Tracking orbital debris in a busy airspace environment.

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Abstract: With the amount of orbital debris increasing dramatically, the development of methods to remove the debris or predict its future impact to other orbital assets is becoming critical. The first step in either effort is to develop the ability to accurately locate and track the debris. Ground based laser ranging can provide more accurate position information then the current radar systems and by using multiple stations to track the same object, accurate orbits can be obtained. In this scenario the more stations participating in the effort, the more accurately and reliably the orbit can be defined. However, stations in areas where the airspace is crowded are limited in the amount of laser power they can use to track such objects without endangering passing aircraft. To reduce these effects we examine the design implications of shifting the laser wavelength from 0.532 μm or 1.064 μm the standards for laser ranging to the 1.5 μm range where more powerful lasers can be used without generating safety concerns. We will examine the trade space of the amount of eye safe power at different wavelengths, combined with link analysis of a sample target and the efficiency of the receive detectors to the returning signal.