

AEVUS

COSMO-5.04g coupled to TERRA_URB

Preliminary test results for Belgium during summer 2012

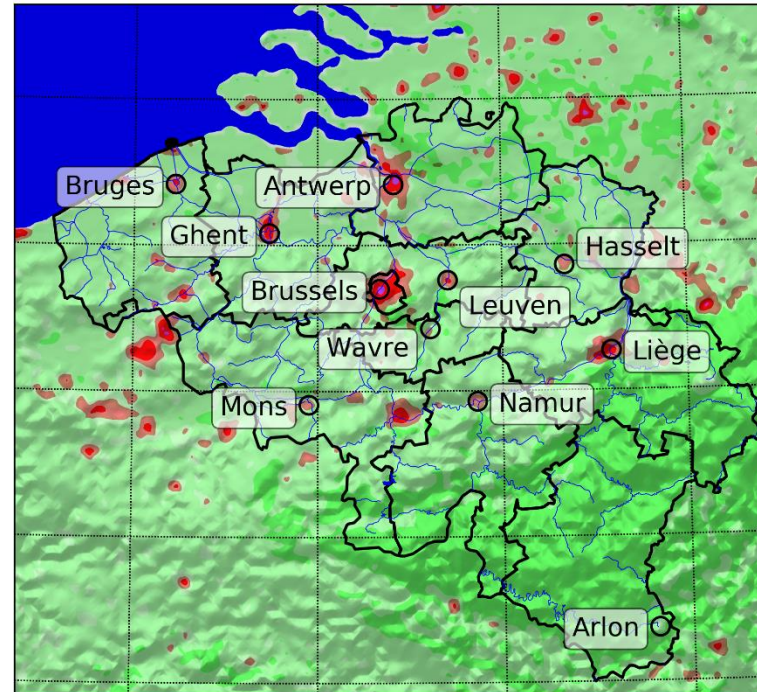


KU LEUVEN



Belgian scene for summer 2012

(see Wouters et al. 2016)



Urban climate observations

- Canopy-layer urban heat island (CLUHI) from in-situ measurements
 - Antwerp
 - Ghent, not shown yet
- Boundary-layer urban heat island (BLUHI) from tower observations
 - Antwerp
- Surface-urban heat island (SUHI) from MODIS land-surface temperature, not shown yet

Simulations

ID	COSMO version	TERRA_URB	scenario	tuning
C5.0_URB	5.0_clm9	2.3	presentday	Yes*
C5.0_VEG	5.0_clm9	no	Vegetation scenario	Yes*
C5.0_STD	5.0_clm9	no	Urbanization is Bare soil (default)	default
C5.04g_URB	5.04g	2.3	presentday	Yes**
C5.04g_STD*	5.04g	no	Urbanization is Bare soil (default)	Yes**

*lbdclim = .FALSE.

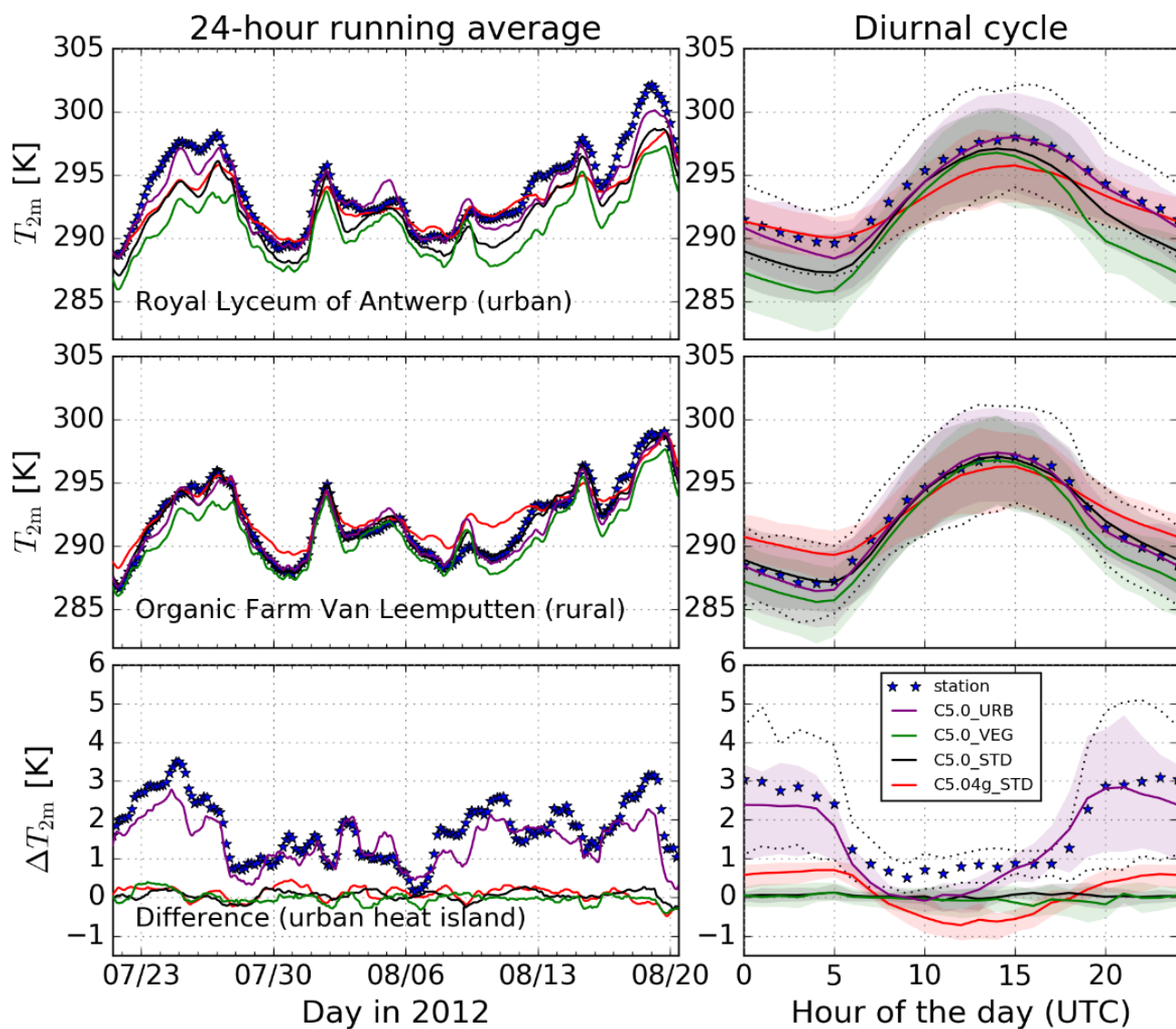
*pat_len=20, tkmmin=tkhmin=0.4, itype_canopy = 2

**only itype_canopy = 2, all the rest are new default settings

Results

- **C5.04g_STD** successful for summer, but crashes in October. Possible reasons:
 - Implicitness (cimpl = 150) of skin-temperature formulation needs to be larger
 - lbdclim = .FALSE. -> leads to inconsistent fields (such as too hot sea surface temperature)
- C5.04g_URB technical tests successful, results are pending

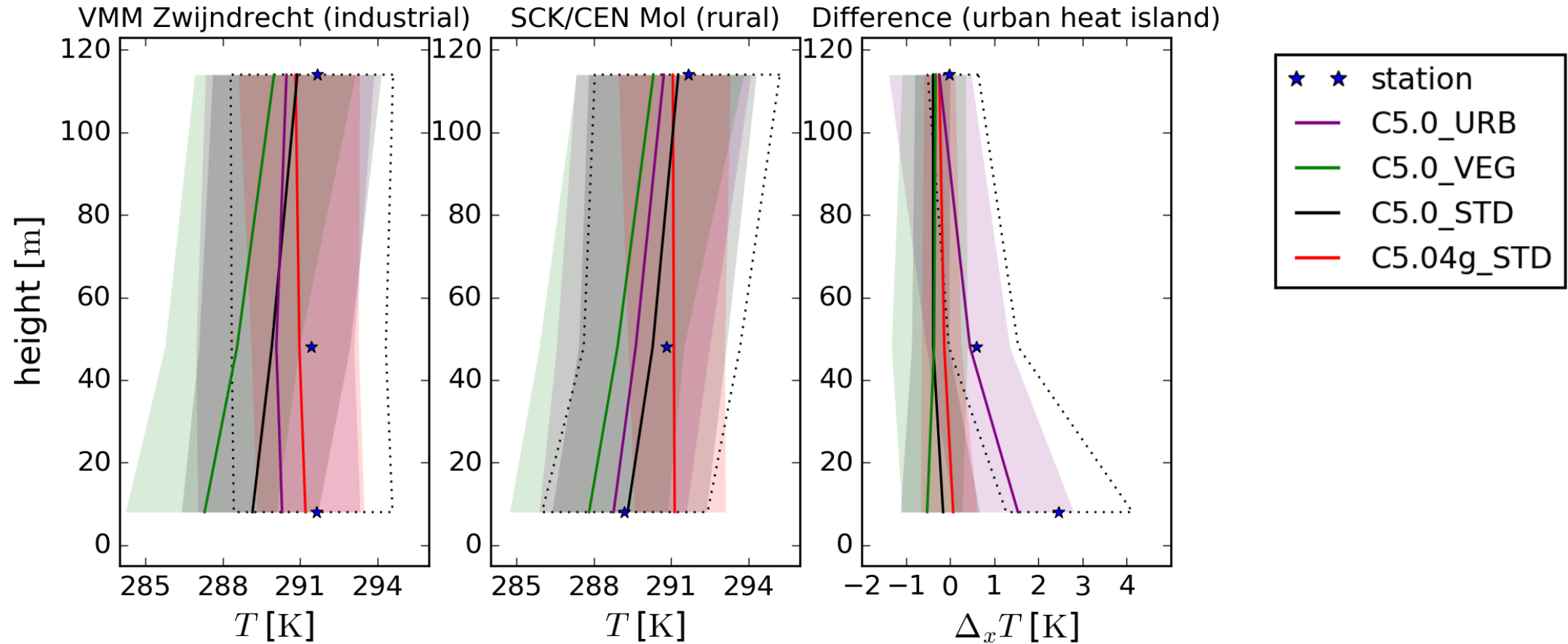
Results in-situ Antwerp



	PCC	RMSE	Bias
--- Urban ---			
C5.0_URB:	0.95	1.55	-0.58
C5.0_VEG:	0.89	3.67	-2.92
C5.0_STD:	0.95	2.29	-1.79
C5.04g_STD:	0.95	2.22	-1.06
--- Rural ---			
C5.0_URB:	0.96	1.49	-0.25
C5.0_VEG:	0.95	1.94	-1.15
C5.0_STD:	0.97	1.21	-0.09
C5.04g_STD:	0.95	2.08	0.59
--- CLUHI ---			
C5.0_URB:	0.80	1.00	-0.33
C5.0_VEG:	0.22	2.33	-1.77
C5.0_STD:	0.11	2.29	-1.70
C5.04g_STD:	0.59	2.09	-1.65

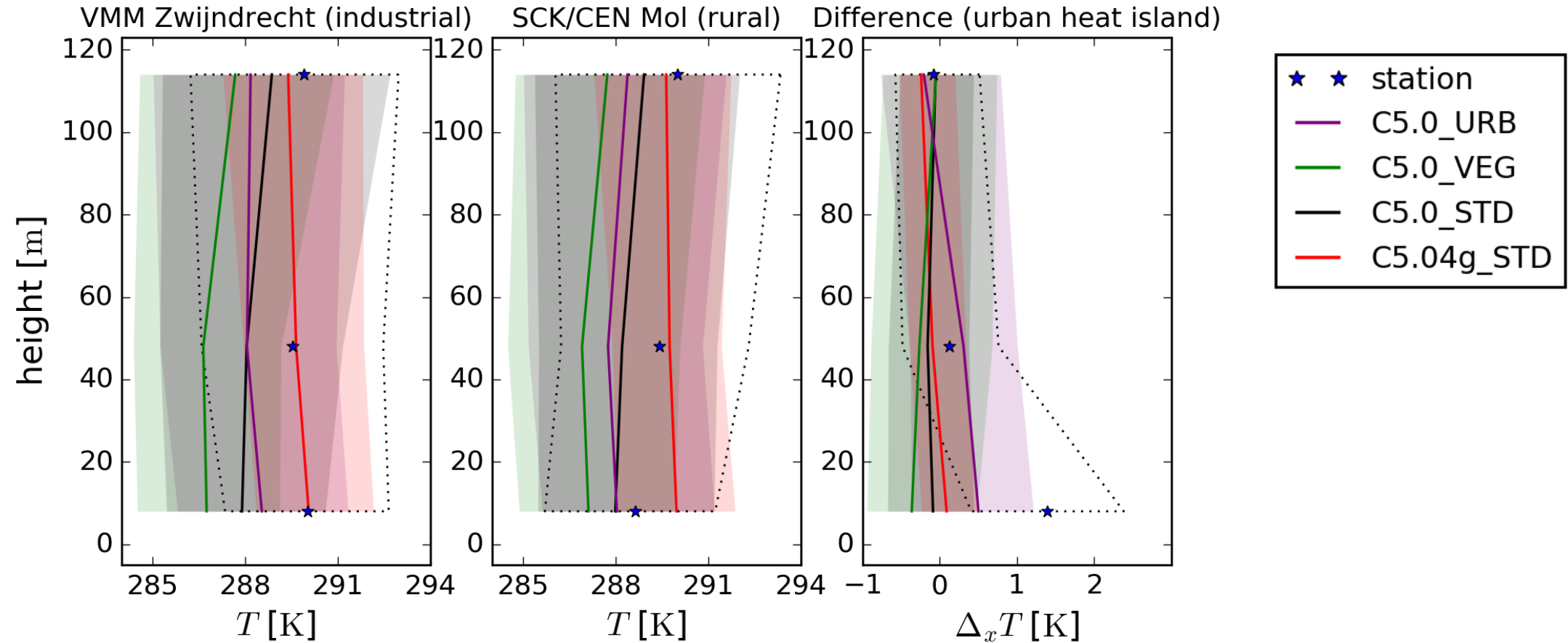
Results tower Antwerp

2012-mid-summer | 0H UTC



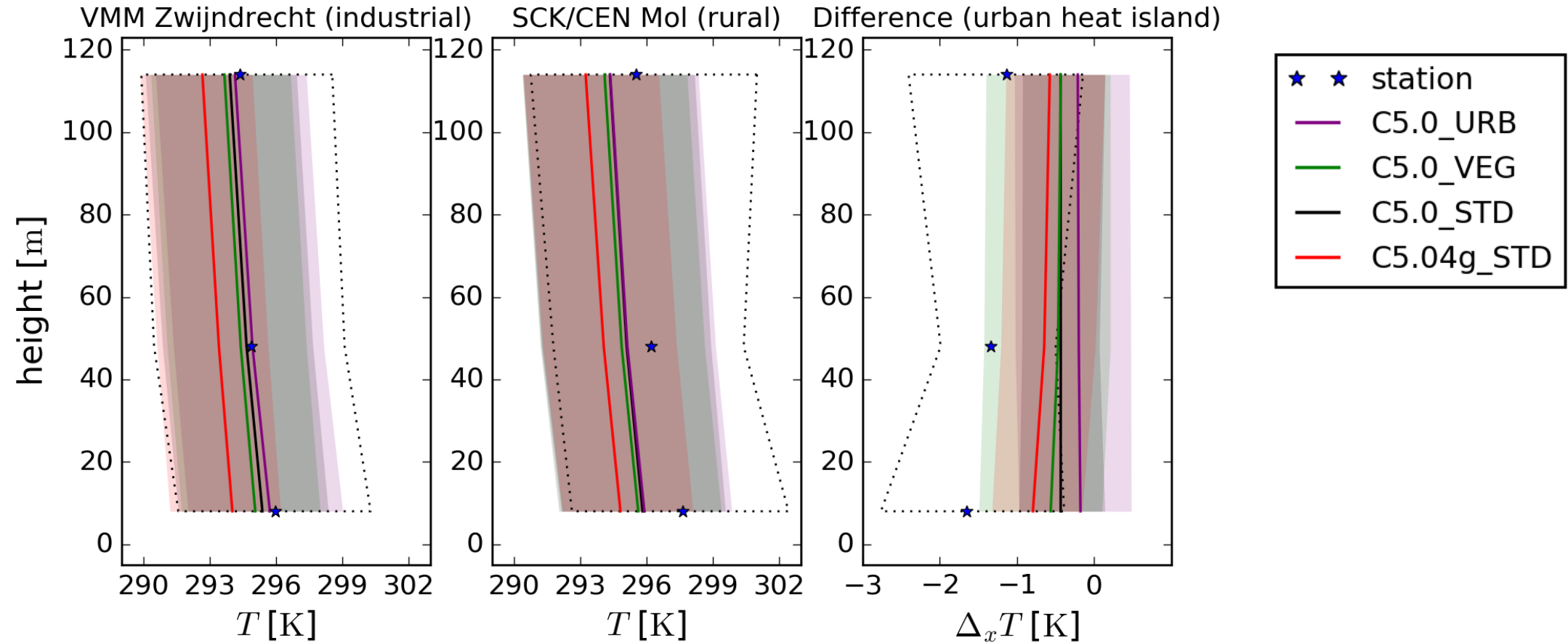
Results tower Antwerp

2012-mid-summer | 6H UTC



Results tower Antwerp

2012-mid-summer | 12H UTC



Conclusions

- Tests of new COSMO-5.04g coupled to TERRA_URB are progressing well, however:
 - results with TERRA_URB are pending, technical tests are successful
 - Results are present for the run without TERRA_URB
 - crashes in October, which needs investigation
 - performance issues (because of itype_canopy?)

Outlook

- Finish C5.04g_URB
- investigate crashes and performance issues
- New runs for obtaining consistent model settings between new and old COSMO versions and different model domains (->discussion)
- Extend evaluation with SUHI from MODIS and in-situ observations for Ghent

TERRA_URB overview current research projects

- Urban climate projections for extreme precipitation, see Helsen et al.
- Urban climate simulations over Kampala for investigating Malaria drivers in African Cities (Brousse et al.)
- SUBLIME single-column urban boundary-layer comparison experiment (including COSMO-5.0 coupled to both TERRA_URB and DCEP)
- H2020 proposal for climate change and urban health was submitted on monday.