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A GLOBAL GEOGRAPHICAL SURVEY OF RECEIVED SIGNAL STRENGTH IN THE VHF BAND

Abstract

Sumbandila (SO-67) is an 81kg LEO satellite launched on 17 September 2009. The satellite's primary payload is a 6.25m ground sampling distance multi-spectral imager. In addition the satellite carries several secondary payloads, including an amateur radio repeater. The satellite has two command transceivers that operate in the commercial UHF/VHF bands. In this article we provide an analysis of signal strength data measured over a range of frequencies in the VHF band across the globe. The source of the received signal may be both terrestrial and not. The data provide very useful information for selecting geographical locations for future ground stations as to minimize unwanted interference. A further application of the data is to obtain an indication of which frequencies to use for command and telemetry communication at existing ground stations.

The data is obtained by executing onboard flight control procedures to select the frequencies to measure. The existing onboard telemetry gathering system is employed to record the data, most notably the received signal strength for the given frequency. The data is downloaded using an adaptation of the imagery data download path. We determine regions of high signal levels by clustering neighbouring measurements and averaging the signal over the cluster, after removing outliers. The data is then plotted on a geographical signal strength heat map.

We contrast our results with similar data measured in the late 90's and demonstrate the changes over the last decade. We conclude that including a receiver capable of measuring frequency interference across a desired frequency range is very useful to future missions for selecting communication frequencies for desired ground station locations.