Searching for Self-Propelled, Semi-Submersibles

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Self-Propelled Semi-Submersibles now transport an estimated 75% of cocaine originating from Colombia and headed for the United States. Joint Interagency Task Force South employs a variety of search platforms to detect, classify, and interdict these vessels. We introduce a defender-attacker optimization to maximize our probability of successful detection and classification via coordinated disposition of these searchers. We assume the "attacker" has imperfect knowledge of our actions but is aware that we are looking for him. Given this, we show how to allocate our optimal mixed (i.e., probabilistic) search effort, and how an intelligent attacker will try to evade us. We show results for both the Eastern Pacific and Caribbean operating areas. This represents a new class of "risk assessment" models that uses our knowledge of limits on our courses of action and objective and limits on attacker courses of action (i.e., things we can be expected to know) to derive mixed strategies. This is in contrast to currently-fashionable risk assessment methods that require "subject matter experts" to guess what an intelligent adversary might do.