

**On the drifts exhibited by cryogenically cooled InSb infrared filtered detectors and their importance to the ATSR-2 and Landsat-5 earth observation missions.**

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**Abstract**

The spectral responsivity of commercially available InSb detectors with low-pass cold filters attached on their cold shields for optimum operation in the 1.6  $\mu\text{m}$  to 2.6  $\mu\text{m}$  wavelength range was observed to drift slowly with time. These drifts were shown to arise due to a thin film of water-ice depositing on the cold low-pass filters mounted on the cold shields of the detectors. The temporal characteristics of these drifts were shown to be strongly dependent on wavelength. A model is proposed for the behaviour of the water present in the dewar-vacuum which can explain and predict the temporal characteristics of the observed drifts for all wavelengths. These observations are particularly relevant to space instruments which use cryogenically-cooled infrared filter radiometers for earth observation. The temporal profile of drifts observed in missions like Landsat-5 is identical to that observed in cryogenically cooled filtered InSb detectors during laboratory measurements. This work confirms that the deposition of a thin film of a material like ice on the cold band-pass filters/windows is therefore the most likely source of the oscillatory drifts observed in the response of some of the channels of the ATSR-2, and Landsat-4 and Landsat-5 earth observation missions.