An FTIR Spectrometer for Remote Measurements of Atmospheric Composition

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Abstract

The JPL Mark IV interferometer, an infrared Michelson interferometer, was built specifically for recording high resolution solar absorption spectra from remote ground-based sites, aircraft and from stratospheric balloons. The instrument is double-passed, with one fixed and one moving corner reflector, allowing up to 200-cm of optical path difference (corresponding to an unapodised spectral resolution of 0.003 cm^{-1}). The carriage which holds the moving reflector is driven by a flexible nut riding on a lead screw. This arrangement, together with the double-passed optical scheme, makes the instrument resistant to the effects of mechanical distortion and shock.

The spectral range of the instrument is covered by two liquid nitrogen-cooled detectors: an InSb photodiode is used for the shorter wavelengths (1.8-5.5 μm, 1,800-5,500 cm^{-1}) and a HgCdTe photoconductor for the range (5.5-15 μm 650-1,800 cm^{-1}). For a single spectrum of 0.01 cm^{-1} resolution, which requires a scan time of 105 seconds, the signal/noise ratio is typically 800:1 over the entire wavelength range.