PP COLOBOC

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Status Report

Jean-Marie Bettems
MeteoSwiss

COLOBOC/SOILVEG Workshop
01 March 2010, Langen

Review – COLOBOC, task 0

Observation sets for SVAT-model validation.

- **New instruments at Payerne**
  Measurement of turbulence @ 10m, in activity since spring 2009.
  Soil moisture and temperature kept after end of SwissSMEX

- **Visit G. Vogel at MeteoSwiss, January 19-22**
  Documentation of usefull observing network on the COSMO web site soon available (new ‚observation' page at top level).

- **Data exchange action within SRNWP**
  Operational data with time lag from:
  Lindenberg (D), Payerne (CH), Toulouse (F), San Pietro (I), Sodankylaa (Finland), Cabauw (Netherland).

Review – COLOBOC, task 0

Data exchange action within SRNWP.

- **Umbrella**: C-SRNWP Programme of EUMETNET
- **Goal**: Exchange of observational data for the validation of land-surface schemes for Short Range Numerical Weather Prediction (SRNWP)
- **Milestone**: prototype with data from 6 participating sites for the period 2006-2008 available at COSMO General Meeting.
- **Resources**: Claudia Heret (DWD) for the data and documentation aspects, Theodore Andreadis and colleagues (Greece) for the ftp server and the COSMO web site

- **Official agreement have been obtained from the 6 sites !**

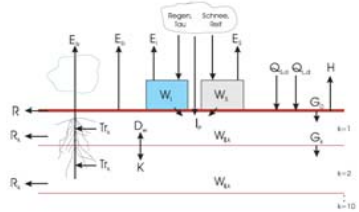
Review – COLOBOC, task 0

Data exchange action within SRNWP.

- **Implementation**:
  > Data on a ftp server in Greece, access password protected through COSMO web site (SRNWP ET soil & surface chair responsible for delivering password).
  > Data in a common format (e.g. CEOP ASCII), packed on a site and monthly or yearly basis.
  > Associated documentation (site, data, ...) on COSMO web site.

- **Further steps**:
  > F. Beyrich (DWD) proposes to organize a discussion with data providers and users at the EMS conference in Zurich (13-17.09).
  > Regular updates, additional sites, EUMETNET OBSNET, ...

Review – COLOBOC, task 1



Consolidate externalized TERRA module.

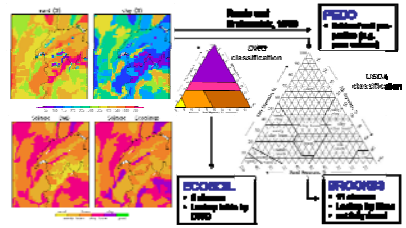
G. de Morsier (CH) is responsible for this task and working on it.

A first consolidated package will be available end of March.

Status:

- Updated with latest COSMO code (4.11).
- Updated documentation.
- Experience from G. Vogel has shown comparable results between full COSMO and offline experiment (3 months, soil moisture)
- Re-start bug not yet corrected!

Review – COLOBOC, task 2



Consolidate software for generating external parameters.

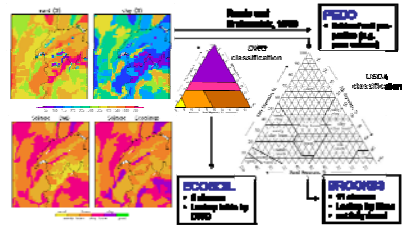
Status:

- Software Requirement Specifications (SRS) is written
- Raw data files are converted into netcdf format
- New code for the aggregation and interpolation of the raw data to the target grid is available (Fortran 90), technical documentation is available

Next steps:

- Final tests of the new code basis.
- Distribute software and raw data to project partners (CLM)
- Implementation and distribution of a reference system at DWD

Review – COLOBOC, task 3.1



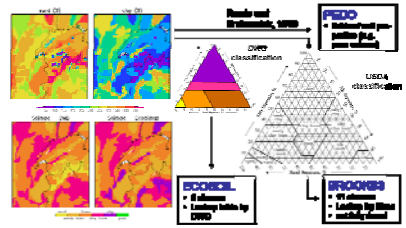
Document external parameters data set.

Status:

- Documentation of datasets available on the COSMO web site
  (http://www.cosmo-model.org/content/model/modules/externalParams/default.htm)

Bettems Jean-Marie (jean-marie.bettems [at] meteoswiss.ch)

Review – COLOBOC, task 3.2

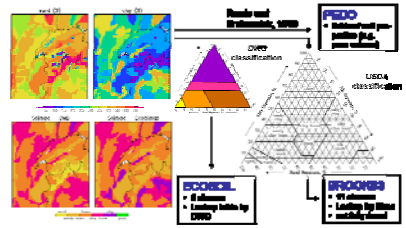


Consolidate external parameters data set.

Status:

- new external parameters available for any domain:
  NDVI (monthly means), emissivity, minimum stomata resistance,
  climatological deep soil temperature,
  urban fraction, aerosols optical thickness (5 types)
- *Only for COSMO-EU:*
  lake fraction and lake depth for FLAKE
- *Only for COSMO-2:*
  orographic radiation correction and SSO-parameters using filtered orography
- *Only over Germany:*
  BUEK1000 high resolution soil data with vertical soil structure

Review – COLOBOC, task 3.2



Consolidate external parameters data set.

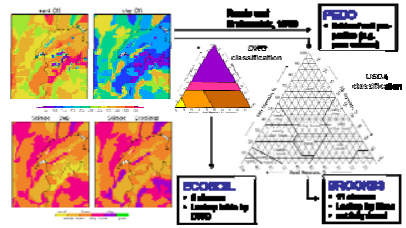
Next steps:

- Make parameters for FLAKE, radiation correction and SSO available on any domain
- MODIS derived background albedo fields
- New global soil parameters based on the Harmonized World Soil Database (HWSD)

Bettems Jean-Marie (jean-marie.bettems [at] meteoswiss.ch)

Review – COLOBOC, task 3.2

Real-time phenology



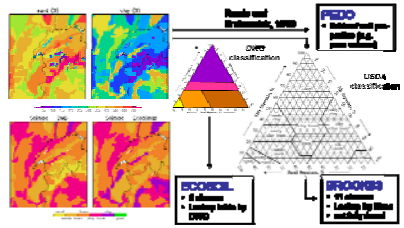
- Historical records of vegetation characteristics reveal a substantial inter-annual variability of the start of season, which may limit the usefulness of a climatology based data set.

- 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).

Review – COLOBOC, task 3.2

Real-time phenology



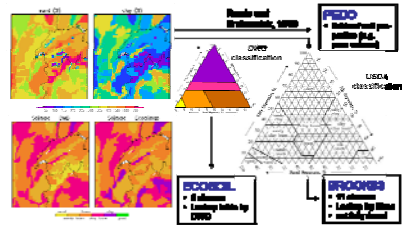
- The prognostic penology model includes the three main climatic controls of seasonal phenological processes: minimum daily temperature, mean daily vapor pressure deficit, mean daily global radiation (Growing Season Index, Jolly et al. 2005).
  The model derives LAI and FPAR (Fraction of Absorbed Photosynthetically Active Radiation)

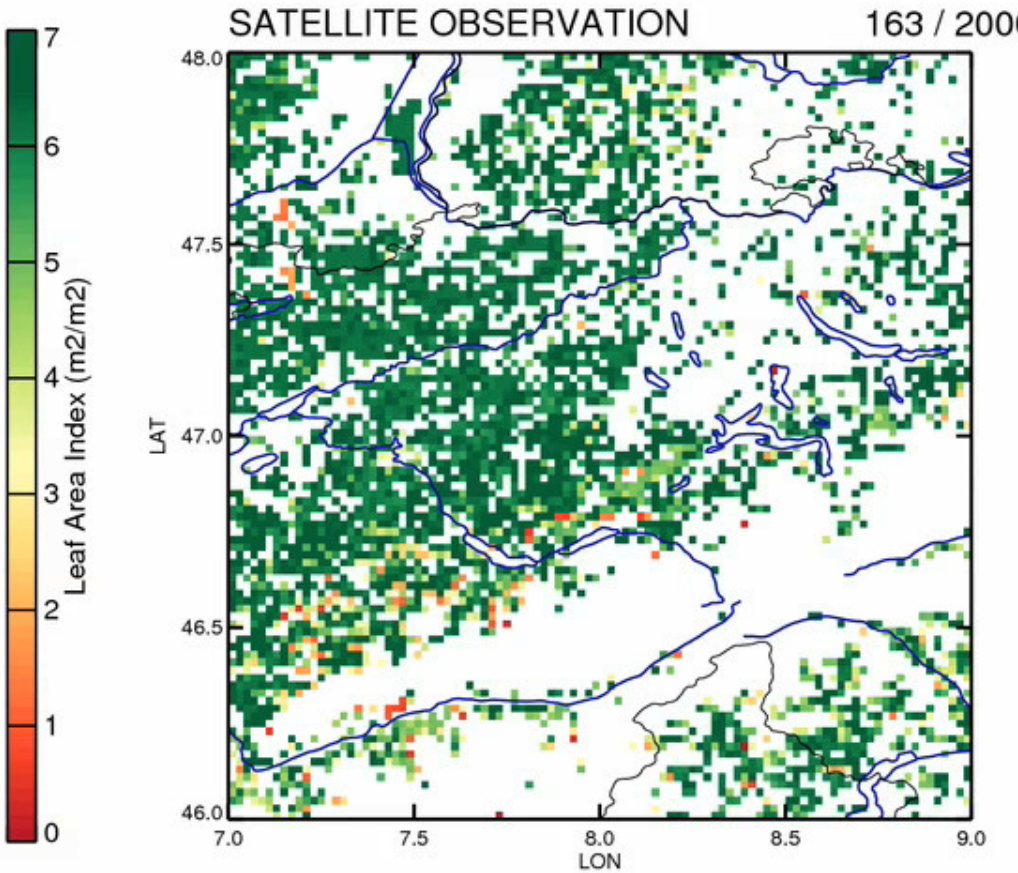
- A 1000 members EKF is used to derives the optimal parameters of the prognostic phenology model; one set of parameters is computed for each type of vegetation.

- '*… the model reproduces the inter-annual variability of start of season with correlations ranging between 0.6-0.9 when compared to independent ground observations*.'
  [Stöckli et al, Journal of Geophysical Research 2008]

Review – COLOBOC, task 3.2

Real-time phenology



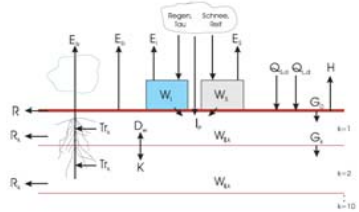


satellite derived LAI

forecast: coupled to NWP model

Bettems Jean-Marie (jean-marie.bettems [at] meteoswiss.ch)

Review – COLOBOC, task 4

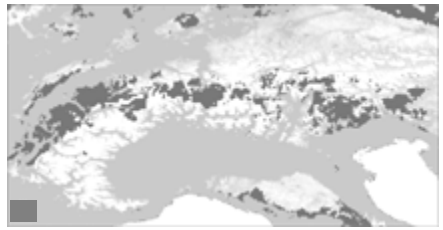


Revision of TERRA and the associated look-up tables.

→ Previous talk !

Bettems Jean-Marie (jean-marie.bettems [at] meteoswiss.ch)

Review – COLOBOC, task 5.1



Verify and consolidate the new multi-layer snow model

Status :

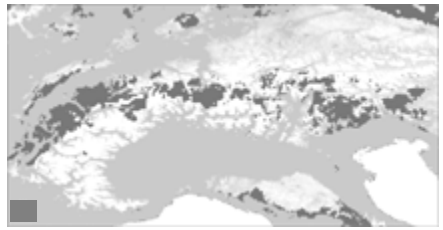
- Implemented in COSMO 4.11
- Documentation is being completed
- On-going tests at DWD and at MeteoSwiss
- Show promising results, but still (numerical) instabilities in some situations

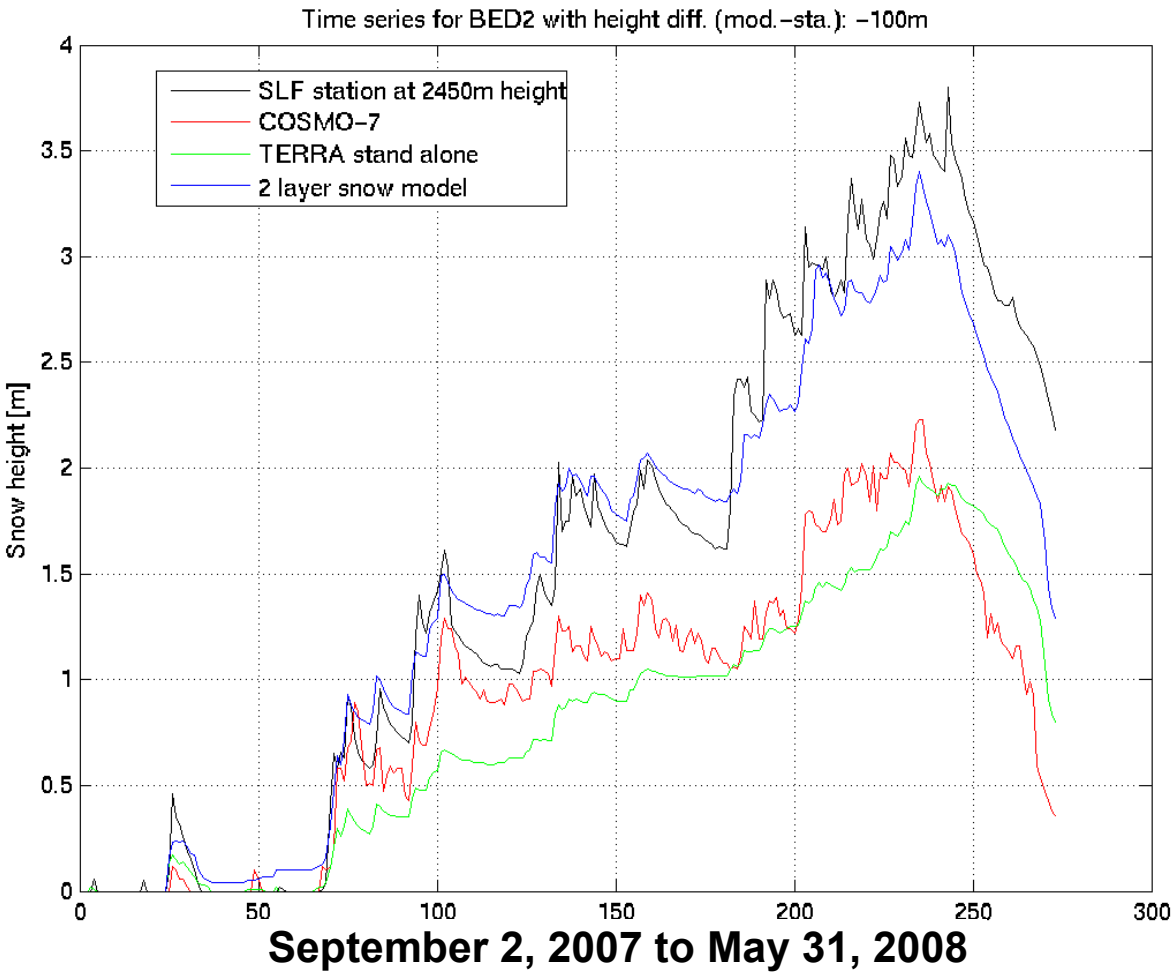
Next steps :

- Further developments at Roshydromet (partial snow cover)

Review – COLOBOC, task 5.1

New multi-layers snow model





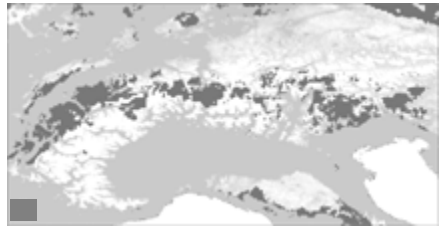
Station at **2450m** on the southern slope of the Alps

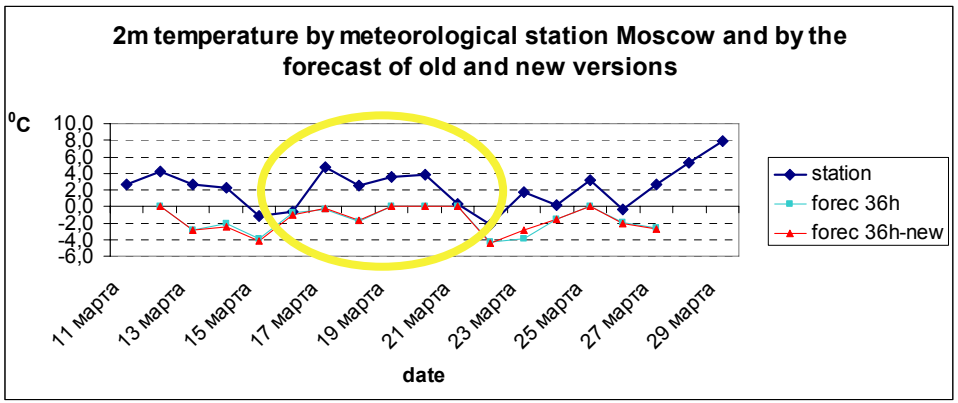
Model at **2350m**

Dh = -100m

Review – COLOBOC, task 5.1

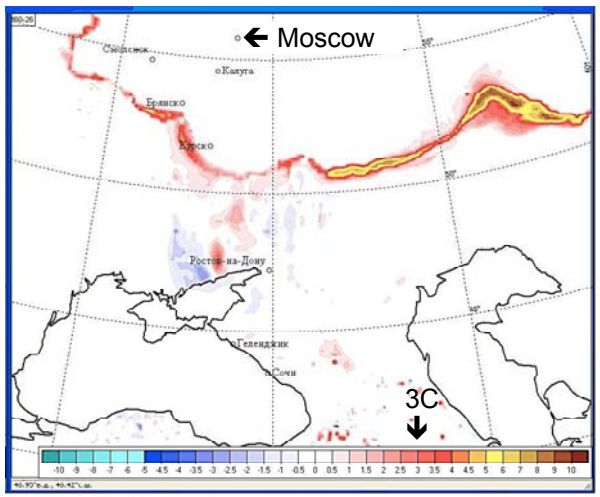
An important issue





Failure to simulate positive T2m over snow pack

Old and new snow scheme,
T2m @ day, March 11th -29th 2009

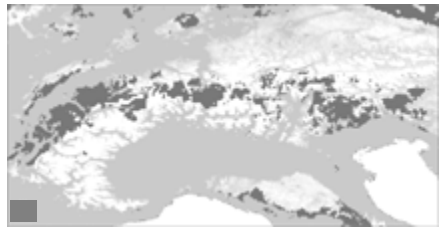


Influence of parametrization of partial snow cover on T2m

COSMO-RU, Δx = 14km, +60h forecast
Russian plain regions, March 26th 2009

Contribution to COLOBOC by Roshydromet

Review – COLOBOC, task 5.2



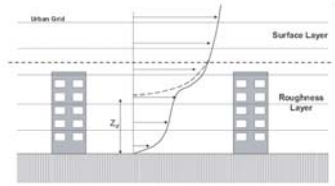
Improved snow analysis

Status :

- Convergence of COLOBOC and DWD developments is on-going
- Still missing (1) altitudinal interpolation
  (2) improve temporal stability
  (3) adapt for new snow model (multi-layers)

Delay due to conflict of priorities!

Review – COLOBOC, task 6

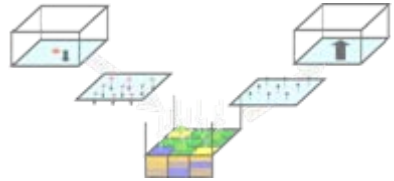


Urban module.

Status:

- Code is ready and has already been used
  (talk by S.Schubert PIK/Potsdam and B.Sändig IfT/Leipzig)
- Documentation is being finalized

Review – COLOBOC, task 7



Parameterization of land surface heterogeneity by the tile/mosaic approach.

A. Mazur / G. Duniec (Polen) are working on this task.

Visit of G. Duniec at Zurich in November 09.

Status:

- Modifications implemented in COSMO v4.8
- Code send to U. Schaettler for review
- Except for one configuration, control experiments produce now correct results (ctrl vs. std, ctrl vs. twin)
- Additional cost of 2x2 refinement is about 15%
- Not all branches/options of the COSMO code have been updated (e.g. multi-layers snow model, recent soil model developments)

Thank you for your attention!