

Progress Toward an Asteroid Deflection Treaty

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Abstract

In 2003, the author presented an IISL paper to examine interdisciplinary obstacles that complicate the draft and implementation of a Near Earth Object (NEO) defense treaty.² An updated analysis is justified by increasing government and societal attention on large-scale disaster planning, mitigation and response on Earth. Growing international attention is focusing on redefining environmental defense. This has evolved to include greater emphasis on impact hazard determination and policies which are required prior to the deflection of any large asteroid impact. The paper will argue how interpretations of Principles Relevant to Nuclear Power Sources in Space, the Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, and other treaties, only appear to forbid 'environmental modification' that creates most notably, "widespread, long-lasting or severe effects as the means of destruction, damage, or injury." Peaceful uses are explicitly allowed, and would thus support the idea of applying nuclear propulsion for eventual asteroid deflection. Such an initiative would benefit from coordinated, monitoring where roles would be outlined in a treaty. The implications of the U.S. position on the Kyoto Protocol, the Anti-Ballistic Missile Treaty and Nuclear Test Ban Treaty, will be addressed alongside the evolution of efforts by the B612 Foundation, the World Federation of Scientists Permanent Monitoring Panel (PMP) for Defense Against Cosmic Objects, Spaceguard, and the

International Council for Science (ICSU), which strongly encourage negotiation of protocols before an impact is predicted. The paper will also make connections among the anticipated Prometheus mission, international capacity-building and the perception of asteroid deflection strategy.

Introduction

Regardless of where a large asteroid or comet may eventually strike the Earth, significant reasons exist to perceive this as a serious global threat.³ Nations on Earth are increasingly connected through trade, energy, communications and transportation infrastructure, economics, political affairs, diplomacy and trans-border problems. Yet, policymakers involved in environmental crises have historically tended to be reactive as opposed to proactive in both thinking and initiatives.

This paper recognizes conditions that cause governments, organizations and agencies to re-evaluate their notions of environmental disaster and defense. In turn, actors both within and external to the traditional space science community, are arguably reframing their views of environmental defense, increasing of the value of geoscience research and applications, intra-professional teamwork and capacity building.⁴ The above-described change in mindset is progressively preparing the world to deal with the consequences of a large asteroid disaster. Over time, legal frameworks of sovereign States involved in disaster mitigation and response will determine the degree to which international law is re-defined, internalized and applied.⁵

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Definitions

The terms *commitment* and *compliance* reflect that laws determine political interactions as much as how these interactions affect the perception of domestic laws and legal institutions.⁶

International law codifies State commitments in collectively agreed upon statements of intent that can have implicit undertones based on different State interests and strategic diplomacy. Such commitments may be explained and quantified in the words of legal instruments. Statements of intent are explained in a treaty by individuals at State levels of authority. Different levels of authority beneath this include local authorities, professional teams and community responders who interpret commitment and compliance at their own level with regard to their specific roles and responsibilities.⁷

Perception : Asteroid Collision Threat

General Public

The general public often bases its understanding of the asteroid threat on comic strips, science fiction stories or popular Hollywood films like *Armageddon* or *Deep Impact*. In 2004, the media repeatedly highlighted asteroid MN4 and others to draw new attention to threats of possible collisions. Public interest in issues has potential to influence government decision-making.⁸

Governments

Government policy makers and budget controllers perceive the large impact, low probability asteroid threat differently on a scale from major to minor, to virtual or non-existent.⁹

For example, consider that the Australian government funded asteroid-related surveillance research through Spaceguard 1988-1996, and then discontinued this financial support in favor of other science and environmental priorities.¹⁰ Geoscience Australia currently has a multidisciplinary impact hazard department that defines and researches many terrestrial impact hazards.¹¹

The U.S., through NASA, is for instance, funding a study to document all the asteroids more than 1km in diameter. This study should be complete in 2008. NASA also has a department dedicated to impact hazard research which undertakes a variety of initiatives.¹²

In 2001, a high-level U.K. Task Force presented a report to the U.K. Science Minister. This initiative led to a trigger effect of soliciting and recruiting interest in the issue from other nations. Financial investment in research of this kind of potential environmental disaster in the U.K. led to an international conference on NEO Impact Hazards hosted by the OECD Global Science Forum. This event laid groundwork for new inter-governmental cooperation.¹³

Scientists

The International Council of Scientific Unions and Member Societies as well as the World Federation of Scientists Permanent Monitoring Panel (PMP) on Defense Against Cosmic Objects, study asteroid issues and have taken fragmented initiatives to define an asteroid deflection treaty.¹⁴ The B612 Foundation also promotes the need to develop nuclear asteroid deflection technology by 2015.¹⁵ Scientists locate, study and track asteroids, enabling them to grasp the realities of cosmic threats.¹⁶

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Government & Scientists Together

The U.S. American Institute of Aeronautics and Astronautics (AIAA) hosted an NEO hazards conference in February 2004. Scientists and high level government representatives were invited. An international group of scientists and government representatives also met in Tenerife, Spain in November 2004 to discuss the issue. A comet and asteroid defense strategy task force was set up during the 2004 IAF to research and compare international approaches for large-scale disaster mitigation and response in a comprehensive report.¹⁷

This said, effective information sharing and consistent coordination about impact hazards is lacking among high-level decision-makers. They often have diverging policy and budget interests. All-the-while, environmental disasters that bring together national leaders and scientific authorities to solve urgent matters are arguably contributing to an evolving global surveillance program. These new kinds of global mobilization and cooperation have yet to be solidified in a treaty, a document which traditionally defines predictable power structures and hierarchies. This may not be appropriate where nature and locations of disasters are unpredictable.

Youth

Youth initiatives have organized conferences¹⁸ and space policy summits in cooperation with space leaders about space priorities.¹⁹ Together, they recognize benefits to be found in substantially increasing the scope of common national space programs including, updating national space defense programs to focus on environmental defense strategies.²⁰

Actors in Environmental Defense

A widening range of professionals and communities are beginning to recognize their interests in learning more about mitigation and response to large-scale disasters. NEO Impact Hazards are thus drawing increasing interest and discussion from more than simply groups of astronomers and hard space scientists.

Experts see connections from their areas of risk management, psychology of change, coping and recovery, law, and emergency responders to large disasters like the 2004 Asian tsunami and hurricanes Katrina and Rita. Earthquakes, floods, volcanic eruptions, unexpected climate change, and other environmental crises are some of the envisioned consequences of a large asteroid collision. The above individuals are not typically involved in defining the frameworks of international law, but they're involved in executing it.

International Law

International lawyers draft agreements with varying degrees of foresight. These individuals aim to anticipate interpretations and future applications of their documents such that they could remain active, in force and pertinent in a variety of circumstances. This is important to recognize in light of justifying any eventual asteroid deflection treaty and related initiatives that would be justified therein.

Agreements such as *Principles Relevant to Nuclear Power Sources* and the *Convention on the Prohibition of Military or any other Hostile Use of Environmental Modification Techniques*, *The Nuclear Test Ban Treaty* and *Anti-*

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Ballistic Missile Treaty Regime (ABTR) were drafted as efforts to avert and prevent destruction in the context of escalating war or other kinds of conflict among civilizations. The first two documents specifically allow “peaceful uses” of nuclear applications which would help to justify any eventual use to deflect large asteroids from colliding with Earth. The Outer Space Treaty (1967) outlines the peaceful uses of outer space.²¹

International Space Station Example

Three tiers of International Space Station (ISS) Agreements and their execution help to clarify a flexible mindset about hierarchies, cooperation and management. Related capacity-building would be vital to the development of an international asteroid deflection treaty and response to any asteroid-related environmental disaster.

The Intergovernmental agreement (IGA) is the highest-level ISS legal regime, defined by national government representatives comprised of rules grounded in jurisdictions (areas under power and control) of ISS Partners. Fifteen ISS Partner States signed a treaty on January 29, 1998 to formalize the ISS IGA.²²

A lower level of ISS legal instruments, MOUs (Memoranda of Understanding) involves the Cooperating Partner Agencies that delegate program responsibilities to their respective space agencies. The third level of ISS instruments is defined by Implementing Arrangements (IAs) between the space agencies. They have been created to develop the ISS MOUs and as such, to delegate some authority to professional teams. They enabled teams to clarify team-level guidelines.

State Level Compliance

An analysis of compliance²³ is wisely approached from several perspectives and on the basis of several causal factors. Why would nations benefit from engaging in an asteroid deflection treaty? Why prioritize interest in universal survival? To recognize different reasons why and how individual governments and societies would seek to assist each other leads to gaining a better grasp of key differences in the kinds of compliance defined and applied by traditional legal instruments.

So long as circumstances are predictable, and each State has the will and circumstances to meet its treaty-defined obligations, State level compliance to environmental defense instruments would be achieved when Partner governments alter behavior and policies, and impose rules and regulations in their societies to meet their collective commitments. This could refer to environmental defense initiatives in media, policy debates, and when forming scientific and policy task forces, allocating budgets, discussing research options, commercial and other development on national agendas, and in diplomatic exchanges.²⁴

Understandably, with multiple interests to satisfy on different levels, issues are best addressed individually. Compliance is based on the context of specific legal and political relationships among actors.²⁵ For instance, compliance is seen where governments, agencies, professionals, teams, and emergency responders have approved, discussed or changed their commitments and reached consensus on how to implement them. This would benefit from an interdisciplinary team approach to traditional law/ policy-making.

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Interdisciplinary Compliance

Consider some of the potential reasons for seeking interdisciplinary compliance with regard to any general environmental defense agreement or eventual asteroid deflection treaty:

- a) To refine protection of political, economic, socio-cultural and other international interests
- b) To uphold a moral principle, whether or not a violation would cause harm.
- c) To impact more interactions than the agreement was designed to protect.
- d) To avoid the problem of setting precedents for future breaches.

Compliance can also be defined by objectives of parties external to those parties involved in a disagreement. For instance, a nation that didn't agree to sign onto the environmental defense treaty was hit by a disaster and unforeseen economic difficulties. This external party could raise questions about signatory compliance and yet the very nature of such an agreement would be to assist regardless of signatory. Perceived legal rights and duties of each party would not have to make such a situation difficult to resolve.

Recall that each ISS Partner State has domestic interests while also being a member of the international community with multinational interests to reconcile. If a specific ISS program timeline changes or technical procedures are changed in the short term, this reality has repercussions on the livelihoods and activities of many people in different countries, companies and entities who are increasingly interdependent.

Also, there is a tendency for government to focus on short-term interest when handling issues of commitment and compliance.²⁶ Consider that a disagreement amongst some actors about what constitutes acceptable and unacceptable conduct or interpretation of terms.

The idea of interdisciplinary compliance is justified by changing understandings of commitment and compliance that may evolve based on negotiations subsequent to those of initial agreements. It is also imperative to recognize the potential for inconsistent objectives among actors.

Possible use of precautionary language, such as "should" reveals a point. In essence, law may be an attempt to define good faith²⁷ in the performance of implementing ISS Program instruments. The good faith is a principle in International Treaty Law.

Conclusion

If progress toward an asteroid treaty is understood as moving closer toward realizing this specific goal, then such a treaty would only be effective in practice to the degree it is understood and applied by actors beneath the level of its conception. The key weakness of such an example of international law is less the issue of enforcement than how to increase understanding of its premise.

The issue of how well each actor lives up to his/her commitments, would mean the roles at different levels would need to be defined. The nature of international cooperation in preparing for other disasters is crucial to the overall perception of progress toward an asteroid deflection treaty or any other environmental defense agreement. To compare and contrast how previous

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space science and international law commitments have been respected or re-defined, points to issues that require new action.

The credibility of respective decision-making politics of international relations is helpful to identify national priorities, and to identify binding and soft law commitments. As time when a variety of national and international environmental disasters evolve, opportunities exist for all nations to challenge, confirm, modify or supplement their formerly outlined notions of environmental defense.

In closing, increased international cooperation recognizes,

plans for, and responds to large-scale earthquakes, tsunamis and other environmental catastrophes. This political recognition is gradually leading to a higher profile and more attention being paid to possible results of space impact hazards, such as impact collisions. This recognition is translated into budget allocation for smaller-scale environmental disaster clean-up and hopefully more proactive research.

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2 Covert, Liara "Before Celestial Bodies Collide-Enhanced Dialogue and Coordination: Precursors to a Treaty for Effective Near Earth Object (NEO) Disaster Response," 2003, p. 1-11. Proceedings of 47th Colloquium of the Laws of Outer Space (AIAA 2004). 54th IAF Congress.

3 Steel, Duncan (2005) *Sky & Space Australia*. July-August. 52-59. (Secondary Sources; Steel, Duncan, *Rogue Asteroids & Dooms Day Comets*, Wiley, NY and Brisbane 1995; Steel Duncan, "Target Earth" *Reader's Digest*, NY and Sydney, 2001; Seamone Evan, (various); Covert, Liara, IISL papers (2000, 2001, 2002, 2003, 2004); Glikson, Andrew (various); OECD Global Science Forum Frascati Final Report, 2003; AIAA Asteroid Defence Conference Papers, 2004; Posner Judge, *Asteroids & International Law*, 2000).

4 Covert, Liara (2001) "Autonomous Multilateral Teams and their Impact on Customary Practice," IAF-IISL Proceedings, Toulouse, France.

5 Kindred Hugh M., Mickelson Karin,

McDorman Ted L., Provost Rene, de Mestral

Armand L.C., Reif Linda C., and Williams Sharon A. (2000), *International Law Chiefly as Interpreted and Applied in Canada*, Sixth Edition, Emond Montgomery Publications Limited, pp. 165.

6 Slaughter Anne Marie (2000), "What International Relations Can Offer International Law", from *International Law and International Relations*, Academie de Droit International, *Recueil des Cours*, Volume 285, p. 26-30.

7 Covert (2002), Doctoral Thesis, *International Space Station (ISS) Negotiations and Manned Space Strategy (MSS): Towards the Consideration of a Multinational Astronaut Corps (MAC)*, Introduction; (thesis 650 pgs).

8 Covert, Liara, "Asteroid, Comet and Planetary Defense: The Joke's On Whom?: A breakdown of Actors in Large-scale disaster Negotiations," *Emerging Issues in Policy & Law*, IAC Electronic Proceedings, 2004, October; *ibid* "The Post Human Era: A Time to Reduce Barriers to Intra-professional Dialogue & apply more effective Policy Response," Proceedings of 48th Colloquium of the Laws of Outer Space (AIAA 2004). 55th IAF Congress.

9 See Global Science Forum, *NEO Conference Final Report* (2003) Frascati, Italy; also nature of media coverage of NASA Deep Impact Mission & individual asteroid sightings.

10 Based on communications with Michael Paine, Ted Bryant, Victor Gostin, Duncan Steel, Andrew Glikson, U.K. Spaceguard and U.S. Spaceguard (2005).

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11 Based on dialogue with Barry Drummond and John Schneider (2005)

12 Based on communications with Dr. David Morrison

13 Based on communications with OECD conference organizer and individual national & scientific participants. One key issue outlined in the five main recommendations, implied all countries represented at the conference did not perceive impact hazards as a serious threat worthy of attention and research funding.

14 See Schweikert, Russell (2004), B612 Foundation, "Asteroid Deflection" (p. 1-7); also communications.

15 See www.b612foundation.org

16 Consider Tunguska Event (1908), Yucatan, and refer also to www.unb.ca/passc (Planetary and Space Science Centre)

17 The author is a member of this Task Force.

18 Consider Space Generation Forum (SGF) which took place at the U.N. (Vienna) at the same time as the UNISPACE III Ministerial (1999)- www.space-generation.org; the evolution of the Space Generation Advisory Council (SGAC) www.sgac.org and initiatives (in both the author was a delegate/ participant)

19 See "Space Priorities for the 21st Century," document with emerged from UNISPACE III and the Vienna Convention.

20 Full Report submitted to the EU Green Paper: <http://www.unsgac.org/downloads/documents/EU/EUSpacePolicy21.6.03.pdf>

20 SGAC Position Papers to the Space Policy Summit: <http://www.unsgac.org/sgs/papers/Breakdown/SPS.pdf>

21 See also 18 UST 2410, TIAS 6347, 610 UNTS 205 (1967)-- (The Outer Space Treaty). The other four space treaties are: Convention on International Liability for Damages Caused By Space Objects, 24 UST 2389, TIAS 2262, 961 UNTS 187 (1971); Convention on the Registration of Objects Launched into Outer Space, 28 UST 695, TIAS 8480, 1023 UNTS 15 (1976); Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched into Outer Space, 19 UST 7570, TIAS 6599, 672 UNTS 119 (1968); and the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 UNTS 3, 18 ILM 1434 (1984).

22 The 1998 ISS IGA treaty was signed by the governments of the United States, Canada, Japan, the Russian Federation, and eleven Member States of the European Space Agency (Belgium, Denmark, France, Germany, Italy, The Netherlands, Norway, Spain, Sweden, Switzerland, and the

United Kingdom of Great Britain and Northern Ireland), see 1998 ISS IGA.

23 The Oxford English Dictionary (1996, 285) offers several definitions, from "obedience to a request" and "yielding" to "unworthy acquiescence"; Benedict Kingsbury suggests that, "there is a shared understanding that compliance is adequately defined as conformity of behavior with legal rules, and agreement that the real problems are about such matters as measuring, monitoring and improving compliance," taken from pp. 49, "The Concept of Compliance as a Function of Competing Conceptions of International Law" in *International Compliance with Non-Binding Accords*, Edited by Edith Brown Weiss, *Studies in Transnational Legal Policy*, No. 29, American Society of International Law, Washington, D.C. 1997; Alternatively, Peter M. Haas states that compliance is explained by "well-established patterns or expectations for patterns [of behavior]" in international relations and ultimately, "compliance is a matter of state choice," taken from "Choosing to Comply: Theorizing from International Relations and Comparative Politics," Chapter 2, *Compliance Theories*, pp. 43-64, in Shelton, Id. 11.

24 See for example, U.S. Public Law 106-391 (106th Congress) which authorizes NASA appropriations for fiscal years 2000, 2001, and 2002 and for other purposes; see Canadian the Civil International Space Station Agreement Implementation Act, S.C., 1999, c.35 Statute No. 999, Article 13-28 and Annex; ESA Ministerial Meeting 2001, 2002 summary and respective ESA Member State Science and Technology Policies.

25 Henkin Louis (1968), "How Nations Behave: Law and Foreign Policy 253, pp. 256-257.

26 "The more that the legal system decides for, and thus, becomes identified with, one side of a major conflict, the less it becomes able to act as an impartial arbiter whose decisions are readily respected." (Fisher, 1981, 25-26); Fisher Roger (1981). *Improving Compliance with International Law*. Procedural Aspects of International Law Series. Volume 14. University Press of Virginia Charlottesville. 370pgs.

27 See "Definition of the Principle of Good Faith in International Law", Chapter 8 in J.K.F. O'Connor (1991) *Good Faith in International Law*, Ashgate Publishers, pp. 117-125, and especially the principles of "honesty, fairness and reasonableness" which require clarification in the context of a given arrangement.