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# COLOBOC **Project Status**

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#### **Observation sets for SVAT model validation.**

- **Documentation** of various data sets on the COSMO web site.
- New permanent instruments at Payerne Measurement of turbulence @ 10m, in activity since spring 2009. Soil moisture and temperature.

#### SRNWP data pool action

Convenient access to recent operational high quality measurements, representative for different climate and different type of soils





#### **SRNWP** data pool

- Soil, surface and BL observations
- Currently 7 sites, data from 2006-2009, in a common ASCII format
- Possibly 2 new sites in the • near future: Debrecen (Hu), Valdai (Ru)





### Review – COLOBOC, task 0



- Promote usage within the COSMO Community
  - $\rightarrow$  extend default set of COSMO model meteograms
  - $\rightarrow$  integrate in soil & BL developments (WG3)
  - $\rightarrow$  routine inter-comparison of soil and surface fluxes (WG5)

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- Make this effort sustainable
  - $\rightarrow$  permanent action within COSMO?





#### **Externalized TERRA module.**

- Package including tests and documentation available on COSMO web, but not maintained (no committment by MeteoSwiss)
- Code remains fragile when used in a non tested configuration (code limitations are documented)
- Usefull functionality for e.g. soil spin-up, efficient experiments with snow model, measurement driven soil moisture analysis

 Extend COSMO SCM framework to include the functionality currently offered by Terra standalone (→ M. Raschendorfer) ?





#### Consolidate software for generating external parameters.

- New **code** for the aggregation and interpolation of the raw data to the target grid is ready (EXTPAR v1.1), and will be made available on the **COSMO web site**.
- **Reference system** at DWD, accessible through a Web interface is in test phase. A link will be put on the COSMO web site.

## **C** Review – COLOBOC, task 3



#### Consolidate external parameters data set.

- New external parameters available now for any domain: *monthly NDVI climatology, minimum stomatal resistance, bare soil emissivity, deep soil temperature, lake fraction and lake depth* (for FLake module), *urban fraction* (for urban module), *monthly climatology for aerosols optical thickness (5 species)*
- Documentation of datasets available on the COSMO web site
- Planned till end of project MODIS derived solar albedo (MPI Hamburg) tests with MODIS calibrated real time phenology computation of topography smoothing in EXTPAR (instead of INT2LM)





- Historical records of vegetation characteristics reveal a substantial interannual variability of the start of season, which may limit the usefulness of a climatology based data set.
- A framework has been developed by R.Stöckli et al., using a prognostic phenology model with parameters constraint by MODIS data, which can provide an offline gridded forecast of the vegetation characteristics taking into account the actual evolution of the weather [Stöckli 2008].
- Basically a statistical approach is used, relying on an ensemble Kalman filter to define the optimal parameters of the phenology model, for a specified set of meteorological data predictor (e.g. from a NWP model).





- Code optimization for oro. radiation correction ; resources ?
- Scale separation for z0 / SSO derivation ; resources ?
- Higher resolution more recent data sets ; plans ?
  - → Provide soil types at higher resolution than FAO, based on more recent data, and including information on the vertical structure of the soil (Harmonized World Soil Database, dx=1km; 10km for FAO / European Soil DataBase)
  - → Provide **land cover** at higher resolution than GLC2000 and based on more recent data (GLOBCOVER, dx=300m; 1km for GLC2000)
  - → Provide **topography** at higher resolution than GLOBE (ASTER GDEM, dx=30m ; 1km for GLOBE)

Applications: high resolution simulations in complex topography or for special purposes, environmental modeling, production of of sub-scale heterogeneities for the turbulence scheme ...





#### **Revision of TERRA and the associated look-up tables.**

 Experiments at DWD and MCH to evaluate the modified land-surface scheme (TERRA parametrizations, external parameters, look-up tables).





Components of the **heat balance** from the eddy-flux measurements, standard model simulation (stand), and simulation with a new model (mire). Degero Srormyr mire, Sweden



Sensible heat

Latent heat



# Review – COLOBOC, task 4



- Different studies (E.Davin/ETHZ, R.Orth/ETHZ, G.Vogel/DWD, F.Di Giuseppe/ ARPA-SIM) have shown some significant limitations of TERRA
  - missing grass layer (no specific treatment of canopy vegetation),
  - inexact temporal evolution of vegetation in spring (representation of inter-annual variability),
  - inconsistent temporal evolution of root depth and vegetation,
  - missing representation of vertical soil structure (in particular depth of active soil),
  - incorrect Bowen ratio (too much latent heat) .
- COSMO coupled with NCAR CLM improves on some of these features
- Many of the elements being developed for TERRA already exist within the CLM (e.g. tile, multi-layers snow model, urban module)
- CLM offers additional functionality in direction of environmental modeling (biochemical emissions)





- Development of mire parametrization by Roshdromet : priority task in COSMO WG3 ?
- Interest of the COSMO community to have CLM as an alternative SVAT model within the official COSMO code ?





#### New multi-layer snow model

- Code is available in latest COSMO release
- Ongoing tests at DWD, Roshydromet and MeteoSwiss

#### **Snow analysis**

• DWD and MeteoSwiss codes have been merged



## Review – COLOBOC, task 5

#### New multi-layers snow model









#### In pipe

- (DWD) Finalize multi-layers snow model
- (A.Will) Tests in **climate** mode
- (RH) Investigate / correct **fresh snow density** and **snow density ageing** issues (important because of the interaction with the snow analysis step)
- (RH) Improve **albedo** in relation with snow and forest (dynamic evolution of snow over forest canopy)
- Improve partial snow cover representation, in particular by using the tile and/or mosaic approach (dynamic tile). This should have an important impact on the correctness of T\_2M (currently a single soil surface temperature is allowed, even in presence of partial snow cover).

See task 7

#### • Fresh snow density to investigate in WG3





#### Urban module.

 Available and documented, but not maintained (no committment by MeteoSwiss, see new rules for COSMO code)

• What to do with this piece of code ?





#### **Tiles and mosaic**

• On going at DWD, incl. dynamic tile for partial snow cover



# Is there a life after COLOBOC?



Priority Project :

The COLOBOC project definitly **ends** at the next COSMO GM (09.2011 in Roma).

• Working Group :

A proposal for splitting COSMO WG3 into WG3a and **WG3b**, with WG3b taking care of soil and surface aspects, has been made by the COSMO SMC to the COSMO StC.

- $\rightarrow$  Federico Grazzini remains WG3a coordinator.
- $\rightarrow$  A new coordinator for WG3b is nominated.
- $\rightarrow$  Decision by StC in April.
- Collaboration :

Close collaboration with COSMO-CLM, and in particular SOILVEG, should continue.





- How **critical** is the further improvement of the lower boundary condition (in particular when compared with other components, e.g. numeric, turbulence) ...
  - ... for climate applications
  - ... for **short range forecasts** (2h 2d)
  - ... for **very high resolution** (≤ 1km) applications **in complex terrain**
- Which **aspects** of the lower boundary condition should be improved in priority (external parameters, model, soil moisture analysis ...)
- Is TERRA fit to support further development required in the future







## Thank you for your attention!

