



## **Automatic detection of reflected signals in GPS occultation events for monitoring of polar regions**

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This work presents a space-born application to monitor the polar areas, in a long-term basis, from the analysis of GPS radio occultation signals observed with Low Earth Orbit (LEO) satellites, and with available data sets back to 1995 (GPS-MET LEO satellite). In some situations, GPS radio occultations present, in addition to the direct link signal, a weaker signal reflected off the Earth's surface, which is highly correlated with the presence of ice sheets at the reflection point. In this work, we present a software tool that automatically detects the presence of reflected signals in radio occultation events by means of pattern recognition and classification techniques, which allows for processing large occultation databases. The tool is based on a linear searching algorithm, applied on the radioholograms of the radio occultation received signals. The linear searching algorithm extracts a set of preselected features for each occultation event and then classifies it as presenting or not a reflected signal, with different degrees of confidence (classification flag). The tool has been tested with a set of 418 occultations of the CHAMP radio occultation database, resulting in an overall classification success rate of 82.1 %. The purpose of the automatic system is threefold:

1. The flag generated by the tool can be of interest for quality monitoring of the atmospheric sounding products.
2. The automatic recognition of a reflection event is the first step in a wider algorithm developed at IEEC and NASA/JPL to use such data sets for polar ice altimetry [Cardellach et al. doi:10.1029/2004GL019775].
3. Finally, the flag itself may contain geophysical information, such as climatological statistics of sea ice coverage and seasonal signatures. A preliminary study of this application will be also presented.