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A free-space optical data relay for Antarctica

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The polar regions have an established history of usage for radio frequency ground stations, offering favourable orbital dynamics for linking with the increasingly large amount of satellites in polar orbits. These dynamics, combined with favourable atmospheric conditions for optics, suggests the Antarctic continent is an excellent location for an optical ground station. We conduct a large number of orbital simulations and combine those results with a suite of remote-sensing data to model the performance of a theoretical optical ground station on Antarctica. Further, we outline the details of an experiment that could be conducted to demonstrate an optical data relay from one of the coastal bases on Antarctica. This concept of a highly effective optical ground station on Antarctica could provide vast improvements to existing bandwidth for offloading science data from the continent as well as offering an effective ground segment for Earth observation satellites.

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