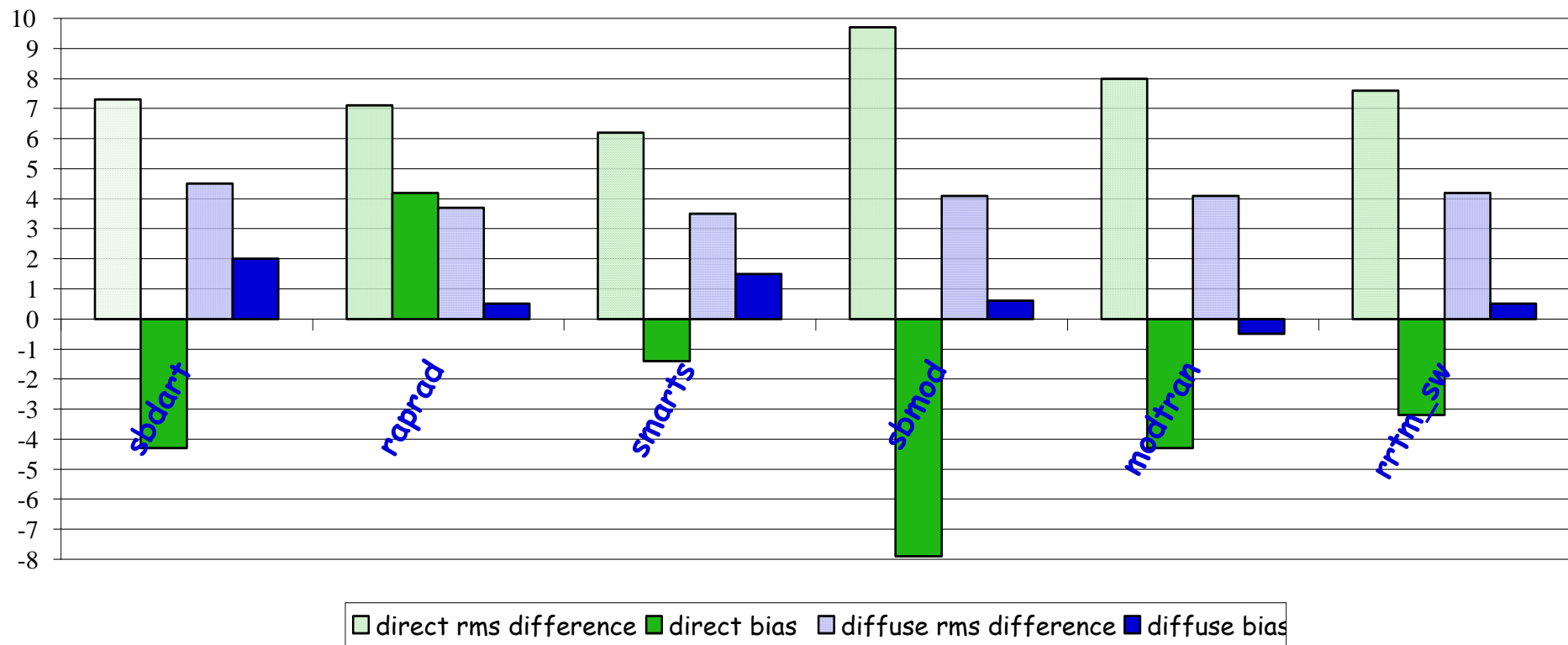


# Comparison of UV-RSS Spectral Measurements and TUV Model Runs for the May 2003 ARM Aerosol Intensive Observation Period

**Joseph Michalsky and Piotr Kiedron**

- The problem and broadband SW results
- The UV-Rotating Shadowband Spectroradiometer
- Model inputs (most are extrapolations from visible) to the Tropospheric UV Visible (TUV) RT model
- The trouble with ET spectra
- Comparisons of diffuse and direct transmission
- An example of direct and diffuse irradiance

(Model - Measured) Dir. Normal (Avg = 761.5  $\text{W/m}^2$ ) Diff. Horizontal (Avg = 108.6  $\text{W/m}^2$ )



## Deployments

10/97 Intercomparison, Table Mt., CO  
Prototype NMOS: 512 pixels

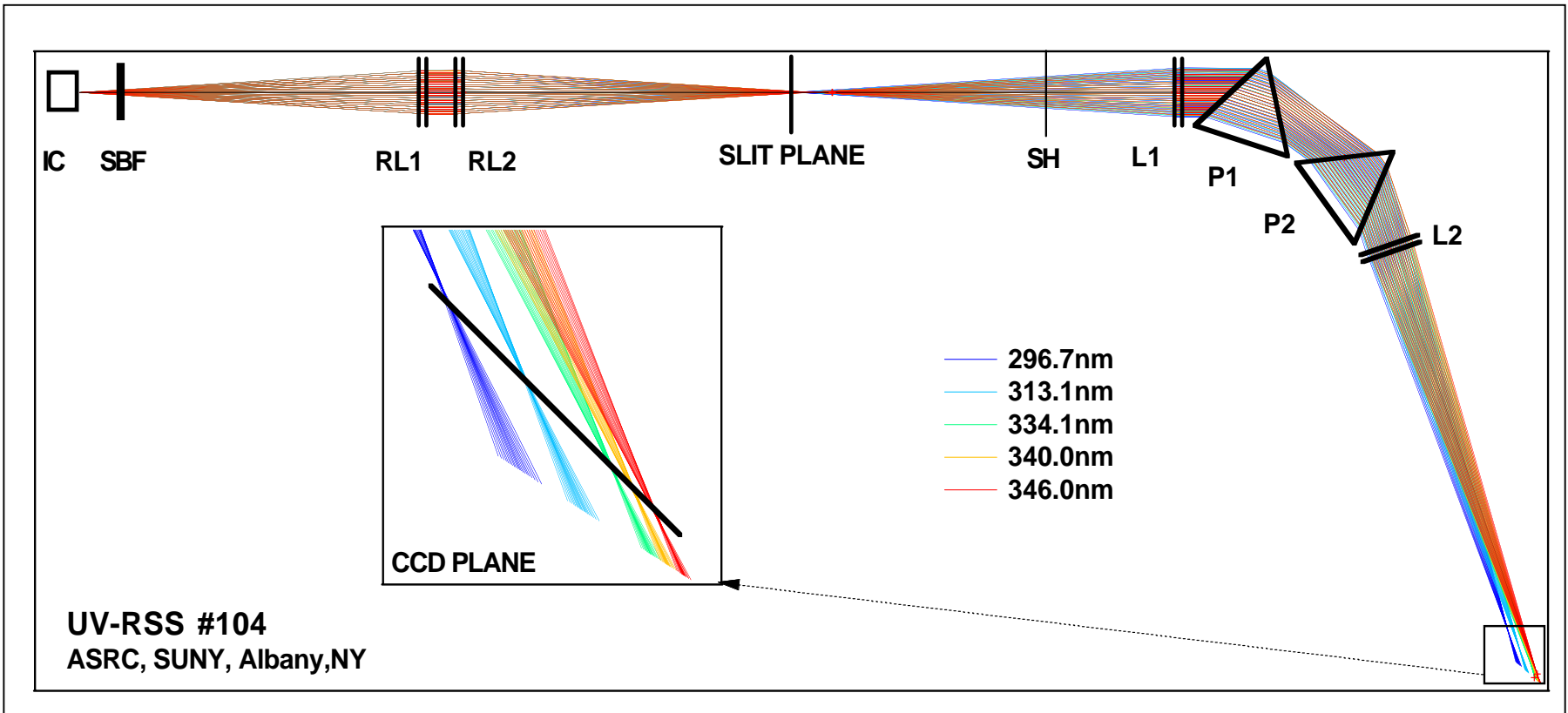
09/01 Diffuse IOP, SPG, OK

05/03 Aerosols IOP, SPG, OK

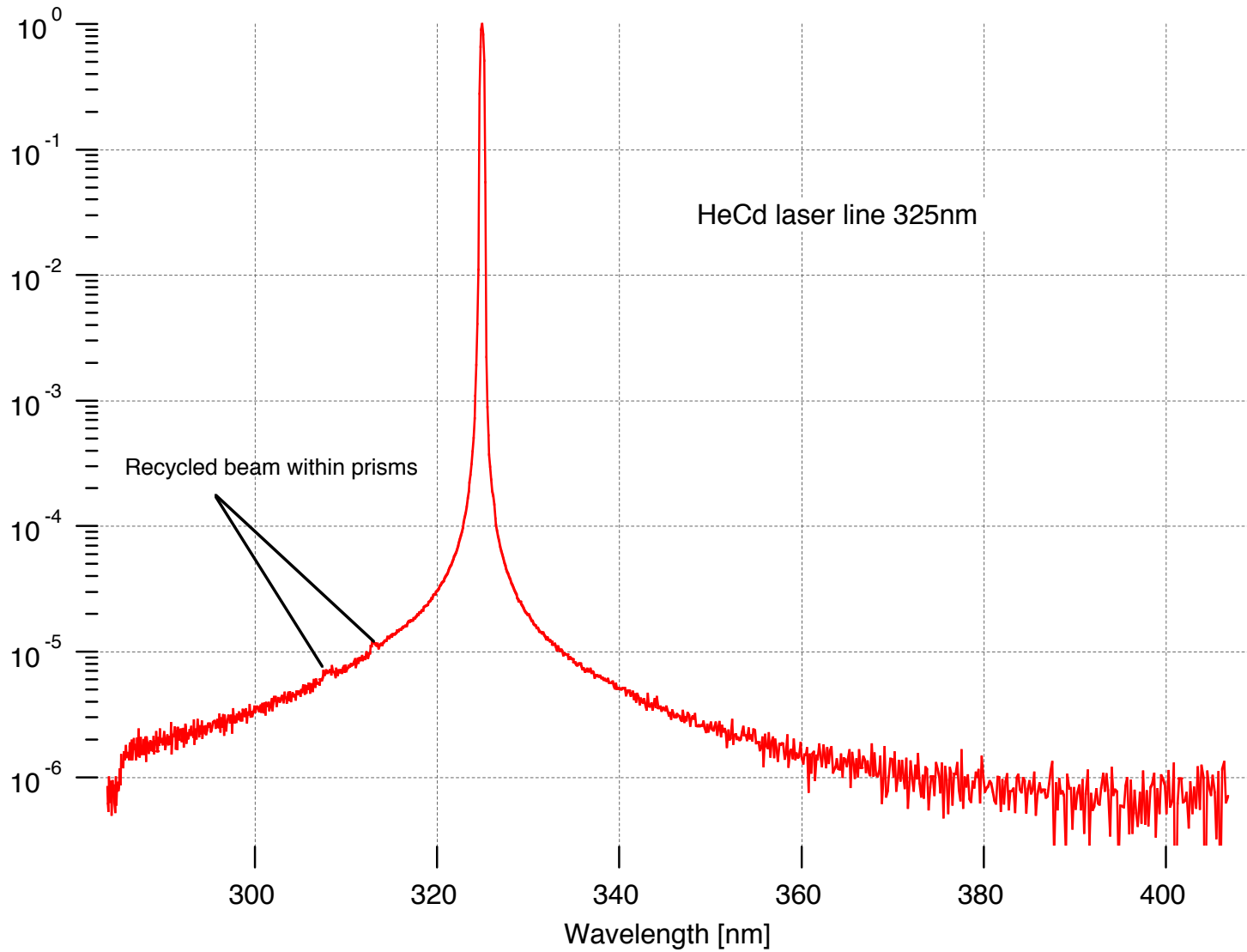
06/03 Intercomparison, Table Mt., CO



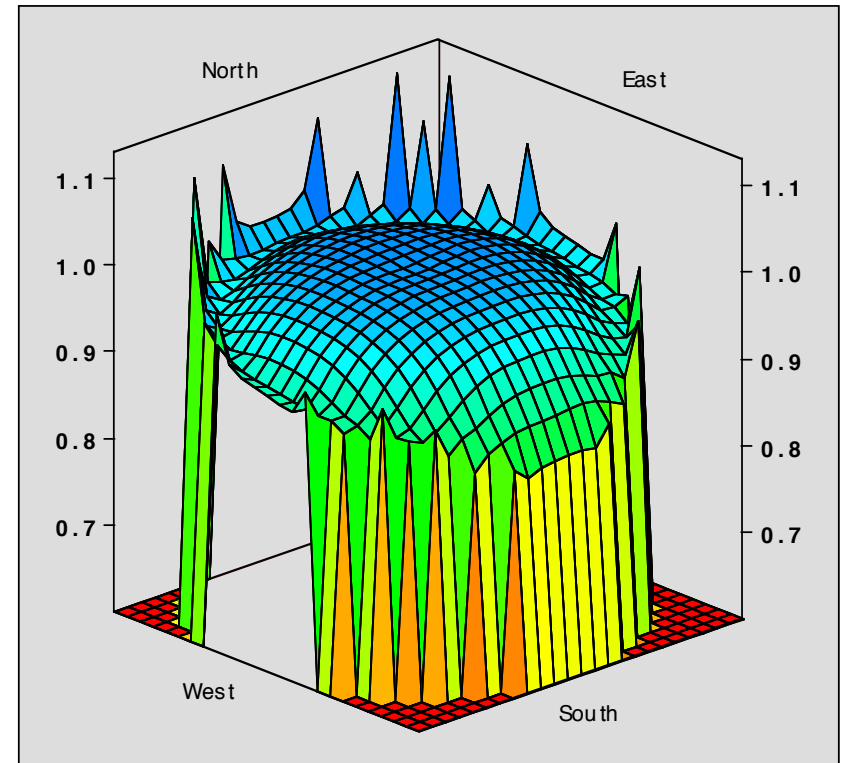
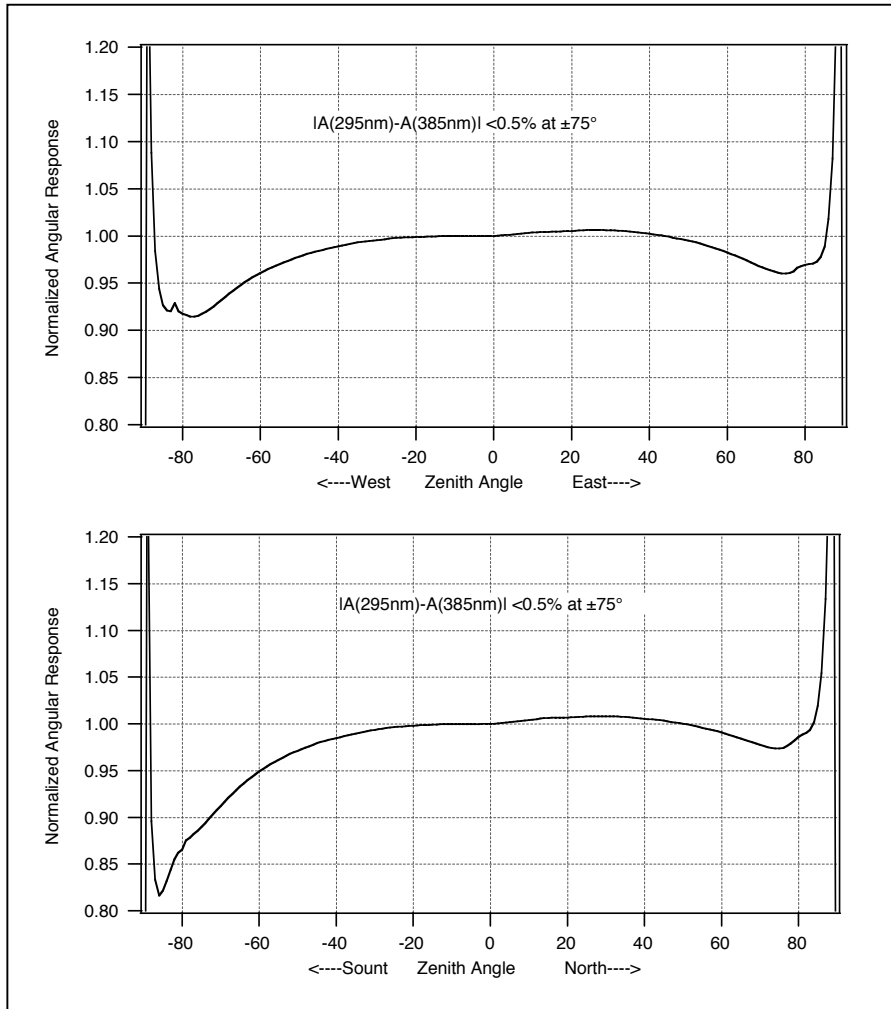
# UV-RSS optical layout and ray-trace



# RSS104 Slit function

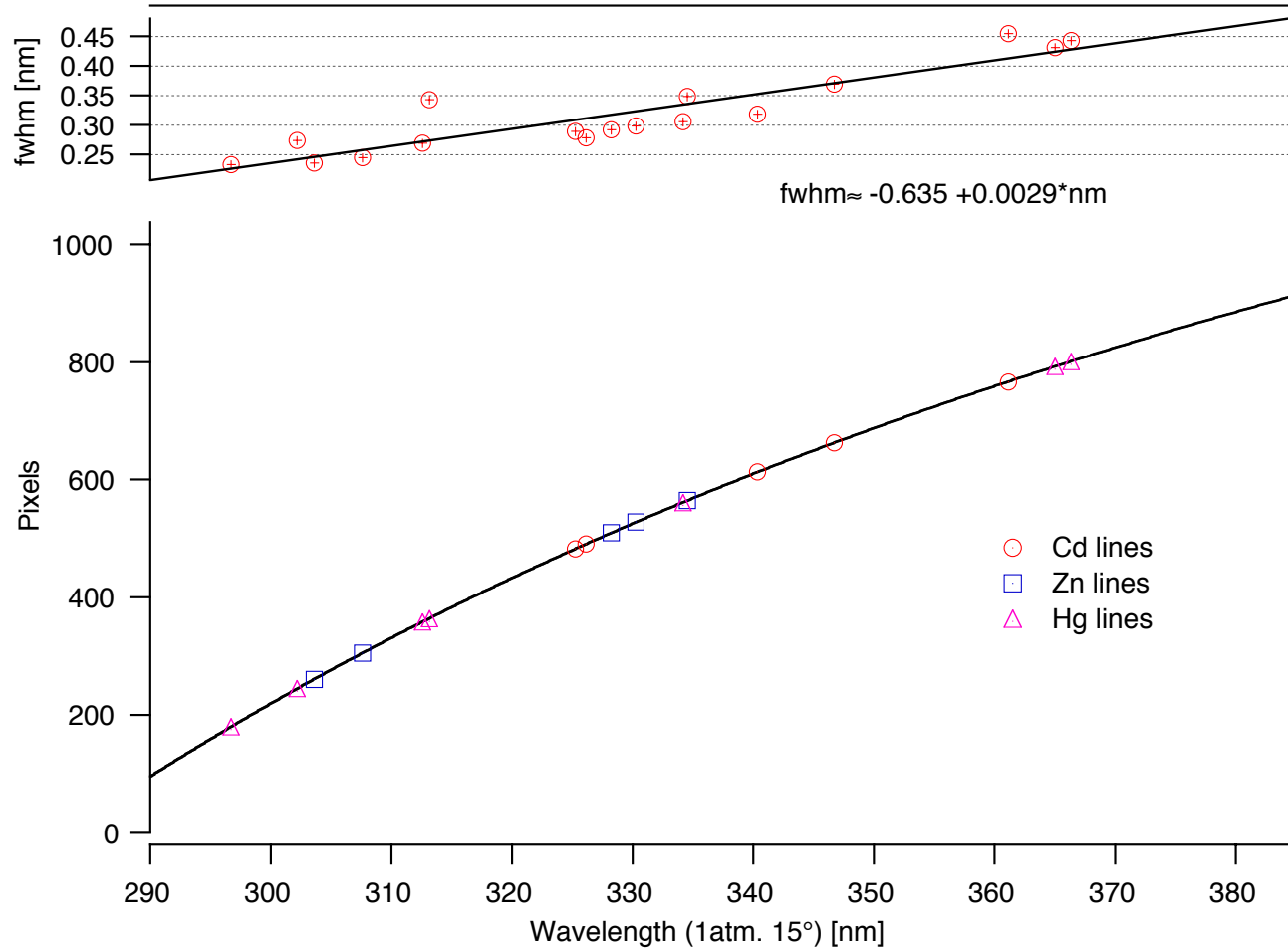


# UV-RSS cosine response



$$\iint \sin(\zeta) \cos(\zeta) (A_R(\zeta, \alpha) - 1) R d\alpha d\zeta < 0.5\%$$

# RSS104 resolution and pixel-wavelength dependence

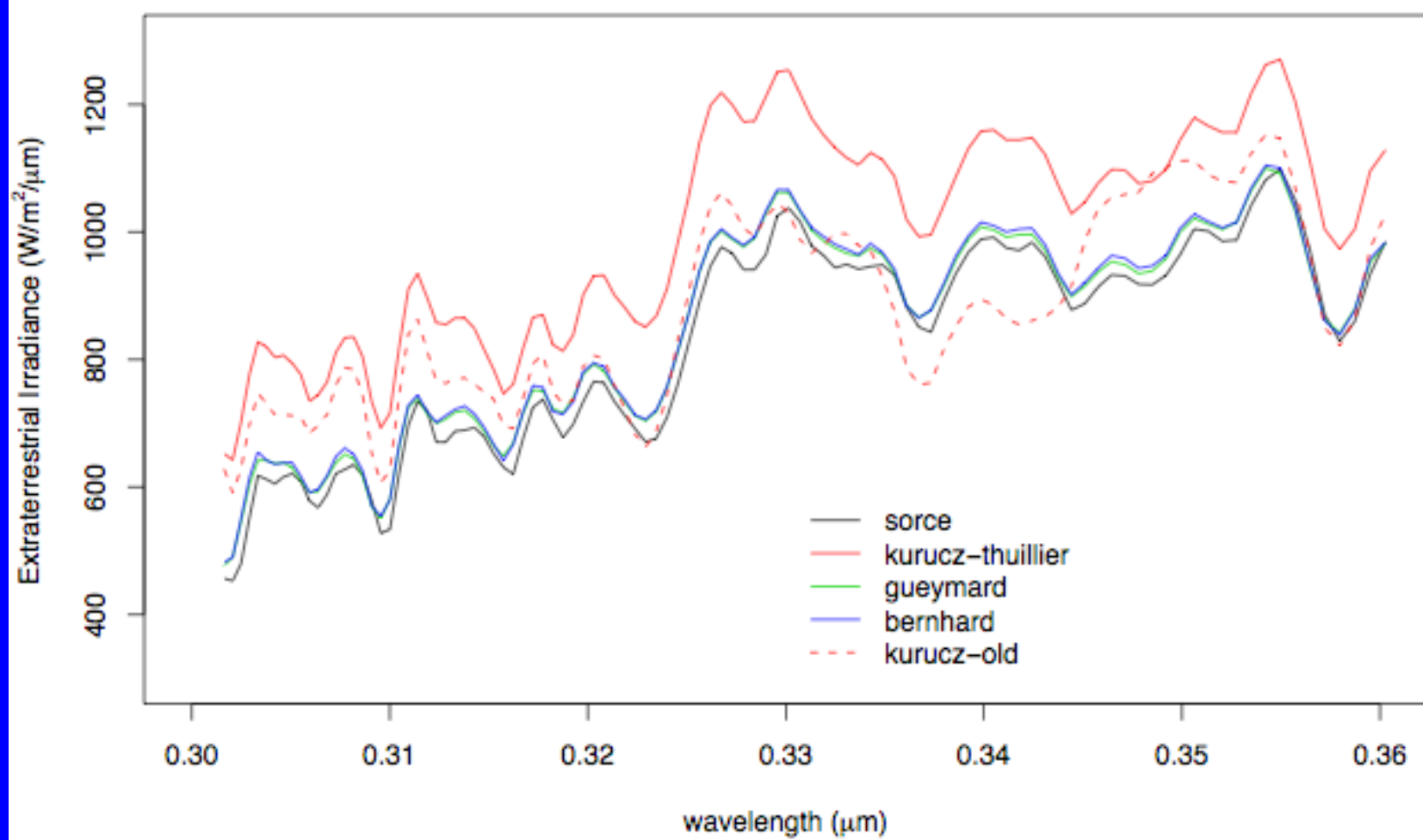


# Tropospheric UV Visible (TUV) RT Model

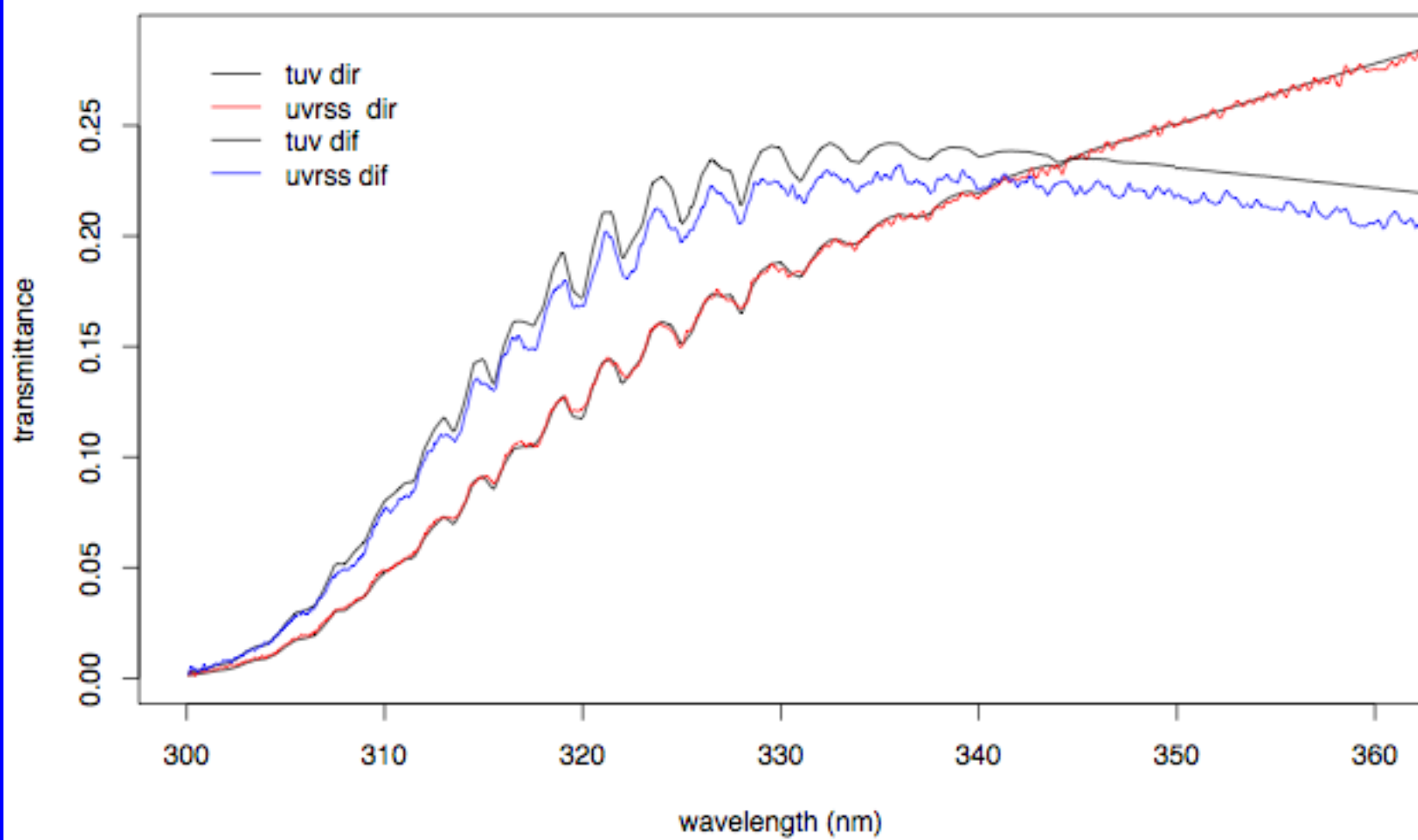
- Run at 0.1 nm resolution from 300-360 nm
- G. Bernhard solar spectrum (JGR 2004)
- **Inputs:** 550 nm ssa; 550 nm asymmetry parameter; AOD and alpha based on 332, 415, and 500 nm; ozone was average of up to five measurements; assumed 0.034 surface albedo

Date	LST	solar elv (degs)	H2O (cm)	ozone (DU)	ssa	g	alpha	tau (550 nm)
11-May-03	920	45.1	1.09	320	0.971	0.573	1.047	0.078
11-May-03	1230	71.3	1.14	320	0.944	0.582	0.69	0.084
11-May-03	1500	51.5	1.13	320	0.957	0.552	0.606	0.07
12-May-03	730	23.3	1.53	328	0.883	0.572	1.25	0.074
12-May-03	950	51.1	1.54	328	0.934	0.562	1.308	0.077
22-May-03	800	30.4	2.43	326	0.939	0.66	1.08	0.18
28-May-03	1800	17.9	2.71	322	0.951	0.619	1.108	0.183

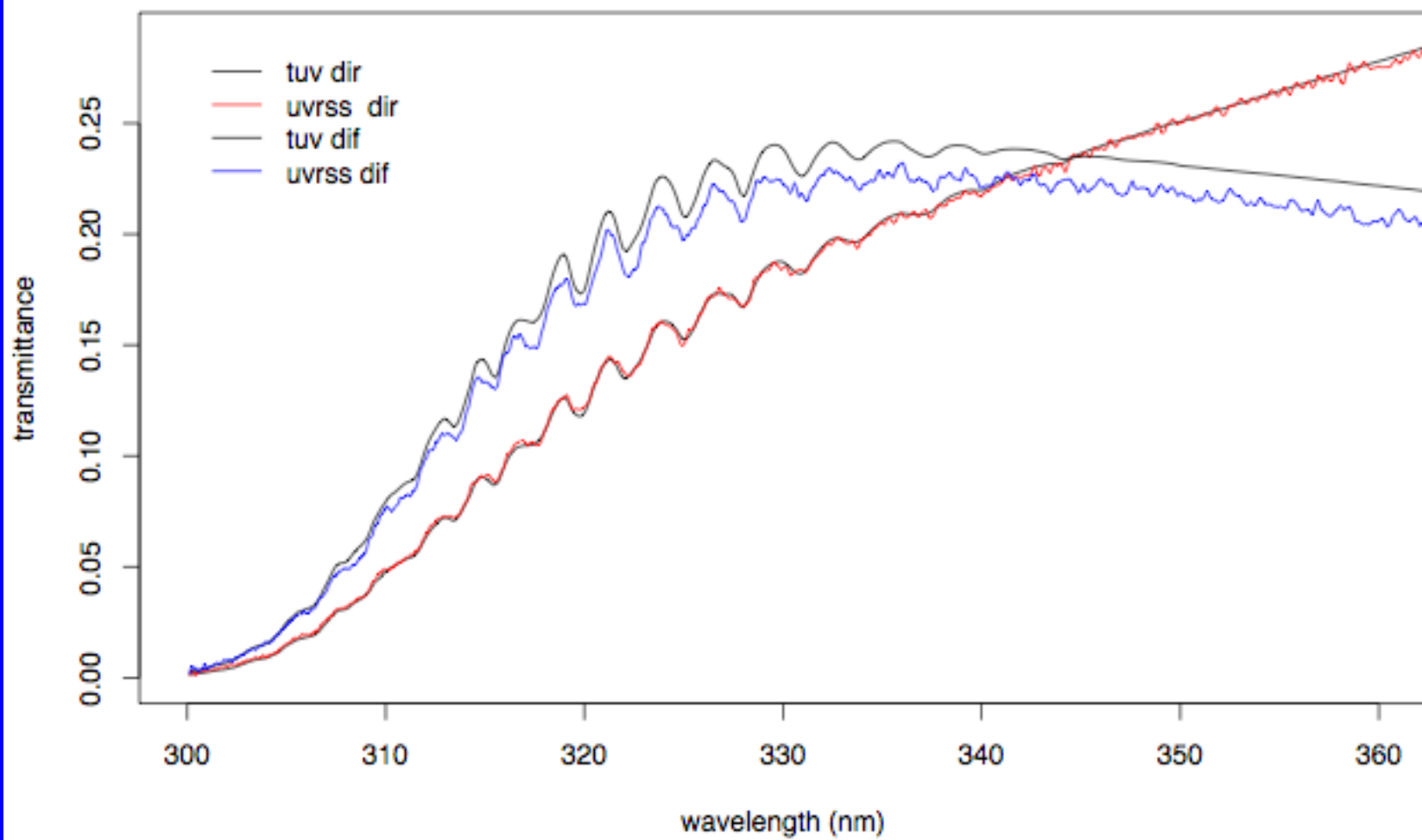
### ET Irradiance in UV @ SORCE Resolution



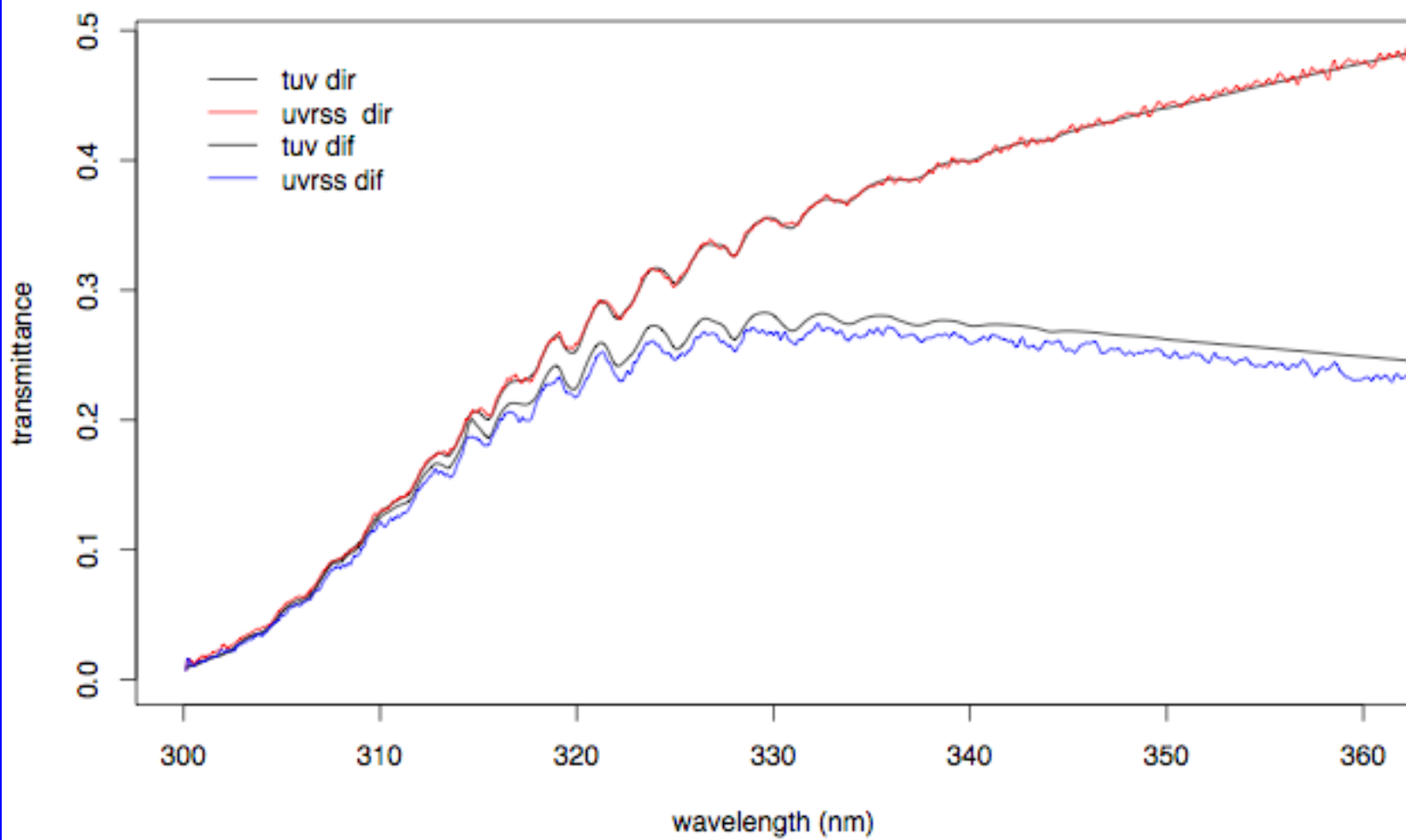
11 May 2003 0920; sza = 44.9; tau550 = 0.078



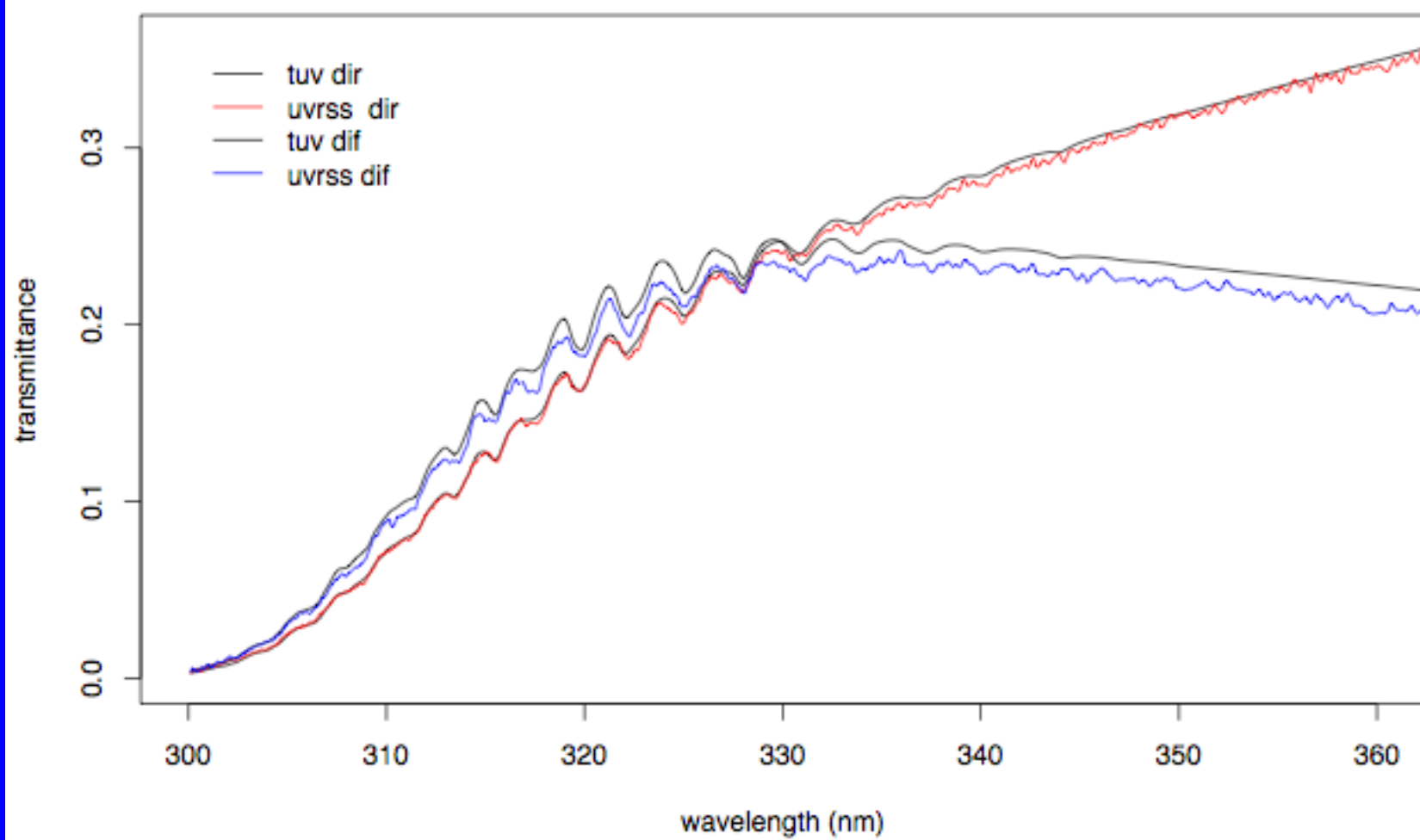
11 May 2003 0920; sza = 44.9; tau550 = 0.078



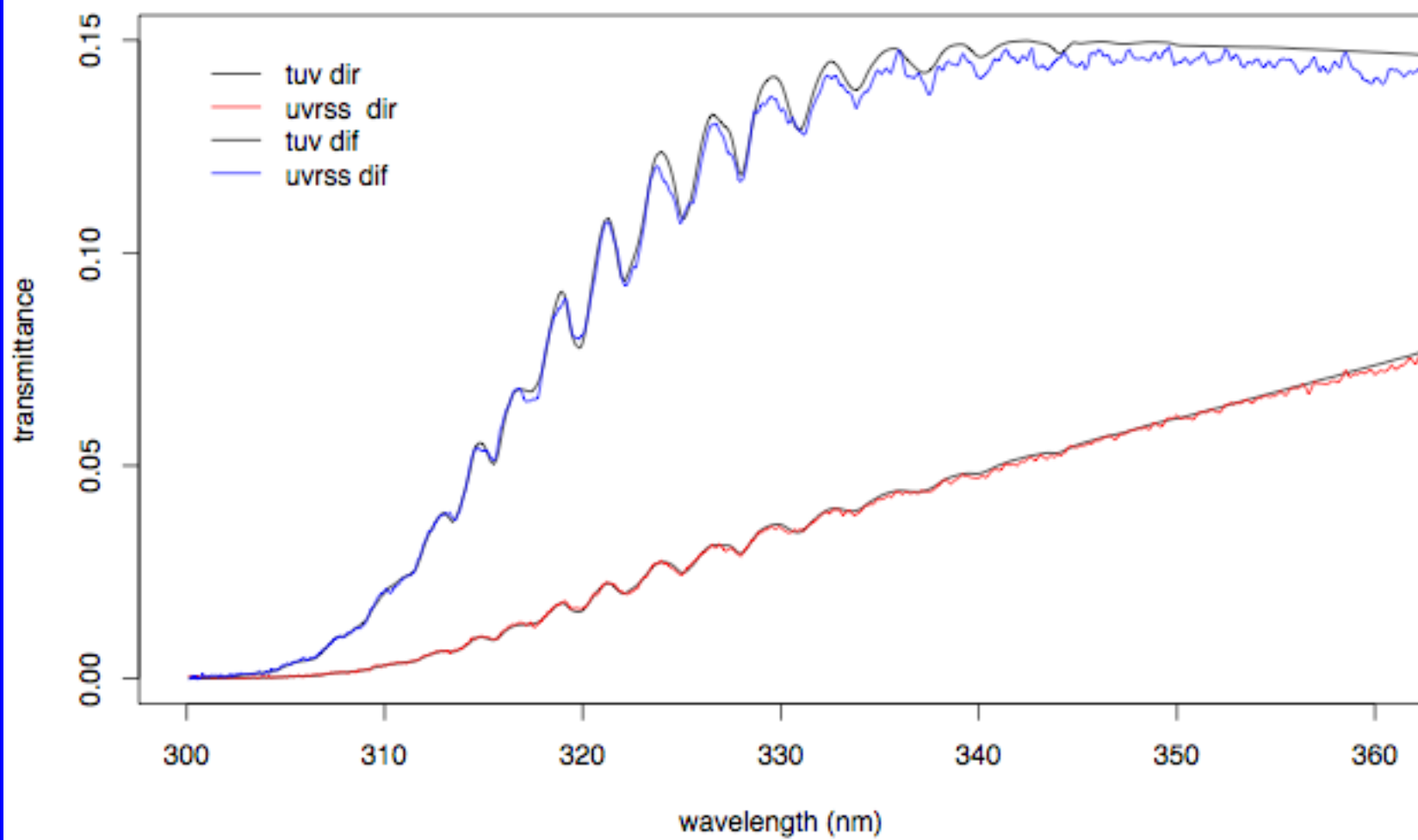
11 May 2003 1230; sza = 18.7; tau550 = 0.084



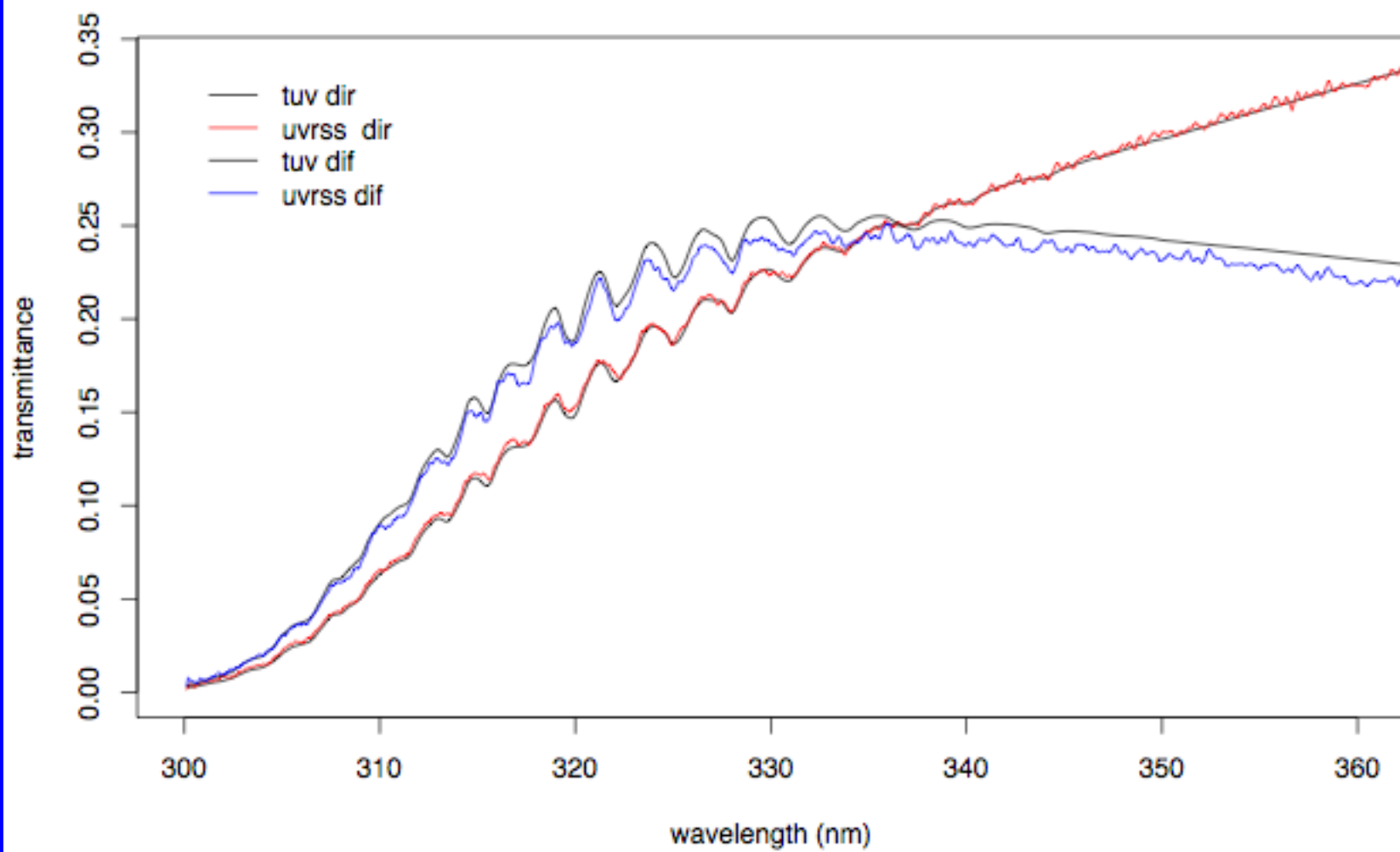
11 May 2003 1500; sza = 38.5; tau550 = 0.070



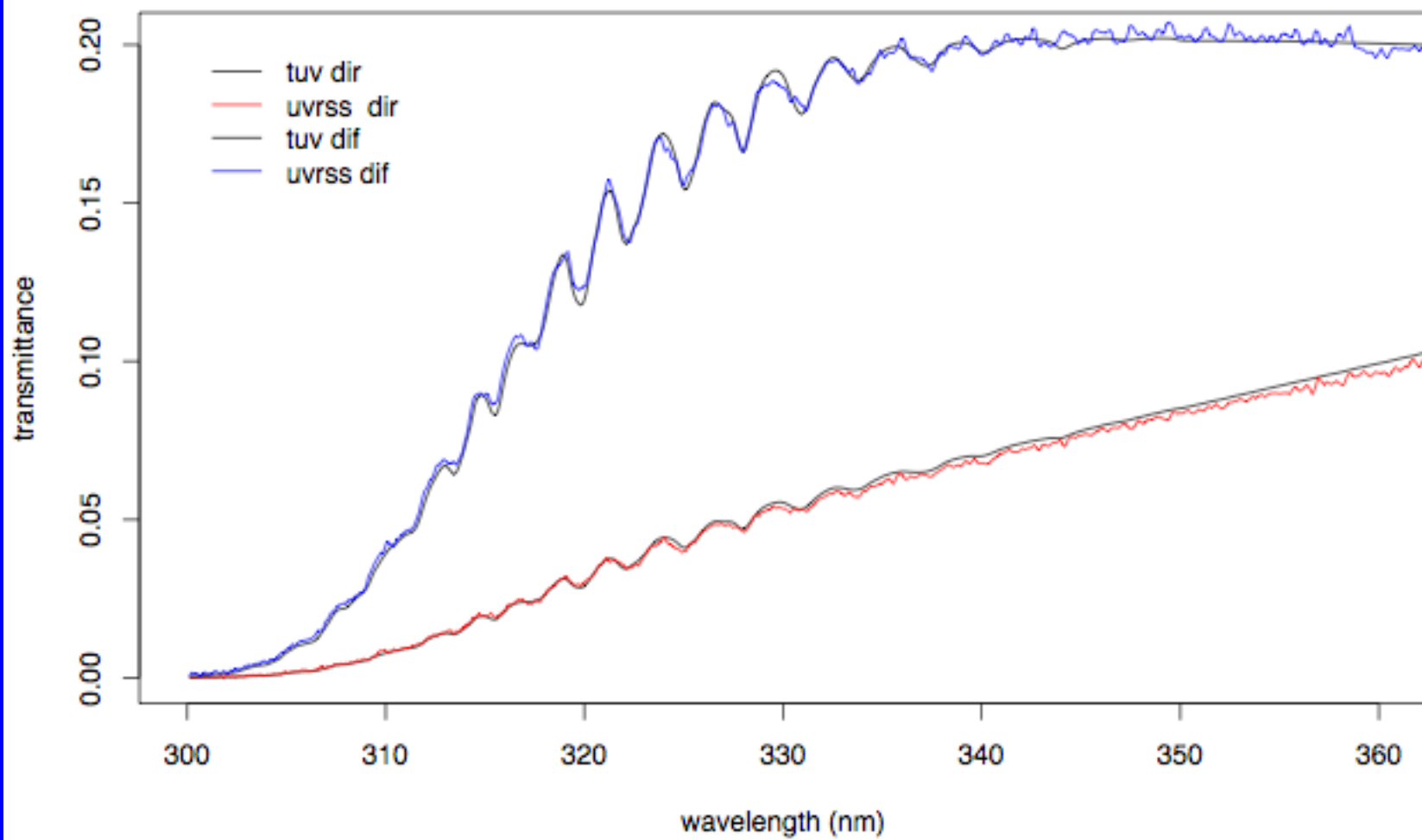
12 May 2003 0730; sza = 66.7; tau550 = 0.074



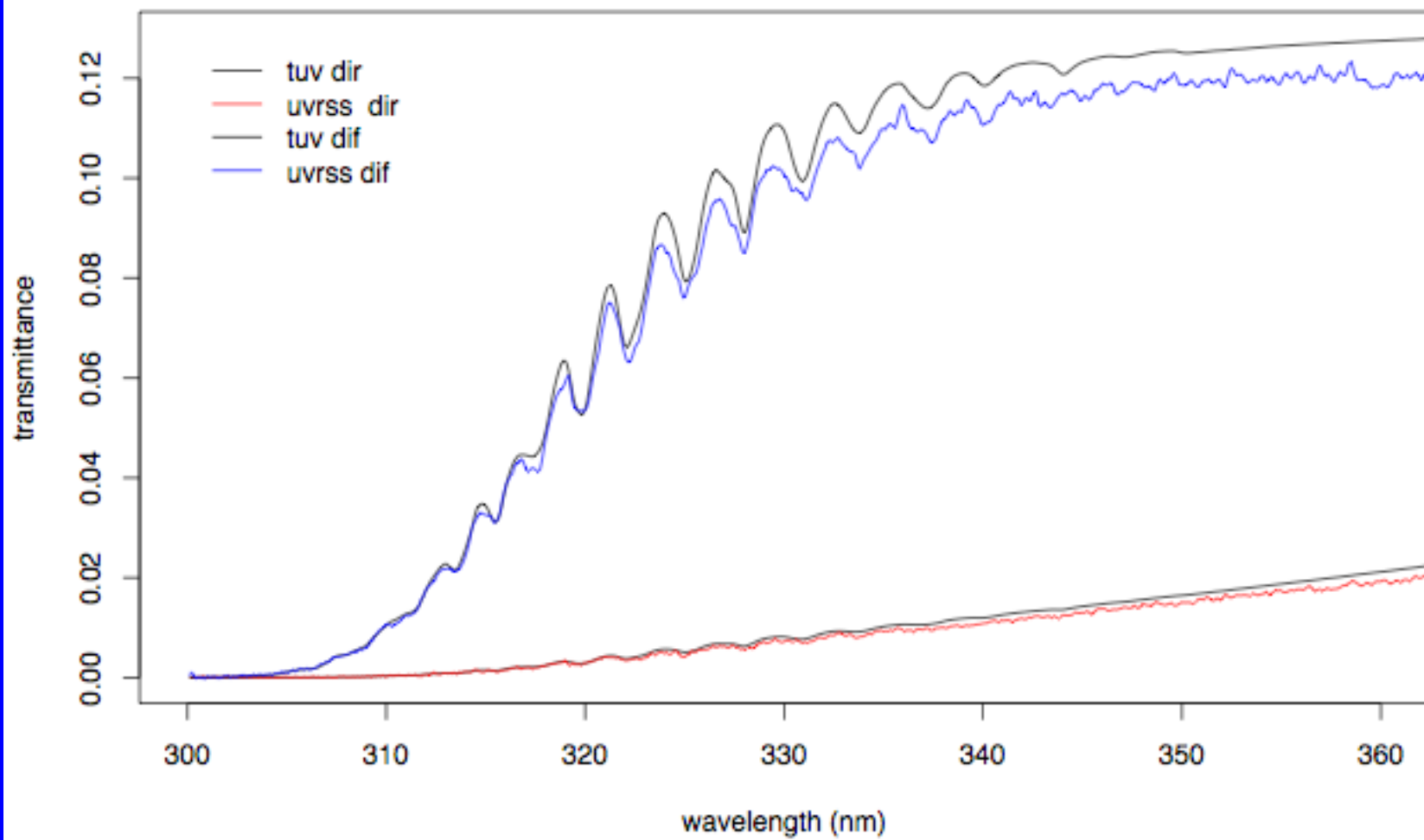
12 May 2003 0950; sza = 38.9; tau550 = 0.077



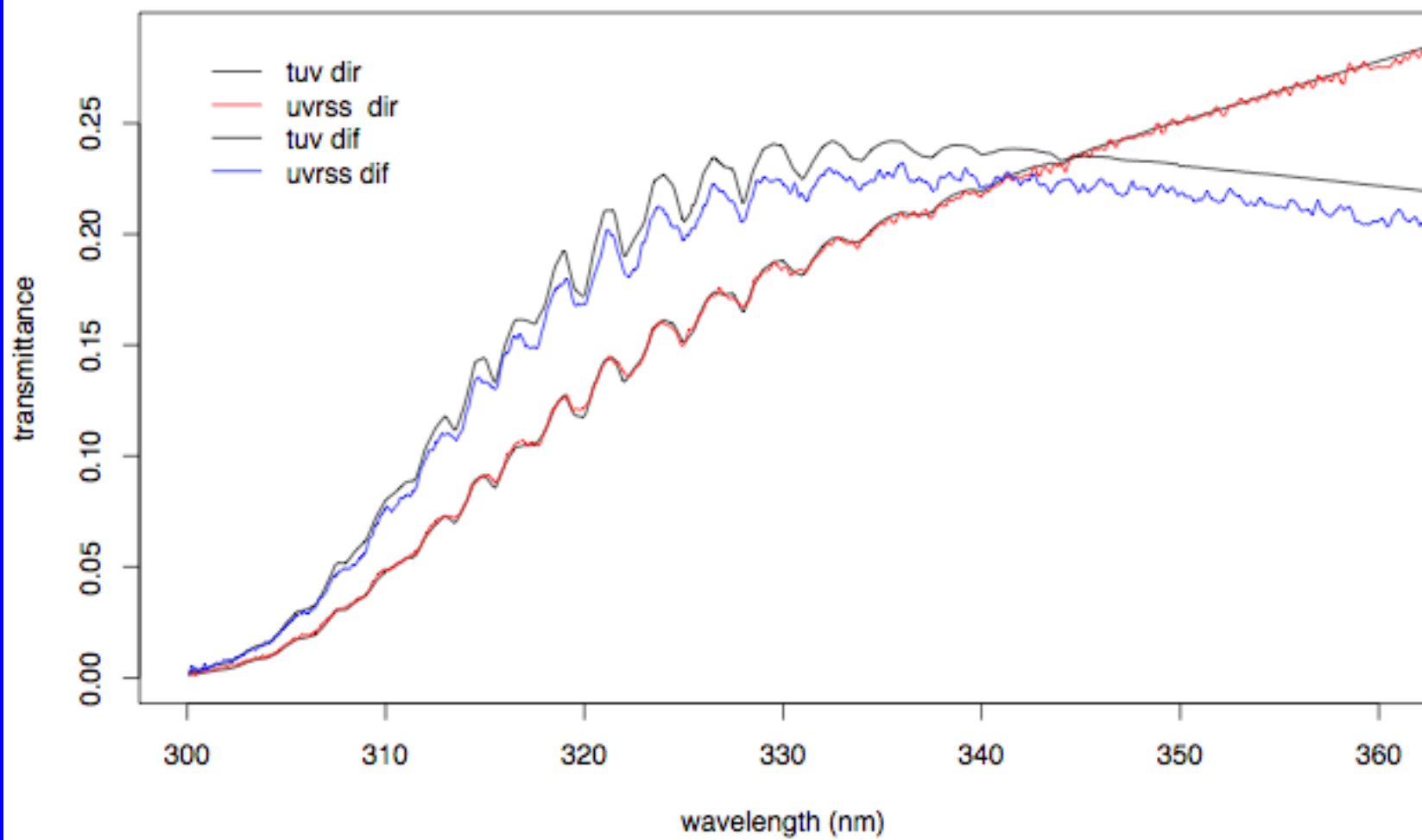
22 May 2003 0920; sza = 59.6; tau550 = 0.180



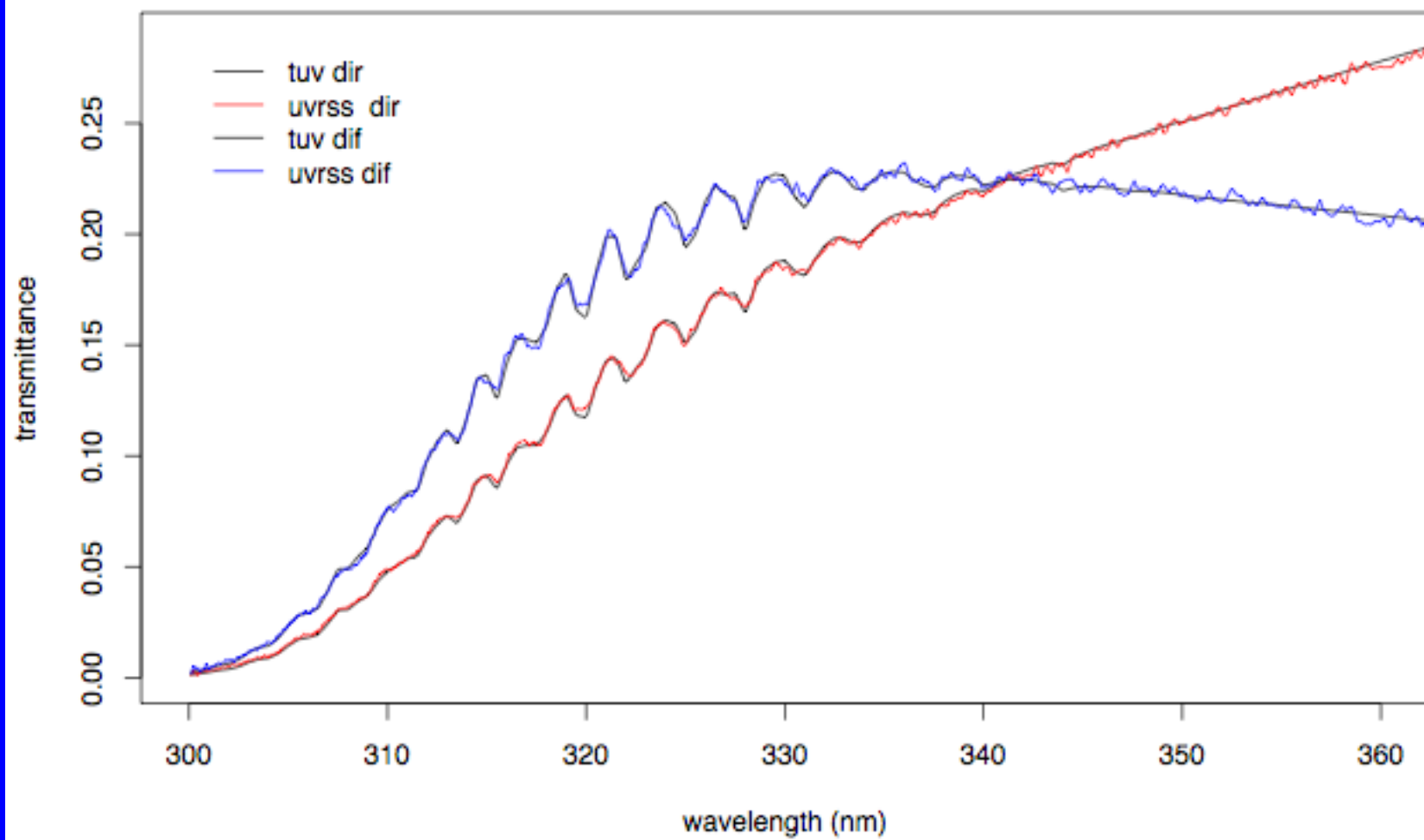
28 May 2003 1800; sza = 72.1; tau550 = 0.183

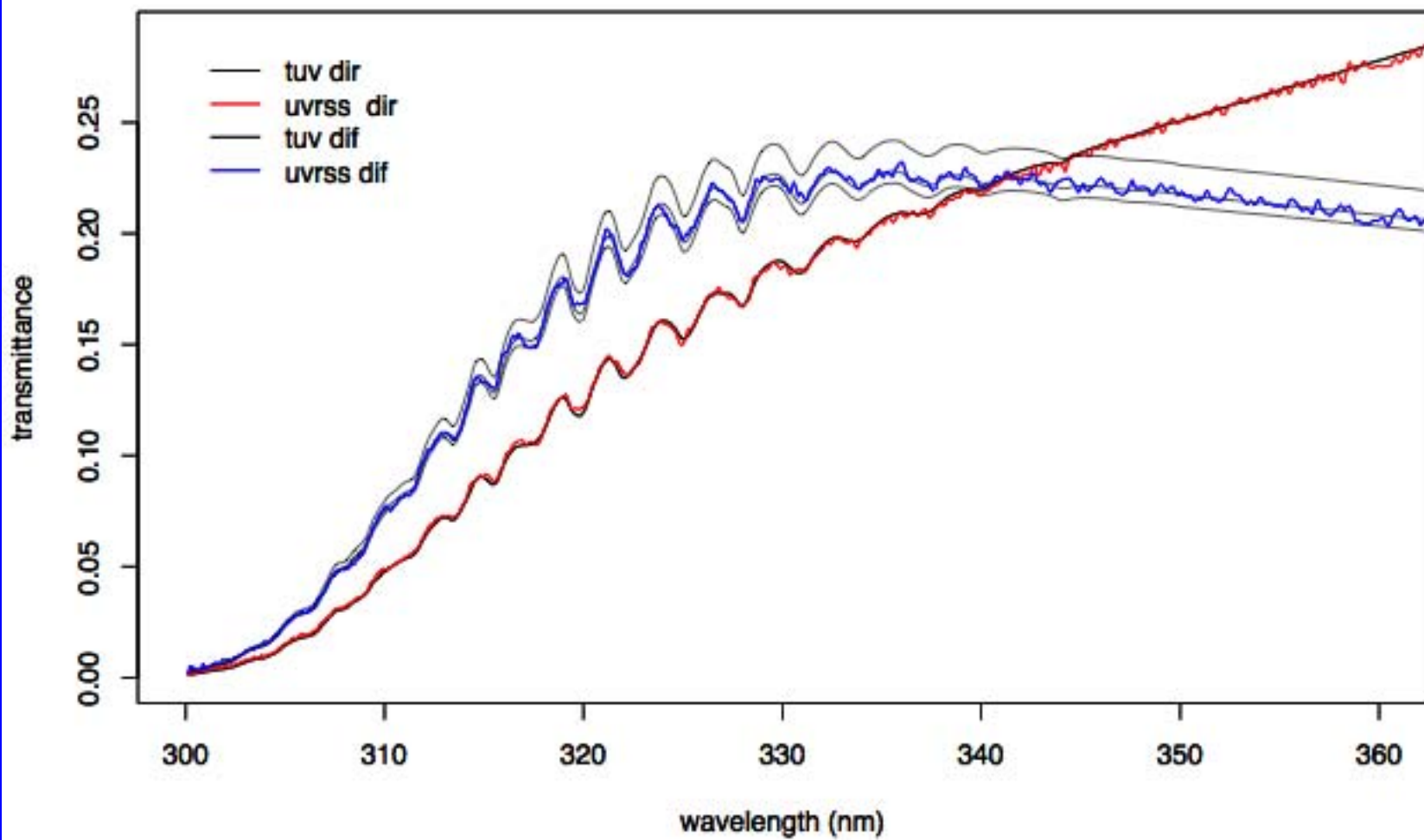


11 May 2003 0920; sza = 44.9; tau550 = 0.078; ssa = .971

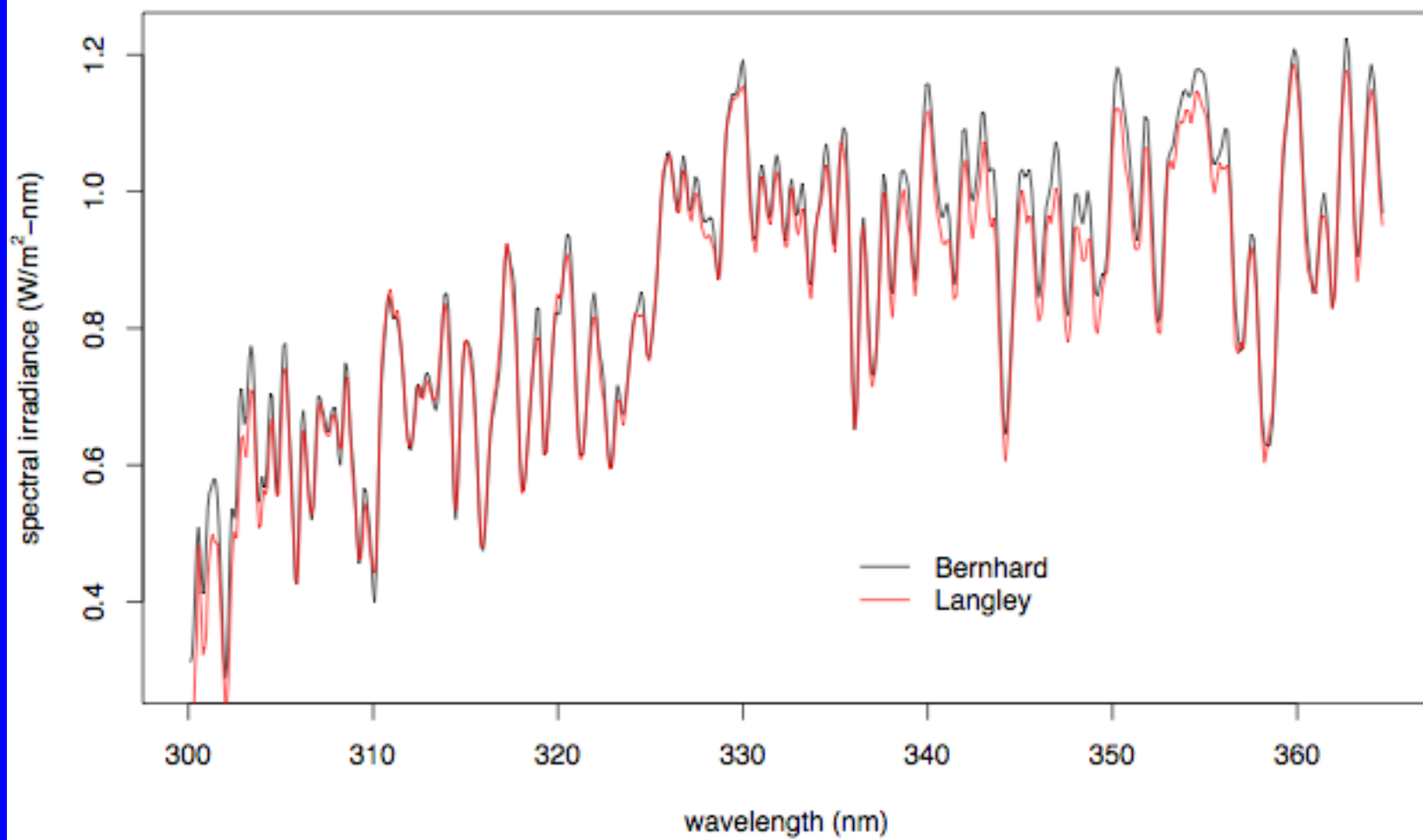


11 May 2003 0920; sza = 44.9; tau550 = 0.078; ssa = .831

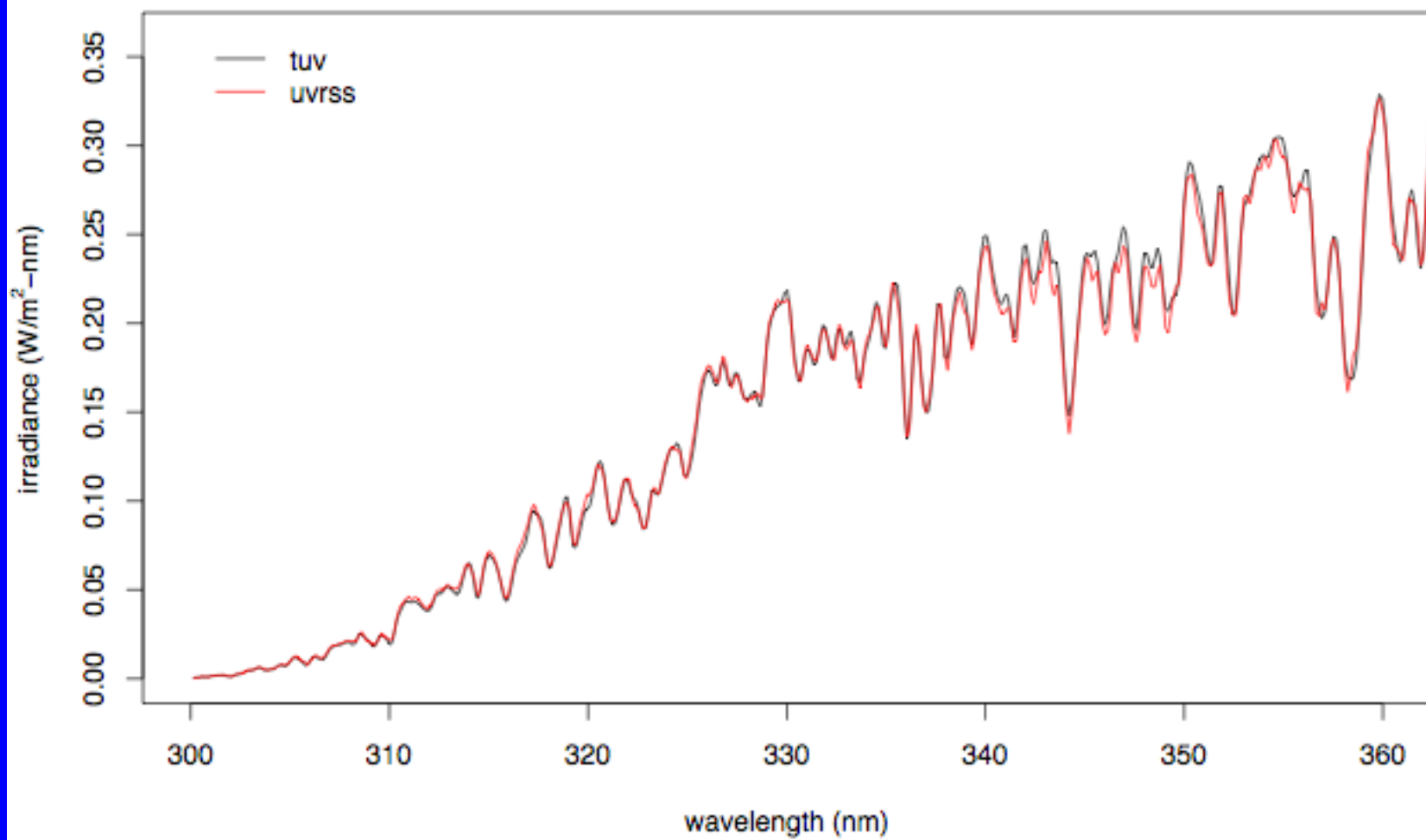




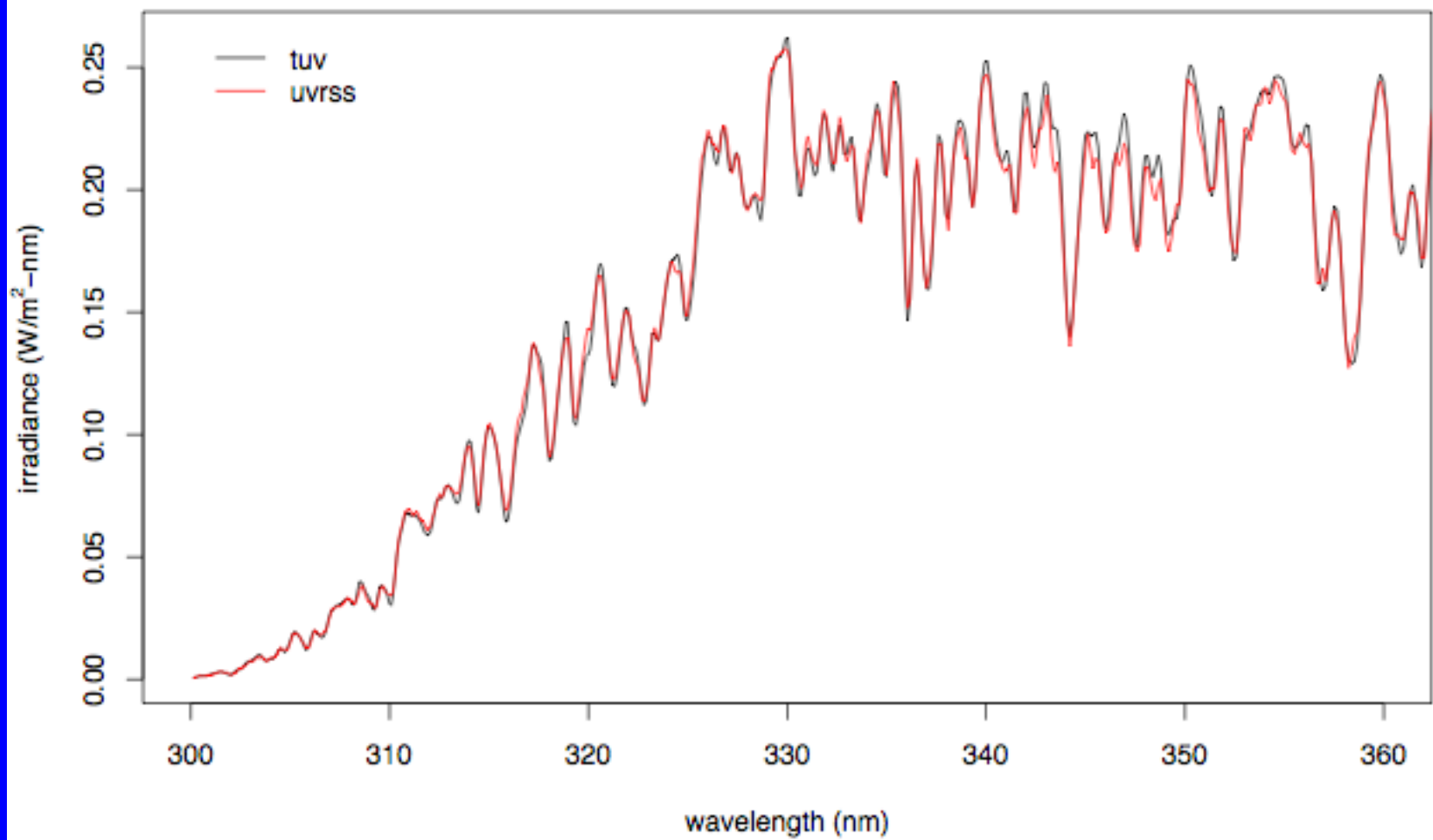
### ET Spectra at UV-RSS Resolution from Langley and Bernhard



direct irradiance on 11 May 2003 @ 0920 LST



diffuse irradiance on 11 May 2003 @ 0920 LST



# Future Efforts

- Refine Langley
- Check slit functions over UV spectrum
- Exploit retrieval potential, specifically
- Ozone retrievals with 3 available x-sections
- $\tau_0$  (ssa) retrievals in UV
- Validate models with UV inputs

The End, Das Ende, Fin

diffuse to direct w/ ssa = 0.971 and ssa = 0.841

