

The Evolution of the US Satellite IR Sounding Program – From the Nimbus SIRS and IRIS to the NPOESS CrIS

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We trace the development of the satellite infrared radiation-sounding program that began with the Nimbus SIRS and IRIS experiments launched on the Nimbus-3 satellite in 1969. These first instruments were well-calibrated grating and interferometer spectrometers with moderate spectral ($2.5\text{-}5.0\text{ cm}^{-1}$) and low horizontal (100-150 km) resolution, respectively. Since that time the evolution continued through much higher horizontal resolution (i.e., 10- 25-km) filter radiometers with poorer spectral resolution ($15\text{-}20\text{ cm}^{-1}$) and calibration accuracy than the SIRS and IRIS. With the advent of the much higher vertical resolution sounding capability first demonstrated from aircraft using the hyperspectral High resolution Interferometer Sounder (HIS), the CrIS instrument was designed to be the NOAA satellite filter sounder replacement for future operational NPOESS satellites. CrIS has a maximum spectral resolution of 0.5 cm^{-1} and a nominal spatial resolution of 15-km. We provide illustrations of the radiometric performance and vertical sounding capability achieved during the satellite sounder evolution. We end the presentation with a demonstration of the extraordinary radiometric performance and sounding resolution and accuracy to be achieved with the recently completed CrIS instrument from the NPP/NPOESS series of operational satellites.