Experience with SRNWP data pool PBL data in VERSUS

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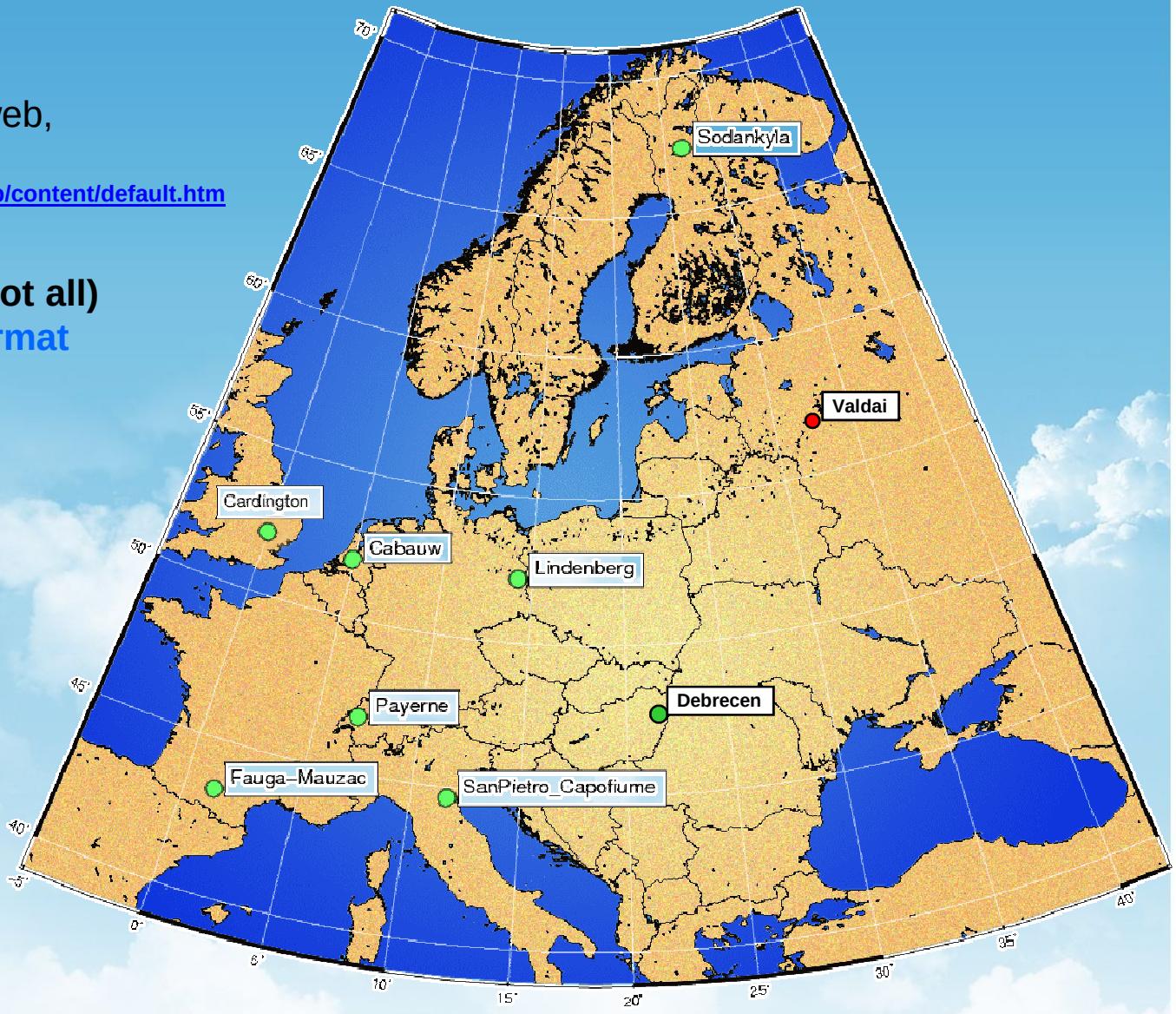
Data pool action

- Access from COSMO web, password protected
  http://www.cosmo-model.org/srnwp/content/default.htm
- Currently **8 sites**, data from **2006-2012** **(not all)** in a **common ASCII format**
- **Soil**, **surface** and **BL** observations



Use of SRNWP data pool for Verification and in VERSUS

Use of selected observations from SRNWP data for verification purposes

Priority: focus on PBL radiation and energy observations

Work done:

- Adaptations on both observations and forecasts for comparison (different averages and reference periods between obs and fcs)

- Verification of correspondent COSMO model variables through Daily Cycles and Time series

Work to be done:

- Full Implementation of SRNWP data for al VERSUS functionalities

Model Used: COSMO-ME archive of model output parameters available since 2008

Obs and Fcs data availability

All stations: Lindenberg, S. Pietro Capofiume, Cabauw, Debrecen, Payerne, Fauga-Mauzac

OBS data	**FCS data**
RSWD: incoming solar radiation	ASWDIR_S Avrg direct downward SW rad Surface
RSWU: reflected solar radiation	ASWDIFD_S Avrg diffuse downward SW rad Surface
	Avrg Balance of SW
RLWD: incoming thermal radiation	ALWD_S Avrg downward LW radiation at the surface
RLWU: outgoing thermal radiation	ALWU_S Avrg upward LW radiation at the surface
	Avrg Balance of LW

Balance of SW and LW for obs is internally calculated and stored

Obs and Fcs availability

Lindenberg, S. Pietro Capofiume, Cabauw, Fauga-Mauzac

OBS	**FCS**
HS: sensible heat flux	ashfl_s: averaged sensible heat flux

Cabauw, Fauga-Mauzac, S. Pietro Capofiume (from 2012)

LE: latent heat flux	alhfl_s: averaged latent heat flux

S. Pietro Capofiume, Cabauw, Fauga-Mauzac (not available in VERSUS)

MOM: momentum flux	aumfl_s: averaged u-comp mom. flux
	avmfl_s: averaged v-comp mom. flux

Obs and Fcs availability (nice to have)

All stations: Lindenberg, S. Pietro Capofiume, Cabauw, Debrecen, Payerne, Fauga-Mauzac (not available in VERSUS)

OBS	**FCS (from 2010)**
TSOIL: soil temperature	T_SO: only the first level
MSOIL: soil moisture content	W_SO: only the first level

VERSUS Implementation

- Front-end to upload Data pool ASCII files for obs
- Calculation of Radiation balances from obs
- Calculation and storage of hourly averaged quantities for obs and fcs
- Daily Cycles
- Time series

Next implementations:

- Scatterplots
- Average on different period (3, 6, 12 hours) – if necessary
- Use of Obs and Fcs for standard and Conditional verification

VERSUS Implementation

Declaration of new parameters in grib1.xml

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VERSUS Implementation

Declaration of new parameters in griboper.xml

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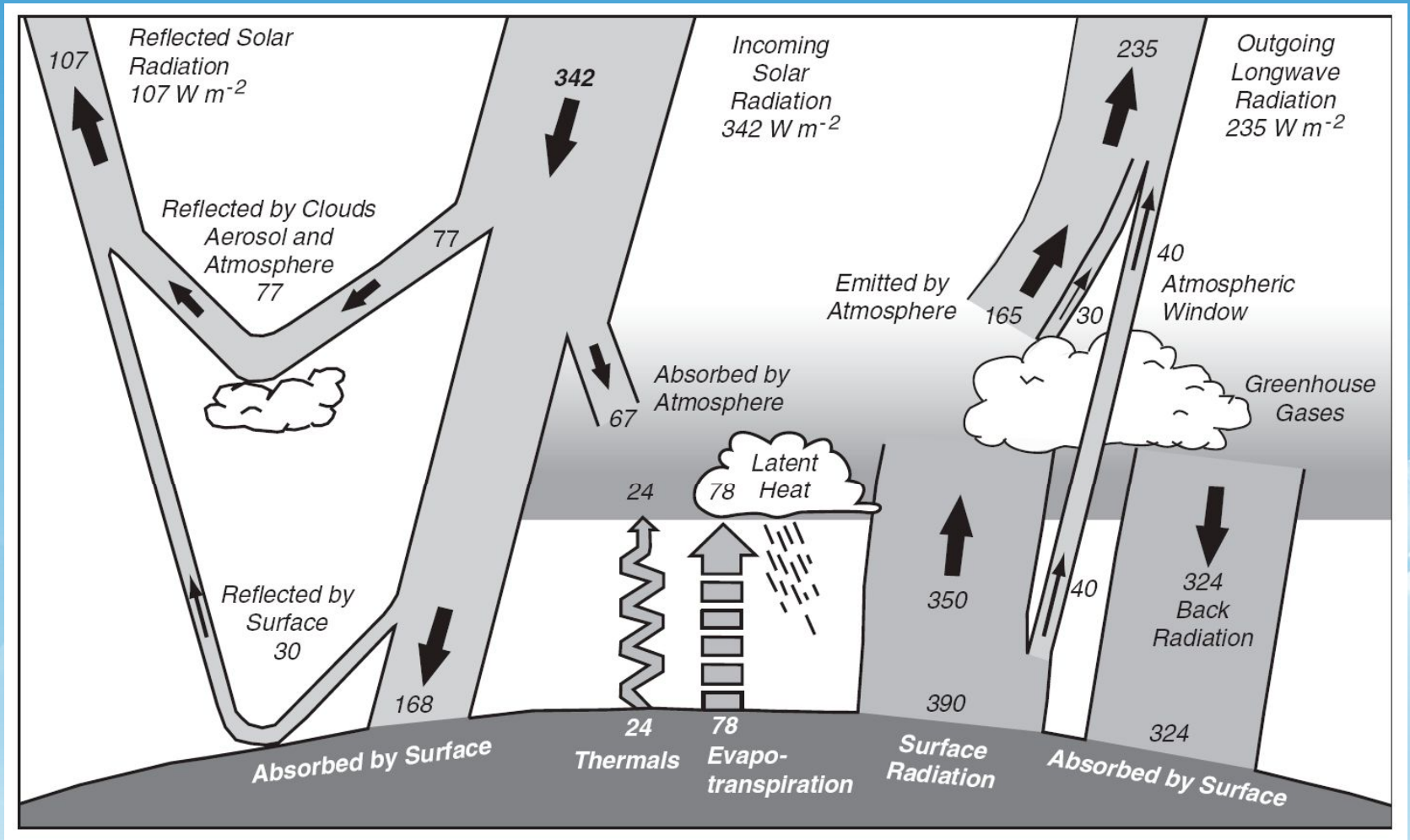
VERSUS Implementation

Some Results

- Period: Jan 2011 – Jun 2011
- Daily Cycles Avg D1: JFM – AMJ (hourly averaged obs and fcs)
- Time Series for shorter periods
- Stratification: All data pool stations – S. Pietro Capofiume
- Confrontation with standard parameters on Emilia Romagna region

VERSUS Implementation



The mean annual radiation and heat balance of the Earth (Houghton et al 1996)

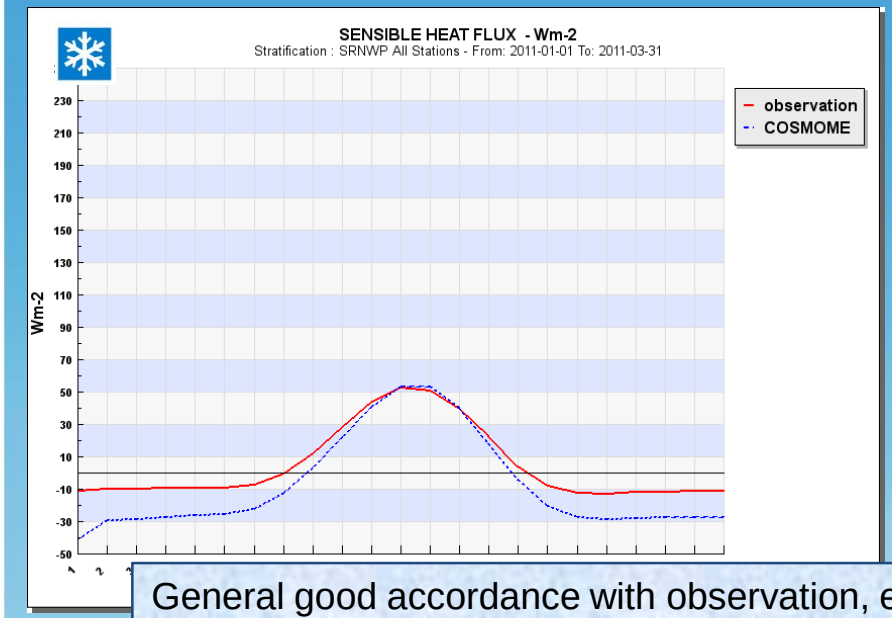
VERSUS Implementation

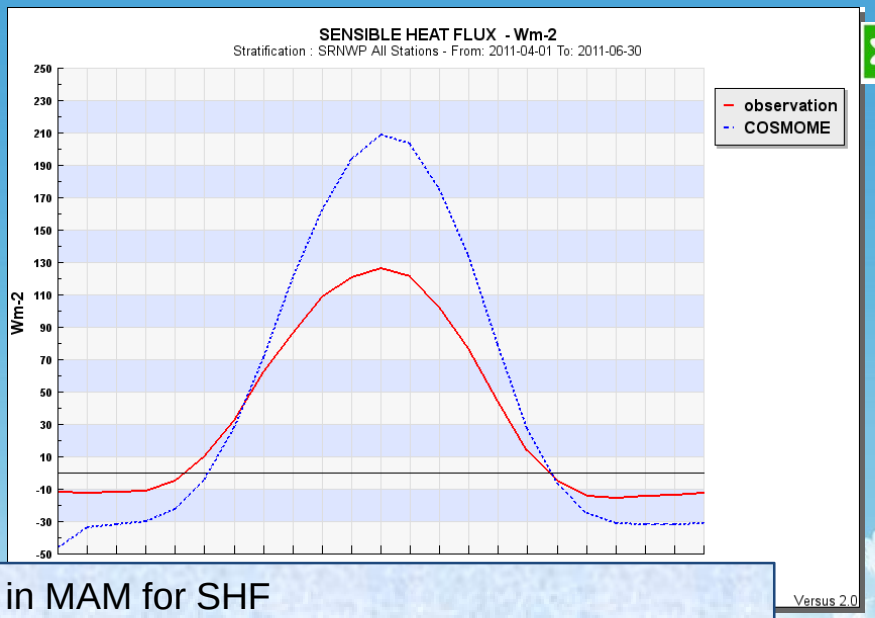
U10 – wind speed at 10 m above the sea level;
ρ – density of air

$$T = \rho_a C_D U_{10}^2$$
$$Q_S = \rho_a C_p C_S U_{10} (t_s - t_a)$$
$$Q_L = \rho_a L_E C_L U_{10} (q_s - q_a)$$

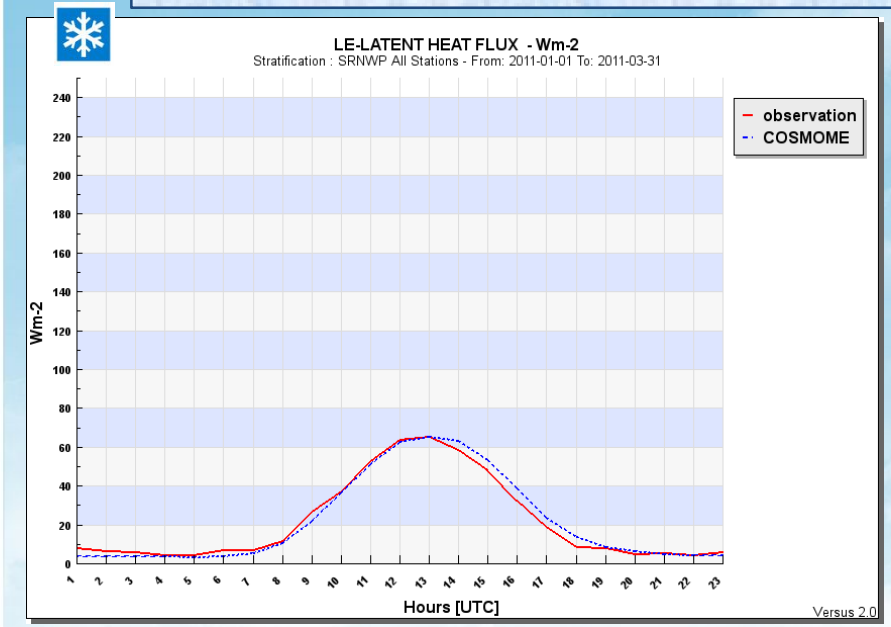
C_p	Specific heat capacity of air	1030 $\mathrm{J{\cdot}kg^{-1}{\cdot}K^{-1}}$
C_D	Drag coefficient (see 4.3)	$(0.50 + 0.071\,U_{10}) \times 10^{-3}$
C_L	Latent heat transfer coefficient	1.2×10^{-3}
C_S	Sensible heat transfer coefficient	1.0×10^{-3}
L_E	Latent heat of evaporation	2.5×10^6 J/kg
q	Specific humidity of air	kg (water vapor)/kg (air)
q_a	Specific humidity of air 10 m above the sea	kg (water vapor)/kg (air)
q_s	Specific humidity of air at the sea surface	kg (water vapor)/kg (air)
Q_S	Sensible heat flux	$\mathrm{W/m^2}$
Q_L	Latent heat flux	$\mathrm{W/m^2}$
T	Wind stress	Pascals
t_a	Temperature of the air 10 m above the sea	K or °C
t_s	Sea-surface temperature	K or °C

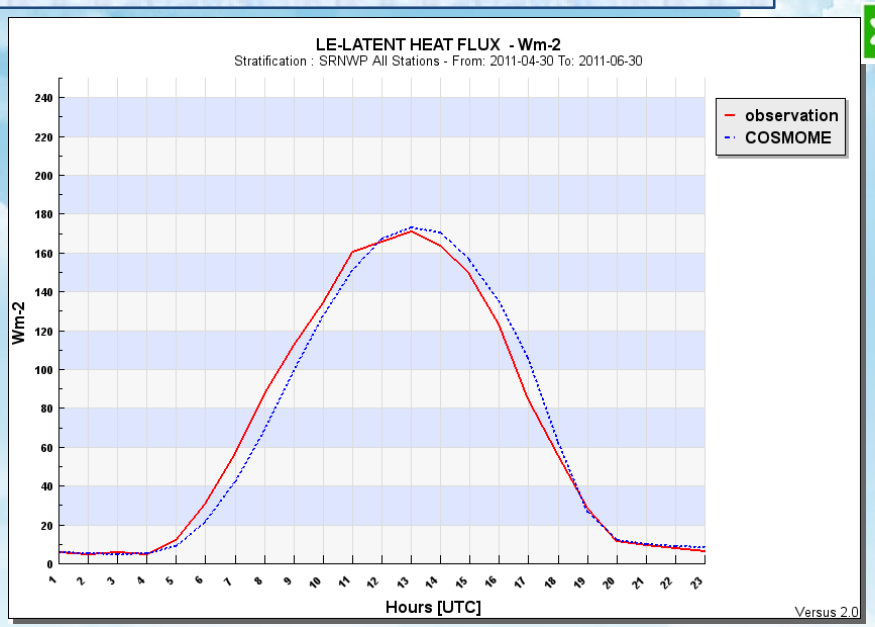
Some Results



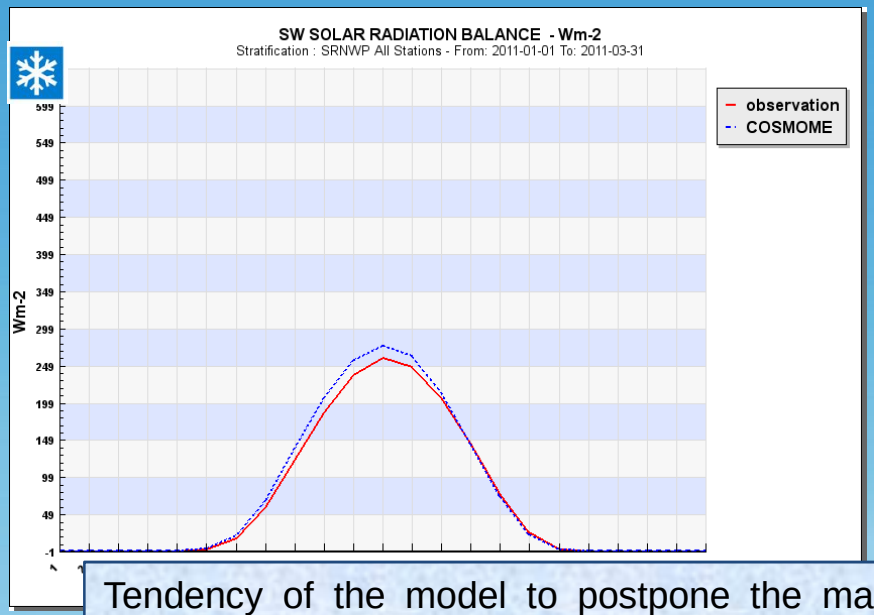


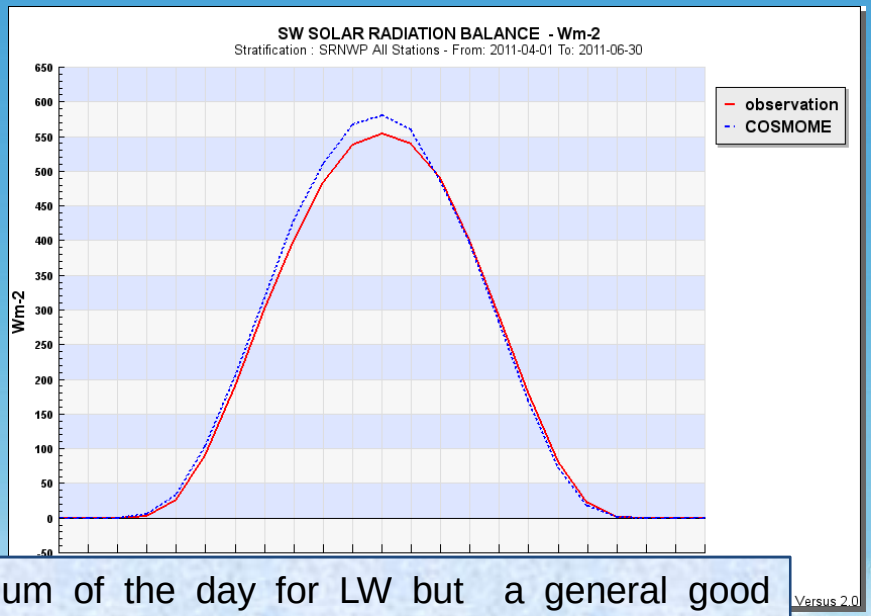
General good accordance with observation, except in MAM for SHF



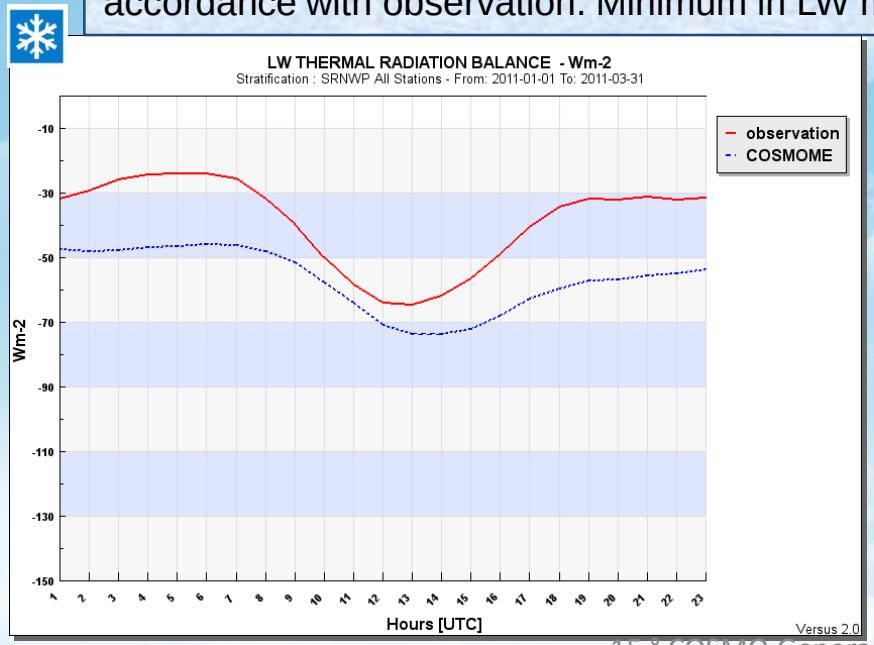


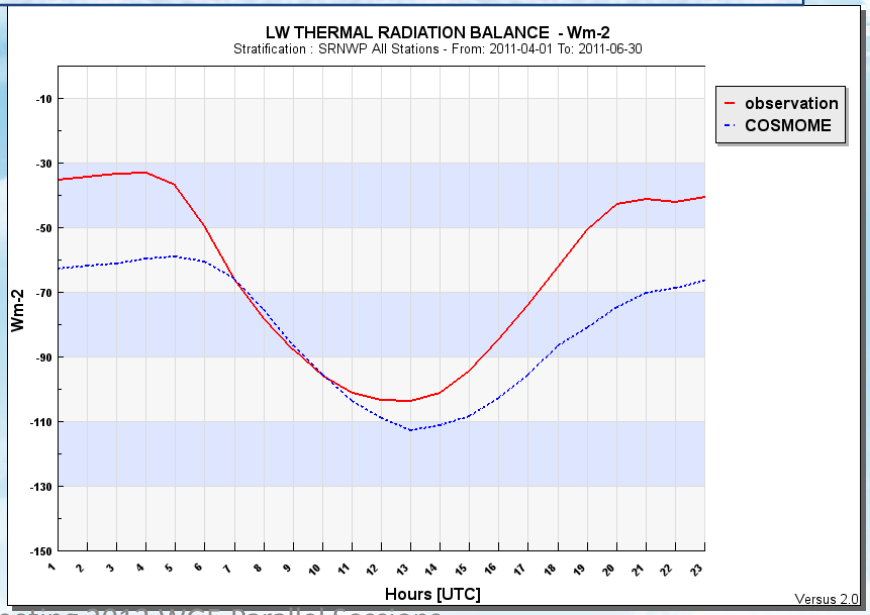
Some Results



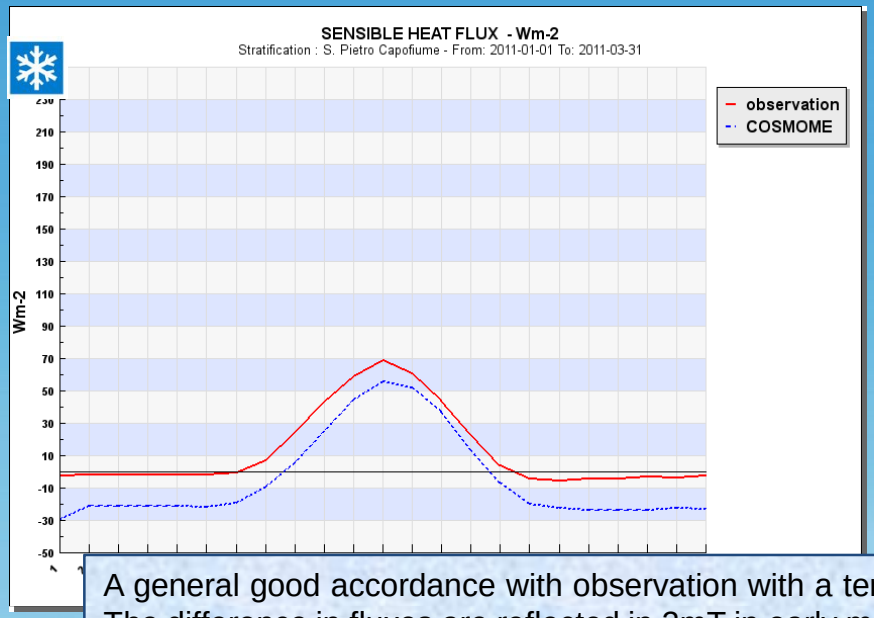


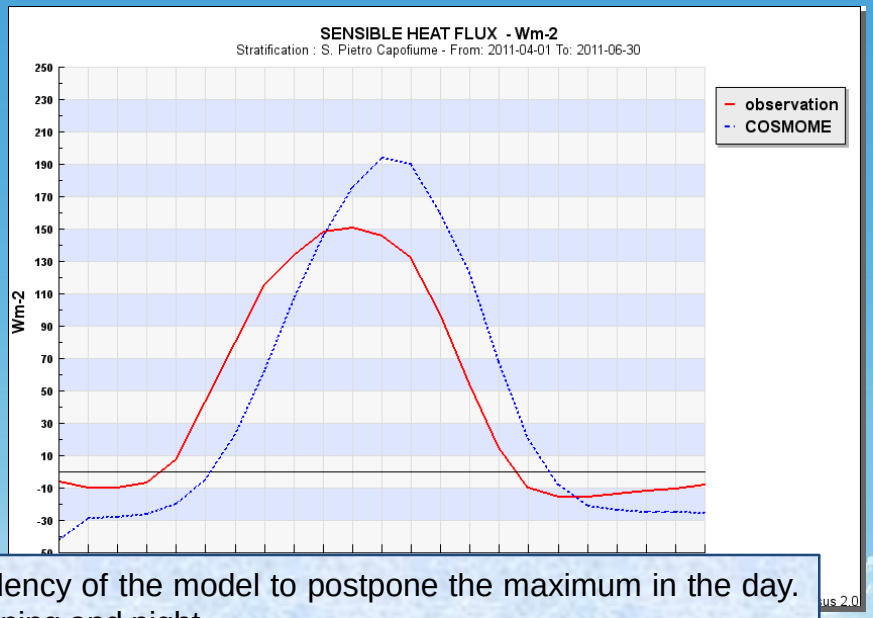
Tendency of the model to postpone the maximum of the day for LW but a general good accordance with observation. Minimum in LW more pronounced in Spring



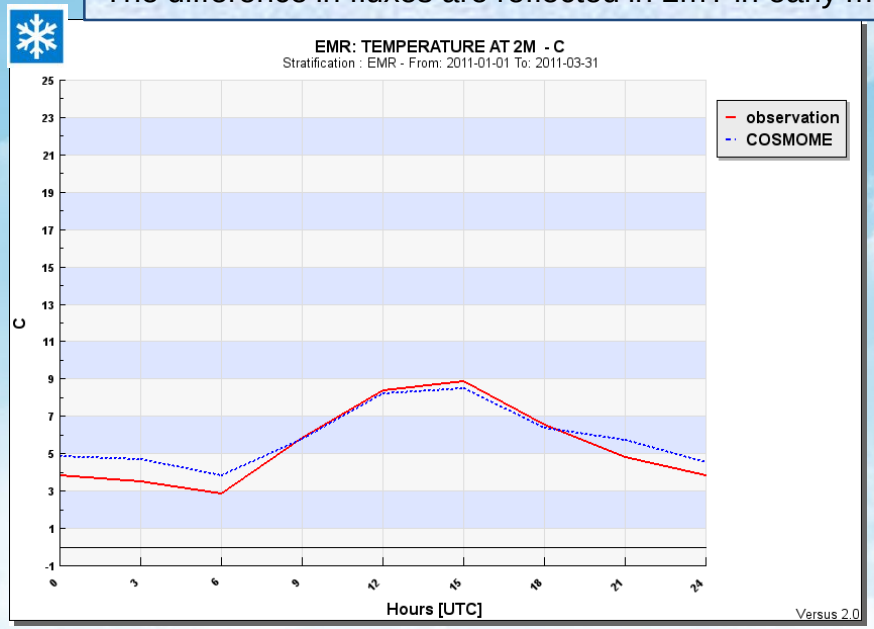


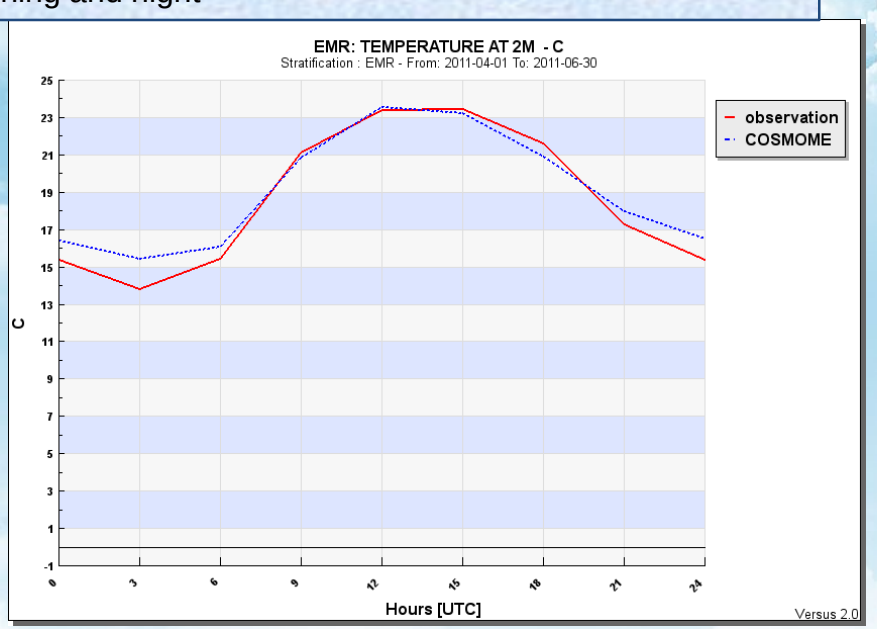
Some First Results



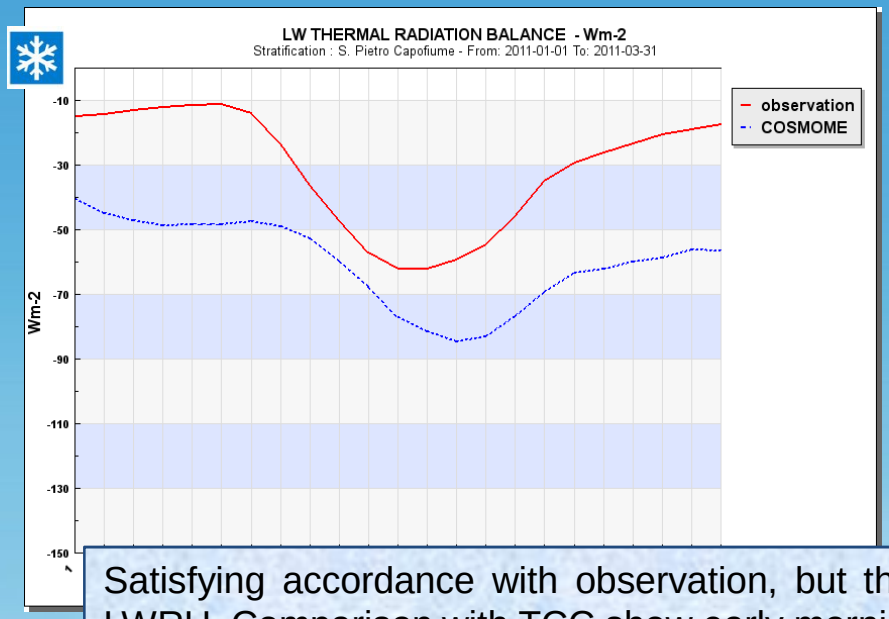


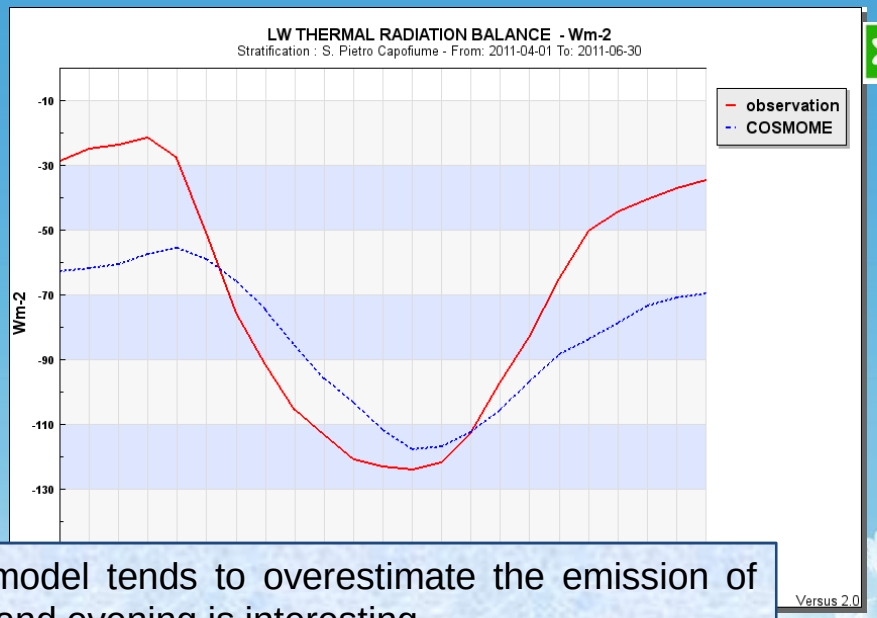
A general good accordance with observation with a tendency of the model to postpone the maximum in the day.
The difference in fluxes are reflected in 2mT in early morning and night



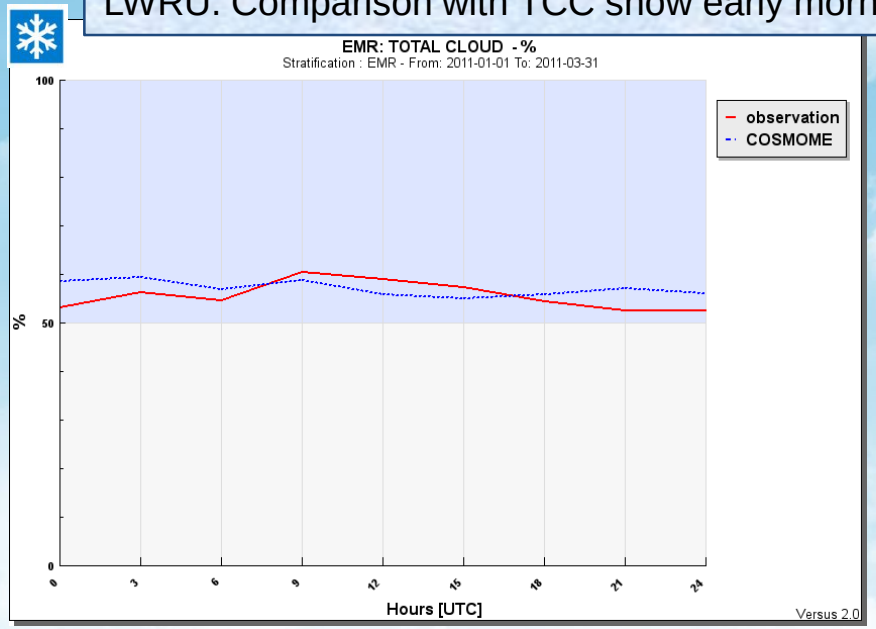


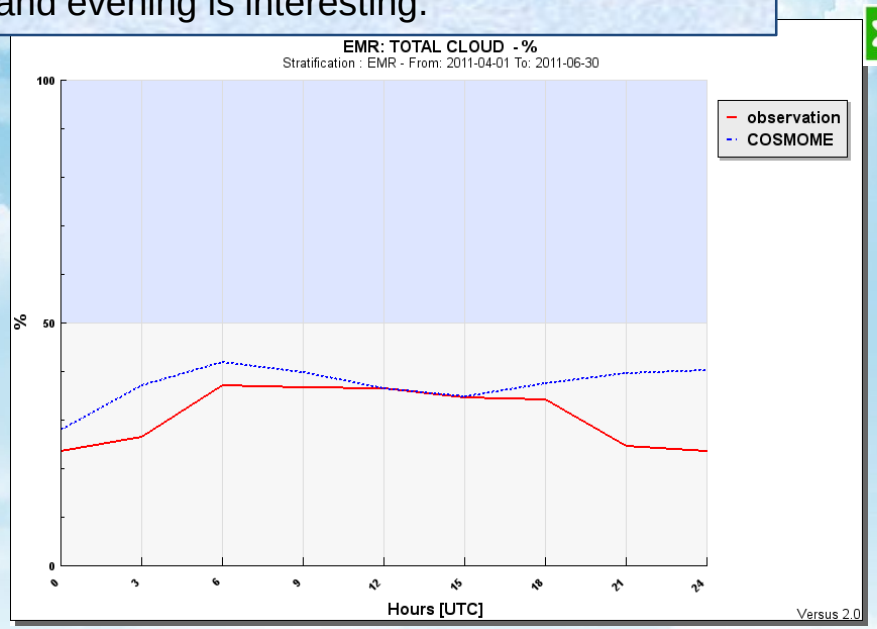
Some First Results



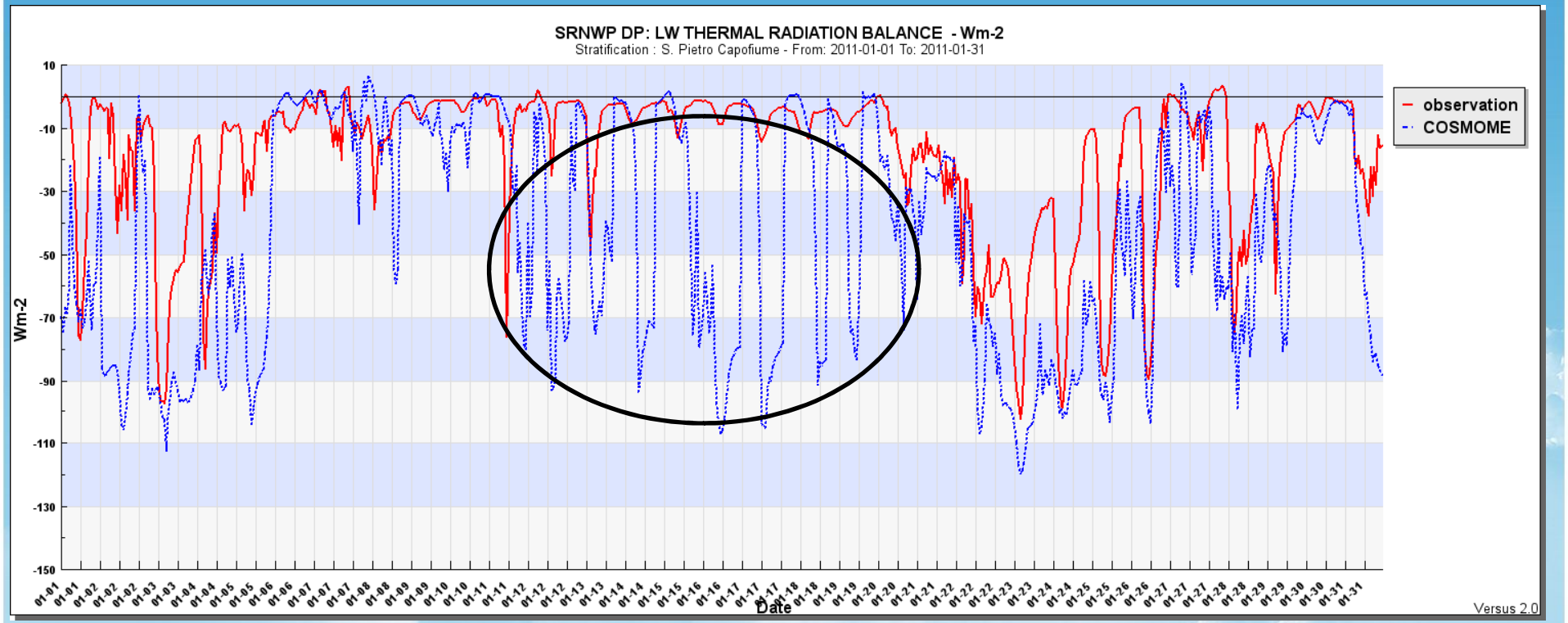


Satisfying accordance with observation, but the model tends to overestimate the emission of LWRU. Comparison with TCC show early morning and evening is interesting.



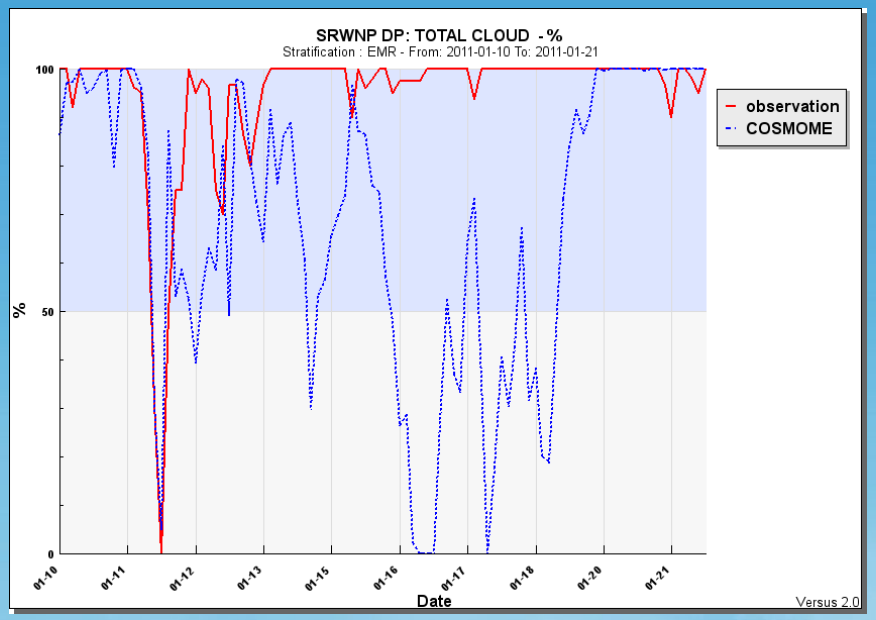


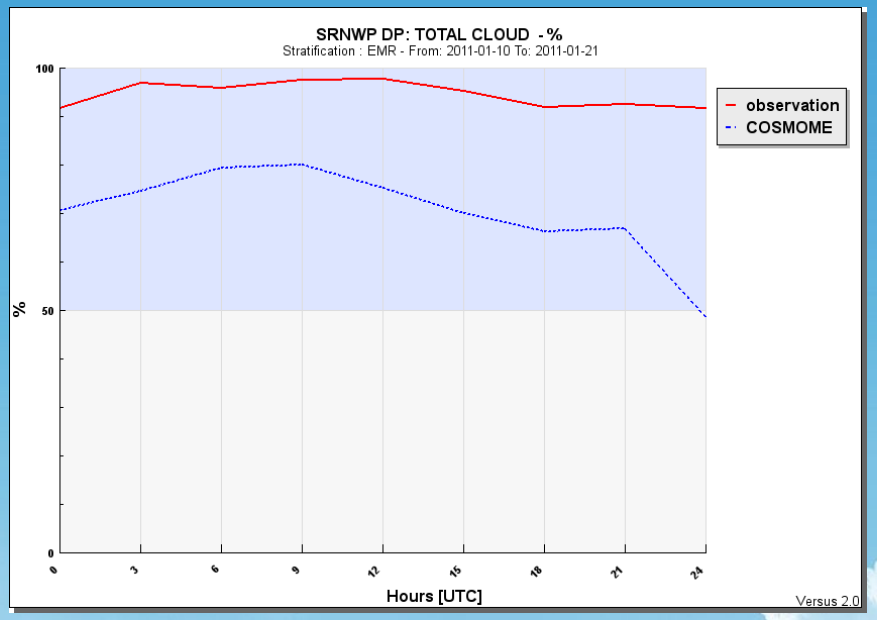
Something interesting

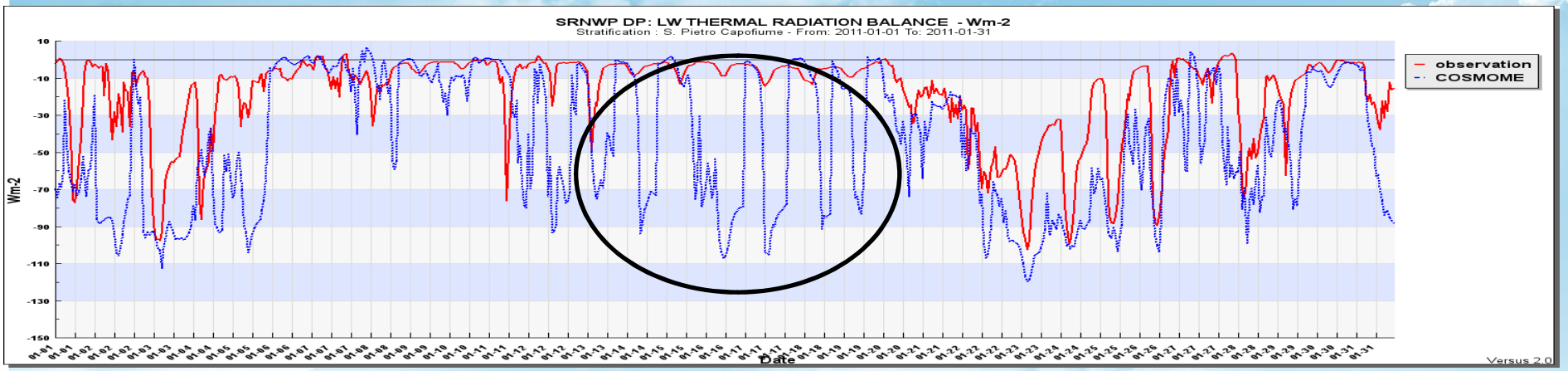


From 10/01/2011 to 20/01/2011 the model gave a completely wrong estimation of LW

Something interesting







Concluding.....

- ASCII Files from SRNWP Data Pool Exchange are now available in VERSUS 3.1 (soon delivered
- Only some parameters are stored in the DB: Radiation and fluxes. Other single level obs can be stored
- Time Series, Daily Cycles and Scores time series are available

- Some experiments show already interesting impact using such data
- Further implementation for full use of these data in VERSUS functionalities
- Important impact expected with the use of Conditional Verification