Global comparisons of IASI radiance simulations with LBLRTM, RTTOV, the Havemann-Taylor Fast Radiative Transfer Code (HT-FRTC) and its monochromatic version

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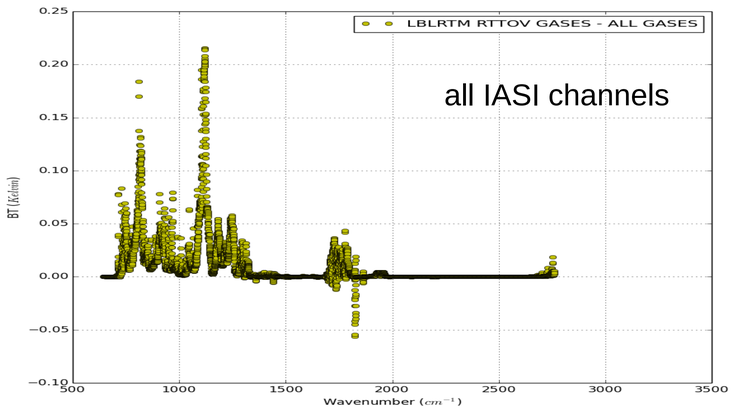
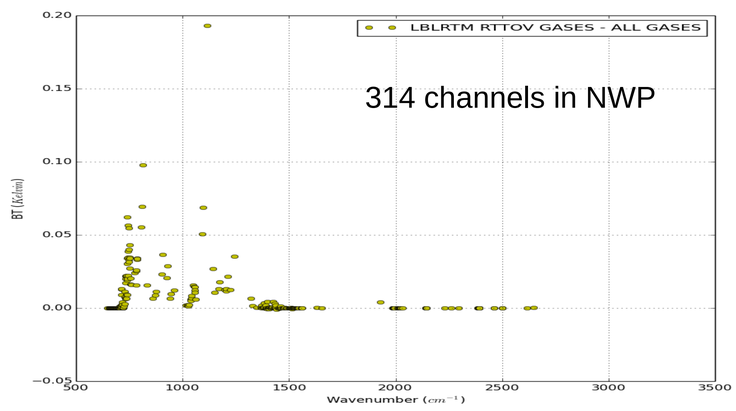
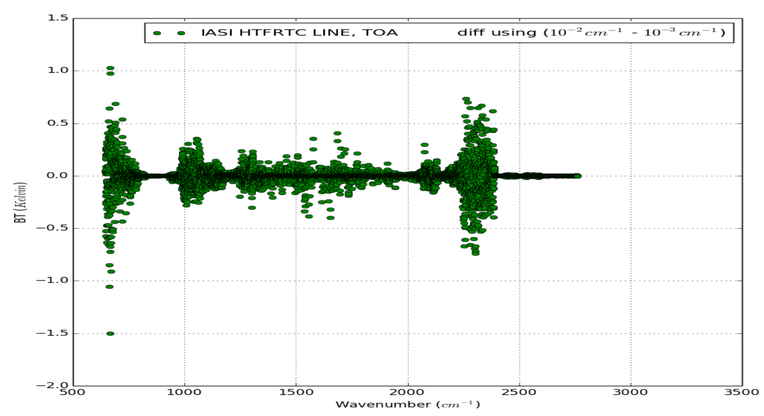
1. Potential sources of differences between models (for the comparisons the assumptions are identical across models, i.e. 17 RTTOV gases, 0.001 cm^{-1}, 91 levels)

a. All HITRAN gases (48) versus RTTOV selection (17)

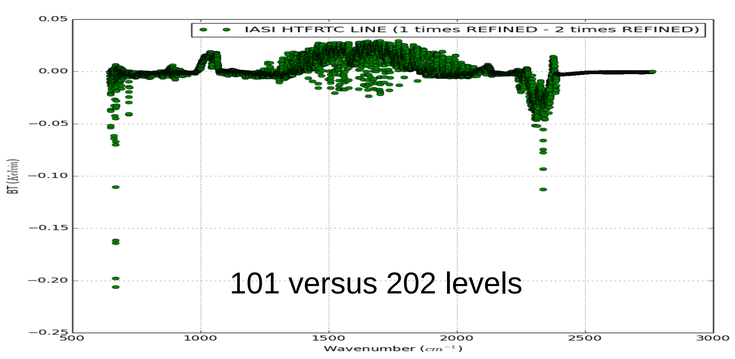


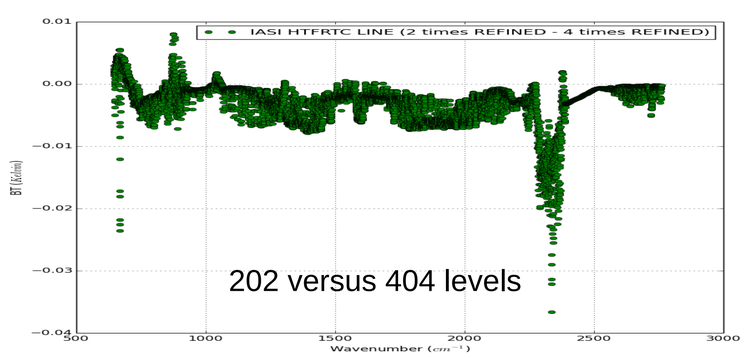


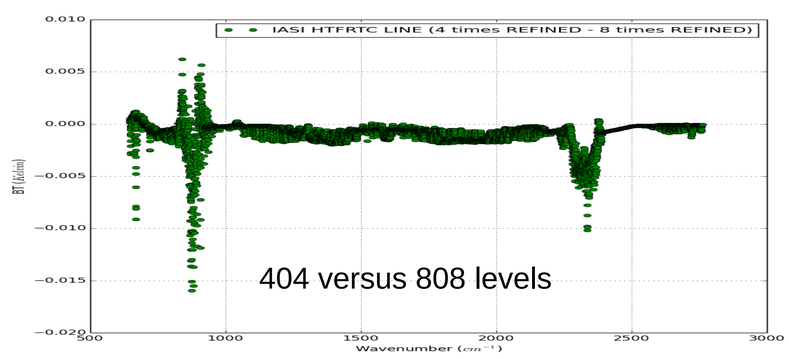
b. Spectral resolution of 0.01 cm^{-1} versus 0.001 cm^{-1}



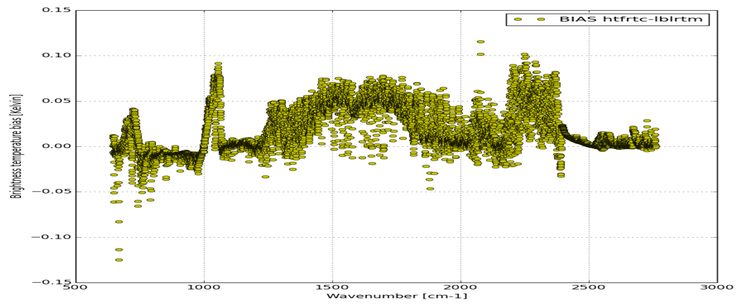
c. Vertical resolution of the atmospheric profiles

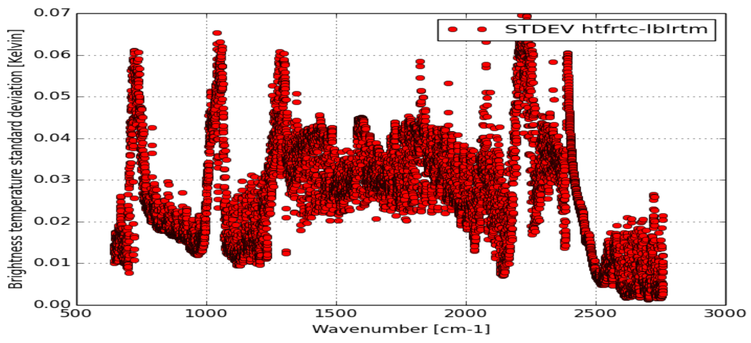




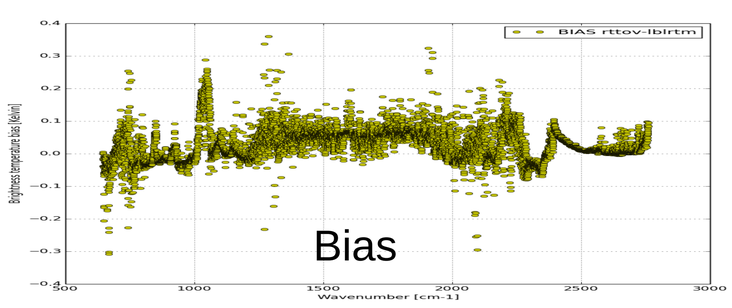


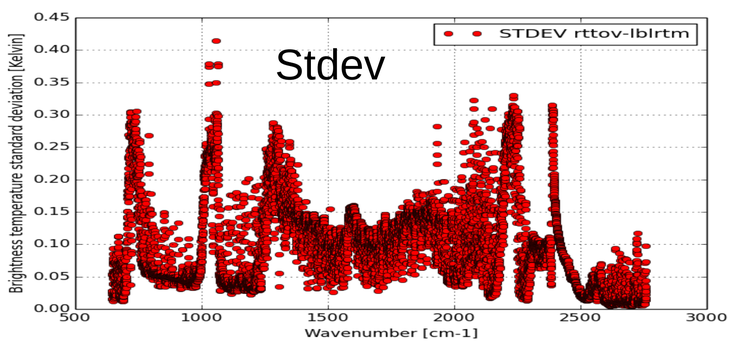
2. HT-FRTC - LBLRTM (100 random independent profiles)



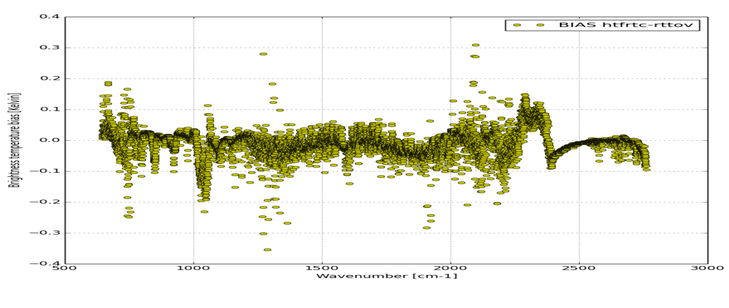


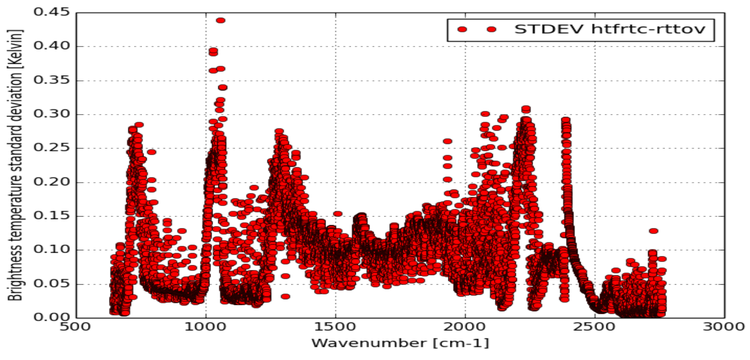
3. RTTOV - LBLRTM (same 100 profiles)



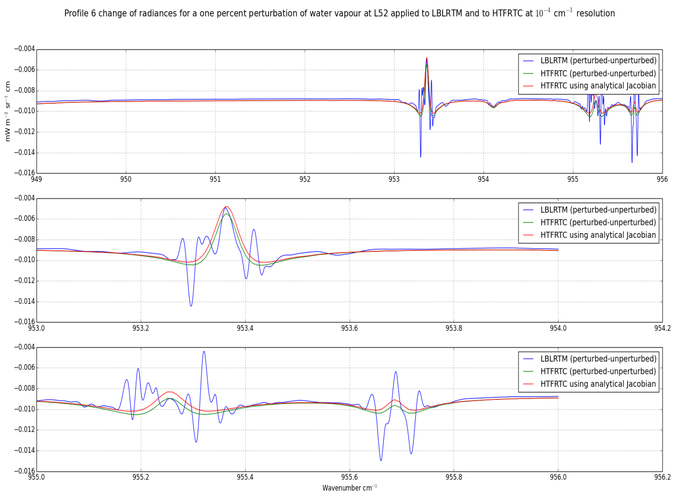


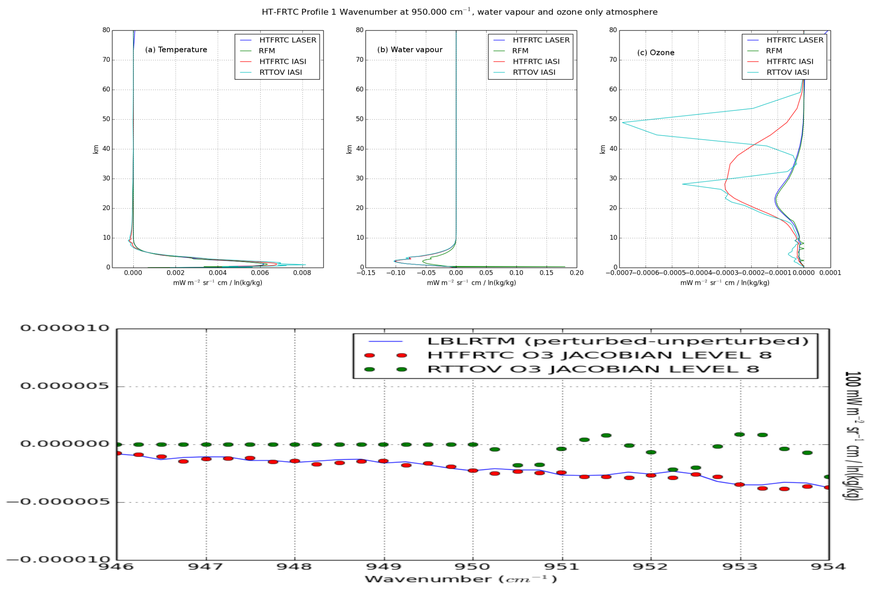
4. HT-FRTC - RTTOV (24000 random independent profiles)





5. Jacobians around 950 cm^{-1}





- ✓ **HT-FRTC uses very high resolution, line-by-line, sensor-independent principal components (PC)**
- ✓ **covers spectrum from microwave to UV**
- ✓ **50 trace gases, 20 aerosols, clouds and precip**
- ✓ **spectrally resolved surface emissivity / reflectivity**
- ✓ **airborne, spaceborne and groundbased sensors**
- ✓ **solar and lunar contribution, spherical Earth**
- ✓ **part of 1D-Var retrieval in PC space**

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