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**AEROSTATS AND MARITIME PIRACY:
PROVIDING COST EFFECTIVE SURVEILLANCE OFF THE HORN OF AFRICA**

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Widespread maritime piracy off the Horn of Africa constitutes a costly threat to international shipping and perpetuates instability in Somalia. The international community has judged this threat severe enough to deploy a multilateral naval coalition to the region. Current efforts, however, rely on inadequate and costly aerial surveillance to monitor a vast area, resulting in a relatively ineffective naval response to pirate attacks.

This brief proposes that the United States augment maritime situational awareness through the use of existing aerostat technology to deploy a low cost persistent radar surveillance network off the coast of Somalia. This maritime awareness network would provide real time tracking of shipping off the Somali coast and facilitate the identification of suspicious vessels or activity. Using low cost aerostats will allow the international community to employ its scarce naval resources in a more effective manner and will help commercial shipping avoid potential threats. The use of aerostats will also allow the United States to cost effectively deploy its limited and expensive manned and unmanned winged surveillance platforms to areas of greater strategic importance.

Maritime Piracy off the Coast of Somalia

According to International Maritime Bureau records, incidents of maritime piracy and armed robbery have risen dramatically since 2006.

Frequency

- Pirates seized a total of 53 vessels in 2010, with Somali pirates responsible for all but four of these hijackings for ransom.¹ This level of activity was a marked increase from the 14 hijackings in 2006, 11 of which were by Somalis.²
- Globally, pirates took 1,181 crew members hostage during 2010. This figure is over six times the number captured during 2006 and Somali pirates accounted for 1,016 of this total.³

- Annual reported pirate attacks doubled between 2006 and 2010, with 239 attacks in 2006 and 445 in 2010.⁴ Somali pirates perpetrate approximately half of all attacks.⁵

The Piracy Business Model

- After receiving ransoms, Somali pirate bosses and financiers typically pocket 20% of the total. Pirate leaders invest another 20% to support future missions and earmark 30% as bribes for government officials.⁶ The pirate rank-and-file take 30%, which translates to incomes that are still two to three times higher than that of the average worker.⁷
- Average ransom payments rose sharply from \$3.4 million in 2009 to \$5.4 million in 2010.⁸ For impoverished Somalis and corrupt government officials alike, piracy is becoming an increasingly lucrative and well entrenched alternative.

Economic Costs and Dangers of Unchecked Piracy

- Ransom payments, elevated insurance premiums, route adjustments, increased salaries for crewmembers, counter-piracy precautions, and legal expenses associated with piracy raise the costs of global commerce by up to \$50 billion per year.⁹
- In addition to the immediate and substantial financial costs of Somali piracy, its long-term intensification increases the danger of major security or environmental crises, such as:
 - Pirate seizure of a ship carrying sensitive cargo;¹⁰
 - Damage to transiting tankers that carry 12% of global petroleum supplies—possibly precipitating a disastrous oil spill;¹¹
 - Closer relations between Islamist militants and pirates, which could provide terrorists with new sources of income.

Current International Counter-Piracy Efforts

The international community to-date is unwilling to embark upon an extensive nation building effort to address the land-based roots of Somali piracy. Instead, many countries have focused on suppressing piracy off the Somali coast.

Background: By 2008 and 2009, several states had sent warships to guard against piracy off the Horn of Africa and secure the heavily trafficked Gulf of Aden. At present, counter-piracy forces in the region include Combined Task Force 151, European Union

Operation Atalanta, NATO's Operation Ocean Shield, and unilateral contributions from Russia, China, India, and Japan, among others. At any given time, a total of up to 50 warships are on patrol in the region.¹²

Strength: Combined with greater industry awareness, international patrols have hindered pirate operations.

- Somali pirates' hijack success rate fell to 22% in 2009, down sharply from 34% the previous year and 63% in 2007.¹³
- In the Gulf of Aden, vessels reported only 45 attacks during the first nine months of 2010 compared with 100 attacks over the same period in 2009.¹⁴
- Currently, naval forces are thought to disrupt approximately one-fifth of pirate attacks.¹⁵

Weakness: Pirates soon adapted and began to rely on motherships to expand their activity into lightly patrolled waters far from the Somali coast. Several enduring challenges constrain the response of counter-piracy forces.

- *A Vast Area of Operations*: Somali pirates have increased their range to include over 2.5 million square miles of sea.¹⁶
- *An Uneconomical Approach*: While naval commanders have been unable to arrest the rise in pirate attacks, governments hesitate to commit more warships against a relatively marginal threat. Deploying a single frigate-class vessel for patrols costs \$1.3 million per month, and the total annual cost of the counter-piracy coalition is approximately \$1.5 billion per year.¹⁷
- *Inadequate Surveillance*: Manned surveillance aircraft and unmanned drones currently provide some wide area surveillance coverage, but these platforms are in high demand elsewhere and are costly to deploy continuously over the region.¹⁸ For example, the hourly operating cost of the E-2C Hawkeye surveillance plane is estimated at \$18,700, forcing many commanders to accept incomplete coverage.¹⁹

Naval forces' consequent lack of real-time maritime awareness results in:

- 1) Lack of Advanced Warning for Naval Forces: Pirate attacks are typically concluded after 15 to 30 minutes. As a result, warships are unable to assist most vessels unless they receive a timely distress call from a ship located only a few miles away.²⁰
- 2) Lack of Advanced Warning for Merchant Vessels: Distress calls usually come too late because small, fast pirate skiffs are typically not detected on

merchant ships' radar. Even if they are detected, skeleton crews and overworked watch officers on commercial vessels are often slow to recognize incoming threats.²¹

A Potential Solution: The Broad Area Maritime Surveillance Program

The Navy plans to deploy the Broad Area Maritime Surveillance (BAMS) program in 2015. This unmanned, high-altitude platform is a maritime version of Northrop Grumman's Global Hawk that will operate over long ranges for more than 30 hours at a time.²² Its sensor package will enable optical and electronic surveillance in addition to a wide area radar system with a detection radius of approximately 125 miles.²³ According to current plans, the Navy will station BAMS at bases in the 5th Fleet's area of responsibility to establish persistent maritime surveillance.

Strength: BAMS is a sophisticated strategic surveillance platform that can provide greater maritime awareness in the Gulf of Aden and off the Somali coast.

Weakness: BAMS is an expensive solution to the low strategic value threat of maritime piracy.

- Each of the Navy's 68 BAMS systems will cost \$55 million.²⁴
- Per flight hour, Global Hawk UAVs cost \$27,000 to operate—a sum even greater than the manned E-2C Hawkeye.²⁵
- Several BAMS platforms will be needed to maintain continual surveillance of the Gulf of Aden and the Somali coast, diverting this highly capable asset from missions of greater strategic importance.

Drawing Lessons from Aerostat-Based Drug Interdiction

In the late 1980s and early 1990s, the Army and Coast Guard moored aerostats to leased commercial vessels to aid drug interdiction efforts in the Gulf of Mexico. The Small Aerostat Surveillance System and the Sea-Based Aerostat program together provided eight ship-based aerostats whose radars could detect ships and planes suspected of drug smuggling.²⁶ Each aerostat had a detection range of 70 miles and guarded maritime chokepoints, including the Mona Passage, the Windward Passage, and the Yucatan Channel.²⁷ Manned radar aircraft and a budding network of land-based aerostats along the southern border supplemented the sea surveillance systems so that drug smugglers faced a formidable "radar fence."

Strength: Drug smugglers were gradually forced to transport their contraband using less desirable modes of transportation and along riskier routes.

- By 1993, aerostats contributed significantly to reducing the level of aerial smuggling by 75% from peak levels in 1982. Smugglers changed practices in light of increased risks and complicated the logistics of drug distribution.²⁸
- Aerostats proved to be sources of relatively cheap persistent surveillance. In fiscal year 1992, the Department of Defense spent \$40.7 million on the entire network of sea aerostats and base ships, and the acquisition cost of each aerostat was a mere \$10 million.²⁹ The Department of Defense's coordinator for drug enforcement policy identified aerostats as the government's "most cost-effective counternarcotics detection and monitoring asset."³⁰

Implication: Despite the success of aerostats in drug interdiction, Clinton administration officials grew frustrated when large quantities of drugs continued to enter the United States. President Clinton gradually reoriented U.S. drug policy and issued Presidential Decision Directive 14 in 1993. The new approach reallocated resources away from interdiction in transit zones in favor of interdiction efforts in the source countries of South America.³¹ Sea-based aerostats and other surveillance and interdiction assets were dismantled, resulting in a "measurable increase in 'trafficking events per month'" in the Gulf of Mexico, according to the Drug Enforcement Agency.³² Despite the government's altered interdiction priorities, aerostats' proven capacity for wide area, persistent, and cost-effective surveillance provides a model for a new maritime network.

Towards Persistent Surveillance and Proactive Interdiction off the Coast of Somalia

Shifting to a strategy that prioritizes early detection and proactive interdiction will mitigate the shortcomings of current counter-piracy efforts. To be successful, such a strategy must increase the responsiveness of coalition forces while respecting constraints on available naval resources. This brief makes two main recommendations for the United States to explore with its maritime allies and partners.

- 1) **Harness Aerostats to Augment Interdiction:** In addition to their previous counter-drug role, surveillance aerostats have deployed to Iraq and Afghanistan to observe bases and key roadways. Counter-piracy forces should further adapt these systems to form a new sea-based aerostat network.

Available Technology: At present, the Tethered Aerostat Radar System (TARS) is the United States' most established aerostat program and has operated along the southern border since the 1980s. TARS relies on Lockheed Martin's L88 wide area surveillance radar, which can detect maritime surface targets. When stationed at 12,000-15,000 feet above sea level, the system boasts an impressive radar detection radius of up to 230 miles.³³ It is capable of remaining aloft for 30 days while supplying persistent, wide area surveillance coverage.³⁴ Although high winds and storms can ground these aerostats, pirates are less likely to be active in

these conditions. If moored to naval vessels, TARS or a similar platform could greatly increase the operational efficiency of naval forces—especially if teamed with “ScanEagle” class UAVs launched from warships to provide optical surveillance.

Deployment: There are three major shipping lanes off the Horn of Africa. The first runs east-west along the Arabian Sea and the second closely skirts the northern rim of the Indian Ocean. Neither route is as well-defined compared to the third, which is narrow and hugs the African coast.³⁵ The United States should deploy a surveillance network of seven aerostats to secure the Gulf of Aden and these routes. Pirates disproportionately concentrate their attention on these areas, which also see the heaviest container and tanker traffic. Deploying a wide area surveillance system would significantly reduce the number of attacks and damage the pirate business model by denying pirates their most lucrative targets.

A Cost Effective Approach: Since 1992, operations and maintenance costs for TARS sites have fallen by more than 50% to the current annual rate of \$2.8 million.³⁶ This translates to a per flight hour price of \$300 to \$500—slightly cheaper than other aerostat models deployed in Iraq and Afghanistan.³⁷ If similar savings can be achieved in a sea-based network, these systems would supply a cheap and effective means of raising maritime awareness. The network would necessitate the modification of existing naval vessels or the transfer of personnel to operate and defend newly acquired base vessels. These added costs, however, would be relatively marginal compared to the cost of providing comparable coverage using other manned and unmanned surveillance platforms.

2) Establish a Maritime Information Network: Naval forces should use radar data to construct an overview of potential pirate threats and share this information with merchant vessels to give them warning of attacks. Virtually all vessels engaged in oceangoing trade are equipped with Automatic Identification System (AIS) transponders that constantly broadcast a ship’s location, heading, speed, and other details via a VHF transmitter.³⁸ Smaller vessels such as fishing trawlers, pirate skiffs, and motherships typically do not possess such transponders.³⁹ Once equipped to receive AIS data from merchant vessels, surveillance aerostats could:

- Expand friendly naval forces’ awareness of shipping activity by providing a wide-area, real-time overview of merchant traffic
- Relay coordinates of unidentified radar contacts to nearby merchant vessels with increased awareness of potential threats, ship captains would have more time to enact evasive or preventive countermeasures. Naval commanders would also receive more timely distress calls, which would increase the responsiveness and success of interdiction efforts.

Conclusion

Enhanced surveillance and interdiction cannot solve what is ultimately a land-based problem. Such measures are only one part of a solution that must include other elements, such as the development of Somali authority and increased international cooperation in prosecuting pirates. While piracy will continue for the foreseeable future, the international community can expect an aerostat-based maritime information network to inexpensively bolster current counter-piracy operations and enhance deterrence.

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² Anthony Barker, "Ship Piracy up, Somali and Nigerian Waters Worsen," *Reuters*, January 9, 2008, <http://www.reuters.com/article/2008/01/09/idUSL09370792>.

³ "Hostage-taking at Sea Rises to Record Levels, Says IMB;" Associated Press, "Pirate Hijackings at Record High," *The Guardian*, January 18, 2011, <http://www.guardian.co.uk/world/2011/jan/18/pirate-hijackings-record-high>.

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¹² Lauren Ploch, *Piracy Off the Horn of Africa*, Congressional Research Service, CRS Report for Congress, April 20, 2009, 50.

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