Terra StandAlone

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with many thanks to Uli, Jurgen

Contents

- -Surface modelling and TSA

- -Capability of TSA

- -Difference with COSMO 6.0

- -Why we use TSA

- -Expanding TSA

- -Discussion

Surface Modelling

- Thermal: Heat equation (with phase changes)

- Water transport: Darcy's Law

- The 'complexity' is at the boundaries and the coefficients (conductivities / diffusivities) and discretisation.
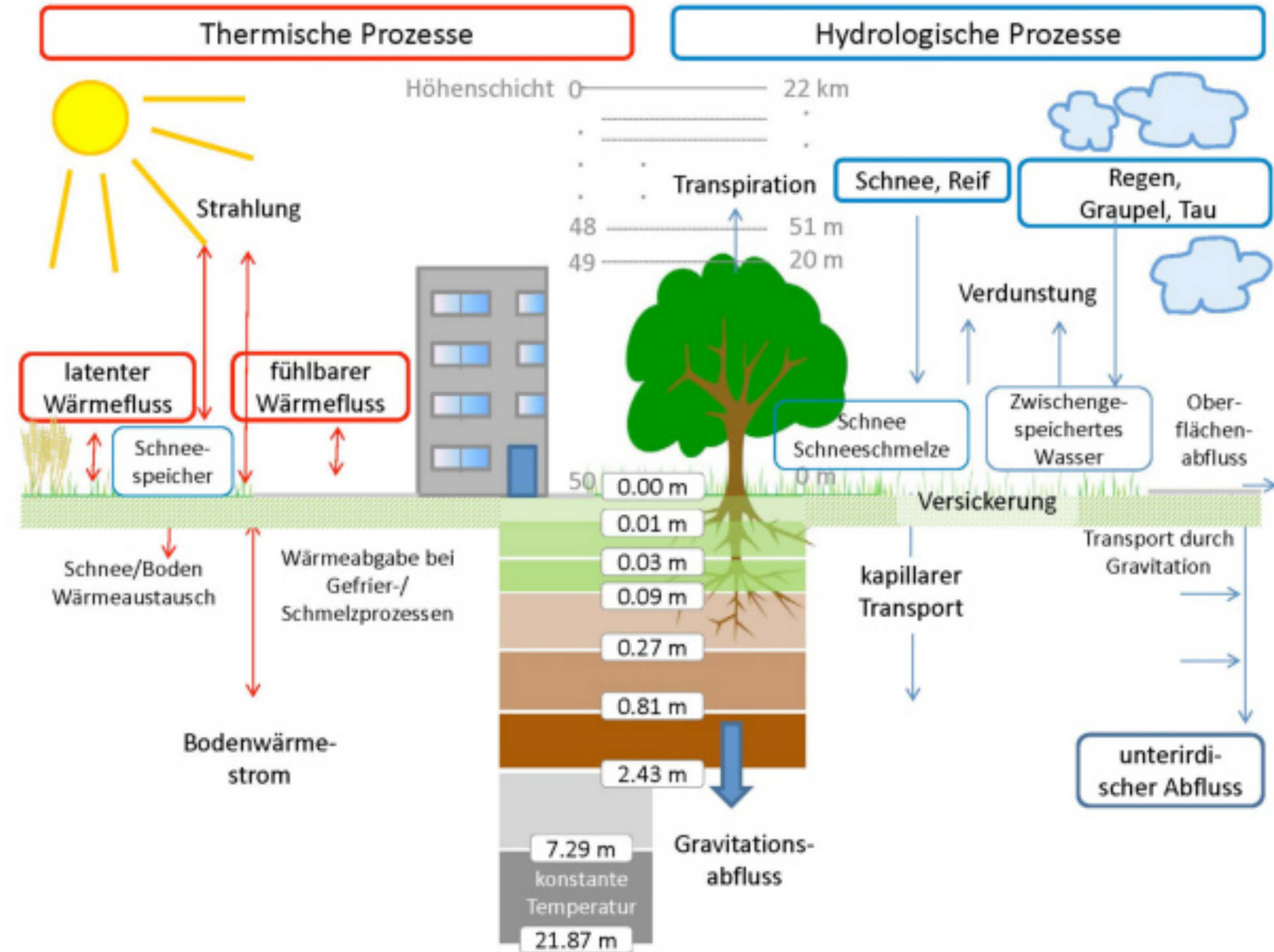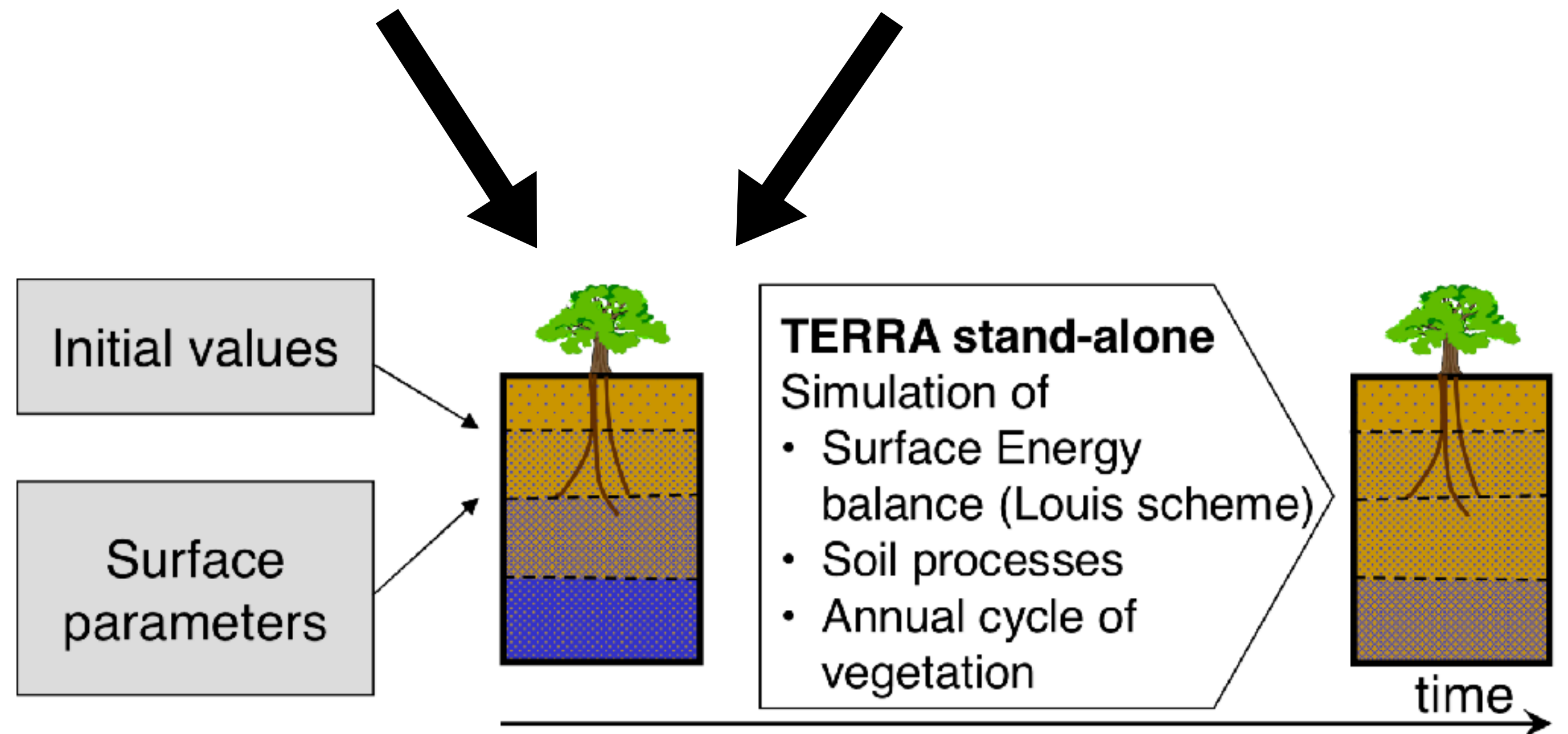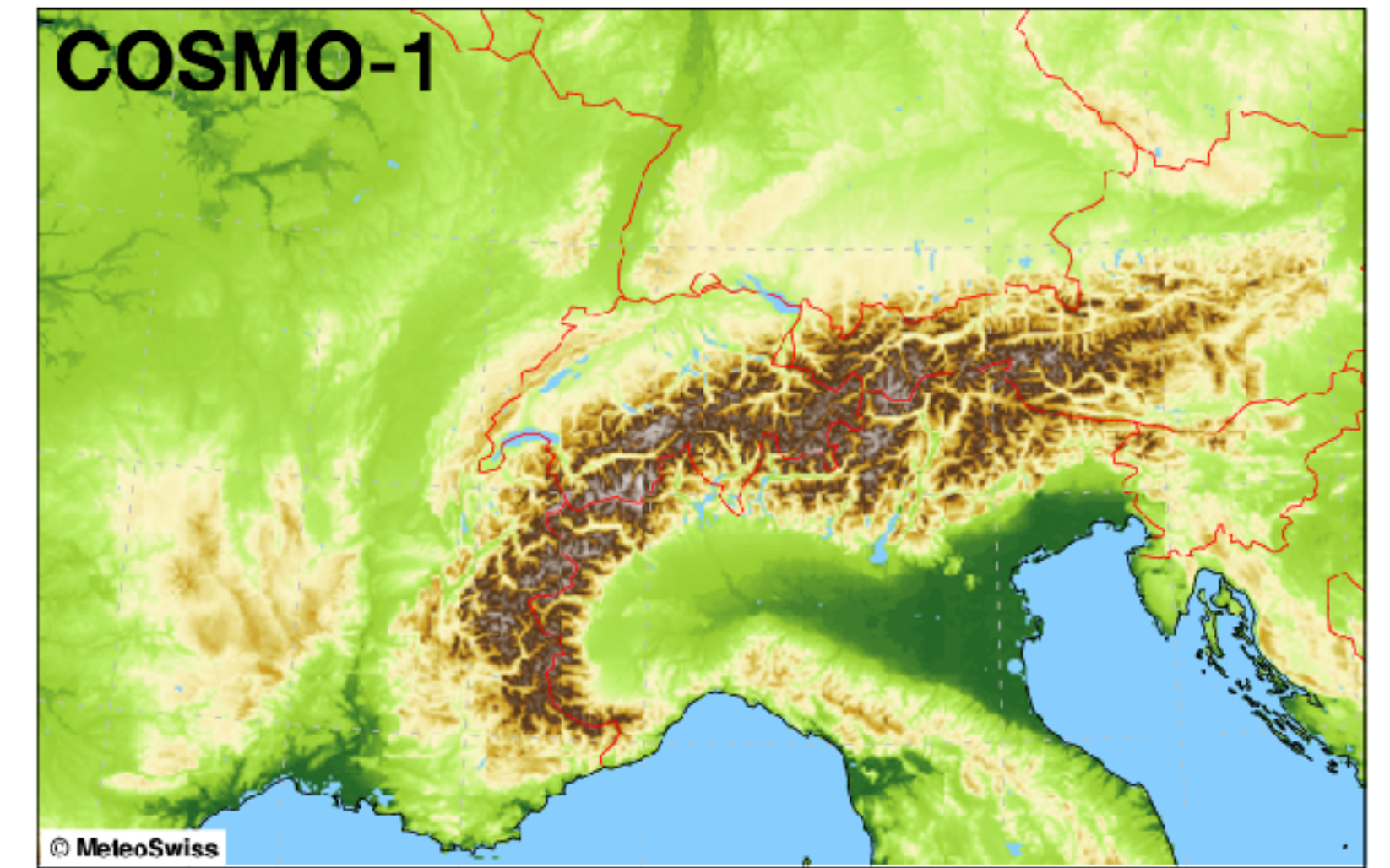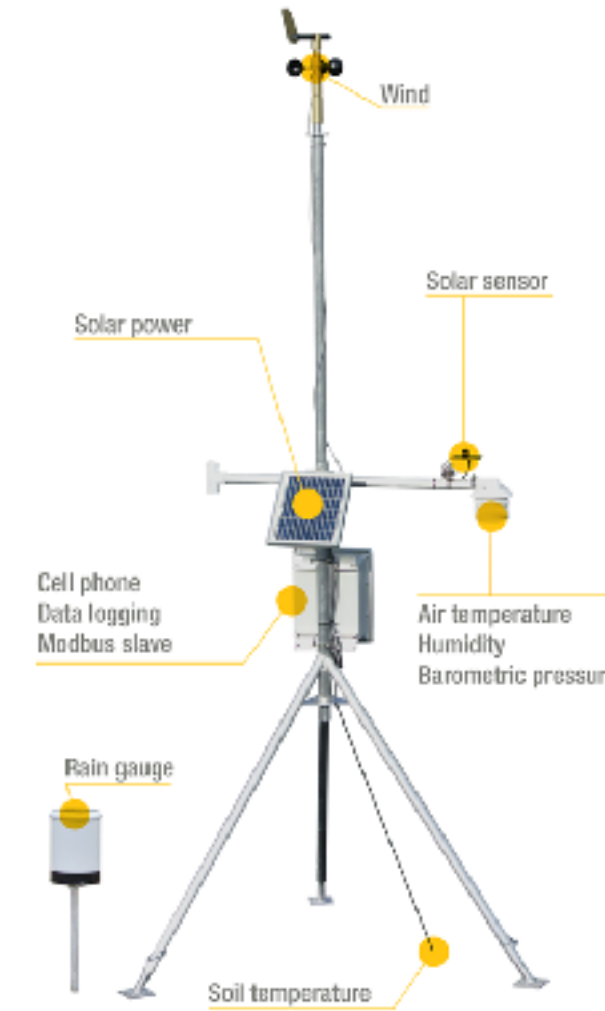
Terra StandAlone

NECESSARY INPUT

- Air temperature (K)

- Relative humidity (%)

- Wind speed (m/s)

- Incoming short wave radiation (W/m^2)

- Incoming long wave radiation (W/m^2)

- Precipitation sum (kg/m^2)

- station driven or gridded surface fields from model outputs
- merging different data sources (say for precip and temperature)
- temporal interpolation

TSA capabilities : physical

| CAPABILITIES	OPTIONS	REFERENCES
Vegetation	Constant Monthly varying	
Evapo-transpiration	• with and without stomatal resistance • BATS	Dickinson (1984)
bare soil evaporation	4 options	• Dickinson (1984) • Noilhan and Planton (1989) • Schulz (1998)
heat conduction	with and without effect of veg.	
canopy	2 options	
peatlands	mires parametrization	
snow	3 options	• Original single layer • Multi-layer snow model (EM) • new 'SNOWPOLINO' scheme
...		

TSA capabilities : technical

–I/O

- GRIB or Ascii

- COSMO and ICON
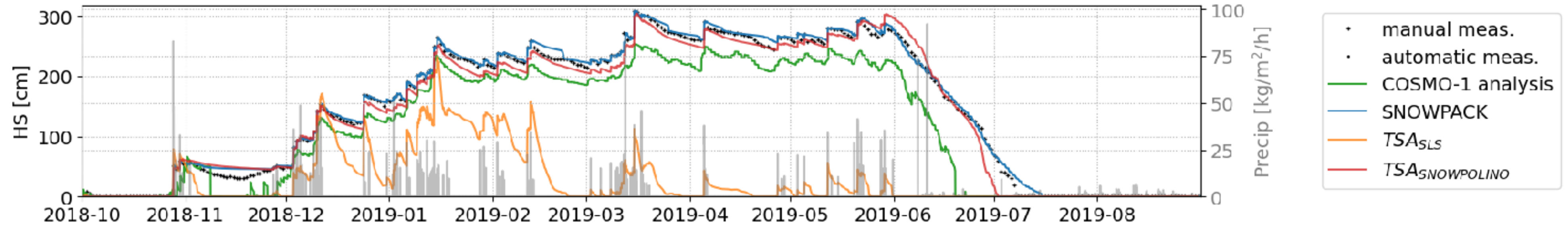
- GRIB-2 for both I and O ?

- Parallelism

- Poor Man's parallelism

- serial-only execution

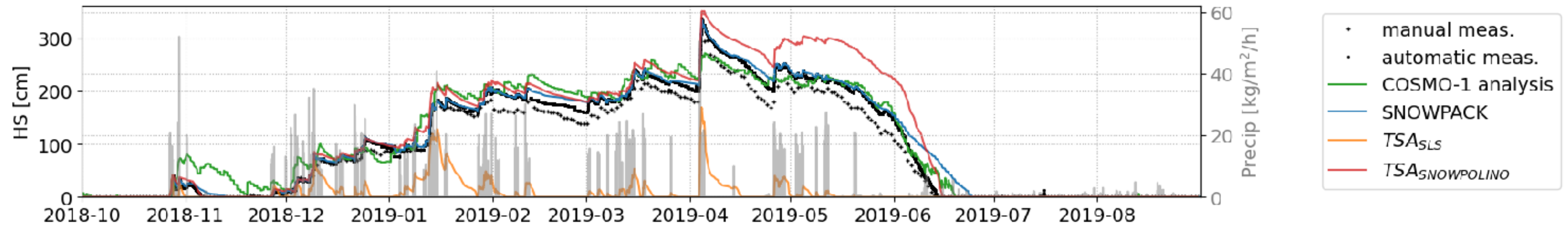# How do we (PT-SAINT) use TSA ?
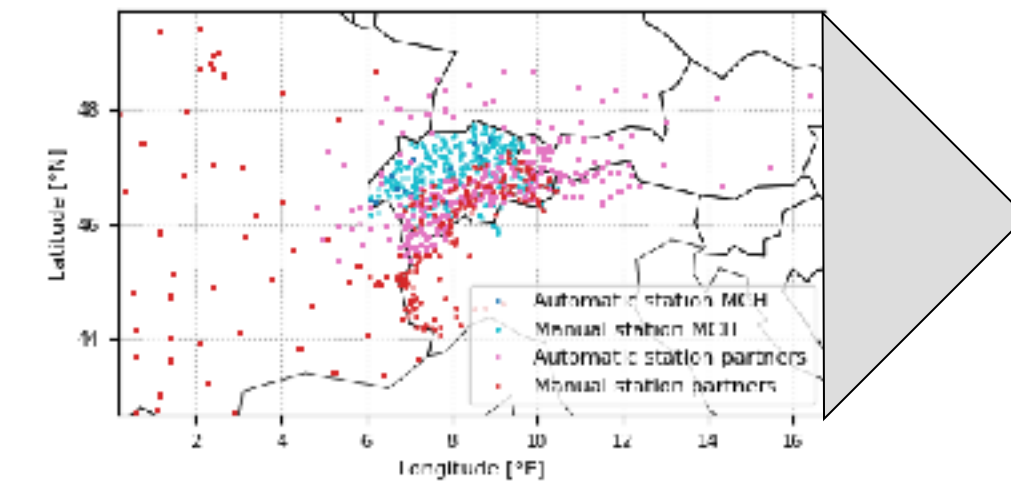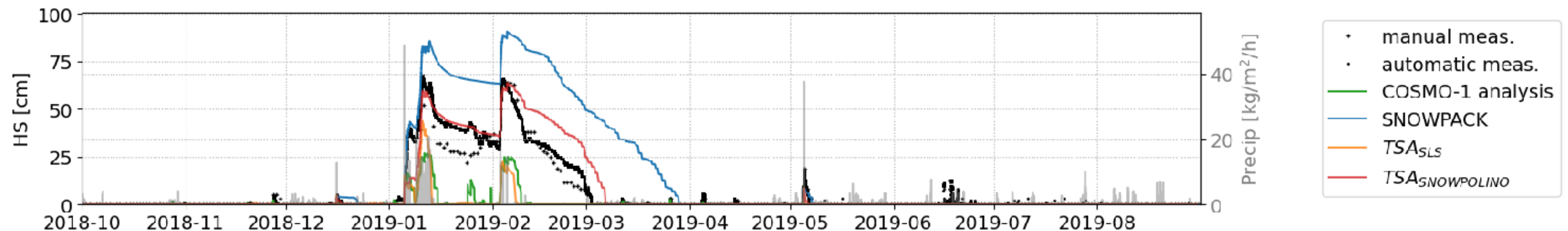

Driven by

in-situ

measurements

WFJ - Weissfluhjoch - (lat, lon, alt)=(46.833, 9.806, 2691.0)

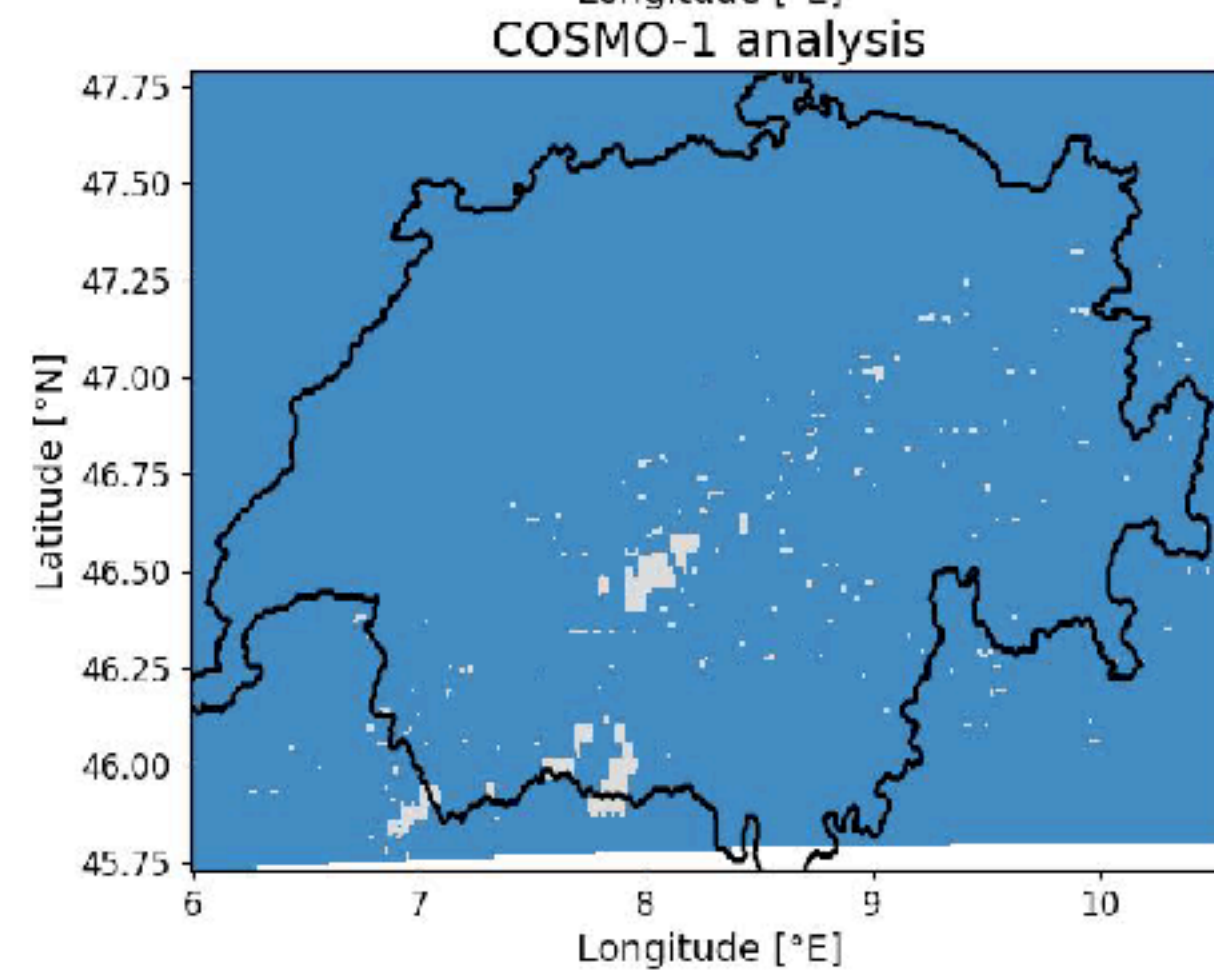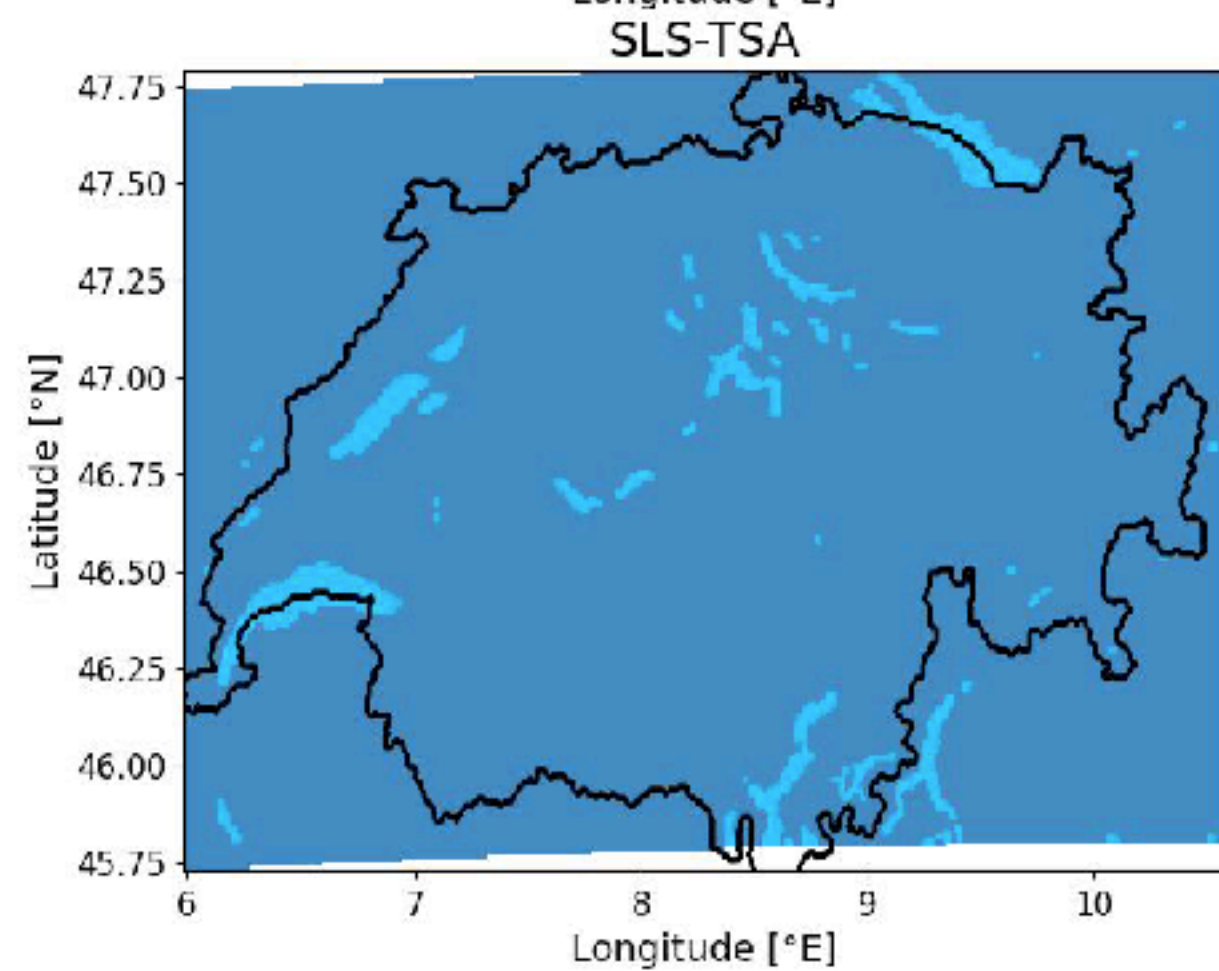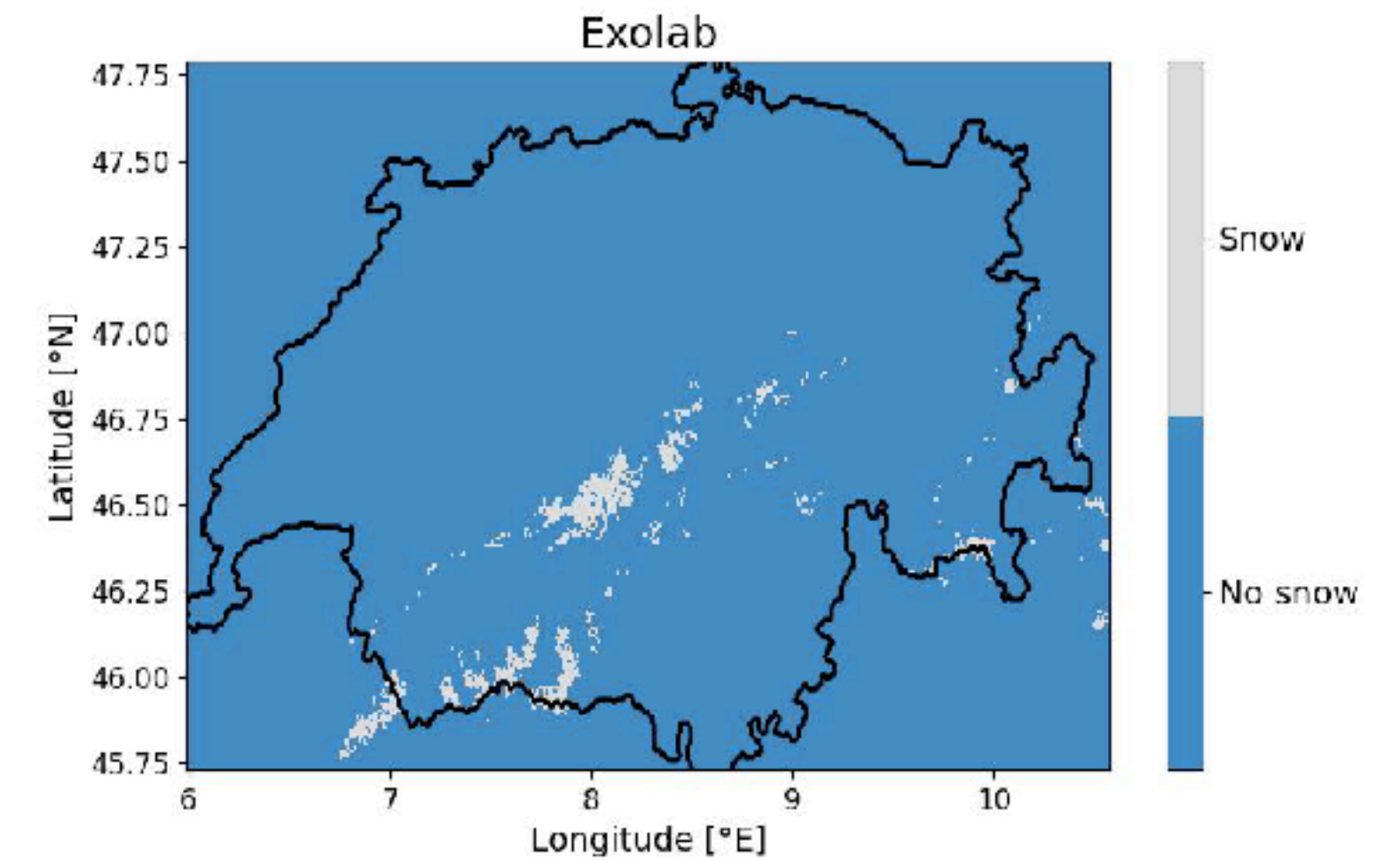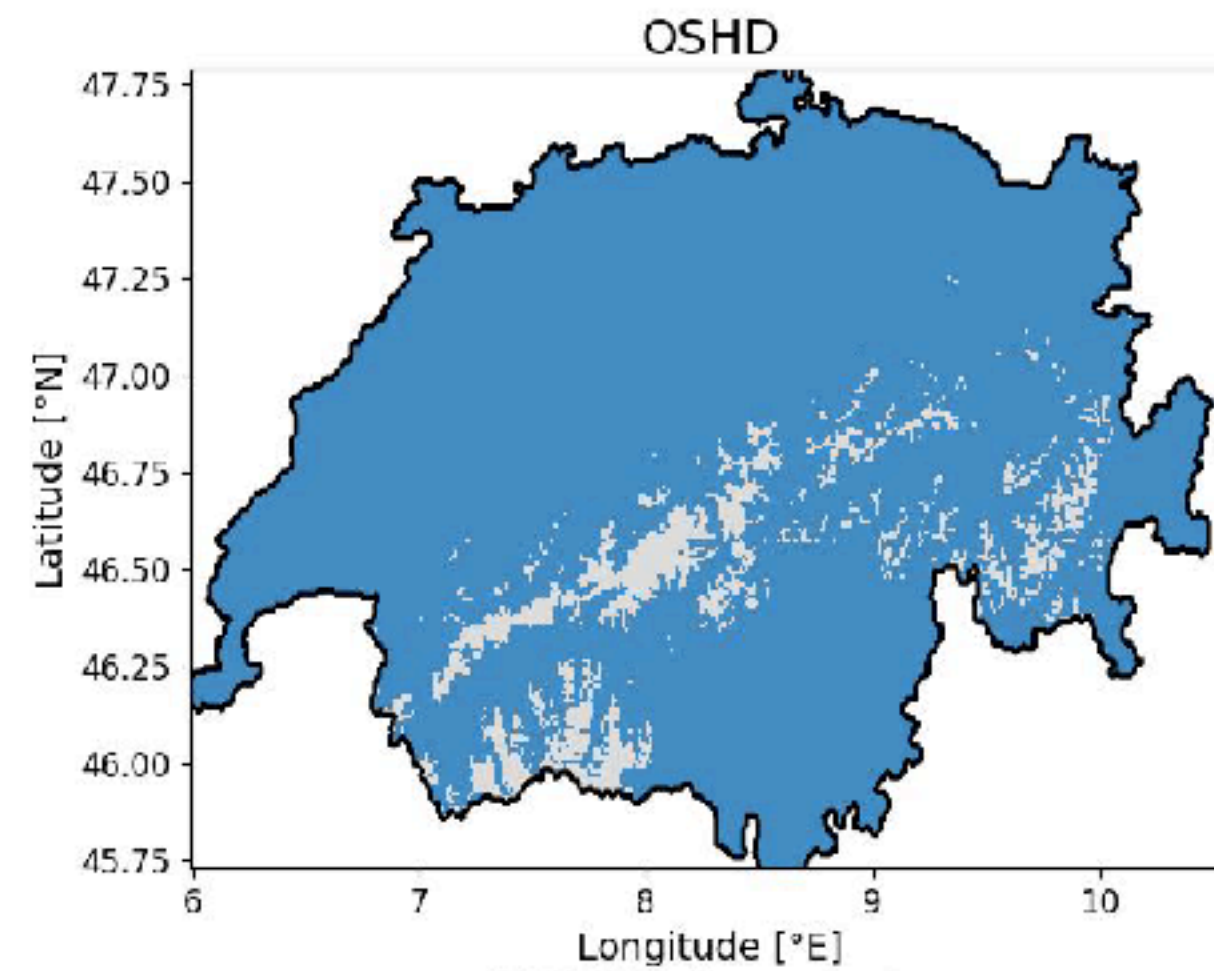GRH - Grimsel Hospiz - (lat, lon, alt)=(46.572, 8.333, 1980.0)
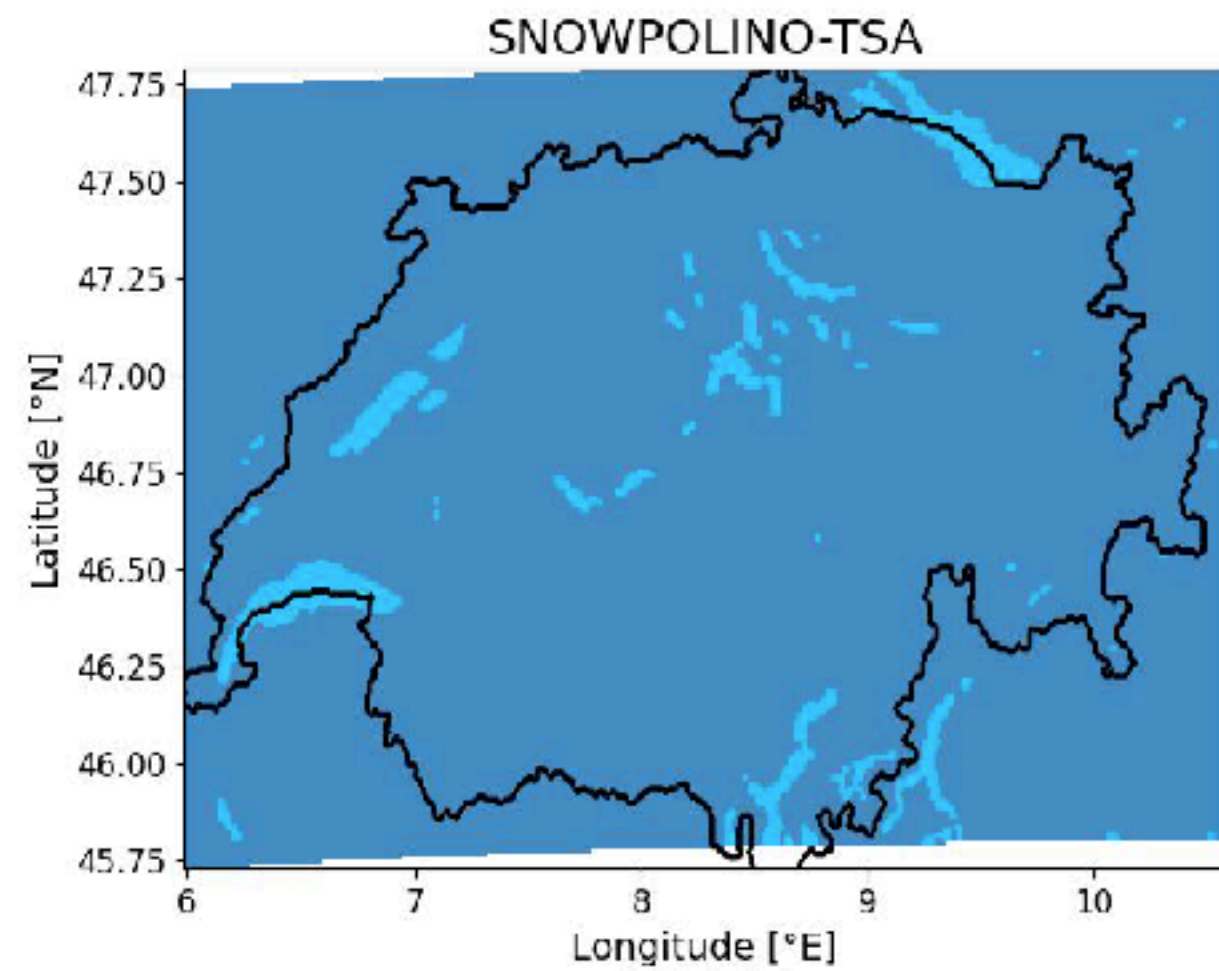
STG - St. Gallen - (lat, lon, alt)=(47.425, 9.399, 776.0)

How do we (PT-SAINT) use TSA ?

Driven by analysis

2018-10-01

FULL TOOLCHAIN to

1. prepare forcing files
2. run TSA
3. postprocess outputs

is available !

Enhancing TSA

–Physics

- We already added snowpolino to TSA

- The new ETHZ developments on soil water transport model.

- Urban Canopies.

- VAINT outcomes

- mosaic / tile approach

- congruence with ICON tomorrow

- A full 'surface' model including lakes ? or even sea-ice / ocean

Enhancing TSA

–Technical

- Updating the I/O subroutines

- OpenACC porting should be tested

- async i/o

- removing 'out-dated' code ? or atleast keep a pragma based 'clean' code ?

- collect or ask groups to submit different local devs of TSA ?

Why do all this ?

- Terra Standalone should be enhanced to ease implement of new physics.

- From a purely scientific perspective:
  - Soil modelling
  - Hydrology
  - Urban meteorology
  - Snow
  - remote sensing
  - all the above at climate timescales