

CM-SAF datasets uses for verification of Belgian Regional Climate Models: case studies

N. Ghilain^(1,2), J.F. Graillet⁽²⁾, T. Dethinne⁽²⁾, J. Strebelle⁽²⁾, W. Moutier⁽¹⁾, X. Fettweis⁽²⁾, B. Van Schaeybroeck^(1,3)

(1) Royal Meteorological Institute (2) ULiege, SPHERES (3) UGhent, Dept of Geography

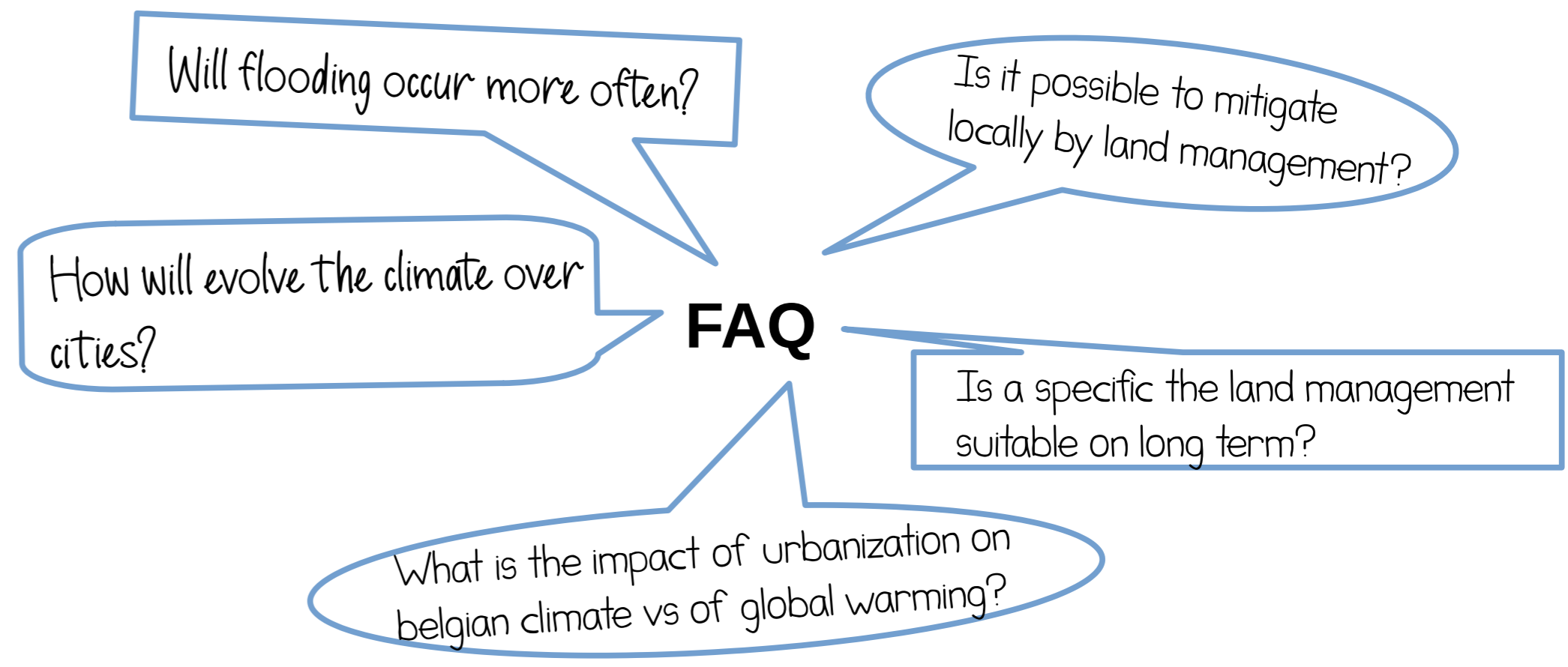


Contact: nicolas.ghilain@meteo.be

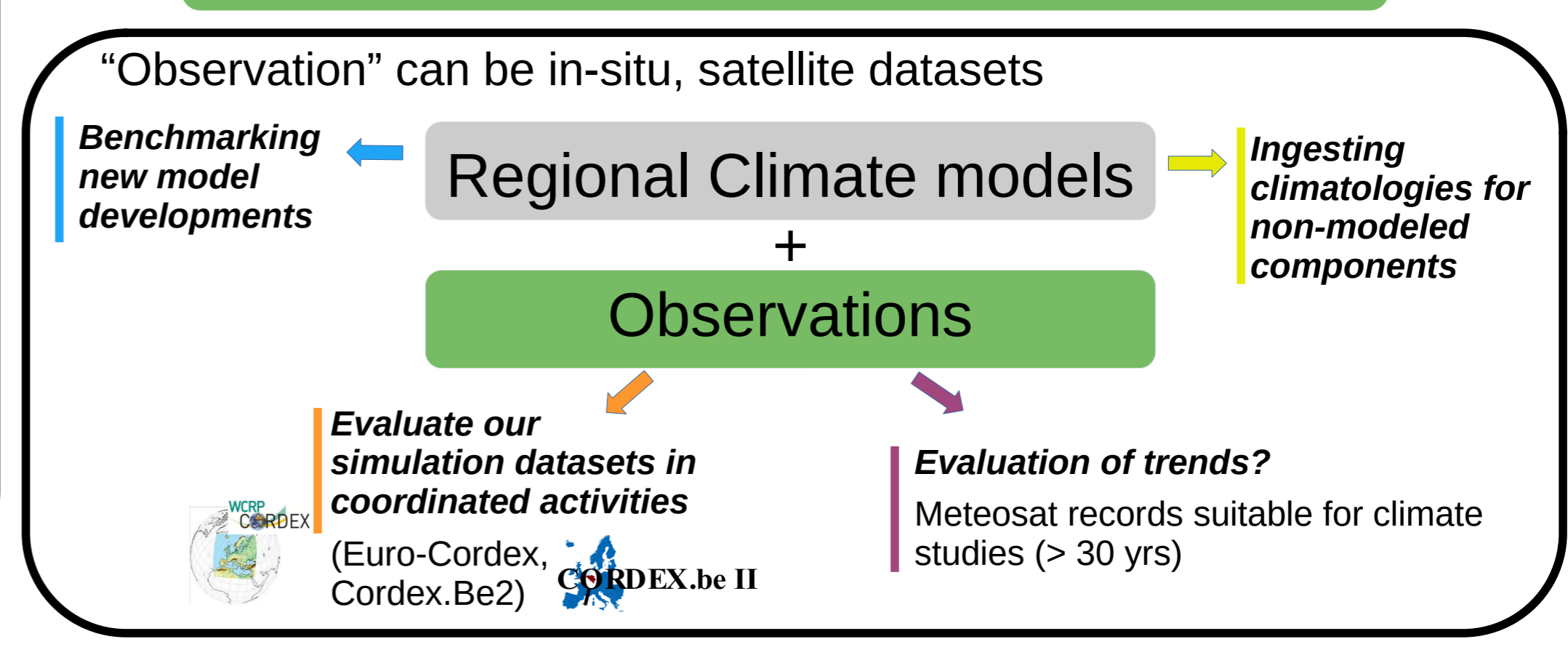


- Regional climate models provide a detailed view of the global warming effects at the regional scale, covering continent or country.
- Projections may vary between models, an ensemble of models is used to give outcome uncertainty.
- Reference datasets are needed to evaluate the model capabilities over the past. Long satellite data records are good candidates!

Climate projections & services over Belgium

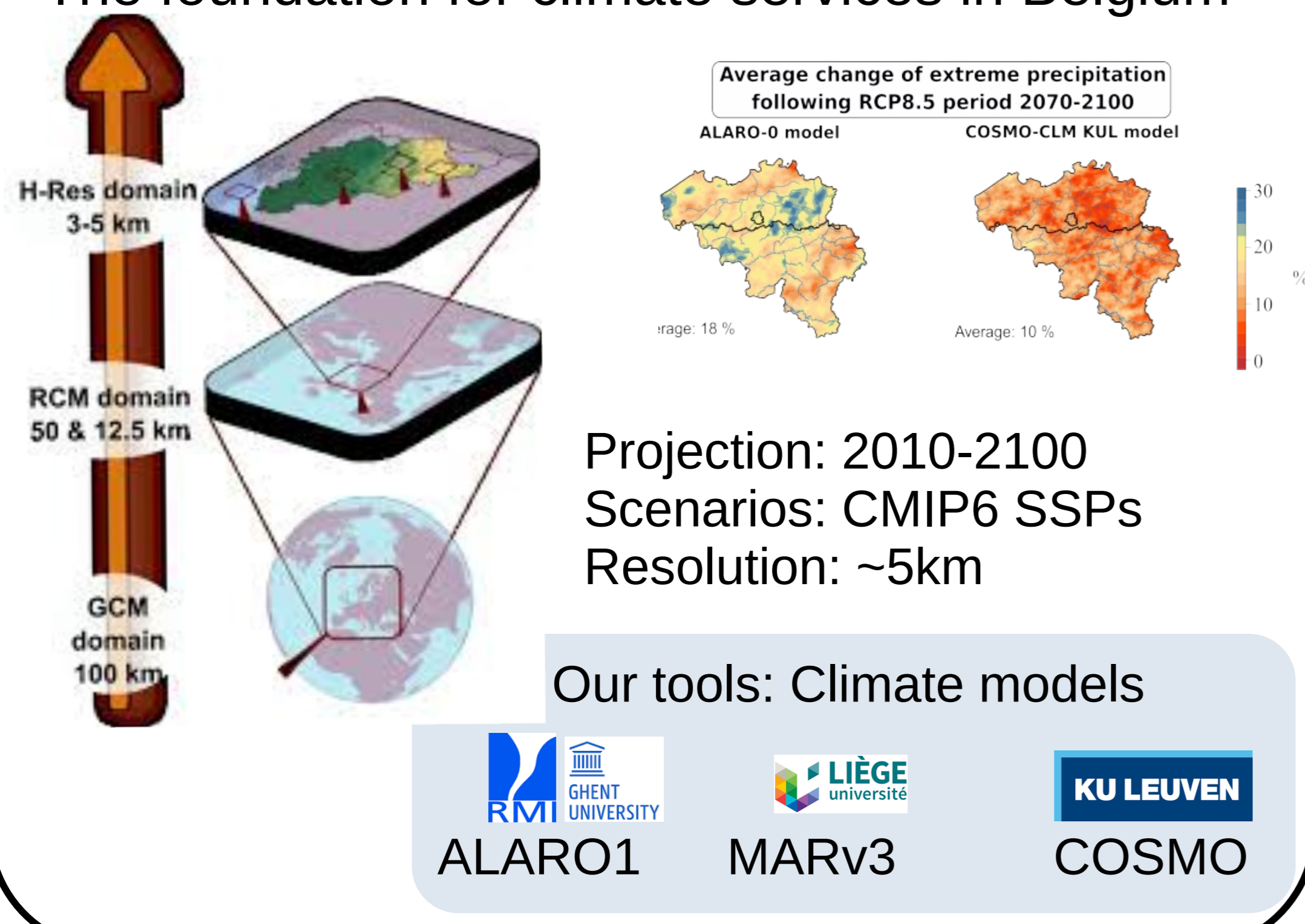


Need for appropriate modeling tools !
Verification is very important!



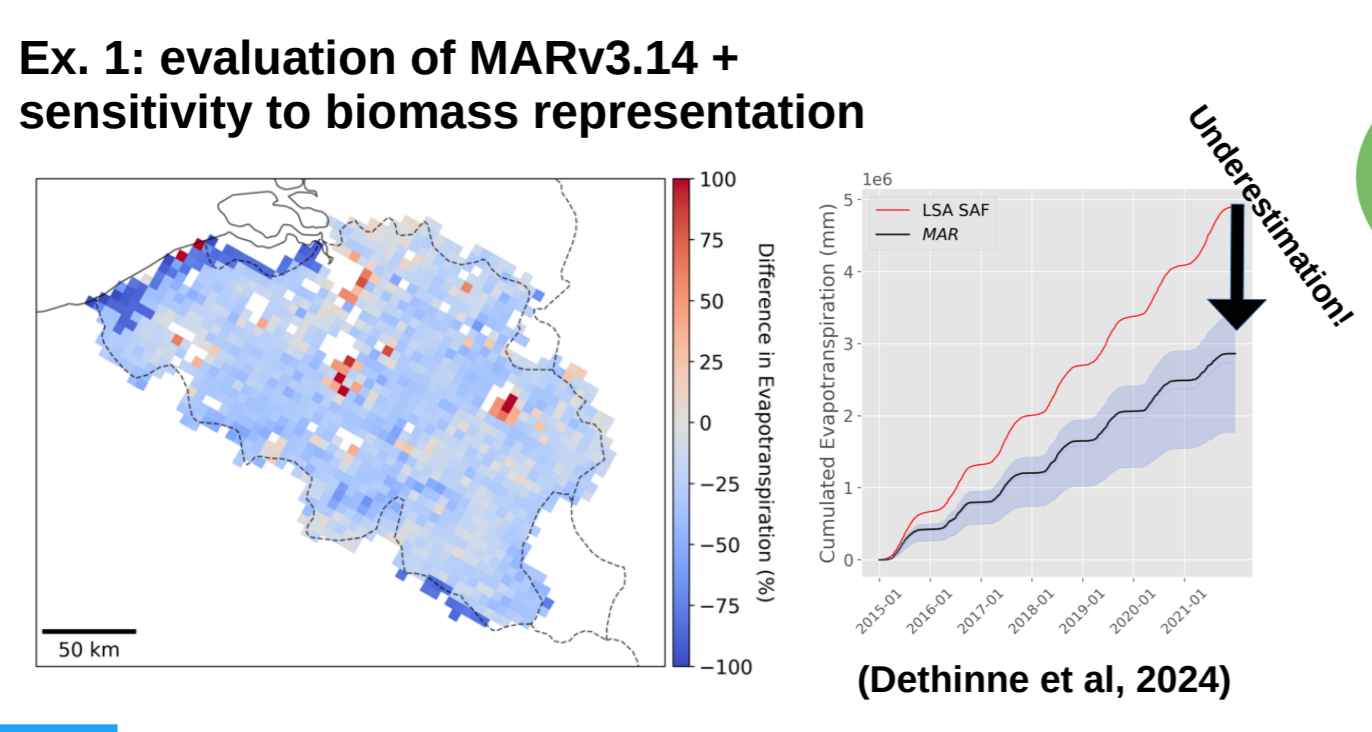
Regional climate projections

Euro-Cordex + Cordex.BE (Termonia et al, 2018a)
 The foundation for climate services in Belgium



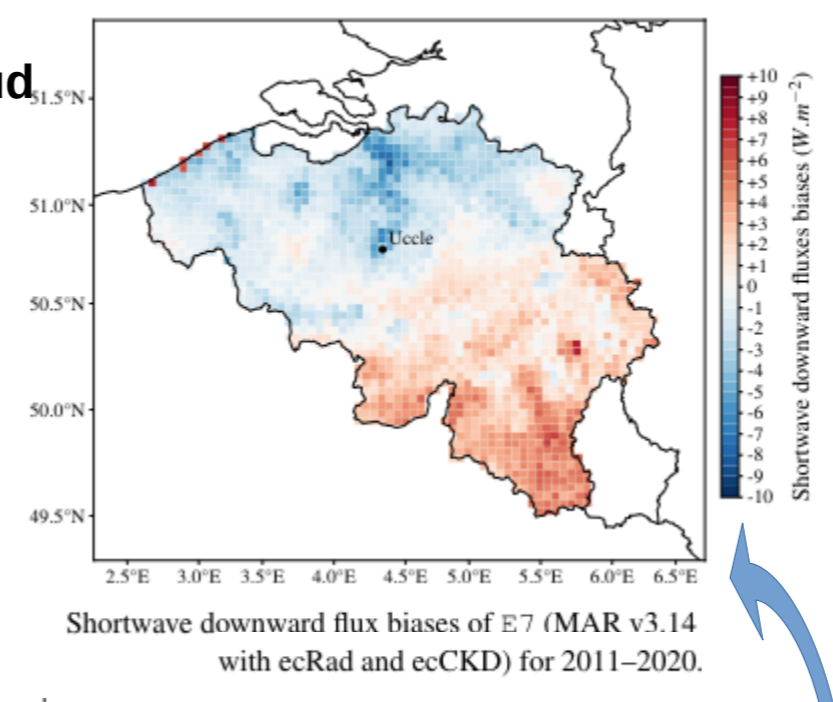
Satellite (SAF) data records are used for...

Benchmarking new model developments



Ex. 2: tuning of new radiation scheme configurations and cloud fraction param in MARv3.14 (Graillet et al, 2024)

- Datasets:**
- SARAHv3.0 (+in-situ) SWD
 - SARAHv3.0 LWD
 - CLAAS Cloud Frac
 - SAF ET/LE/H

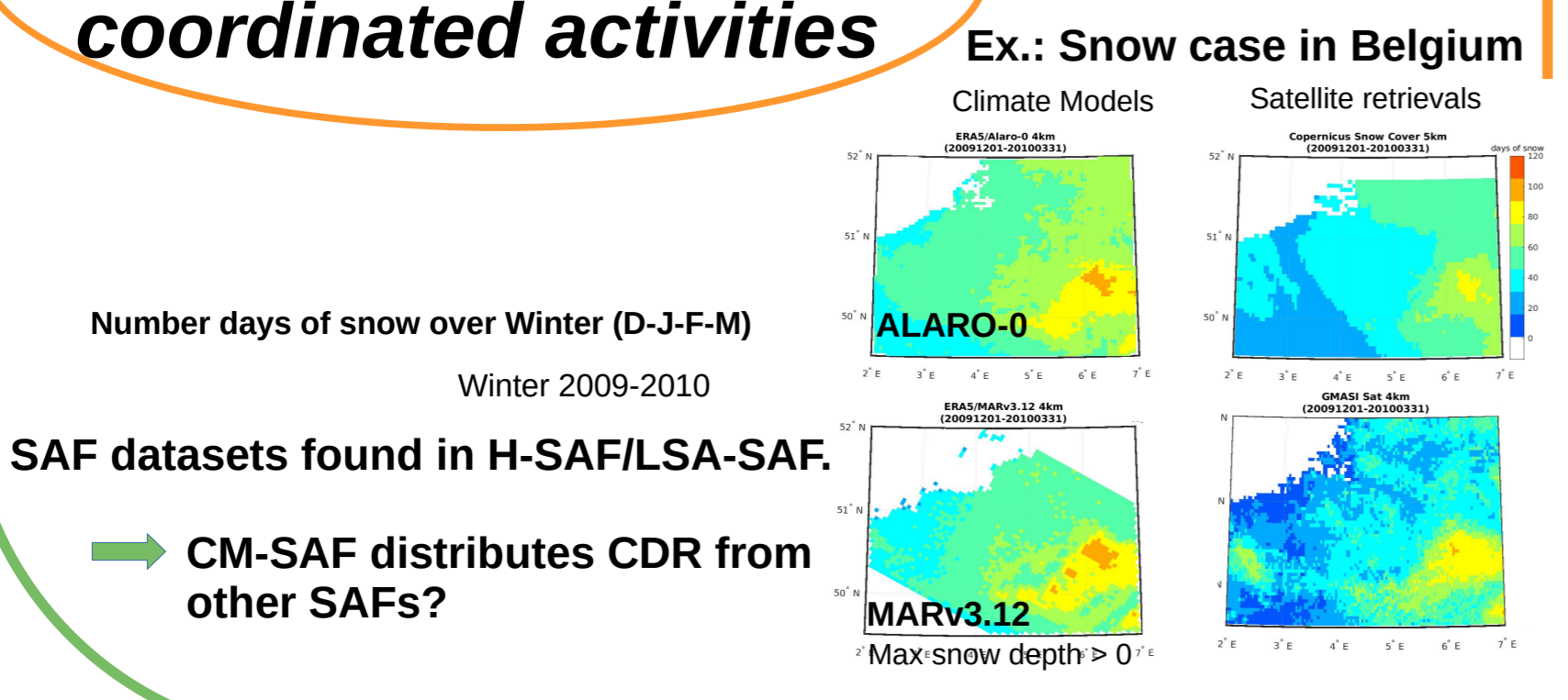


Radiation scheme		Morcrette		ecRad						
MAR simulation		MI	M2	E1	E2	E3	E4	E5	E6	E7
Shortwave ($W m^{-2}$)	Correlation	0.940	0.939	0.945	0.945	0.944	0.947	0.941	0.943	0.947
	RMSE	35.66	34.04	35.18	34.38	32.95	31.14	33.43	32.17	31.06
Longwave ($W m^{-2}$)	Bias	2.64	-4.95	12.42	11.03	4.57	0.67	1.04	-2.71	0.36
	Correlation	0.851	0.859	0.876	0.876	0.871	0.884	0.864	0.877	0.882
Difference	RMSE	20.92	19.60	20.23	20.15	19.19	17.98	19.47	18.37	18.10
	Difference	-5.71	0.00	-8.20	-8.07	-3.85	-1.50	-2.82	-0.43	-1.77

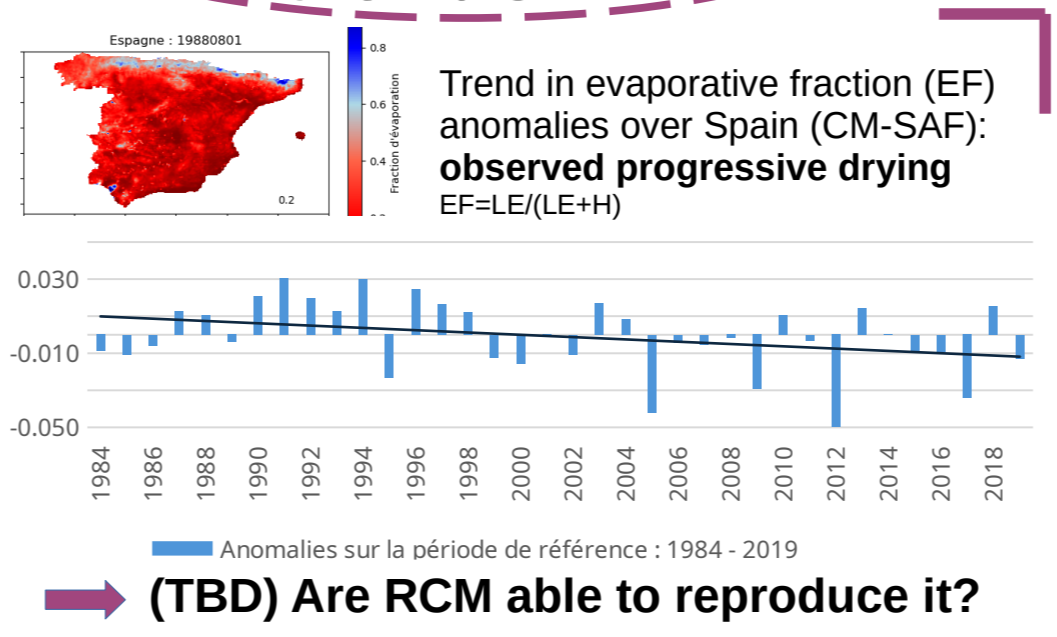
Ingesting climatologies for non-modeled components

- Datasets:**
- CLARA AVHRR v3 Blue-sky albedo
 - MERRA2 AOD → CM-SAF AOD?
 - HOAPS SST ?
 - O3 ?

Evaluate our simulation datasets in coordinated activities



TBD: Evaluation of trends?



CM-SAF datasets advantages:

- ✓ long series (~40 yrs)
- ✓ well documented & evaluated
- ✓ consistent (e.g. energy budget)
- ✓ big portfolio

Some minor difficulties / questions:

- ? big portfolio → need expert to select relevant dataset
- ? multiple datasets for same variable → report on consistency?
- ? other SAF produce datasets → could be CDR via CM-SAF?