Application of a Principal Component-based Radiative Transfer Model to NAST-I data Retrievals

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The Principal Component-based Radiative Transfer Model (PCRTM) was developed for super fast retrievals of atmospheric temperature and moisture profiles from hyperspectral remote sensors. The NPOESS Airborne Sounder Testbed Interferometer (NAST-I) is an instrument with 8632 spectral channels. A large amount of time is needed to model all the channel radiances of the NAST-I instrument using channel-based radiative transfer models. The PCRTM on the other hand calculates the principal component scores of the NAST-I radiance, which has much smaller dimension relative to the original channel radiances. The parameterization of the PCRTM model is derived from properties of PC scores and instrument line shape functions. It is physical and accurate. The inversion algorithm is based on a non-linear Levenberg-Marquardt method with climatology covariance and a priori information as constraints. The new physical inversion algorithm has been successfully applied to the NAST-I data. It uses all NAST-I channels for atmospheric temperature and moisture profile retrievals. The results are compared with collocated radiosondes and Lidar measurements.

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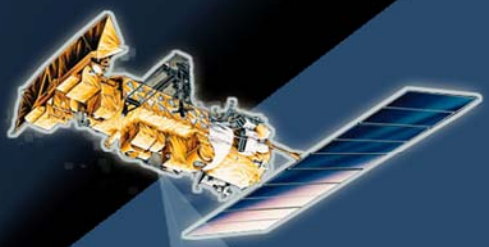

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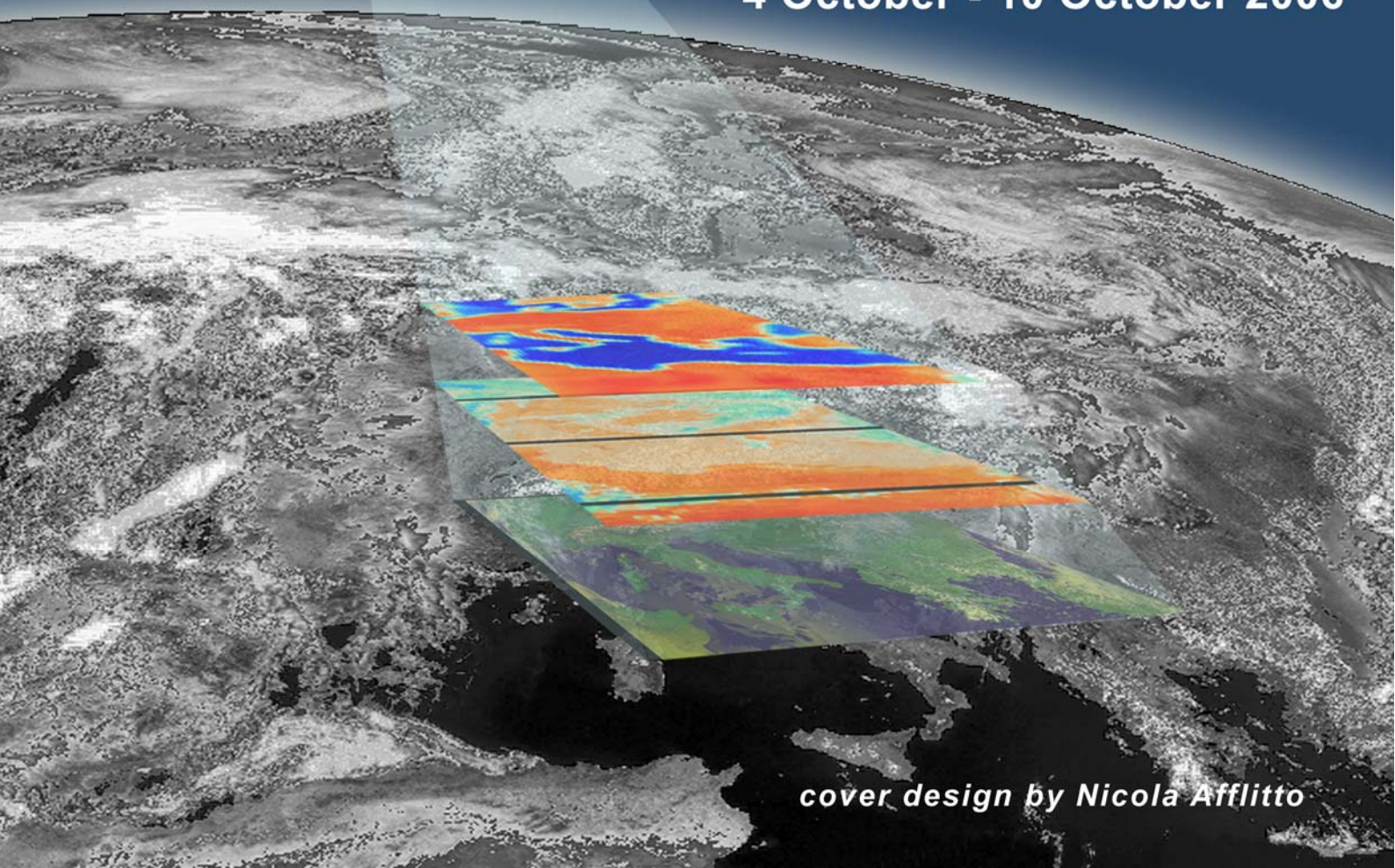

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