

ARTS IR application

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Outline

- Motivation
- HIRS-setup
- ARTS
- KOPRA
- Results
- Discussion/Outlook

Motivation

- Nadir sounding with similar geometry as AMSU-B/MHS since early 1980s
- Retrieve UTH and obtain long timeseries with up to 30 yrs
- Several IR instruments operated beside MW instruments -> Intercomparison
- Use one RT-model

Comparing two RT models

- ARTS started for MW applications
- KOPRA developed for IR applications
- So why not compare the two

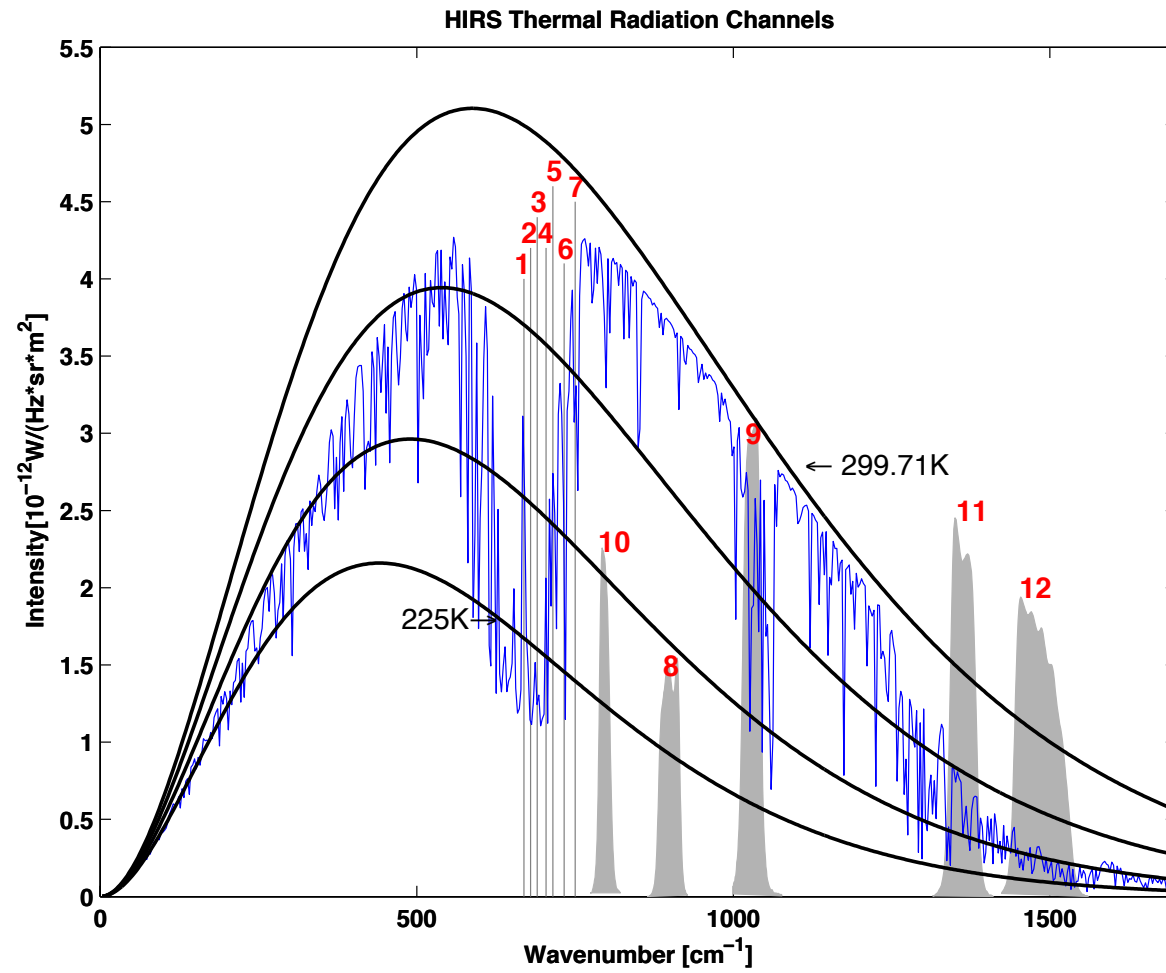
ARTS

- Applied to various MW instruments
 - NADIR (AMSU-B, MHS, etc.)
 - Limb (e.g. ODIN)
 - Upward looking (MIAWARA, AMSOS, etc)
 - Frequency (Hz)
- For this application
 - IR range
 - Broadband channels

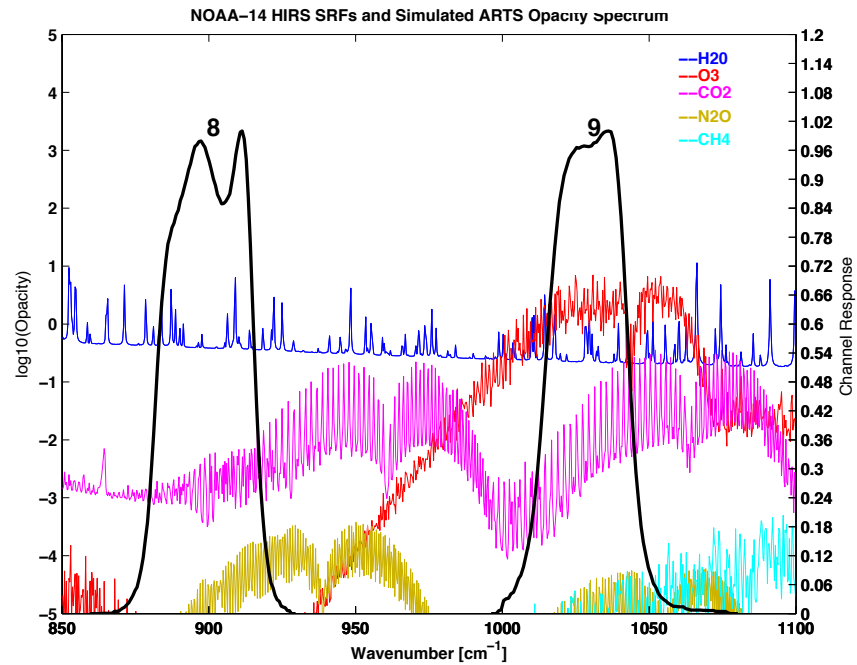
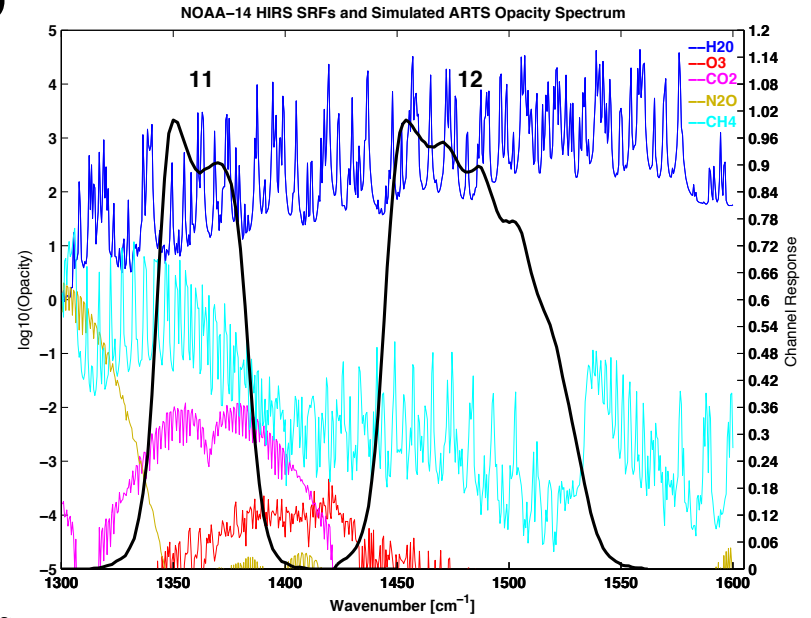
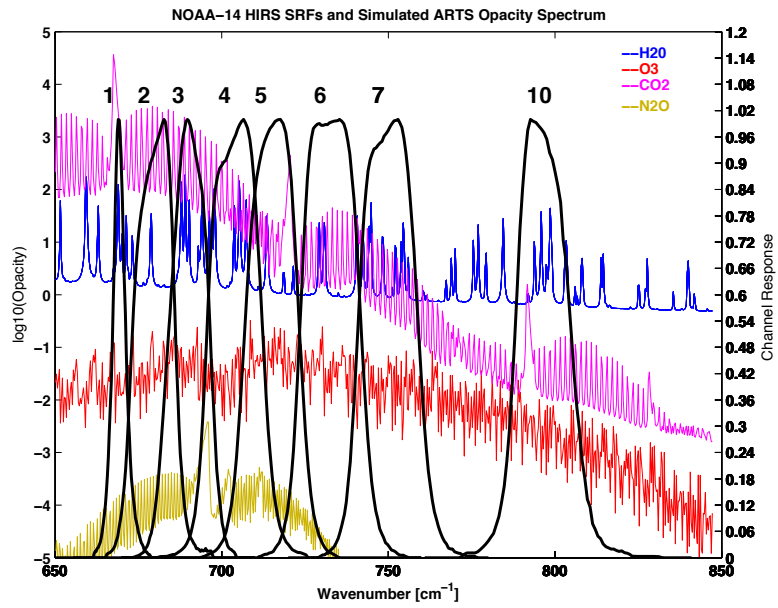
KOPRA

- Designed for MIPAS
 - Mid-IR
 - Limb-sounding
 - Interferometer
 - High spectral resolution
 - Wavelength (cm^{-1})
- For this application:
 - Nadir looking
 - Broad band channels/radiometer

HIRS



HIRS

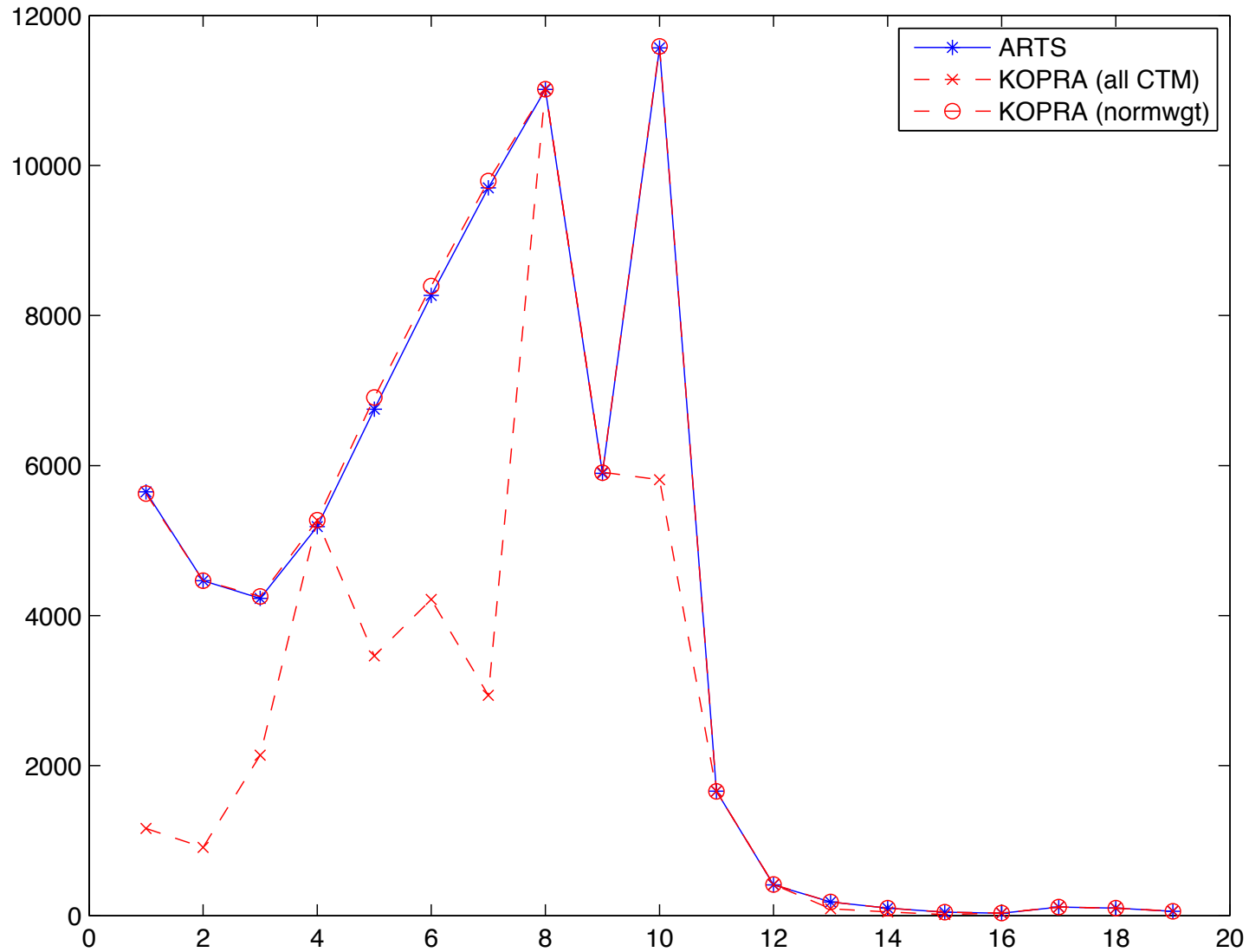


Test setup

- HIRS channel characteristics
- Nadir looking
- Garand dataset (42 profiles): p, T, H₂O, CO₂, O₃, N₂O, CO, CH₄, O₂, N₂

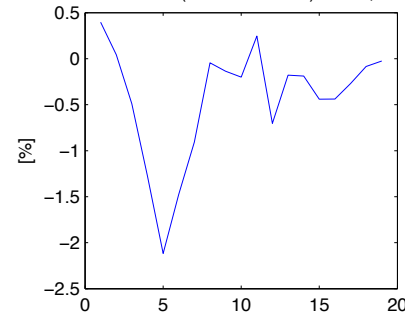
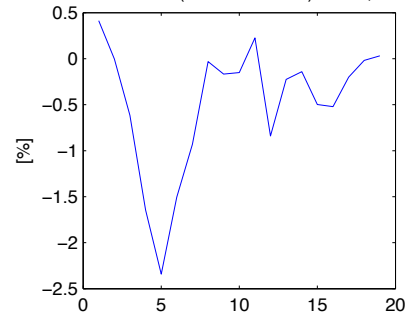
Radiances for one profile

All HIRS channels, Profile 01

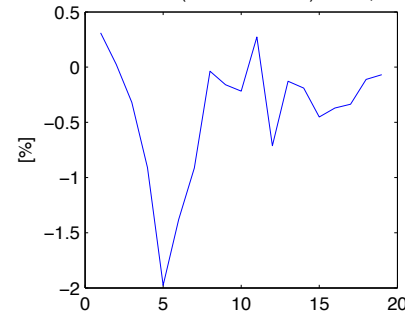
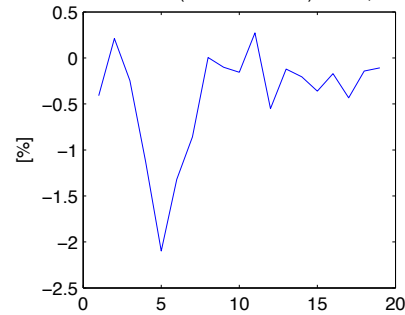


Radiances for one profile

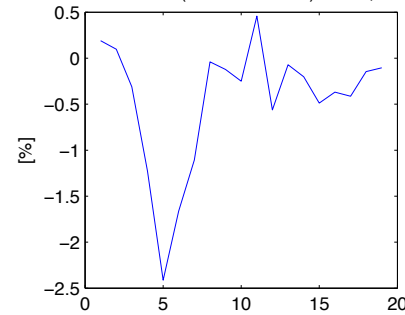
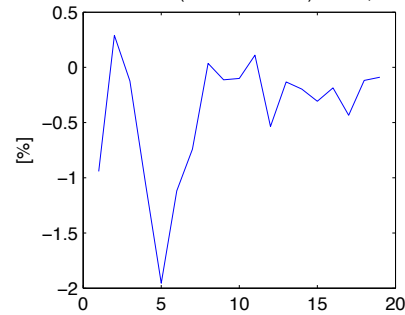
All HIRS channels (ARTS-KOPRA)/ARTS, Profile 01 All HIRS channels (ARTS-KOPRA)/ARTS, Profile 02



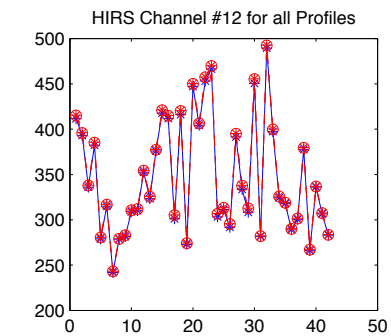
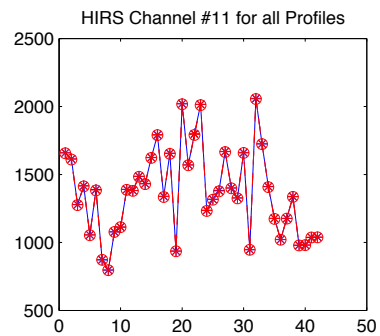
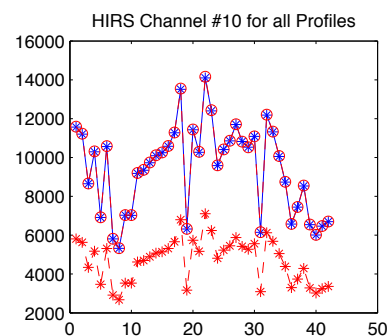
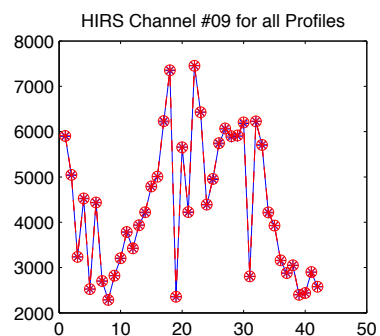
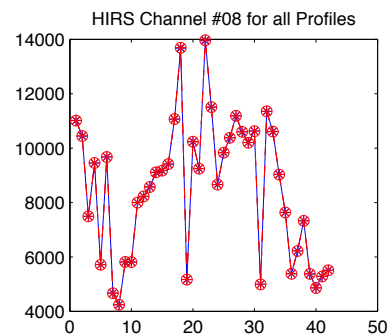
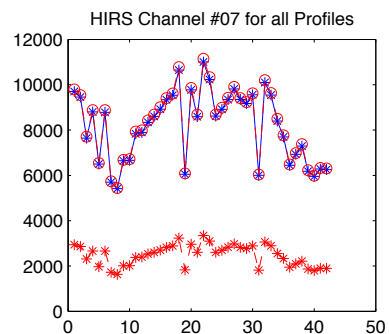
All HIRS channels (ARTS-KOPRA)/ARTS, Profile 03 All HIRS channels (ARTS-KOPRA)/ARTS, Profile 04



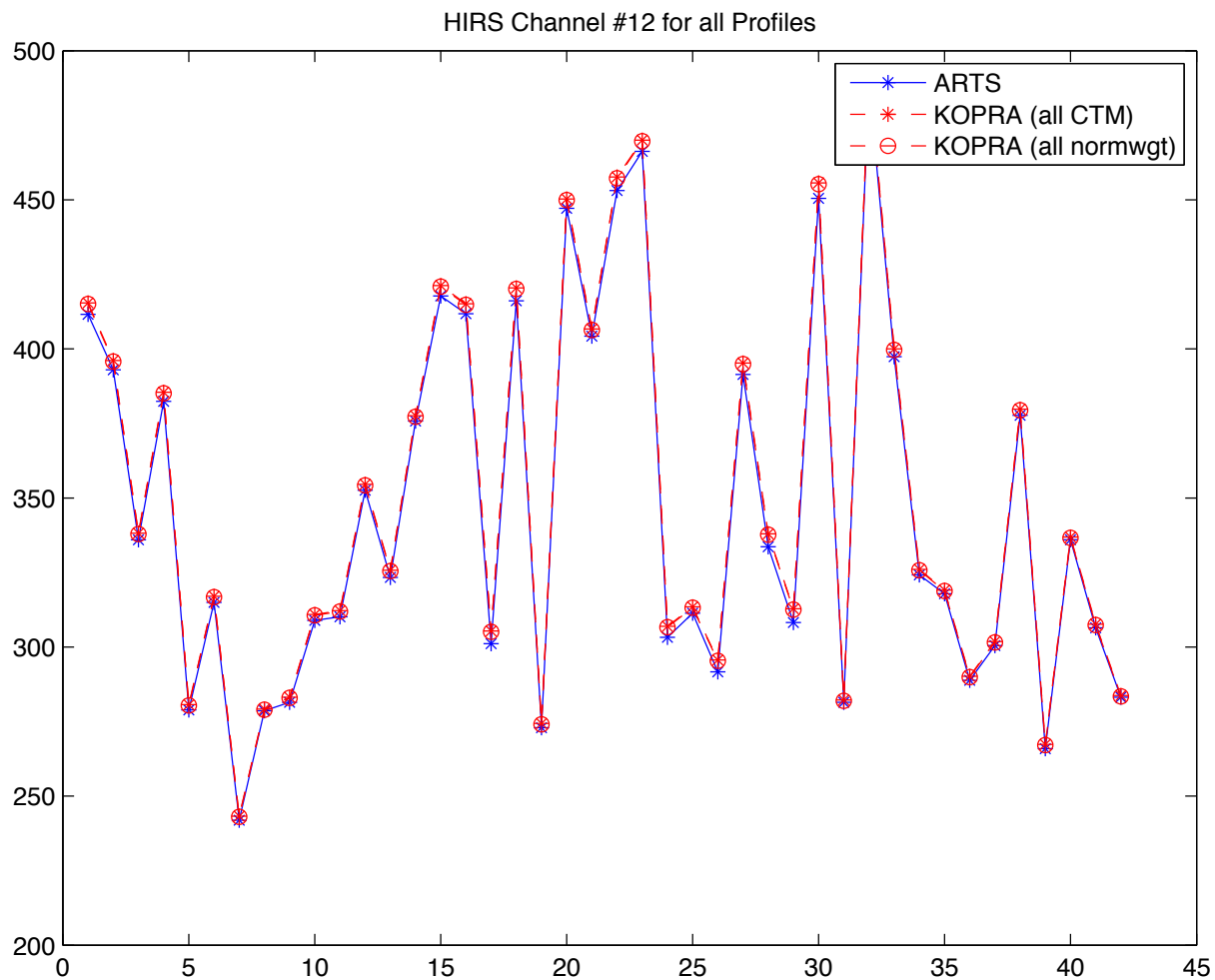
All HIRS channels (ARTS-KOPRA)/ARTS, Profile 05 All HIRS channels (ARTS-KOPRA)/ARTS, Profile 06



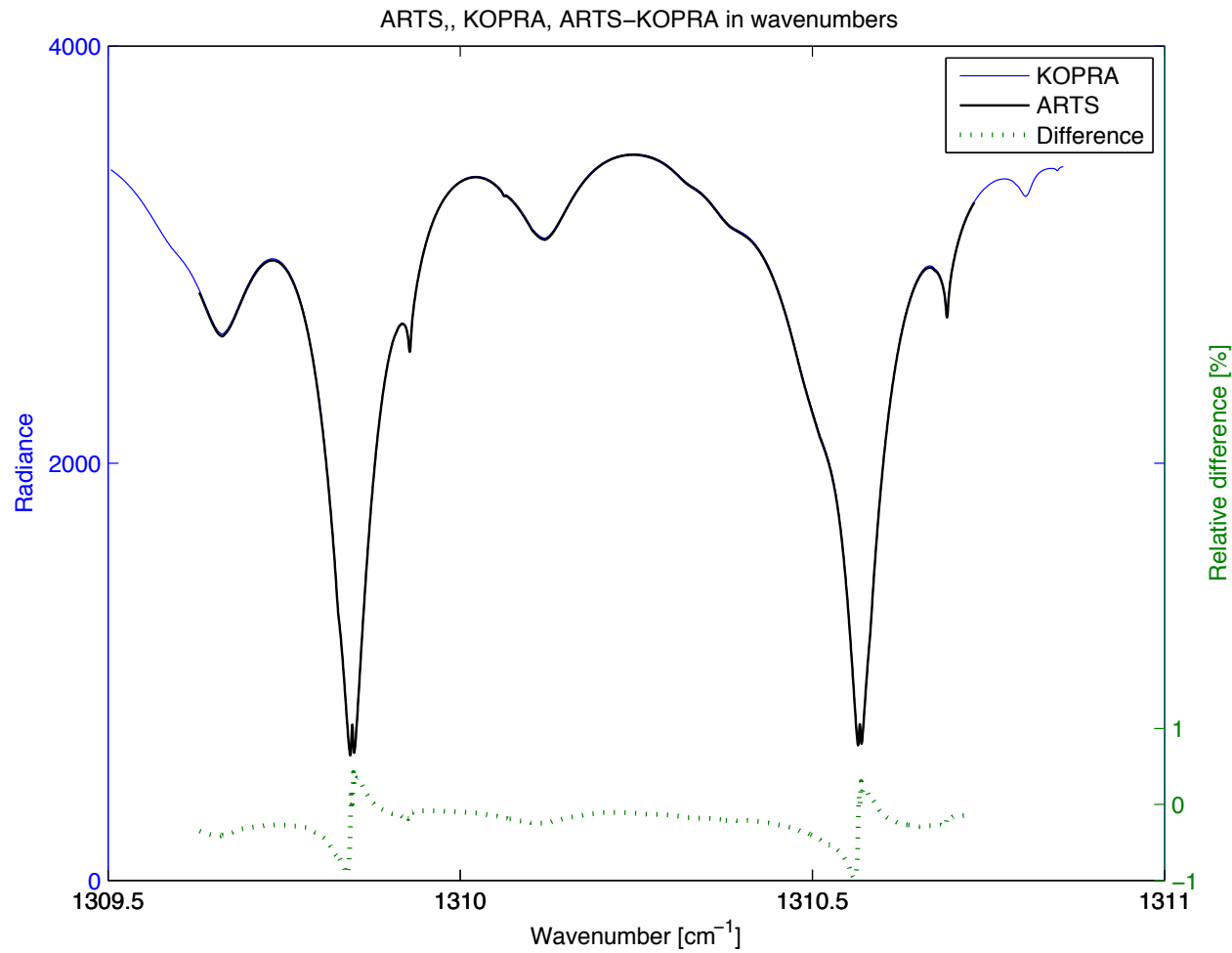
Radiances for one channel



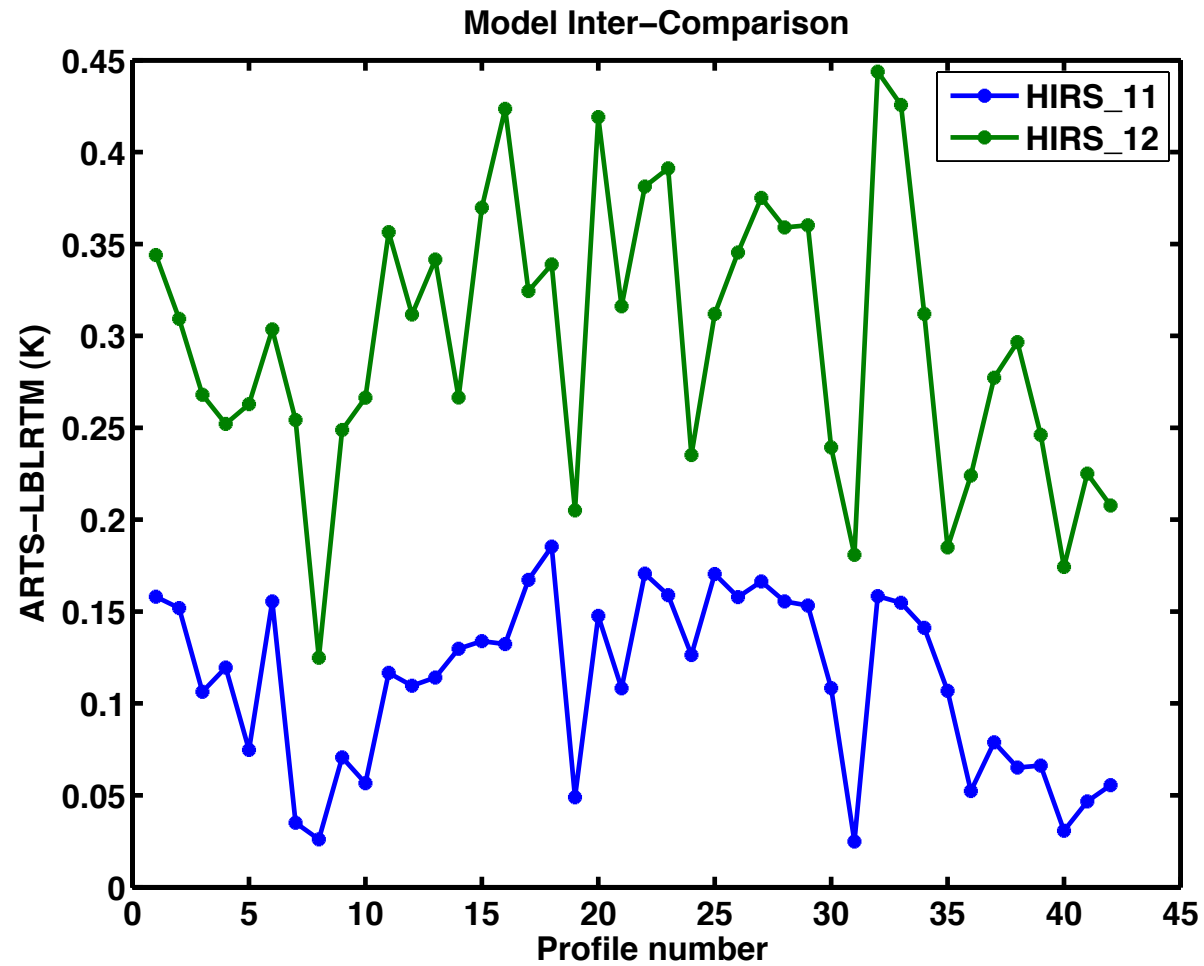
Radiances for one channel



Radiances for high-resolution calculations



Comparison LBLRTM vs ARTS (Ajil)



Conclusion

- Good agreement of HIRS simulations with ARTS compared to KOPRA and LBLRTM
- Good agreement in high resolution calculations
- KOPRA performs good in radiometer mode
- Future project: Update continuum model to recent version.