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Oral

The presence of clouds is a critically important parameter for Department of Defense applications, especially for the directed energy (DE) community. Therefore, understanding the probability that a cloud will inhibit the performance of existing and emerging DE technologies (e.g. high energy lasers, power beaming, free space optical communications) for operational regions of interest is necessary. Existing cloud climatologies are available for limited land sites but do not account for elevation and azimuthal variations. The Air Force Institute of Technology's Center for Directed Energy (AFIT/CDE) has developed a robust simulation technique leveraging 10+ years' worth of numerical weather prediction (NWP) data. Utilizing realistic sky characterizations from AFIT/CDE's 4D Weather Cube tool, NWP-inferred cloud layers are defined and cloud free line of sight (CFLOS) probabilities quantified over a 10+ year period for any worldwide location, including littoral and over-ocean sites. Recent high performance computing optimizations allow for efficient runtimes and yield cloud climatologies for various worldwide locations, times of day, and view angles considering azimuthal variations.

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