Consortium for Small-Scale Modelling

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Consortia presentations
31st EWGLAM and 16th SRNWP meeting
28 September 2009, Athens

Outline

- COSMO Organisation: News
- COSMO Model: Changes since last meeting
- COSMO Operational Applications
- COSMO Activities

COSMO Organisation: News

- Russia now full member, resulting in 7 full members (in chronological order: Germany, Switzerland, Italy, Greece, Poland, Romania, and Russia).

  → COSMO General Meeting 2010 to be held in Moscow

- First COSMO license (almost …) sold to United Arab Emirates.

COSMO Model: Changes since last meeting (1/2)

- Version 4.8
  - **New reference atmosphere**
  - …
- Version 4.9
  - **Implementation of COSMO-ART**
  - More accurate (and expensive) discretisation of metric terms in the sound wave solver of the Runge-Kutta scheme
  - **Implemented option for using potential temperature as advected variable**
  - Improved treatment of humidity variables in the boundary zones
  - …

COSMO Model: Changes since last meeting (2/2)

- Version 4.10
  - New sea ice scheme
  - Added source term for horizontal wind-shear production of TKE in turbulence scheme
  - Introduced source terms in TKE equation to account for dissipation of energy in Sub-grid Scale Orography (SSO) scheme
  - …

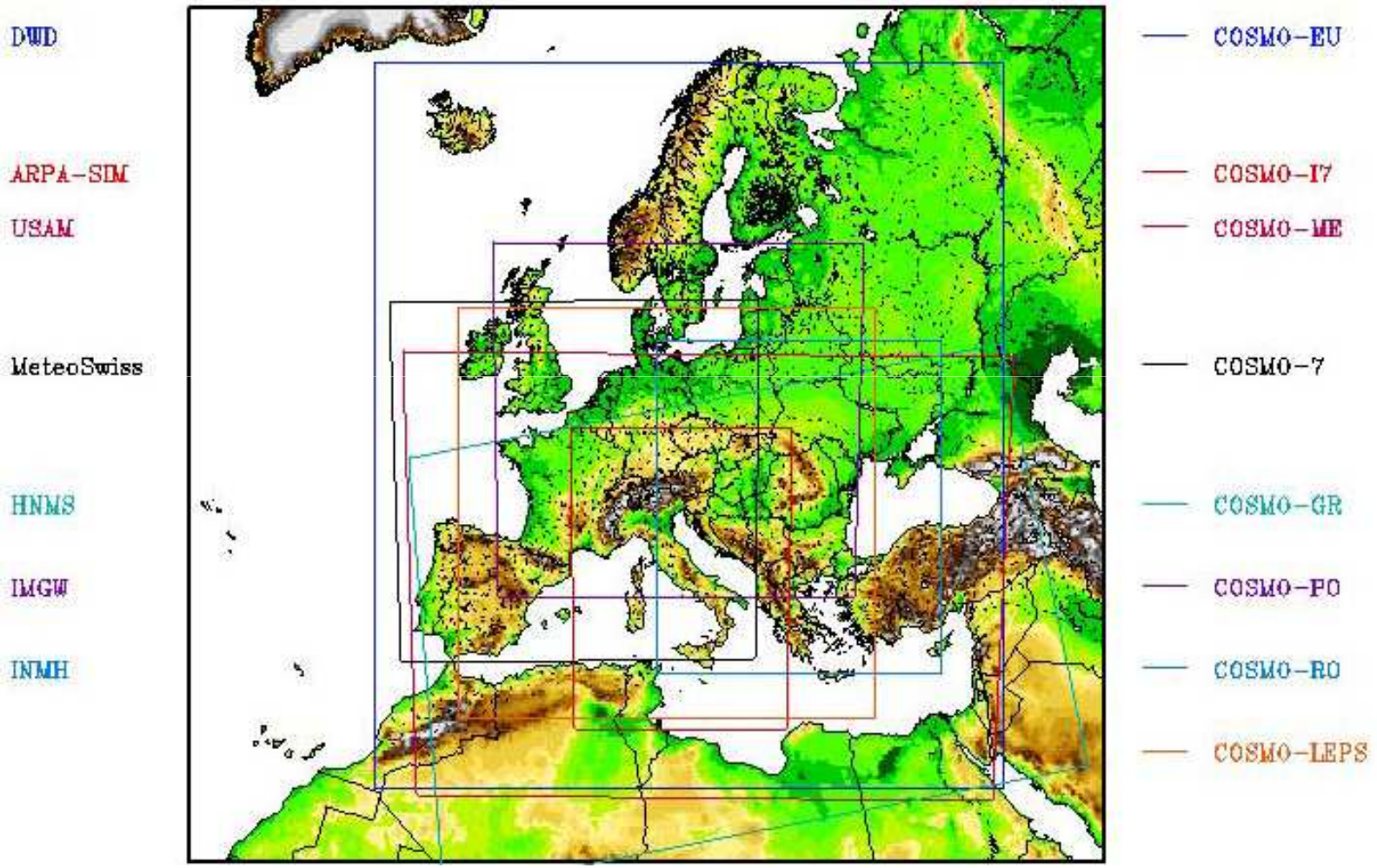
COSMO Operational Applications

- DWD: EU (7) and DE (2.8)
- MeteoSwiss: 7 (6.6) and 2 (2.2)
- USAM: ME (7) and IT (2.8)
- ARPA-SIMC: I7 (7) and I2 (2.8)
- HNMS: GR (7); 2.5km soon
- IMGW: still run at 14km; both 7km and 2.8km soon
- NMA: RO (7 and 2.8)
- Roshydromet: RU (7); 2.8km soon (Moscow & Sochi)

COSMO Operational Applications

→ www.cosmo-model.org/content/tasks/operational/default.htm

→ **posters!**



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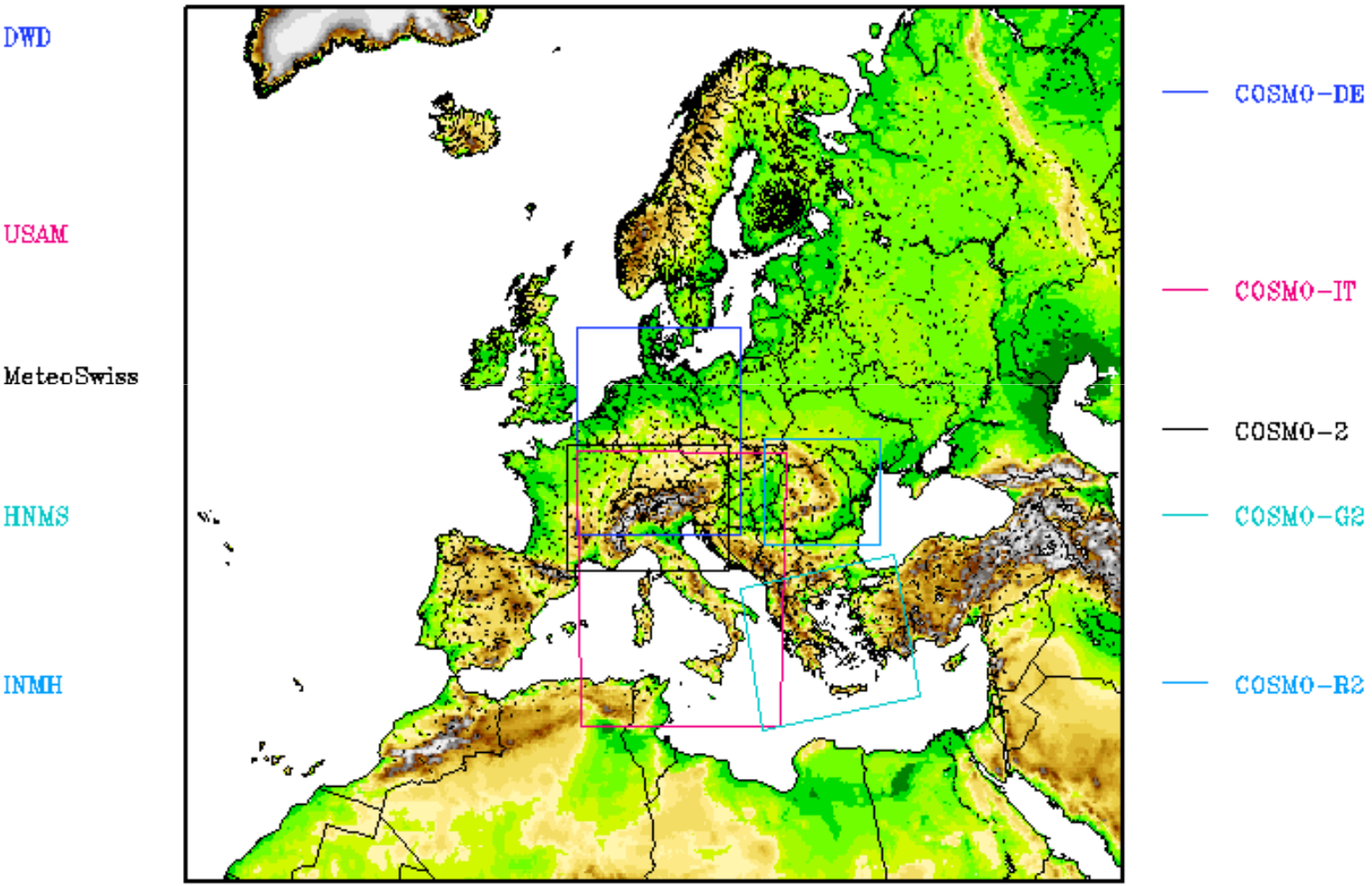


COSMO Activities: Science Plan (SP)

- Work in progress:
  Main goals are defined, but the subsequent **strategies** deserve further attention …

- Aim:
  Review of final draft by (some of) the SRNWP Expert Team chairpersons in December/January 2009/2010.

SP: Principal goal(s)

The **principal goal** of COSMO is **to develop a model for the short to very short range and with very high (convective scale) resolution**.

Due to the inherent chaotic nature of the processes that are important at the convective scale, we additionally need to have a tool to **assess the reliability of the forecasts**, especially during '**high impact weather**' situations.

SP: Complementary goals

Ensemble prediction system for the convective scale

At the convective scale, the goal needs to be to **run an ensemble prediction systems at the highest possible resolution**, since:

- Convection as well as many other physical processes at the convective scale can not be deterministically forecast neither at the correct location nor at the correct time.
- To be able to provide probabilistic forecasts and indeed probabilistic warnings at the local scale, an ensemble prediction system for the convective scale is mandatory.

SP: Complementary goals

Data assimilation system for the convective scale

- To develop an **ensemble-based** data assimilation system **for the convective scale** that provides initial conditions for the convective scale ensemble prediction system.
- To develop a **computationally efficient** data assimilation system that is **fast enough to allow for a frequent updating** of the analysis and that **makes best use of the locally available dense (in space and time) non-conventional observational data** (especially remote sensing data such as radar and satellite data), considering that a number of assumptions that have been made for the lower resolution are no longer valid.

SP: Complementary goals

Extension of environmental prediction capabilities

- To include the necessary **additional prognostic variables and equations** to improve the model formulation (e.g., number density for microphysics scheme, turbulent potential energy for turbulence scheme, aerosols for radiation scheme) and/or to facilitate the prediction of new parameters (e.g., aerosols for visibility forecasts, pollen).
- To establish or extend appropriate high-resolution **assimilation algorithms** or derive **suitable initial fields** for the **new prognostic variables** in the atmosphere (e.g., aerosols and other atmospheric constituents) and at the surface (e.g., snow height, snow density, and liquid water content within snow deck for different layers of snow scheme).
- To provide the necessary **output for standalone application models** (e.g., air quality, dispersion, hydrology, ocean waves).

SP: Complementary goals

Verification tool for the convective scale

- To develop a **verification tool** suitable for operational verification of **convective scale deterministic as well as probabilistic forecasts** against all kinds of observational data (especially remote sensing data such as radar and satellite data). In particular, this tool needs to overcome the **double penalty problem** associated with very high resolution forecasts.
- To enhance the verification tool to allow for **conditional verification** (e.g., weather type, clear sky conditions in upstream region, early morning temperatures below T_{thr}, etc.) for operational as well as research purposes.
- To extend the verification tool to also work on **analysis data** as well as on output from the **single column version of COSMO** or of any **standalone module of COSMO** (e.g., the soil model).

SP: Complementary goals

Intermediate resolution COSMO version for BCs

- To be able to (continue to) provide the best possible boundary conditions for the convective scale deterministic as well as probabilistic COSMO applications it is mandatory to **continue to maintain and further develop the intermediate resolution COSMO version for both the O(5-10) km deterministic as well as the ensemble COSMO applications** for the time being. – Eventually, the O(5-10) km COSMO applications may be replaced by the DWD ICON (cf. section 3.1) or a sufficiently high-resolution ECMWF deterministic run or EPS, respectively.

SP: Complementary goals

Intensified collaboration

- To further **intensify the collaboration within COSMO**.
- To increase **visibility** through peer-reviewed publications, conference contributions, and representation in international projects and committees.
- To commonly apply for extra (external) **funding at the European level**.
- To actively invite **external review** by establishing a Scientific Advisory Committee of external experts.
- To cooperate more closely with the other consortia in the framework of the EUMETNET **SRNWP** programme, as well as with the COSMO-CLM community.

COSMO Activities

ET on predictability and EPS

- **COSMO-DE-EPS**
  PL: Susanne Theis (susanne.theis [at] dwd.de)
- **Consolidation of COSMO Ensemble (CONSENS)**
  PL: Chiara Marsigli (cmarsigli [at] arpa.emr.it)

→ talk by Susanne Theis on COSMO-DE-EPS

→ review talk on predictability and EPS by Chiara Marsigli

COSMO Activities

ET on data assimilation

- **Km-Scale Ensemble-Based Data Assimilation (KENDA)**
  PL: Christoph Schraff (christoph.schraff [at] dwd.de)

→ (related) talk by Christoph Schraff

COSMO Activities

ET on dynamics

- **Conservative dynamical core (CDC)**
  PL: Michael Baldauf (michael.baldauf [at] dwd.de)

→ talk by Detlev Majewski

COSMO Activities

ET on verification

- **Verification System Unified Survey (VERSUS 2)**
  PL: Adriano Raspanti (a.raspanti [at] meteoam.it)

→ talk and poster by Adriano Raspanti

COSMO Activities

ET on physics

- **Towards Unified Turbulence-Shallow Convection Scheme (UTCS)**
  PL: Dmitrii Mironov (dmitrii.mironov [at] dwd.de)

→ talk by Federico Grazzini on physics developments within COSMO

COSMO Activities

ET on surface

- **Consolidation of Lower Boundary Conditions (COLOBOC)**
  PL: Jean-Marie Bettems (jean-marie.bettems [at] meteoswiss.ch)

→ talk by Christoph Schraff

COSMO Activities

ET on system aspects

→ talk by Ulrich Schättler on COSMO activities within SRNWP-I

→ talk by Philippe Steiner on operational convection resolving implementations of COSMO

Questions?

additional (hidden) slides …

COSMO members (chronological order)

DWD	Deutscher Wetterdienst Germany
MeteoSwiss	MeteoSwiss Switzerland
USAM	Ufficio Generale Spazio Aereo e Meteorologia Italy
HNMS	Hellenic National Meteorological Service Greece
IMGW	Institute for Meteorology and Water Management Poland
NMA	National Meteorological Administration Romania
Roshydromet	Federal Service for Hydrometeorology and Environmental Monitoring Russia

COSMO Governance: Steering Committee

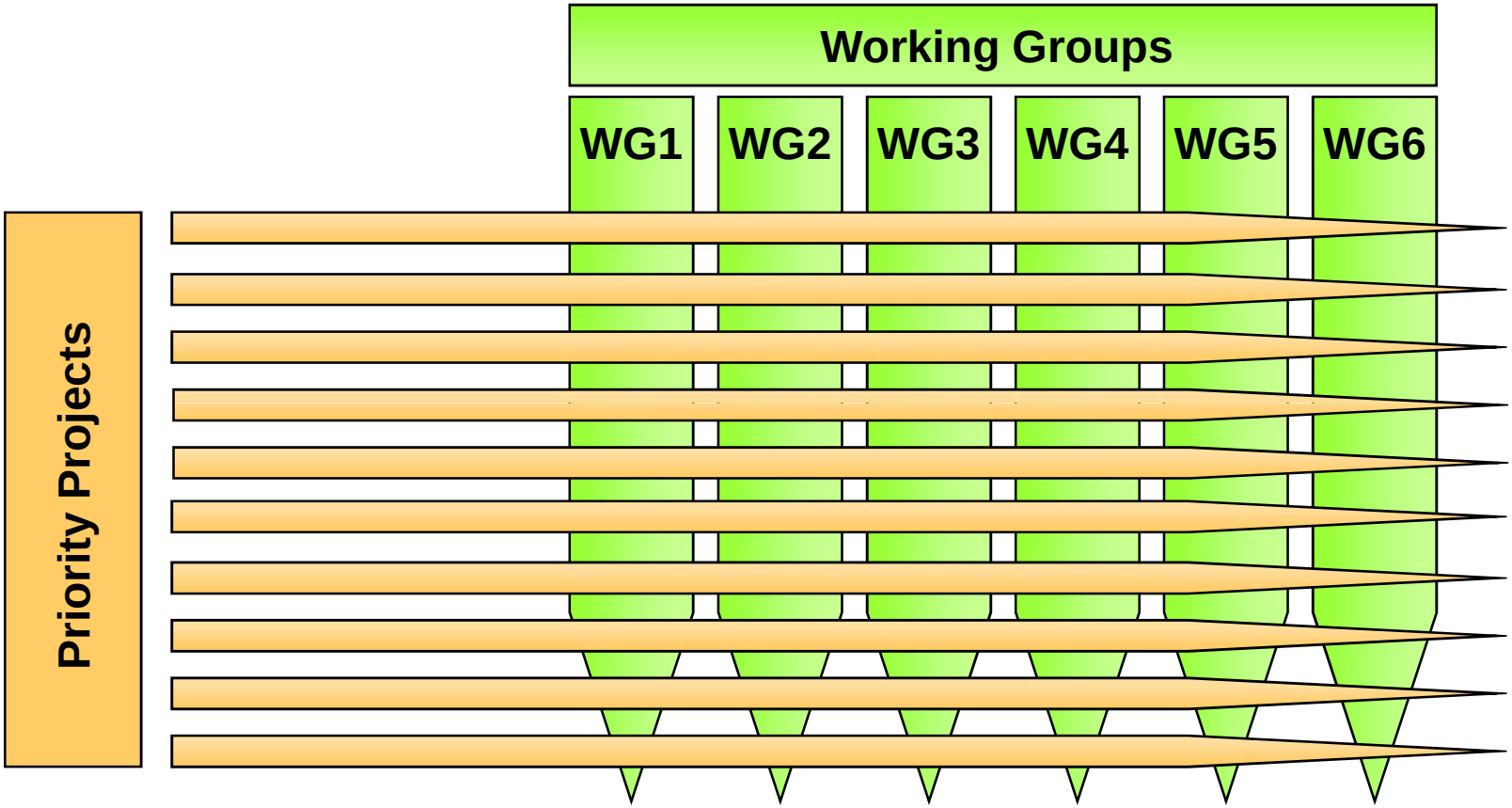
- Hans-Joachim Koppert (DWD; current Chairman)
- Philippe Steiner (MeteoSwiss)
- Massimo Ferri (USAM)
- Theagenis Charantonis (HNMS)
- Rafał Bąkowski (IMGW)
- Gheorghe Stancalie (NMA)
- Dmitry Kiktev (Roshydromet)

Note: There in no (formal) meeting of the directors.

COSMO Governance: Working Groups & WG Coordinators

- **Data Assimilation (WG 1)**
  Christoph Schraff (christoph.schraff [at] dwd.de)
- **Numerical Aspects (WG 2)**
  Michael Baldauf (michael.baldauf [at] dwd.de)
- **Physical Aspects (WG 3)**
  Federico Grazzini (fgrazzini [at] arpa.emr.it)
- **Interpretation and Applications (WG 4)**
  Pierre Eckert (pierre.eckert [at] meteoswiss.ch)
- **Verification and Case Studies (WG 5)**
  Adriano Raspanti (a.raspanti [at] meteoam.it)
- **Reference Version and Implementation (WG 6)**
  Ulrich Schättler (ulrich.schaettler [at] dwd.de)

COSMO Governance:
Working Groups & Priority Projects



Every COSMO member needs to provide a minimum of 2 FTEs per year for the Priority Projects or Priority Tasks.

COSMO Governance:
Priority Projects & PP Leaders

- **Conservative dynamical core (CDC)**
  Michael Baldauf (michael.baldauf [at] dwd.de)
- **Consolidation of Lower Boundary Conditions (COLOBOC)**
  Jean-Marie Bettems (jean-marie.bettems [at] meteoswiss.ch)
- **Consolidation of COSMO Ensemble (CONSENS)**
  Chiara Marsigli (cmarsigli [at] arpa.emr.it)
- **Km-Scale Ensemble-Based Data Assimilation (KENDA)**
  Christoph Schraff (christoph.schraff [at] dwd.de)
- **Towards Unified Turbulence-Shallow Convection Scheme (UTCS)**
  Dmitrii Mironov (dmitrii.mironov [at] dwd.de)
- **Verification System Unified Survey (VERSUS 2)**
  Adriano Raspanti (a.raspanti [at] meteoam.it)

COSMO Governance: Priority Tasks & PT Leaders

- **Post-processing**
  Jean-Marie Bettems (jean-marie.bettems [at] meteoswiss.ch)
- **Support Activities**
  Ulrich Schättler (ulrich.schaettler [at] dwd.de)

COSMO Governance:
Scientific Management Committee

Members:

- Working Group Coordinators
- Priority Project Leaders
- Priority Task Leaders
- Scientific Project Manager
- Chairman of the Steering Committee
- One representative for each otherwise not represented member as observer
- COSMO-CLM representative as observer

COSMO Staff and Budget

- Staff:
  - Approximately 125 subscribers to COSMO mailing lists.
  - 20-25 FTEs / year used for Priority Projects and Priority Tasks.

- Budget:
  - None.
  - However: Efforts to sell model licences. Income will be used for travelling / short-term missions.

SRNWP Expert Team members

see above, plus

- Jürgen Helmert (juergen.helmert [at] dwd.de)
- Detlev Majewski (detlev.majewski [at] dwd.de)
- Francis Schubiger (francis.schubiger [at] meteoswiss.ch)
- Lucio Torrisi (torrisi [at] meteoam.it)