Validation Studies Using NAST-Interferometer Field Measurements

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The Integrated Program Office (IPO) developed and supports high-altitude aircraft flights of the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Airborne Sounding Testbed (NAST) as part of risk mitigation activities for future NPOESS sensors. The NAST-Interferometer (NAST-I) is a high spectral and spatial resolution (0.25 cm^{-1} and 0.13 km nadir footprint per km of aircraft altitude, respectively) cross-track scanning (2 km swath width per km of altitude) Fourier Transform Spectrometer (FTS) observing within the 3.7 – 15.5 micron spectral range. NAST-I infrared spectral radiances are used to characterize the atmospheric thermodynamic state and provide information on radiatively active trace gases (e.g. O_3 & CO), clouds, and the terrestrial surface during experimental campaigns. These direct and derived NAST-I data products greatly contribute toward instrument and forward model pre-launch specification optimization and will enhance post-launch calibration/validation activities for the Cross-track Infrared Sounder, CrIS, to fly on NPP and NPOESS (as well as for other advanced atmospheric spaceborne sensors). In this paper we address some of the challenges associated with validating infrared spectral radiances obtained from such high spectral resolution remote sensing systems. This will include comparison of NAST-I infrared spectral radiances measured during recent field experiment campaigns with other radiance measurements as well as radiance calculations performed using Line-by-Line (LBL) and "Fast" forward radiative transfer models based on independent, nearly-coincident observations of atmospheric state.

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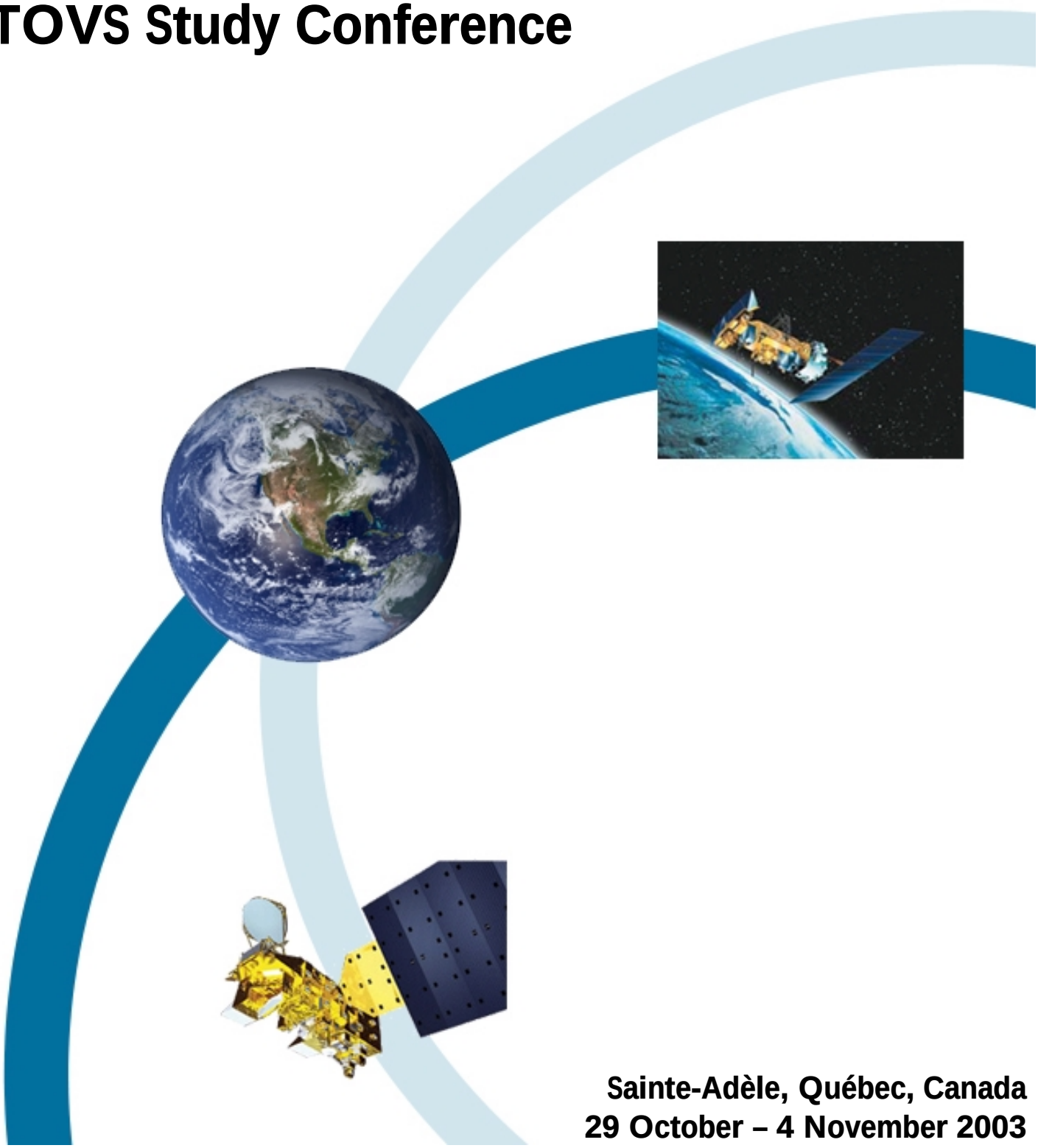

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