Dan Lindley

Cooperative Airborne Monitoring: Opening the Skies to Promote Peace, Protect the Environment, and Cope with Natural Disasters

ABSTRACT

Few arms control scholars or practitioners are familiar with the Open Skies Treaty and ny other cooperative airborne monitoring programs. Yet, the Treaty just began full-scale implementation on January 1, 2006, and all NATO members and many states in the area of the former Warsaw Pact are subject to overflights. According to the quotas specified by the treaty, the US and Russia will each be subject to up to forty-two confidence-building overflights per year by planes equipped with cameras and other sensors – though there will be only four overflights in 2006. Other parties to the Treaty have overflight quotas between two and twelve. This is progress, but there are a host of new applications for airborne monitoring regimes that have barely been explored. This article summarizes the history and current status of Open Skies, indicating its strengths but also highlighting its weaknesses. Finally, it suggests areas for future uses of cooperative airborne monitoring. Open Skies-like regimes could be an effective tool in a number of global conflict areas including between India and Pakistan and on the Horn of Africa, they could help monitor arms control agreements, and they can be used to survey the environment for a number of purposes: verifying environmental rules and treaties, evaluating degradation and other trends, and natural disaster assessment.

INTRODUCTION[1]

Despite the importance of controlling weapons of mass destruction or helping prevent war, few new arms control initiatives seem on the horizon. The political climate is one in which innovation seems nearly futile, and even the Nunn-Lugar/Cooperative Threat Reduction program to help control poorly guarded nuclear materials in Russia did not receive substantially higher priority after 9/11.[2] In this context, few know that an Open Skies Treaty entered into force in

[1] Assistant Professor, Department of Political Science, 448 Decio Hall, University of Notre Dame, Notre Dame, IN 46556 Phone: 574-631-3226, Fax: 574-631-8209, Email: dlindley@nd.edu. I would like to thank Matthew Flynn for his research assistance, and Francis X. Stenger and several anonymous reviewers for their helpful comments.

[2] For more information, see the Nuclear Threat Initiative website at <<http://www.nti.org/f_wmd411/f1b5_2.html>>.

January 1, 2002 and recently began full-scale implementation on January 1, 2006. In fact, efforts to calm tensions in Europe have included the Open Skies program, and airborne monitoring between Hungary and Romania in the early 1990s was a notable success in smoothing relations between the two countries. In 2005 at the First Review Conference on the Implementation of the Treaty on Open Skies, member states praised the Treaty's role as a "stabilising factor" in times of a changing European security environment.[3] This article reviews the history of Open Skies and explains its purposes, summarizes current cooperative airborne monitoring activities, suggests a number of new ways to use airborne monitoring, and, finally, considers challenges and criticisms facing Open Skies.

The Open Skies concept is one in which countries make agreed-upon surveillance overflights between themselves. These flights can increase transparency by checking on large troop exercises, or strategically meaningful new bases, equipment, or deployments. Each flight is manned by personnel from the country overflown, as well as from the country that requested the flight. Equipment can be inspected beforehand, sensors certified, and copies of the data gathered are shared between all parties to each cooperative airborne monitoring agreement.

Currently, the main Open Skies Treaty is in effect between thirty-four countries of NATO, the former Warsaw Pact and Soviet Union, and several others. Before this came into effect, Hungary and Romania launched their own bilateral Open Skies agreement in 1991.[4] In addition, various forms of cooperative airborne monitoring have been used between Israel and its

[3] "Statement by the Chairman of the First Review Conference on the Implementation of the Treaty on Open Skies at the Closing Plenary," OSCC.RC/45/05, Vienna, 16 February 2005.

[4] This bilateral agreement was terminated in 2004, since NATO member states agreed – through an inter-alliance understanding – not to inspect each other.

neighbors, as well as in several U.N. peacekeeping operations.

From India - Pakistan to the wider Middle East and the Horn of Africa, there are many regions of potential conflict that could benefit from confidence building measures such as cooperative airborne monitoring. Further, there are new issues such as environmental monitoring into which the Open Skies concept can be expanded.

THE HISTORY OF OPEN SKIES

The idea for Open Skies became public with President Dwight Eisenhower's July 1955 proposal to the Soviet Union to allow mutual overflights of each other's territory, and reduce fears of surprise attack. Eisenhower's proposal was generally welcomed on Capitol Hill, and most of the few conservative Senators who dissented did so because they were not consulted. Some, such as Eisenhower, supported the proposal as a move to calm tensions and promote peace. However, others including General Arthur Radford envisioned a net intelligence gain for the open U.S. which had more difficulty penetrating the closed Russian security apparatus than vice-versa.[5] While the Soviets publically professed that the proposal did not go far enough to promote peace, they in fact rejected it as a "Western espionage plot."[6] Eisenhower was

---

[5] W. W. Rostow, *Open Skies: Eisenhower's Proposal of July 21, 1955* (Austin, TX: University of Texas Press, 1982), pp. 57-62. Rostow is firmly convinced of Eisenhower's sincerity, p. xii. However, Jonathan B. Tucker sees the Open Skies proposal as a "public relations maneuver," in "Negotiating Open Skies: A Diplomatic History," in Michael Krepon and Amy E. Smithson, "Introduction" in Michael Krepon and Amy E. Smithson, eds., *Open Skies, Arms Control, and Cooperative Security* (New York, NY: St. Martin's Press, 1992), p. 6. John Lewis Gaddis sides with Rostow in *The Long Peace: Inquiries Into the History of the Cold War* (Oxford, Great Britain: Oxford University Press, 1987), pp. 198-199.

[6] Tucker, "Negotiating Open Skies," p. 5. See also Staff Sergeant Kirk W. Clear, USAF and Steven E. Block, *The Treaty on Open Skies* (Dulles, VA: Defense Threat Reduction Agency, U.S. Department of Defense, April 1999), p. 2 and Rostow, *Open Skies*, pp. 63-64.

motivated by mutual benefit, but the Soviets were gripped by fears about spying. Information asymmetries in themselves cause relative gains concerns, and these may be exacerbated by measures which measures whose intent is to increase transparency.[7] Relative gains concerns and fears the transparency will divulge national secrets are barriers to Open Skies programs.

The Open Skies proposal lay dormant until May 1989 when President George H. W. Bush rekindled the idea in a speech. In the intervening three decades, however, the U.S. had unilaterally opened the Soviet's skies with U-2 and SR-71 spy plane overflights, while both sides deployed increasingly sophisticated spy satellites. While satellites and other sensor platforms increasingly limited the amount of transparency gained from aerial photography, the Bush proposal did aim to increase transparency in that he was testing Russia's commitment to greater openness. Although he was also countering the good publicity created by Mikhail Gorbachev's many initiatives, the more general lesson here is that Open Skies proposals also test the political climate, as do other confidence-building measures.[8] The Canadians subsequently prodded Bush into making Open Skies a multilateral agreement, which was meant to encompass the then 16 NATO members and the Soviet Union with her European allies. Even if Russia and the U.S. could rely mostly on their intelligence-gathering satellites, the multilateral version of Open Skies would diffuse the transparency benefits of the resulting flights more broadly.

The U.S. State and Defense Departments and its intelligence community had to figure out what kind of sensors the surveillance aircraft would use, what kind of restrictions would be

---

[7] James D. Morrow, "The Forms of International Cooperation," *International Organization,* Vol. 48, No. 3 (Summer 1994), p. 388.

[8] Tucker, "Negotiating Open Skies," pp. 6-8. See also James J. Marquardt, "Open Skies: Not a Moment Too Soon," *Bulletin of the Atomic Scientists*, Vol. 58, No. 1, (January/February 2002), pp. 18-20.

placed on flight plans, who would have access to data gathered, and so forth. As these agencies moved to make the proposal concrete and firm up the U.S. bargaining position, they split among and within each other between those who wanted intrusive inspections and were willing to give up some secrecy in return, and those who placed a higher priority on secrecy. This conflict of priorities is "central" to aerial surveillance negotiations, and this applies to bureaucratic disputes within countries as well.[9] At first, the U.S. wanted to have unrestricted flight plans (with limits only for safety), a ban on sensors for signals intelligence (SIGINT), and unlimited types of other sensors.

In the end, the U.S. aimed for an agreement in which flight plans had to be announced in advance, SIGINT sensors were banned, and four types of other sensors were allowed: two types of cameras (optical and video), one infrared imager, and one sideways-looking synthetic aperture radar, all with specifically limited resolutions. This proposal went through some intra-NATO discussion and modifications, and the two sides opened negotiations in February 1990. The Soviets initially rejected the U.S./NATO proposal because of U.S. sensor superiority, and countered by proposing a common aerial fleet with a central data processing facility. By late 1991 however, the Soviets acceded to phased-in but more intrusive inspections with no territorial limits. In March 1992, the Open Skies Treaty was signed.[10]

The Treaty was quickly ratified by the U.S. and most of the NATO and former Warsaw Pact countries. But it did not come into force until January 1, 2002, after the Russians finally

---

[9] U.S. Congress, Office of Technology Assessment, *Verification Technologies: Cooperative Aerial Surveillance in International Agreements*, OTA-ISC-480 (Washington, DC: U.S. Government Printing Office, July 1991), p. 22.

[10] Marquardt, "Open Skies" and Tucker, "Negotiating Open Skies." U.S. Congress, OTA, *Verification Technologies* has a table depicting the tradeoffs of Open Skies for each superpower, and its allies on page 55.

ratified the Treaty. By 2005, a number of other states joined the treaty: the Baltic states of Estonia, Finland, Latvia, and Lithuania and the Balkan states of Bosnia-Herzegovina, Croatia, and Slovenia. Now, any state participating in the Organization for Security and Cooperation in Europe may join.[11]

Regarding details of implementation, each state party is assigned a quota, or maximum, of flights that it can initiate, and that it must accept. There is no right of refusal of flights, nor any right to limit where the flights go or what they may image with their array of sensors. However, the flights must be announced seventy-two hours in advance, and fixed flight plans must also be submitted after arrival in the country to be observed, which leaves about twenty-four hours for concealment of sensitive equipment. Portugal has the smallest quota and it must accept two overflights of its territory, the U.S. and Russia have the largest quotas at forty two, and the larger European countries have a quota of twelve. Any country may submit requests for inspections of other signatory countries, but all requests are processed and coordinated by the Open Skies Consultative Commission charged with Treaty implementation.

Countries initiating inspections can use their own aircraft, though observed countries may substitute their own aircraft under what is called the "taxi option." In all cases, teams from the observer and observed states may inspect the aircraft and its sensors, and teams from both are onboard during flights where they each may take up positions at each sensor station, and in the cockpit. Despite the delayed entry into force of Open Skies, a number of countries have been conducting joint trial flights since its 1992 signing. When flights are completed, film and

[11] According to the Treaty any state worldwide can apply for accession. It is the present understanding of the U.S. and Russia that membership should be limited to the OSCE area.

magnetic tapes are put in sealed containers and taken to agreed-upon processing facilities.[12] The data is given to the observed and observing parties, and is made available upon request to any state party at nominal cost of reproduction.[13] Currently, in fact, some states other than those directly involved in overflights have been capitalizing on this opportunity to purchase resulting data. The U.S. always purchases data from all countries overflying Russia. The U.K. and Germany do the same, but they are more targeted about the data that interests them. The proposed move to digital sensors is likely to further increase this type of data sharing, as the resulting data is cheaper and easier to transfer and store.[14]

The aims of the treaty are well expressed here:

> ....According to the agreement of 24 March 1992, twenty-five states from the North Atlantic Treaty Organization (NATO), the former Warsaw Pact, and the former Soviet Union will conduct unarmed overflights of one another's territories to assess the disposition, strength, and preparedness of opposing military forces.
>
> These flights will allow states to evaluate the nature of security threats – based on facts collected independently or collaboratively, not on unfounded suspicions or worst case analyses. They will permit nations to survey the status of events in countries of interest, gleaning early indications and warning of troubling developments or reassurance of a neighbor's peaceful intent. Thus, the possibility of wars caused by accident, or by a buildup of tensions based on rumor and suspicion can be significantly reduced.[15]

---

[12] Such as the Open Skies Media Processing Facility at Wright-Patterson Air Force Base in the U.S.. See: <<http://www.osmpf.wpafb.af.mil/Facilities/Facilities.htm>>.

[13] Defense Treaty Inspection Readiness Program, "The U.S. Experience with Joint Trial Flights – A History," (Fort Belvoir, VA: Defense Threat Reduction Agency, August 2004) and Defense Treaty Inspection Readiness Program, "Questions Facing the U.S. Defense Industry: Treaty on Open Skies ," order number 305P (Fort Belvoir, VA: Defense Threat Reduction Agency, June 2003) both available via <<http://dtirp.dtra.mil/products/cat_os.asp>>.

[14] Francis X. Stenger, Deputy Division Chief for implementation of the Open Skies Treaty at the DoD Defense Threat Reduction Agency (DTRA), email correspondence, February 2006.

[15] Krepon and Smithson, *Open Skies, Arms Control, and Cooperative Security*, p. 1.

Like almost all the literature on Open Skies, and arms control more generally, this passage echoes the conventional wisdom that transparency promotes peace and reduces tensions by reducing uncertainty, miscalculation, and misperception, and in particular by reducing unwarranted fears and worst-case assumptions.[16]

HUNGARY/ROMANIA AND BILATERAL OPEN SKIES

Open Skies and cooperative airborne monitoring flights in various forms have been taking place for years. For example, Israel and Egypt have used bilateral and third party (U.S.) overflights to monitor peace in the Sinai since the 1973 War. Participants in the Sinai Agreements were able to fly their own aircraft to monitor areas key to conflict, and then depended on the U.S. for assistance in higher-altitude overflights. As a historically significant predecessor to the Open Skies Treaty, the Sinai Agreements included the collecting and sharing of the resulting imaging data among the states of Egypt, Israel, and Syria.[17] Integral to the success of the cooperation in the Sinai were land-based monitoring measures, too, as the Sinai Field Mission (SFM) engaged in monitoring on this additional front. In 1982, the Multinational Force and Observers (MFO) consolidated and replaced the previous field (SFM) and aerial monitoring efforts, and the MFO continues to perform field inspections and data-gathering

[16] The conventional wisdom is increasingly challenged by theorists, and sometimes does not hold up empirically. See Dan Lindley, *Promoting Peace with Information: Transparency as a Tool of Security Regimes* (Princeton, NJ: Princeton University Press, forthcoming) for a review of the theoretical debates and case studies that examine the contending views on transparency.

[17] Mohammed Arshad Chaudhry and K.C. Cariappa, "How Cooperative Aerial Monitoring Can Contribute to Reducing Tensions Between India and Pakistan," SAND98-0505/22 (Albuquerque, NM: Sandia National Laboratories, December 2001).

overflights.[18]

Open Skies-type flights have been carried out in Bosnia-Herzegovina in support of arms control and verification commitments of the Bosnian entities under the Dayton agreement. In addition, the U.N. used or uses helicopters and fixed-wing aircraft to conduct aerial inspections from Yemen, Cyprus, Lebanon, and the Persian Gulf to Western Sahara, Angola, and Cambodia. The Organization of American States sent flights between Ecuador and Peru, and between Costa Rica and Nicaragua.[19]

Although some observers point to the Sinai as a success for cooperative airborne monitoring, and it is, the clearest exemplar for future Open Skies-like regimes lies in the case of Hungary and Romania. The area of Transylvania has grown and shrunk and gone back and forth between Hungary and Romania several times during the war-torn history of the Balkans. At the end of World War II, Romania gained control of the territory. With the end of the Cold War, nationalists in both Hungary and Romania used the substantial Hungarian population in Transylvania to stir up tensions. With the Soviet Union's controlling influence greatly dissipated, the fall of Romanian dictator Nicolae Ceausescu raised the specter of malignant ethno-nationalism in Transylvania.[20] This threat was underscored by the disastrous experience in

---

[18] Michael G. Vannoni, "Sensors in the Sinai: A Precedent for Regional Cooperative Monitoring," SAND96-2574 (Albuquerque, NM: Sandia National Laboratories, June 1998). See also the MFO website at <<http://www.mfo.org/homepage/homepage.asp>>.

[19] Michael Krepon and Peter D. Constable, "Confidence-Building, Peacemaking, and Aerial Inspections in the Middle East," in Krepon and Smithson, *Open Skies, Arms Control, and Cooperative Security*, chapter 12, pp. 243-261; Arian L. Pregenzer, Michael Vannoni, and Kent L. Biringer, "Cooperative Monitoring of Regional Security Agreements," SAND96-1121 (Albuquerque, NM: Sandia National Laboratories, November 1996); and the SFOR website: <<http://www.nato.int/sfor/partners/osce-opski/osceopen.htm>>.

[20] George W. White, "Transylvania: Hungarian, Romanian, or Neither?" in Guntram H. Herb and David H. Kaplan, eds., *Nested Identities: Nationalism, Territory, and Scale* (Lanham, MD: Roman and Littlefield, 1999), pp. 267-288, esp. p. 273; George W. White, *Nationalism and Territory: Constructing*

neighboring Yugoslavia following the rule of Josip Tito. Hungary and Romania have rich historical ties to Transylvania, and there was a long tradition of Transylvania's 'owners' reframing history and renaming places and monuments to suit their own glorious pasts, as part of more general campaigns of cultural and political domination.

So it was no surprise when tensions rose and violence broke out, most notably at Tirgu Mures in March 1990 when almost 20,000 ethnic Romanians and ethnic Hungarians fought in a bloody clash.[21] Fortunately, those interested in peace began to prevail, and both sides sought to calm tensions within themselves, between themselves, and to demonstrate to the outside world that the region was stable and worthy of investment. As part of this process, Romania proposed a bilateral Open Skies agreement with Hungary in July of 1990. Hungary, though, was more interested in the multilateral version of Open Skies as proposed by Bush. However, with the Bush proposal stalled, Hungary agreed to talk and bilateral negotiations began in February 1991. This was a textbook case of how the anticipation of increased transparency promoted cooperation as "the perception by both sides of the immediate need for greater transparency led to rapid negotiation and implementation of an agreement."[22]

The lesson here is that making cooperative airborne monitoring capabilities available to

---

Group Identity in Southeastern Europe (Lanham, MD: Roman and Littlefield, 2000), pp. 67-178; Marton Krasznai, "Cooperative Bilateral Aerial Inspections: The Hungarian-Romanian Experience," in Krepon and Smithson, *Open Skies, Arms Control, and Cooperative Security*, pp. 135-146; and Marton Krasznai, "Scenarios for Co-operative Aerial Observations in Support of Crisis Prevention and Post-conflict Settlement: Lessons from the Bosnia Experience," comments prepared for a seminar "Perspectives for Co-operative Aerial Observation and the Treaty on Open Skies," at the Stockholm International Peace Research Institute (SIPRI), Stockholm, November 30 - December 1, 2004 <<http://www.sipri.org/contents/director/esdp/KrasznaiOS.html>>.

[21] Section "ROMANIA, Human Rights Developments" from *Human Rights Watch World Report 1990* available at: <<http://www.hrw.org/reports/1990/WR90/HELSINKI.BOU-02.htm>> and White, *Nationalism and Territory* pp. 93-107, 147-153. Tirgu is spelled Targu in some sources.

[22] Pregenzer, Vannoni, and Biringer, "Cooperative Monitoring of Regional Security Agreements," p. 23

the U.N., other mediators, or directly to parties in conflict themselves can help them reach peace agreements. Some scholars argue that the promise of large and imposing armed force is the best way to help enemies reach peace.[23] They may be right, but because large peacekeeping forces are expensive and risky to interpose, such interventions are likely to be relatively infrequent. Cheaper cooperative airborne monitoring agreements may hasten agreements in some circumstances, and supplement more robust peacekeeping operations in others. Airborne platforms are easy and quick to deploy, and what they report can readily be rendered impartial by inviting inflight teams and equipment inspections from all sides. This is not to deny that they may create information asymmetries and relative gains concerns, especially between sides with unequal unilateral intelligence capabilities or of unequal transparency. However, the impartiality of Open Skies programs and their credibility is nonetheless bolstered because the planes are inspected and teams from both sides are aboard.

The main points of the bilateral Open Skies regime were negotiated in three days, and a Treaty signed on May 11, 1991. The treaty allowed for four eight hour flights per year for each country, with seven day advance notice (and any flights taken under the subsequent multilateral Open Skies Treaty add to this number). A demonstration flight with a multinational crew went up in June 1991, and media coverage helped boost popular support for the program.[24] Observers from seventeen of the states participating in the multilateral Open Skies negotiations were on hand "to get the message through to their governments: Hungarian-Romania (sic) relations were

---

[23] Barbara F. Walter, *Committing to Peace: The Successful Settlement of Civil Wars* (Princeton, NJ: Princeton University Press, 2002).

[24] The implementation of the Hungarian Romanian OS agreement was additionally eased by two factors: 1) Both states had suitable aircraft and aerial monitoring experience; 2) France provided a dual camera, which takes two identical sets of images on two films, which eased the sharing of image data.

stable."[25]

Hungarian treaty negotiator Marton Krasznai uses the experience of Hungary and Romania to claim that Open Skies is an "exceptionally effective" confidence-building measure.[26] Francis X. Stenger agreed that the flights had calming effects.[27] Five years later, in 1996, the overflights still got glowing press coverage – the flights reassure politicians and people on the street about each side's peaceful intentions, and helped them in "overcoming or reframing enemy images."[28]

In the end, although it appears that both sides were interested in increasing transparency, what they got from their four yearly flights was probably as much the appearance of transparency as a real increase in transparency. However, the symbolic importance was a real and significant factor in convincing the respective publics in each country that peace should prevail, in helping the overall bilateral peace process, and helping outsiders perceive the situation as stable.

The point here is that even if flights are limited or are announced in advance, willingness to accede to an Open Skies/cooperative airborne monitoring arrangement can itself be a positive signal. As the case of Libya shows, states can change their images and emerge from international isolation with credible commitments and greater transparency. If North Korea or Iran accepted

---

[25] Quote in Krasznai, "Scenarios for Co-operative Aerial Observations." See also Pregenzer, Vannoni, and Biringer, "Cooperative Monitoring of Regional Security Agreements" and Hartwig Spitzer "The Open-Skies Treaty as a tool for confidence building and arms control verification," expanded version of a paper for the 18th ISODARCO Summer Course, Siena, Italy, July 29-August 8, 1996.

[26] Krasznai, "Cooperative Bilateral Aerial Inspections," p. 143.

[27] Deputy Division Chief for implementation of the Open Skies Treaty at the DoD Defense Threat Reduction Agency (DTRA), telephone interview and email correspondence, November and December 2005.

[28] Spitzer "Open-Skies Treaty," p. 23. See also Krasznai, "Cooperative Bilateral Aerial Inspections."

greater transparency and overflights, it would significantly change the reality and perceptions about these two difficult states – assuming openness could be verified and the commitment was credible. In general, and as shown above, states negotiate about transparency with great seriousness. Those with something to hide would likely reject any overflights, even if pre-announced. They would likely be paranoid, and with good reason.

Moreover, the impact of transparency can go beyond sending signals. The Hungary/Romania case shows this in real terms, as do the various forms of overflights in the Sinai. The Cold War provides an important bilateral exemplar of transparency calming fears. Although it was non-cooperative up until the early-mid 1960s, the historian John Lewis Gaddis contends that the reconnaissance revolution "may rival in importance the 'nuclear revolution' that preceded it" in explaining the long peace of the Cold War and that orbiting spy satellites helped prevent recurrence of the bomber gap and missile gap panics.[29]

EXPANDING OPEN SKIES AND COOPERATIVE AIRBORNE MONITORING

Open Skies aerial surveillance platforms are flexible, and relatively cheap to operate. Because they are cooperatively used, they do not push the state of the art in surveillance or platform technology. As noted, sensor resolutions are limited, pushing down their costs, and opening the possibility for using off the shelf technologies. Further, states have been satisfied using older platforms; the U.S. uses Boeing 707s designated as OC-135Bs, some European states

[29] Quote in *Long Peace*, p. 232; see also chapter 7, "Learning to Live with Transparency: The Emergence of a Reconnaissance Satellite Regime" and Jane Kellett Cramer, *National Security Panics: Overestimating Threats to National Security*, PhD dissertation (Cambridge, MA: MIT, 2002).

and Canada use a Hercules C-130, and the Russians use Antonov An-30s and Tupolev Tu-154s – both of which first debuted in the late 1960s.

Conflict Areas: Confidence-building and Peacekeeping

Proponents for the expansion of Open Skies programs argue that there are many conflict areas where cooperative airborne monitoring overflights would help interstate and intrastate confidence building. One such area is between India and Pakistan where, for example, a withdrawal of forces beyond mutual firing ranges could be monitored. Although terrain or political sensitivity may hinder airborne monitoring in some areas, much of the international border could be well served. Open Skies proponents hope that an incremental approach could widen the monitored buffer zone over time, and exclude increasing numbers and types of weapons.[30] The argument, in general, is that greater transparency in Southeast Asia could stabilize the deterrent relationship between India and Pakistan.[31]

Other potential areas for monitoring include the Koreas, Central Asia, and a number of conflict zones in the Middle East and Africa. A particularly ripe example is between Ethiopia and Eritrea, where tensions are currently flaring and war is threatening. Overflights would helpful because the U.N. has trouble monitoring the lengthy and contested buffer zone, and each

[30] See Air Marshal Mohammed Arshad Chaudry (PAF) and Air Marshal K.C. Cariappa (IAF), "How Cooperative Aerial Monitoring Can Contribute to Reducing Tensions between India and Pakistan," Cooperative Monitoring Center Occasional Paper/22, SAND-98-0505/22 (Albuquerque, NM: Sandia National Laboratories, December 2001).

[31] Air Commodore Tariq Mahmud Ashraf and Dr. Arpit Rajain, "The Role of Transparency in Achieving Strategic Stability in South Asia," Cooperative Monitoring Center Occasional Paper, SAND 2005-4957 (Albuquerque, NM: Sandia National Laboratories, July 2005).

side's threat perceptions are exacerbated by rumors about actions on the other side.[32]

Proponents of Open Skies expansion also point to the Korean peninsula, where overflights could help prevent recurrent maritime incidents, help monitor the buffer zone and conventional force postures, and help verify whatever deal is eventually reached (hopefully) to bring North Korea back into compliance with the NPT. Of course, much political progress is a prerequisite, but the promise of verification could help each side reach deals across these various issue areas.[33]

Similarly, many current and future U.N. and other peacekeeping operations could benefit from aerial monitoring. Almost anywhere U.N. peacekeepers monitor buffer zones, disengagements, disarmaments, cantonments, or demobilizations, U.N.-flagged and crewed airborne monitoring flights could offer a perspective on the area of operation that could not otherwise be gained. Further, almost all peacekeeping missions are under-manned, under-equipped, and surely under-sensored. Open Skies proponents argue that cooperative airborne monitoring flights under these circumstances would be a significant force-multiplier.

One study ran through a variety of sensor technologies that could be used by peacekeepers and noted that aerial platforms could be "very applicable" for monitoring lines of control and disarmament, and "applicable" for monitoring movement, facilities, and checkpoints.[34] Movement might be upgraded into very applicable, depending on terrain, as

---

[32] Lindley, *Promoting Peace with Information*.

[33] John Olson, "Confidence Building Measures to Support the Sunshine Policy," SAND2001-2159P (Albuquerque, NM: Sandia National Laboratories, July 2001).

[34] Reynolds M. Salerno, Michael G. Vannoni, David S. Barber, Randall R. Parish, and Rebecca L. Frerichs, "Enhanced Peacekeeping with Monitoring Technologies," SAND2000-1400 (Albuquerque, NM: Sandia National Laboratories, June 2000).

anything that moves is much easier to detect than when it is stationary. On the other hand, disarmament might be downgraded, as many of the conflicts where peacekeepers are deployed are fueled by small arms. Small arms are notoriously hard to track by any method, and peacekeeping missions often face difficulties in fulfilling the disarmament aspects of their mandates.

In internal conflicts, U.N.-flagged aerial surveillance planes could help track rebel and government forces, which would allow the possibility of subjecting them to the international spotlight and international condemnation. Refugees in these conflicts occasionally become literally lost, making aid deliveries impossible. An ancillary but non-trivial benefit of aerial surveillance in this context would be to help locate refugees.

A final and innovative use for U.N. – flagged platforms could be as rapidly-deployable confidence-building mechanisms in areas where crises were escalating. Proposals for a U.N. standing force have stalled due to political and financial considerations. Even if it did exist, such a force would take time and face political hurdles to deploy. However, cooperative airborne monitoring flights are far quicker and cheaper to deploy, and pose less political challenge to the local governments because the U.N. would not be putting any (or as many) troops onto any state's soil. Such flights could be run by any interested state or organization, though it seems logical to start with flights by international organizations that can best don a mantle of impartiality. One analyst borrows from the term "Blue Helmets" for U.N. peacekeepers and calls U.N. use of surveillance technologies "Blue Sensors" precisely because of the impartiality that

the U.N. connotes.[35]

Arms Control

Cooperative airborne monitoring regimes can also help verify arms control agreements. Given the mostly European area covered by the Open Skies Treaty, overflights already play a role in backing up on-site inspections and other verification efforts for the 1991 Conventional Forces in Europe (CFE) Treaty. More ambitious roles for cooperative airborne monitoring include helping verify the Nuclear Non-Proliferation Treaty (NPT), the Chemical Weapons Convention (CWC), and the Biological Weapons Convention (BWC). In these contexts, overflights could be useful in a number of roles. For example, flights could monitor temperature variations at supposedly mothballed facilities and detect new or buried construction or abnormal activity. Flights might also detect if seals had been broken at closed and sealed facilities. Various sensor suites and sniffers could assess radioactive materials or chemical and biological compounds that became airborne. However, depending on the quantity, airborne materials may offer some plausible deniability as they may have entered the air from outside the target country.[36]

For this reason, airborne monitoring flights may provide more benefits if they can work in

---

[35] A. Walter Dorn, "Blue Sensors: Technology and Cooperative Monitoring in UN Peacekeeping," Cooperative Monitoring Center Occasional Paper 36, SAND 2004-1380 (Albuquerque, NM: Sandia National Laboratories, April 2004).

[36] Greg D. Rowe, "Using Airborne Remote Sensing to Verify the CWC," *The Nonproliferation Review*, Vol. 3, No. 3 (Spring/Summer 1996), pp. 63-73 and Amy E. Smithson and Michael Krepon, "Strengthening the Chemical Weapons Convention Through Aerial Inspections," in Krepon and Smithson, *Open Skies, Arms Control, and Cooperative Security*, chapter 11, pp. 221-242.

tandem with or trigger other inspections.[37] Airborne monitoring flights can only supplement and not replace satellite and other surveillance programs, and nothing is better than on-site inspections. Nonetheless, it is because these issues are important that states and international organizations should more fully use all the tools at their disposal.

For any agreements that limit the number of weapons or other treaty-limited items or equipment (TLIs and TLE), some have proposed tagging these items so that they could be counted by overflights.[38] This might be especially important for strengthening treaties such as the CFE which monitor very large amounts of weapons over huge areas. Counting would be done in much the same way as sensors read passing cars on "E-ZPass" enabled tollways. With E-ZPass, overhead antennas at toll booths communicate with transponders in moving cars and toll money is automatically deducted from the driver's account.[39] On the security side, tags could be placed on the TLIs which could be read by cooperative monitoring aircraft. However, not much progress has been made with this idea because of fears that the same tags could be used to track and target the items with other platforms. In addition, it would be hard to tag TLIs in situations where states relied heavily on militias, paramilitaries, and other relatively informal forces.[40]

---

[37] Bennett Ramberg, "Open Skies and Nuclear Nonproliferation," in Krepon and Smithson, *Open Skies, Arms Control, and Cooperative Security*, chapter 10, pp. 207-219; U.S. Congress, OTA, *Verification Technologies*, pp. 67-68.

[38] U.S. Congress, OTA, *Verification Technologies*, p. 68.

[39] See E-Zpass information at: <<http://www.ezpass.com/static/info/howit.shtml>>and at Wikipedia: <<http://en.wikipedia.org/wiki/E-Z_Pass>>.

[40] U.S. Congress, OTA, *Verification Technologies*, p. 26 and Amy E. Smithson and Stanley K. Fraley, Monitoring Military Equipment with Aerial Inspections and Tags," in Krepon and Smithson, *Open Skies, Arms Control, and Cooperative Security*, chapter 9, pp. 187-206.

In terms of future technologies, surveillance platforms could be expanded from helicopters and fixed wing aircraft to unmanned aerial vehicles (UAVs) or even blimps. UAVs have comparatively long loiter times, and but may be less politically neutral and acceptable compared to larger manned platforms. However, just as aircraft can hold teams from the observed side/s, teams from these side/s can also operate UAVs in real time. Smaller unmanned platforms are likely to be more transparent in operation than larger UAVs or manned aircraft in that pre-flight inspections of smaller platforms are more likely to reveal any hidden capabilities, and it is harder to install multiple sensors on smaller platforms. Depending on the operating environment and requirements though, some UAVs are fairly sophisticated and expensive - though still far cheaper than manned platforms. Operating costs are lower for UAVs, and no human lives are placed at risk during their flights.[41] The potential setback in implementing UAV monitoring, however, would be the loss of symbolic onboard interaction between state parties during flights.

There are few technological limits (with respect to known technologies) to the sensor suites that could be included on some or all of these platforms. Radiation, chemical, and biological sensors are not yet deployed on official Open Skies aircraft, but sensor technology in these areas has undergone rapid development after the September 11, 2001 terrorist attacks in the U.S. For environmental monitoring, some sensors such as multispectral cameras for tracking vegetation are fairly simple, while airborne pollution or chemical weapon sniffers would pose more difficulties.

---

[41] Lawrence Trost, "Unmanned Air Vehicles (UAVs) for Cooperative Monitoring," SAND2000-185 (Albuquerque, NM: Sandia National Laboratories, January 2000). See also U.S. Congress, OTA, *Verification Technologies*, pp. 31-34.

Open Skies flights may be used to detect releases of radiation. According to the U.S. Office of Technology Assessment, "Radioactive emissions from illegal tests or facilities in the form of telltale neutrons or gamma-rays might also be measured from aircraft carrying detectors." For example, "airborne 'sniffers' could monitor for radiation leaks banned under the Limited Test Ban Treaty." However, the OTA also notes that small radiation sources such as warheads would be hard to detect as they are easily shielded.[42] Although it is under-reported, national-level efforts to conduct airborne radiation monitoring are already in place, with the U.S. maintaining a dedicated aircraft for nuclear materials detection – the WC-135 Constant Phoenix – and a world-leading particle analysis facility within the Air Force Technical Applications Center, at Patrick Air Force Base in Florida.[43]

Some monitoring technologies are relatively expensive to implement – examples are laboratories to analyze biological or nuclear compounds. The bottom line though is that cooperative airborne monitoring platforms are relatively cheap to build or upgrade, especially given the importance of monitoring weapons of mass destruction. And once the capability exists, the platforms can be readily adapted to new missions, loaned to other conflict areas, temporarily loaned and reflagged to the U.N., sent to natural disasters, and so forth.

The biggest hurdles may in fact be more political than technological because at some

---

[42] U.S. Congress, OTA, *Verification Technologies*, pp. 41-42, 5.

[43] Information on the U.S. airborne (and other) nuclear monitoring at the Federation of American Scientists and Globalsecurity.org websites: <<http://www.fas.org/irp/agency/aftac/intro.htm>> and <<http://www.globalsecurity.org/intell/systems/constant_phoenix.htm>>. See also Man-Kwon Nam and Sung-Tack Shin, " ENTNEA: A Concept for Enhancing Nuclear Transparency for Confidence Building in Northeast Asia," Cooperative Monitoring Center Occasional Paper/12, SAND 98-0505/12, (Albuquerque, NM: Sandia National Laboratories, June 1999)

point, states often begin to value secrecy above transparency. States may resist, for example, sensors that allow airborne monitoring platforms to take their nuclear 'fingerprints' as found in the isotopic ratios of radioactive compounds. Many of these concerns can be addressed by tailoring the sensors to the application, and these concerns help explain why, although Open Skies cameras in Europe and North America permitted by the Treaty are much better than commercial satellites and are good enough to detect large-scale strategically significant actions, they still fall far short of easily achieved much higher resolutions. Their capabilities are limited for political and military reasons. Similarly, it is unlikely that sensors would ever be deployed on multilateral platforms that would infringe on the civil liberties or privacy of citizens in member states.

Non-security Applications

Turning to non-security applications of airborne monitoring, overflights could be used in the "three borders" area between Brazil, Argentina, and Paraguay to monitor smuggling. Overflights could be used to survey and help stop drug production from the Andes to Afghanistan. Flights can monitor environmental problems as well as to evaluate natural disasters and coordinate responses.[44] Indeed, flights using Open Skies aircraft helped assess the damage caused by Hurricane Mitch to Central America in 1998, and by the flooding of the Oder River in 1997. In the latter case, German Open Skies aircraft shared imagery with the affected countries

[44] Britting and Spitzer, "Open Skies Treaty;" Clear and Block, *Treaty on Open Skies*, p. 49; John Hawes, "Open Skies: Beyond 'Vancouver to Vladivostok'" Stimson Center Occasional Paper, No. 10 (December 1992); Spitzer and Wiemker, "Perspectives for Open Skies."

of Poland and the Czech Republic. The capacity developed for some of the above mentioned security-oriented missions – planes, pilots, sensors, cameras, and other resources – create a standing capability for other emergency environmental, natural disaster, and other contingencies.

After Hurricane Mitch struck, the U.S. used its Open Skies platforms in five missions to provide 5,000 aerial photographs and 15,000 video images to those responding to the disaster in El Salvador, Guatemala, the Honduras, and Nicaragua. One of the first needs of the affected governments and aid agencies was timely damage assessment, and the images identified landslides and floods, as well as agricultural and ocean reef damage. The flights were a rapidly organized cooperative effort between the U.S. Geological Survey and the Defense Threat Reduction Agency, demonstrating the inherent flexibility of airborne monitoring capabilities.[45] U.S. Open Skies aircraft were even used to take aerial photographs of the damage wrought by Hurricane Katrina in 2005, and tornadoes in Oklahoma City in 1999.[46] Spanish Open Skies aircraft detected and tracked a 2002 oil spill off its coast after the tanker Prestige sunk.[47]

Airborne monitoring can help with a number of environmental problems. Readers may be familiar with satellite photographs of roads and other signs of civilization penetrating rainforests, or telltale plumes of fires clearing the forests for farm use.[48] Airborne monitoring

---

[45] Bruce F. Molnia and Cheryl A. Hallam, "Open Skies Aerial Photography of Selected Areas in Central America Affected by Hurricane Mitch," U.S. Geological Survey Circular 1181, U.S. Department of the Interior, with the U.S. Defense Threat Reduction Agency (Washington, D.C.: United States Government Printing Office, 1999).

[46] Photographs of the damaged roof of the New Orleans Superdome, and other damage, are on the U.S. Defense Threat Reduction Agency's website at: <<http://www.dtra.mil/toolbox/directorates/osi/programs/ops/os/index.cfm>>.

[47] Environment News Service, "Space Focus Shifts to Environment, Development," October 19, 2004 at <<http://www.ens-newswire.com/ens/oct2004/2004-10-19-03.asp>>.

[48] If not, see this at the Junglephotos website: http://www.junglephotos.com/amazon/amspace/amdeforest/roadsfires.shtml

platforms can provide similar assessments. Although in Open Skies platforms only cover about fifty square kilometers per photo, the planes can fly higher for environmental assessment, accepting the resulting degradation in resolution. As shown above, there was an average of 1000 aerial photographs for each flight responding to Hurricane Mitch, showing that the potential coverage area of overflights is in fact quite vast.

Satellite surveillance has increasingly been used to protect the environment, promote development, and spur more efficient farming and land use. But in many cases airborne monitoring platforms can do the same job with greater flexibility and less expense. Discussion of how to use Open Skies and cooperative airborne monitoring platforms for these expanded roles has only just begun. A preliminary meeting of the thirty-one Open Skies party states in October 2004 discussed how to use their platforms for assessing natural disasters, as well as air and soil pollution, and urbanization. Military experts and scientists lauded Open Skies' potential value for environmental monitoring, especially stressing the regime's utility in emergencies.[49] This sentiment was reiterated in 2005 at the First Review Conference on the Implementation of the Treaty on Open Skies, where the Open Skies member states voiced appreciation of both actual uses of Open Skies resources in past environmental emergencies and further investigation and discussion, at least, of the potential for future use of Open Skies resources in this respect.[50]

It is possible that future binding environmental agreements will need verification in much the same way as arms control agreements. One of the best ways to confront many transnational

---

[49] U.S. Department of State, "Open Skies Aircraft Might Be Used for Environmental Protection," at <<http://www.uspolicy.be/Article.asp?ID=68C1D417-EBE6-4E52-85E8-2F3CD57FE753>>.

[50] "Statement by the Chairman of the First Review Conference on the Implementation of the Treaty on Open Skies at the Closing Plenary."

environmental problems will be with international agreements. However, these agreements will impose costs on some if not all countries, these costs will encourage cheating, and this creates demand for environmental monitoring to prevent waves of defection. With their capacity to take airborne samples and photographs over wide areas, cooperative airborne monitoring flights can be helpful for environmental monitoring. Agreements are far more likely to be negotiated and ratified if states know that they can be verified.[51]

CRITIQUES AND CHALLENGES FACING OPEN SKIES

Critics of Open Skies argue that it is hard to tell from the sparse Open Skies literature what concrete effects Open Skies flights have had on international politics and levels of tension. For example, tension levels between the U.S. and Russia are now so low that they have now signed a strategic nuclear arms control agreement with no verification provisions at all – the Strategic Offensive Reduction Treaty (SORT) of May 2002. How to measure the effects of confidence-building measures in this environment? In addition, some argue that the growth of civilian remote-sensing satellites and the diffusion of military surveillance satellites have threatened to make aerial surveillance, and therefore Open Skies, redundant.[52] Another critique of Open Skies is that because flights and flight plans are pre-announced, important secrets can be sheltered from view (or ruses set up).

---

[51] Kenneth W. Abbott, "'Trust but Verify:' The Production of Information in Arms Control Treaties and Other International Agreements," *Cornell Journal of International Law*, Vol. 26, No. 1 (Winter 1993), pp. 1-58.

[52] Ann. M. Florini, "The Opening Skies: Third-Party Imaging Satellites and U.S. Security," *International Security* Vol. 13, No. 2 (Autumn 1988), pp. 91-123; Marquardt, "Open Skies," p. 20; and Johan Swahn, "International Surveillance Satellites: Open Skies for All?" *Journal of Peace Research*, Vol. 25, No. 3 (September, 1988), pp. 229-244.

As mentioned above, transparency is not necessarily an absolute good but instead can deepen relative gains concerns and security dilemmas.[53] States have natural worries about helping others learn their military secrets and dispositions. The security dilemma is a fairly profound factor in international relations and is hard to overcome.

Fully extending and implementing an Open Skies environmental monitoring regime would not be without its challenges. Though aerial monitoring of disasters and areas of environmental concern proves to be quicker and less expensive than, for instance, the task of orienting an orbiting satellite, the matter of cost-effectiveness becomes more complex. Before successfully implementing an Open Skies-like environmental regime, there are a number of financial and institutional hurdles that must be overcome. Successfully analyzing and geocoding obtained imagery data requires special expertise, training, and equipment. Many states already possess functional private and commercial means by which to monitor and assess environmental matters, including the use of less expensive, smaller aircraft that are more efficiently suited for the task of environmental monitoring. Implementing an Open Skies regime for environmental monitoring would challenge already existing monitoring institutions in each state, and overcoming this institutional obstacle would be no modest task.[54] Though such theoretical solutions to overcoming institutional challenges as "dual-use" flights that would cover

---

[53] Relative gains concerns are discussed in: Joseph M. Grieco, "Anarchy and the Limits of Cooperation: A Realist Critique of the Newest Liberal Institutionalism," *International Organization*, Vol. 42, No. 3 (Summer 1988), pp. 487-90; Charles Lipson, "International Cooperation in Economic and Security Affairs," *World Politics*, Vol. 37, No. 1 (October 1984); Mearsheimer, "The False Promise of International Institutions," *International Security*, Vol. 19., No. 3 (Winter 1994/95), pp. 9-14, esp 12-13; Kenneth Oye, ed., *Cooperation Under Anarchy* (Princeton, NJ.: Princeton University Press, 1986); and Kenneth Waltz, *Theory of International Politics* (New York, NY: Random House, 1979), chapter 6, esp. pp. 105-106, 118.

[54] Hartwig Spitzer, "Potential of the Open Skies Regime and Sensor Suite for Environmental Monitoring," presented at the Third International Airborne Remote Sensing Conference and Exhibition, Copenhagen, Denmark, 7-10 July 1997.

environmental and military targets in one flight provide further promise, entrenched interests may nonetheless prove to be a pervasive barrier.[55]

Overcoming state bureaucratic and organizational resistance is an additional challenge for expanding Open Skies' uses in the future. Barriers ranging from budgetary matters to jurisdictional territoriality are often not friendly to new Open Skies implementation. In early January 2005, for instance, the Open Skies division in the U.S. State Department proposed to use the U.S. Open Skies aircraft for Tsunami post-disaster monitoring. Partly due to jurisdictional territoriality, partly due to unfamiliarity with Open Skies' unique advantages in the international realm, and partly due to the larger administration's struggle with its total response to the tsunami, the U.S. Department of Defense rejected the proposal. Again in January 2005, Sweden considered using its Open Skies aircraft for tsunami post-disaster monitoring, provided that the U.N. Office for the Coordination of Humanitarian Affairs in Geneva would request a flight. This also failed to work because of bureaucratic drag within the U.N. system and lack of established flexible decision-making procedures between the U.N. and the affected states.[56]

Competition for monitoring contracts exists in each state and also worldwide, as the International Charter for Space and Major Disasters – comprised by such groups as ESA, CNES, CSA, ISRO, NOAA, CONAE, JAXA, USGS, and DMC – has already established itself as an expertise- and resource-rich response to disaster monitoring.[57] It would be an admittedly difficult

---

[55] Hartwig Spitzer, "Potential of the Open Skies Regime and Sensor Suite for Environmental Monitoring."

[56] Francis X. Stenger, Deputy Division Chief for implementation of the Open Skies Treaty at the DoD Defense Threat Reduction Agency (DTRA), email correspondence, March 2006.

[57] International Charter "Space and Major Disasters," February 20, 2006 at <<http://www.disasterscharter.org/main_e.html>>.

task for Open Skies-like regimes to assert themselves given these existing monitoring establishments.

ARGUMENTS OF OPEN SKIES PROPONENTS

Proponents of Open Skies and cooperative airborne monitoring make a number of points, some of which counter the above critiques. The Open Skies Treaty succeeded in one of its major political goals which was to test and demonstrate Russia's commitment to transparency and openness. Officials who negotiated Open Skies, implementing agencies, and other proponents argue that Open Skies still offers a number of transparency and other benefits. Its symbolic importance is said to fuel further cooperation and trust. It helps level the intelligence playing field for participating countries, as all sides have access to the data gathered. Even though surveillance satellites have proliferated, most NATO and former Warsaw pact countries do not operate them. Finally, like most arms control agreements, if the time does come when the Treaty is violated (flights denied in this case), then that sends a signal of malign intent. Such signals are less obvious when there are no agreements to break.[58]

For the U.S., even though it possesses much greater surveillance capabilities than any other state, Open Skies lets it keep more expensive and hard to maneuver assets (satellites)

---

[58] Defense Threat Reduction Agency (DTRA) Fact Sheet: "Treaty on Open Skies" (November 2005) available at <<http://www.dtra.mil/press_resources/fact_sheets/display.cfm?fs=os>>; Hartwig Spitzer and Rafael Wiemker, "Perspectives for Open Skies: Technical, Operational, and Political Aspects," presented at the Fourth International Airborne Remote Sensing Conference and Exhibition, 21st Canadian Symposium on Remote Sensing, Ottawa, Ontario, June 21-24, 1999; and Ambassador John Hawes, U.S. representative to the Open Skies Conference, "Open Skies: From Ideas to Negotiation," NATO Review, web edition, Vol. 38, No. 2 (April 1990), pp. 6-9, updated March 5, 2002, available at <<http://www.nato.int/docu/review/1990/9002-02.htm>>.

focused on the most strategically or tactically important areas such as China, North Korea, Iraq, and Iran while overflights help monitor the Eurasian areas within the Treaty zone. As an open country, the U.S., along with the West more generally, has relatively little to lose and more to gain from transparency compared to more closed countries. As mentioned before, this point is not lost on less transparent states. For states that lack overhead reconnaissance platforms or the ability to use them, the Open Skies Treaty affords access to otherwise impossible to get data about neighbors.

In practice, Open Skies platforms offer some advantages. Commercial satellite images can be manipulated - especially as they are not dual-teamed as Open Skies platforms are, and they do not match the optical and infrared resolutions of Open Skies sensors, which are limited to thirty and fifty centimeters, respectively. Open Skies sensors resolve at twice the resolution of the best commercial optical satellite (Quickbird) and 30 times better than the best commercial satellite in the thermal infrared spectrum. Resolution issues may not be so relevant with large-scale strategic movements. With a resolution of ten meters (and swath of 120 kilometers), French SPOT satellites were able to detect the buildup for the left hook attack from Saudi Arabia into Iraq in the Desert Storm phase of the first Gulf/Iraq War in 1991.[59] That said, another limit of commercial satellites is that they are hard to maneuver to areas of interest – doing so is at a minimum extremely expensive, and is often physically impossible. A final advantage of Open Skies planes over satellites is that they are manned by the inspecting side. There is a verifiable chain of custody of the images that contrasts with commercial sources, and this provides

[59] Vipin Gupta and George Harris, "Detecting Massed Troops with the French Spot Satellites: A Feasibility Study for Cooperative Monitoring," SAND-98-85973 (Albuquerque, NM: Sandia National Laboratories, 1998).

insurance of accuracy.

Even pre-announced flights can accomplish their missions. The point of Open Skies is to reveal national intentions, such as fleet or mass army movements, not national secrets; it is "Open Skies not Open Spies" according to one U.S. Department of Defense official.[60] For this reason, the approximately 24 hour warning between disclosure of the flight plan and the actual flight does not corrupt the purpose of Open Skies because national secrets may be cloaked in that time, but not signals of national intent. The agreed upon resolution of photographic cameras (30 cm) allows for the identification of major weapons systems in open display and of military infrastructure, but not for detailed analysis. Thus a line is drawn between making strategically significant developments transparent and unlimited intelligence.[61] Another way to phrase this is that cooperative airborne monitoring is designed and able to detect strategically significant actions and force structures, while allowing technical, tactical, or lesser operational secrets to be protected. It is also true that cooperative airborne monitoring can not be expected to detect small activities or capabilities, such as the movement of nuclear warheads, though this limitation affects most intelligence platforms.

For those concerned that Open Skies allows too much insight into U.S. (or other homeland) defense activities, and is just another form of spying, the U.S. has a program called the Defense Treaty Inspection Readiness Program (DTIRP) devoted to mitigating this problem. This program is commonsensical and easily replicated by any signatory country that so wishes,

---

[60] Telephone interview, November 3, 2005.

[61] Hartwig Spitzer and Rafael Wiemker, "Image Analysis and Data Assessment: What Can Be Learnt from Open Skies Image Data," in P. Dunay et al, *Open Skies: A Cooperative Approach to Military Transparency and Confidence Building*, UNIDIR, 2004, chapter 6, pp. 103-126.

thanks to the pre-notification requirements in the Open Skies Treaty. The program can also be emulated in most future cooperative airborne monitoring agreements.

The Defense Treaty Inspection Readiness Program (DTIRP) is designed to reduce the security and secrecy consequences of inspections and verification from all the arms control treaties the U.S. has signed, including Open Skies. DTIRP advises military bases and contractors on what the various treaties are, and how to prepare for inspections. In the case of Open Skies, the U.S. analyzes each flight plan, and determines the area within the sensor range of the aircraft. This is usually assumed to be about fifty kilometers on each side, far wider than, for example, the actual maximum operational ground surveillance swath of twenty-nine kilometers of the "Pod Group's" Hercules C-130 aircraft. The swaths of other Open Skies platforms range from twenty three to seven kilometers). It then uses an automated Telephone Notification System (TNS) to send a series of messages to affected facilities: pre-notification of overflights, notification of takeoffs and landings of flights, and so forth. Not only does this allow the facilities to protect activities which need protecting, mutual safety is increased as exercises and tests can take into account the overflights.[62]

Only a careless state would let overflights reveal tactical or operational secrets. And it must be re-iterated that the aim of cooperative airborne monitoring is to detect actions and violations when they reach a strategically important level. That said though, one benefit of

---

[62] Ernst Britting and Hartwig Spitzer, "The Open Skies Treaty," in Trevor Findlay and Oliver Meier, eds., *VERTIC Verification Yearbook*, (London, UK: Verification Research, Training and Information Centre (VERTIC) 2002), Chapter 13, pp. 223-238, esp. p. 228; Defense Treaty Inspection Readiness Program, "Open Skies Notification System," order number 315P (Fort Belvoir, VA: Defense Threat Reduction Agency, June 2003) via <<http://dtirp.dtra.mil/products/cat_os.asp>>; and Amy Smithson, "Open Skies: Ready for Takeoff," *Bulletin of the Atomic Scientists*, Vol. 48, No. 1 (January/February 1992), pp. 17-22. For more on the Pod Group, see: <<http://www.openskiespodgroup.com/html/HEADSITE.htm>>.

cooperative airborne monitoring above and beyond confidence building and verification is that it is a supplement to national intelligence collection efforts. It provides redundancy and confirmation, and this applies to both on-site inspections and other verification measures as well as to national technical means (NTMs) such as satellites. If problems or ambiguities are detected by overflights, additional intelligence assets can be cued for further investigation – and vice-versa.[63]

The security dilemma is indeed pervasive, and helps explain why the cooperative agreements are much rarer in the realm of security than in economics.[64] For example, the U.N. mission between India and Pakistan accomplishes little because the two sides are sharp rivals and find it difficult to cooperate. So long as this rivalry continues, it may not be realistic to expect them to create an Open Skies regime. More generally, the prospects for Open Skies and cooperative airborne monitoring may appear dim in an era when arms control seems on the wane.

However, there are several counter-arguments. First, one can see in Cold War arms control and in the Sinai two examples of states with profound suspicions engaging in measures to build confidence and increase transparency. Second, the lack of interest in arms control may be more apparent than real. Even the hawkish Bush administration which has disparaged arms control at times has used the IAEA to help build its case against Iraq. If the political climate changes, one can expect arms control to regain some stature. Other forms of cooperative security are flourishing. In 2005, U.N. peacekeeping enjoyed a "banner" year, with peacekeeping hitting its peak in terms of numbers of peacekeepers and budget, and missions continuing to "grow in

---

[63] U.S. Congress, OTA, *Verification Technologies*, pp. 15-16.

[64] Lipson "International Cooperation in Economic and Security Affairs."

scope and complexity."[65]

Third, even hostile states may benefit from transparency if they seek to limit their arms races and mitigate their rivalry. In an uncertain and anarchic world, states seek insurance by making worst-case assumptions.[66] Incomplete information and uncertainty allow for threat assessments that overestimate an adversary's hostility, and these are "one of the most common and important forms of misperception."[67] This misperception in turn worsens the security dilemma, escalates spirals and arms races, and increases tension and conflict. With increased transparency, states may replace worst-case assumptions with facts. Transparency can thereby reduce unwarranted fears, tensions, and security spirals, reducing the likelihood of war and increasing the likelihood of cooperation. Thus, while the security dilemma limits cooperation, increased transparency offers a vehicle towards detente for those states that so wish such a policy.

As with peacekeeping generally and other efforts to increase transparency, Open Skies works best within a limited zone of relations between adversaries. On the one hand, if transparency is to reduce fears, calm tensions, and build confidence, there have to be fears and tensions in the first place. On the other hand, relations can not be so bad that cooperation is

---

[65] United Nations, Department of Peacekeeping Operations, *Year in Review 2005: A Good Year for Peacekeeping* at <<http://www.un.org/Depts/dpko/dpko/pub/year_review05/introduction.htm>>.

[66] Robert Jervis, *Perception and Misperception in International Politics* (Princeton, NJ: Princeton University Press, 1976), chapter 3.

[67] Jack Levy, "The Causes of War: A Review of Theories," in Philip E. Tetlock, Jo L. Husbands, Robert Jervis, Paul C. Stern, and Charles Tilly, eds., *Behavior, Society, and Nuclear War*, Vol. 1 (New York, NY: Oxford University Press, 1989), p. 280.

impossible.[68]

CONCLUSION

World military expenditures are near their Cold War highs.[69] This is an indicator that international wars, tensions, and rivalries continue apace in the post-Cold War world. Belying the downfall of cooperative approaches to security problems, U.N. peacekeeping operations are flourishing, and the IAEA has rarely enjoyed such substantive prominence. The need for peacekeeping operations also underscores the extent of current conflicts.

In a conflict-ridden world, states should avail themselves of the tools at their disposal to help create stability and peace. There are no panaceas, but this only means that diverse mechanisms should be used and combined. This article recommends taking advantage of the relatively cheap and flexible tools of Open Skies and cooperative airborne monitoring more broadly to help build confidence, help peacekeepers accomplish their mandates, and help monitor compliance with arms control agreements including the NPT, BWC, and CWC.

Additionally, cooperative airborne monitoring can help with a number of other tasks ranging from locating refugees and deliver aid, monitoring and deterring international crime, evaluating natural disasters and coordinating responses, and verifying current and future environmental treaties, to monitoring environmental degradation and land use.

---

[68] This band is called the "Goldilocks zone" in Lindley, *Promoting Peace with Information*.

[69] "Recent trends in military expenditure" Stockholm International Peace Research Institute, <<http://www.sipri.org/contents/milap/milex/mex_trends.html>>.

There are, of course, limitations to Open Skies and cooperative airborne monitoring in most of these domains. Yet cooperative airborne monitoring provides capabilities worth consideration by policy makers as they confront conflict and other problems.