history of science and technology (KRIGE; BARTH, 2006) and internationalization of science (WAGNER; LEYDESDORF). Nonetheless, recent scholarship in International Relations seems to be relying on the ideas first coined by the Royal Society and the American Association for the Advancement of Science to understand how S&T affect the relations between countries. This is the approach we use in this article, since it is the one most in consonance with the classic International Relations theoretical perspectives, such as Realism, Liberalism and Constructivism.

b) The concept of "Science Diplomacy"

Science Diplomacy (SD) is becoming a hot topic in the academic community. In addition to the increasing interest of the general press and governments in the subject, more and more journal articles and books about the topic are published every year. For instance, in 2012 the American Association for the Advancement of Science (AAAS) launched a journal (Science & Diplomacy) entirely devoted to SD questions. This is just one example of the recognition of the increasing complexity of international relations and the global expansion of S&T.

Science Diplomacy (SD) is a strategy used by political actors to stimulate scientific interactions between nations in order to achieve certain objectives such as strengthening the bonds of partnership, proposing solutions to common problems, and building knowledge (TUREKIAN; NEUREITER, 2012, FEDEROFF, 2009; ROYAL SOCIETY, 2010). SD can be classified as what Joseph Nye called *soft power*, i.e. exchange channels that have the potential to resolve conflicts and organize coalitions, building common interests and values that attract, persuade and influence (NYE, 2009; ROYAL SOCIETY, 2010). It is a consensus

that S&T were, and historically are important for the construction of *hard power*, in particular in the well-known military field. The innovative aspect of the new approaches of SD, especially the ones that use the same definition we are proposing here, lies in treating S&T topics as soft power instruments. Due to the attractiveness and influence of S&T, they can serve as a national global power asset that transcends national interests[3].

In other fields of knowledge, especially history and sociology of science, the idea of using S&T to establish and maintain political, economic, and social relations to other nations has been extensively investigated; however, in many cases the authors do not use the term "Science Diplomacy." In many historical accounts of the transfer of scientific investigation, technologies, and innovations, S&T are used in controversial ways. For instance, Salvatore (2016) shows how the United States used Sociology, Anthropology, and Archeology, in the beginning of the 20th century to "rediscover" South America, rendering the region legible for the American Government, and providing hegemonic control. Another example is Cullather's (2010) account of the Green Revolution, or on how food and agricultural sciences became the new instrument of diplomacy during the Cold War. He shows how S&T was used to, among other objectives, control entire populations and exact authority over resources and territory. Without being uncritical to the negative impacts of S&T exchanges, in this article, we address the positive outcomes S&T have brought to the relations between countries, a focus that only recently has been brought to light, especially after AAAS and Royal Society reports on the topic.

According to Linkov (2014), SD has three dimensions: science in diplomacy, diplomacy for science and science for diplomacy. Science in diplomacy is about employing scientists as advisors on international issues, enhancing the contribution of science to foreign policy objectives. This first dimension sees science from a critical perspective and is especially concerned with coping cooperatively with the global challenges of this century such as climate change. Science in diplomacy employS SD as a tool for communication between scientists and decision makers (LINVOK et al., 2014). The second dimension, diplomacy for science, emphasizes international cooperation and treats science as a bridge between communities whose political connections are weak and adds important diplomatic elements such as contracts and intellectual property to these communities (TUREKIAN, 2012). Science for diplomacy, the third dimension of SD, is the strategy of using S&T as instruments to approximate nations politically (GLUCKMAN et al., 2012).

[3] Joseph Nye defines *hard power* as the use of coercion and threats in international relations; s*oft power* is the ability to obtain certain results by attraction processes and cooptation (Nye, 2009).

Countries with high scientific excellence such as the United States and the United Kingdom have been using mechanisms of SD long before the Second World War. Brazil and other emerging countries like China are investing in this type of strategy more recently, especially after the Cold War. In the current context, SD has been used mainly to transform bilateral relations, promote public diplomacy, strengthen dialogue on cooperation in various subjects and even promote national security (DOLAN, 2012).

SD actions can be identified in foreign S&T policies in various ways: as the traditional bilateral, international and multilateral cooperation agreements in S&T; as memoranda of understanding and declarations of intentions; as investment in technical cooperation and international transfer of technologies; as development aid programs that include S&T activities or international institutions programs such as the Global Perspective On Science, Technology And Innovation of the United Nations Educational, Scientific and Cultural Organization (UNESCO); and other international cooperation agreements between governments and other institutions of science, technology and innovation. In an innovative way, countries with high scientific excellence have created new SD mechanisms such as sending scientific attachés to their embassies, organizing bilateral summits on topics of S&T, festivals and scientific exhibitions, creating development agencies offices abroad, and carrying out track two diplomacy i.e. contacts and informal and unofficial activities related to S&T subjects accomplished by private citizens or groups of individuals with no ties to the state.

Let us illustrate what SD is with some examples. In the years after the Cold War, the North Atlantic Treaty Organization (NATO) – via its Scientific Committee – began talks to create a new educational institution focused on the training of scientists and engineers from Eastern European countries, located in Western Europe. Although the institution recognizes S&T as a tool for economic and social development, its real interest was to advance European integration, linking the distant East nations to the developed West and to add power to the capitalist block (SKOLNIKOFF, 2001). Another example of SD happened around the 50's when the United States, the Soviet Union and the United Kingdom tried to build a scientific consensus to advance political negotiations around the Ban Treaty of nuclear trials (SKOLNIKOFF, 2001).

Regarding the current debate about Science Diplomacy, Hormats (2012) emphasizes the importance and visibility given to SD, especially due to the potential it has to strengthen relations between countries while advancing the frontiers of knowledge. The importance of a study about SD within Political Science and International Relations fields stems from the fact

that there is now global interconnection between the policies of different countries and the integration of science in these, transforming these science policies into a powerful political tool (LINKOV; TRUMP, 2014). But why should countries invest in SD and S&T?

c) Why do countries invest in S&T?

Scholarship in the field of Economy of Innovation, sociology of science and social studies of S&T (STS) are pioneers regarding the investigation of why countries and organizations invest in S&T). According to economists (DOSI, 1982; NELSON; WINTER, 1982; FREEMAN et al, 1982), S&T play a central role in the economic development process as it develops capabilities and stimulates businesses[4]. Sociologists and theorists of S&T, on the other hand, treat the international contact as an essential part of the social organization of scientific activity (MERTON, 1977). S&T are important not only for achieving goals related to the sphere of science (development of technological capacities and attraction of talents in certain disciplines), but also to stimulate connections in other areas, such as economic and political ones (WAGNER, 2002; PRICE, 1963). This occurs through strategies such as international cooperation and SD, that allow close communication with other nations, providing room for dialogue on matters of economic interest – attracting international investment and improving national competitiveness – political interest – the guarantee of national security and support for coping with global challenges – diplomatic interest – assistance to underdeveloped countries and the maintenance of the role of international donor – and cultural interest – unravel important historical aspects and preserve cultural material.

Moreover, these sociologists and theorists of S&T also investigate how the interaction between countries in S&T issues can contribute to the transformation of the pattern of relations between states (SKOLNIKOFF, 1993; GAILLARD, 1999). The cooperation in S&T, for example, enables countries to tackle global challenges (such as climate change, health issues and renewable energy resources) together. Therefore, it becomes essential for the development and implementation of public policies aimed at S&T national development (DUARTE, 2008; SALOMON, 1977).

The changes caused by S&T in the relations between states and the role they play in the international arena are evident when we look at a country like Brazil, for example. On the one

[4] This approach, however, provides a very narrow view of the consequences of investing in S&T and does not fit the scope of this paper. Sociologists and theorists of S&T are dedicated to understanding the motivations and actions of agents involved in S&T processes: researchers, bureaucrats, decision makers. Therefore, these approaches are better suited to this work.

hand Brazil receives knowledge from developed countries (through know-how, ans products and services otherwise not available there), and on the other, it not only participates with these same countries in international research organizations, but it also helps poor countries to acquire capabilities in S&T. This is only one of many examples of the dynamic role states play in S&T issues. S&T was a field dominated by the United States, but, currently, it became a multipolar field. Excellence in research is no longer synonymous with developed countries, and high quality S&T infrastructure can be found in almost every corner of the world (COLGLAZIER; LYONS, 2014). In this sense, many studies have focused on the necessary adaptations the United States must undertake to continue to be on the cutting edge of S&T: to increase investments in SD and international cooperation, as well as in defense and security (COLGLAZIER; LYONS, 2014; WHITE HOUSE, 2012).

S&T are used by states, unilaterally or cooperatively, to achieve their goals at the international level, combining them with geopolitics and economics. When officials visit other countries with which their country maintains friendly relations, it is quite common to include S&T items in the negotiation agenda. Diplomatic bodies believe that through S&T partnerships, countries can strengthen their economies as well as their trade and geopolitical positions in the international system (SKOLNIKOFF, 1993).

Due to the diverse goals that investment in S&T can meet and the range they achieve – far beyond the advancement of science – the investment in S&T ends up serving a wide range of objectives from intrinsic in science and directed to it; to other surpassing its borders. In this regard, states tend to adopt a 'broad paradigm' of international action in S&T, going far beyond a 'narrow paradigm'. The latter relates to improving the quality, scope and critical mass in S&T through the pooling of resources and domestic and foreign knowledge (EUROPEAN COMMISSION, 2009). According to the 'narrow paradigm' (EUROPEAN COMMISSION, 2009) the determinants for international action in S&T originate within the scientific community and then are translated into science policy instruments[53].

However, in addition to scientific objectives, the states use S&T to achieve other goals unrelated to the scientific sphere –the 'broad paradigm'. In general, there are three main causes for the adoption of a 'broad paradigm' of international action in S&T (EUROPEAN COMMISSION, 2009): the first concerns the objectives linked to the improvement of national competitiveness; the second includes goals related to security and the military sector; the third includes political and diplomatic intentions. The latter objective arises from the desire to

[5] Examples of major goals for international action are to solve scientific problems, achieve excellence in research and attract human resources.

create stable and positive diplomatic relations, as well as to indirectly ensure international security. Often scientific relations are the first step towards the establishment of diplomatic relations or as a result of lasting diplomatic ties (EUROPEAN COMMISSION, 2009).

II. From theory to action: Science Diplomacy cases involving the United States of America

Joseph Nye, who coined the concept of "soft power", has not only acted as an university professor and researcher, but also served three times as an employee of the United States Government, holding different positions. Thus, it is not surprising that his ideas have spread across his nation, being implemented both by the government of the United States and by independent national actors with a worldwide presence and influence. This section presents four examples of how SD acts like a tool to improve the relation between the U.S. and other nations through soft power. The cases presented here (Cuba, North Korea, Russia and Muslim countries, such as Egypt, Lybia and Pakistan) are illustrative of our argument and represent important foreign policy strategies in the field of S&T.

a) U.S.-Cuba science relations

For over fifty years the U.S. and Cuba have had a frozen relationship and have not developed any kind of political and economic linkages. Scientists have been trying to maintain S&T joint research; however, the obstacles imposed by the governments are formidable. Before the diplomatic breach, American and Cuban scientists collaborated in various fields. Due to the proximity between the two countries and the constant mobility of people, collaborative efforts especially in public health were extremely beneficial for both countries (TUREKIAN, 2014). However, with political and economic impediments, the scientific communities of both countries slowly separated, and today they have to put in a great deal of effort to collaborate.

More recently, the American Association for the Advancement of Science (AAAS) and the Cuban Academy of Science invested considerably in building a stronger S&T relationship between American and Cuban scientists. According to AAAS' director for diplomacy (TUREKIAN, 2014: 1065), SD is the most efficient tool to address "science-based questions whose answers are impeded because political relationships limit official interactions between the countries". More than a year before Obama and Castro shook hands and reopened

embassies, both academies of science signed an agreement committing to advance scientific cooperation, in April 2014 (KORTE, 2015). When both countries officially reestablished relations (July, 2015), the two scientific communities were already ready to intensify their cooperative linkages. In September, two medical institutes (the Roswell Park Cancer Institute in New York and Cuba's Center for Molecular Immunology) announced a collaboration to test a cancer vaccine, and in November, two agreements related to environmental protection were signed. The agreement signed on November 18th establishes a sister relationship between marine sanctuaries in the U.S. and Cuba, which will facilitate learning and exchange between scientists from both countries and benefit coral reef resources in the Atlantic Ocean (KORTE, 2015). The second agreement, signed on November 24th guides collaborative efforts regarding coastal and marine protection, the protection of biodiversity including endangered and threatened species, climate change, disaster risk reduction, and marine pollution (KORTE, 2015). The areas of collaboration between the countries are not a surprise: cancer is one of the most fatal diseases affecting Americans and Cubans and cooperative arrangements in environmental protection are a reflection of the great interconnectedness of the countries' ecosystems. They are separated by less than 100 miles of sea (KORTE, 2015) and it would be difficult for Americans to protect their own ecosystem without protecting Cuba's too (KORTE, 2015) since they are all interconnected. In December 2014, the first panel among scientists after the restoration of diplomatic relations was organized. Even though the United States declares that its approach to Cuba will be focused on empowering Cubans and supporting the emergence of a democratic society, the truth is that American scientists are interested in gaining expertise in several areas of Cuba expertise such as public health and environmental research (KORTE, 2015).

The relations between the U.S. and Cuba during the years of diplomatic breach were in fact only tolerated by both governments. Only private funds and independent institutions of scientists – like the Academy of Sciences of Cuba and the AAAS – fostered S&T partnerships up to the present (PATRANA, 2015). During the Republican years in the U.S., the Smithsonian tried to defend its right to continue working with Cuba; however its efforts were unsuccessful (PATRANA, 2015). Although today the perspective of improving bilateral relationships is good, the still existent embargo and the travelling laws inhibit great part of the collaborative efforts between the countries. Cuba suffers from economic difficulties and the U.S. still prohibits funding for Cuban scientists. In addition, the movement of non-governmental American scientists to Cuba is complicated by the bureaucratic process of getting a special license (KORTE, 2015).

b) U.S.-North Korea relations

The Democratic People's Republic of Korea (DPRK), also commonly known as North Korea, and the United States have not had official diplomatic relations for decades. Although the American government established contact with Korea's Joseon Dynasty in the 1880s, Japan dominated the territory in the 1910s. It was only when the Second World War came to an end and the Japanese surrendered, that the U.S. and the Soviet Union were able to take over the control of the Korean Peninsula. They decided to divide the island at the 38th parallel, creating two separated and independent countries: North Korea and South Korea. North Korea invaded South Korea in 1950 and, while the U.S. entered the war to support South Koreans, the Chinese and the Soviets were also involved on behalf of the North. Three years later, direct confrontation ceased when both sides agreed to an armistice, but a peace treaty was never signed. Following these events, the United States imposed a series of economic sanctions against Pyongyang, under its "Trading with the Enemy" Act, which continue to be maintained today after more than 60 years (SEO; THORSON, 2009).

Since then, the Union of Soviet Socialist Republics has collapsed, marking the end of the bipolar world of the Cold War, and even though there were efforts to reestablish connections between the United States and North Korea in the 1990s, considerable tension still remains among both nations. For instance, in 2001, President George W. Bush and his administration labeled North Korea as part of the so-called "axis of evil" (alongside Iran and Iraq) in response to the the development of a nuclear program with various tests of missiles – that allegedly have the capability to reach other Asian countries as well as the U.S. – carried out by Kim Jong-il and, more recently, by his son and successor Kim-Jong-un (SEO; THORSON, 2009).

Despite the political scenario of volatility and uncertainty, both governments allowed a "channel of engagement" for scientific cooperation to remain open (CAMPBELL, 2012). Through this channel, in 2001, two universities began sharing experiences and interacting with each other: Syracuse University, in New York, and Kim Chaek University of Technology (KCUT), in Pyongyang (THORSON, 2012). Because there is no diplomatic representation between the United States and North Korea, Syracuse University had the support of the DRPK's representatives at the United Nations and of the private, non-profit and non-partisan organization, Korea Society, to set up the bilateral agreement with KCUT. Focused on the area of information technology, both universities engaged researchers to form

a team that would implement and foster their connection in four phases (SEO; THORSON, 2009). The first phase began in 2002, when the first North Korean scholar delegation arrived in New York to visit Syracuse. Since then, at least other nine visit exchanges (seven to New York and two to Pyongyang), usually lasting from one to five weeks, occurred, facilitated by the agreement (SEO; THORSON, 2009). Moreover, the academic institutions held four joint meetings in Beijing during the period of 2002 - 2009. An important achievement of the first phase of their cooperation was the creation of RDPK's first digital library at Kim Chaek University of Technology, replacing the traditional physical card model of catalogue. After receiving official authorization of the United States government, SU exported low-level computing equipment to North Korea and, in January 2006, the library was opened to the KUT community (SEO; THORSON, 2009).

During 2005, the second phase started with the launching of the Regional Scholars and Leaders Seminar Program (RSLS) in Beijing, China. With the objective of developing capabilities of new leaders in information technology, the RSLS program was organized by SU, the Korea Society and South Korea's Pohang University of Science and Technology (POSTECH). It also had the support of China's Huazhong University of Science and Technology. It was the first time an initiative of this kind was available for North Korean researchers (SEO; THORSON, 2009). Also in 2005, one of the participants of the first RSLS Program suggested that Syracuse and KUT made efforts to take a North Korean delegation to the International Collegiate Programming Contest (ICPC), an event organized by the Association for Computing Machinery (ACM). After arranging meetings with ACM and the United Board for Christian Higher Education in Asia, the organizers were convinced to invite North Korea to the ICPC and, in its 2006 edition, three undergraduate teams competed as representatives of DPRK for the first time (SEO; THORSON, 2009). These efforts were known as the third phase of the SU-KUT cooperation.

Finally, in 2007, building on all the accomplishments of the agreement between Syracuse University and Kim Chaek University of Technology, many Non-Governmental Organizations such as the AAAS, CRDF Global, and the Pacific Century Institute decided to join forces to create the U.S.-DPRK Scientific Engagement Consortium. Considered the fourth phase of the SU-KUT cooperation, the consortium has described itself as an "action-oriented" body and has focused mainly on establishing an English language training program and developing a completely virtual science library to facilitate access to scientific knowledge in North Korea (CAMPBELL, 2012).

Although relations between the United States and North Korea are still far from being pacific and stable, it is possible to argue that, in this case, SD has been a successful strategy to promote some interaction between two societies that have been, for many decades, almost totally separated. While the official discourse, on both sides, express deep and irreconcilable differences, the SU-KUT cooperation and the U.S.-DPRK Scientific Engagement Consortium could not have achieved any results if the North Korean and American governments had not provided some type of direct and/or indirect aid (SEO; THORSON, 2009). Therefore, despite not being the ultimate solution, scientific cooperation can be considered a path with the potential to lead to one (CAMPBELL, 2012).

c) US-Russia relations

In the bipolarized world of the second half of the 20th century, the high tensions and threats between the Union of Soviet Socialist Republics (USSR) and the United States (U.S.) did not interrupt scientific cooperation within their academic communities. For instance, even though there was a race for atomic weaponry, agreements were signed by both countries in an effort to share technology that would verify nuclear arms control (ROYAL SOCIETY, 2010). During the 1990s, despite the collapse of the USSR and the reminiscence – in many regions – of anti-American beliefs, collaboration between Russian and U.S. academies continued to grow. Two specific areas presented interesting achievements: SD in healthcare and SD for the Arctic governance.

Health cooperation between Russian and American societies dates back to the 1950s and had extraordinary results, such as the polio vaccine, which was developed by an American and first applied in mass scale by a Soviet scientist (ROJANSKI; TABAROVSKI, 2013). However, with the fragmentation of the Soviet Union in 1990, the cooperation assumed a model focused on human assistance, coordinated by the U.S. Agency for International Development (USAID) and the Center for Disease Control and Prevention (CDC), that allocated – from 1991 to 2012 – a large portion of its US$ 2.6 billion investment on health issues (ROJANSKI; TABAROVSKI, 2013). Another important achievement was the creation, in 2009, of the U.S.-Russia Bilateral President Commission, a working group with the object to foster dialogue and cooperation between these nations to find mutual solutions for the mutual challenges they face. The institution has a body devoted especially to healthcare issues and has, since then, been focusing its actions in four strategic fields:

scientific collaboration, global health, children (and maternal) health, and healthy lifestyles (ROJANSKI; TABAROVSKI, 2013).

As to the governance of the Arctic Ocean, due to the environmental transformations of the region in the last decades and the possibilities of new explorations of the land that are expected to emerge, not only the United States and Russia but also all of the other Arctic states have shown an increasing interest in this region (ROYAL SOCIETY, 2010). Tension has been especially high because, except for Moscow, every other Arctic nation is part of the NATO (North Atlantic Treaty Organization), organization considered by the Russian government as one of the biggest threats to the country's national security (BERKMAN, 2014). Moreover, recent disputes between Russia and Ukraine for Crimea forced the U.S. publicly acknowledge the need of a united front in the Arctic to ensure international stability, deepening Russian concerns (BERKMAN, 2014). Therefore, initiatives to debate the challenges of international governance in the Arctic are highly relevant to the maintenance of peace in the region (BERKMAN, 2014). The best example is the "Arctic Forum for Dialogue," a space of discussion organized by the Russian Geographic Society since 2010 that gathers not only head-of-states and government officials but also scientists, indigenous people and non-governmental organization representatives. The initiative also shows the value of scientific communities' direct engagement in policy-making, achieving new milestones to ensure that the United States and Russia remain cooperating with one another (CAMPBELL, 2014).

d) U.S. - Muslim countries relations

In 2009, President Obama gave a speech at the University of Cairo where he declared the commitment of the United States to a program of scientific and technological cooperation with Muslim countries. That program was a cornerstone to the U.S. efforts to improve relations with Muslim countries (OBAMA, 2009). Muslim countries is a simplified category that does not represent all the diversity in terms of politics, economics and social relations of Middle-East and African countries. We acknowledge these differences and abhor the generalization in one simple category; however, we use it in this article for a good reason: it makes sense in the context of U.S. foreign policy.

The effort of strengthening American relations with Muslim countries comes within an overall policy of improving the perception of the U.S. in Muslim majority countries. According to Campbell (2015), in worldwide polls, the U.S. received strong negative views

regarding its relations to Muslim countries, although these countries have strong admiration for U.S. S&T. Before Cairo in 2010, the U.S. had already had cooperative plans with some Muslim countries. Libya, for example, was a good collaborator despite its status of a state sponsor of terror. After Libya announced plans to dismantle its weapons of mass destruction and long-range ballistic missile program and begin to cooperate with international partners, a S&T agreement was signed, which represented a "new phase in U.S. - Libyan relations" and demonstrated the U.S. commitment to bilateral cooperation (DOLAN, 2012). According to a note of the Department of State, the Libyan example is one among a "broader effort to reach out to the Maghreb countries in particular and Muslim-majority countries more broadly, and to improve international public understanding of American values, policies and initiatives." (DoS, 2007). From 2004 to 2006, the Department of State started regional dialogues about S&T and agreement negotiations with Tunisia, Algeria, and Morocco (DOLAN, 2012).

The relations with Pakistan are another example of the U.S. initiative towards Muslim countries. Following 9/11, Pakistan had become a vital ally for antiterrorism efforts. In 2003, an S&T agreement was signed in order to initiate cooperation in education, health, and capacity building. In the U.S., the program is coordinated by the U.S. Academy of Sciences. The partnership is considered to be very successful by the two countries: both governments committed funds for joints programs within the agreement; the groups that receive funding are selected through a competitive and transparent review process in which all funding decisions are made by consensus; a joint committee was established and they are committed to regular meetings; the areas for potential collaboration are already known since they were mapped prior to signing the agreement. (DOLAN, 2012).

In addition to programs with Libya and Pakistan, the U.S. has worked since 2002 with Iran in the U.S.-Iran engagement in science, engineering, and health. During the first decade of this program, both national academies and partner organizations engaged more than 500 scientists and engineers from over 80 institutions in both countries. During visits, hundreds of additional scientists have met with their counterparts abroad and American scientists delivered lectures for thousands of Iranian scientists and students. Moreover, workshops have been the primary mechanism for the engagement effort, and seventeen were jointly organized, with more than 500 participants. (SCHWEITZER, 2010).

In addition to bilateral initiatives, in 2009 and 2010, the U.S. invested in three actions in order to convene scientists from a higher number of Muslim countries. The Department of State sent nine prominent U.S. scientists to a group of Muslim countries "to explore ways to strengthen partnerships and solve common science and engineering challenges" (CAMPBEL,

2015, p. 35). The envoys came back with series of advices on how to improve and consolidate the program and extend its duration. The future of the program is uncertain, since it has no direct funding associated with it, however, the initiative is unprecedented and it can represent the beginning of a new program. In 2009, the U.S. Agency for International Development (USAID) and the State Department began the creation of a center of excellence: (CAMPBELL, 2015) the Middle East, and North Africa Network of Water Centers of Excellence (MENA). The center convenes several institutions, universities and international organizations from the Middle East, North Africa, Europe and North America to share knowledge, cooperate on technical research and develop capacity. Lastly, since 2011, the U.S. National Academy of Sciences and the National Academy of Engineering organize the Arab-American Frontiers of Science, Engineering, and Medicine program with a variety of Arab partners (CAMPBELL, 2015). The meeting convenes outstanding young scientists, engineers, and medical professionals from the United States and the 22 countries of the Arab League. The overall goal of the program is to "increase scientific exchange and dialogue among researchers in Arab countries and the United States, and to facilitate research collaboration within and beyond the region" (CAMPBELL, 2015).

III. Concluding remarks

The goal of this paper was to demonstrate how SD has unified countries and has been employed as a strategy that assists diplomats in interpreting technical knowledge, supports scientists in negotiating multilateral projects, and, most importantly, promotes alliances between countries. Following a brief summary of the intellectual history of the concept of SD, we presented four cases in which SD strategies were used by the U.S. These cases reveal the power of SD in building relations between countries that otherwise have weak or even hostile political and economic ties. The number of programs financed by the partners in these cases reveal reciprocal interest in building research partnerships. Despite a blockage in U.S. – Cuban political and economic relations, cooperation in S&T persisted in the Cuban case. Scientists continued to work together, overcoming political and economic obstacles. Regarding the partnership between the U.S. and Muslim countries, researchers continued to meet, travel and benefit from research opportunities even in times of open military conflict. The same occured for the cases of North Korea and Russia, where the political scenario did not impede scientific cooperation between these countries and the U.S.

The role of non-governmental institutions in building research links is a significant component in all cases. Despite being underrepresented by analytical studies on SD issues, scientific institutions, national academies of science and other agencies that are independent from national governments governments are especially relevant in maintaining a healthy relation and dialogue among researches of different states. On the other hand, the lack of political and economic ties complicated an effective approximation of the countries. For instance, Cuba, North Korea and Muslim countries face harsh financial constraints, as well as varied degrees of political turmoil (some are in times of civil war). Therefore, the commitment to any kind of stable funding is complicated and it can result in cancellation of scientific programs or slower implementation, at best. Since the Arab Spring, cooperative activities have been put on hold with many countries in the region. The agreements signed by the U.S. are a gesture of good faith but they do not automatically compromise money to programs. In addition, there are still visa and security restrictions that prevent the mobility of researchers and students, which stimulate Cuban, North Korean, Russian and Muslim scholars to turn toward other regions of the world, especially Europe and Asia.

Considering all these difficulties, we conclude that, even though SD is especially dependent on political and economic factors, the aforementioned cases reveal that cooperative activities among researchers are possible even in situations where political and economic ties are nonexistent or underdeveloped. SD proved to be a good strategy to unified countries - including countries whose diplomatic relations are shaken - and to promote some kind of bargain in order to obtain assets, access to markets, or to reward certain kinds of behavior. Libya and Pakistan are excellent examples. As we showed, U.S. SD strategy intensified after Libya disarmament and the alliance with Pakistan was crucial for U.S. foreign policy objectives. In both cases, S&T were used strategically and allowed the maintenance of good relations.

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Abbreviations

ACM - Association for Computing Machinery
AAAS – American Association for the Advancement of Science
CDC – Center for Diseases Control
DPRK - The Democratic People's Republic of Korea
ICPC - International Collegiate Programming Contest
KCUT - Kim Chaek University of Technology
MENA - Middle East, and North Africa Network of Water Centers of Excellence
NATO – North Atlantic Treaty Organization
POSTECH - South Korea's Pohang University of Science and Technology
RSLS - Regional Scholars and Leaders Seminar Program
SD – Science Diplomacy
STI – Science, Technology and Innovation
STS – Science and Technology Studies
SU - Syracuse University
S&T – Science and Technology
UNESCO - United Nations Educational, Scientific and Cultural Organization

U.S. – United States

USAID – United States Agency for International Development

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