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FRANKFURT AM MAIN

TERRA-ML Developments 2013

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CURRENT STATUS

Name	Mainly relates to	Target version	Task subject	Responsible person	Task status	Started	Expected delivery	Secondary association
2	**Model development (CLM-Community, TERRA)**							
2.1	COSMO	N/A	Vertically dependent soil structure, HWSD data set	[CLM] B. Ahrens (Uni Frankfurt	work	N/A	2012-12-31	N/A
								notes status
2.2	COSMO	N/A	Soil thermal conductivity dependent on soil moisture	[CLM] JP. Schulz (Uni Frankfur	test	N/A	N/A	N/A
								notes status
2.3	CO							
2.4	CO							otes status
2.5	CO							otes status
2.6	CO							otes status
2.7	CO							otes status
2.8	CO							otes status

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2.3	COSMO	N/A	Carbon cycle	[CLM] B. Ahrens (Uni Frankfurt
2.4	COSMO	N/A	Dynamic vegetation	[CLM] B. Ahrens (Uni Frankfurt
2.5	COSMO	N/A	Urban scheme BEP	[CLM] S. Schubert (PIK)
2.6	COSMO	N/A	Urban scheme TEB	[CLM] K. Trusilova (DWD)
2.7	COSMO	N/A	Parameterization of urban effects	[CLM] H. Wouters (KU Leuven)
2.8	COSMO	N/A	River routing model	[CLM] J. Volkholz (PIK)

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CURRENT STATUS 2.1

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CURRENT STATUS 2.1

2.1	COSMO	N/A	Vertically dependent soil structure, HWSD data set	[CLM] B. Ahrens (Uni Frankfurt

- Adaption of water budget equation to inhomogeneous soil texture
- Implementation of inhomogeneous soil textures from Harmonized World Soil Database
- Some tests were made, but substantial evaluation is still missing
- Main work by Frank Kalinka
- Frank left the group and the way forward is unclear

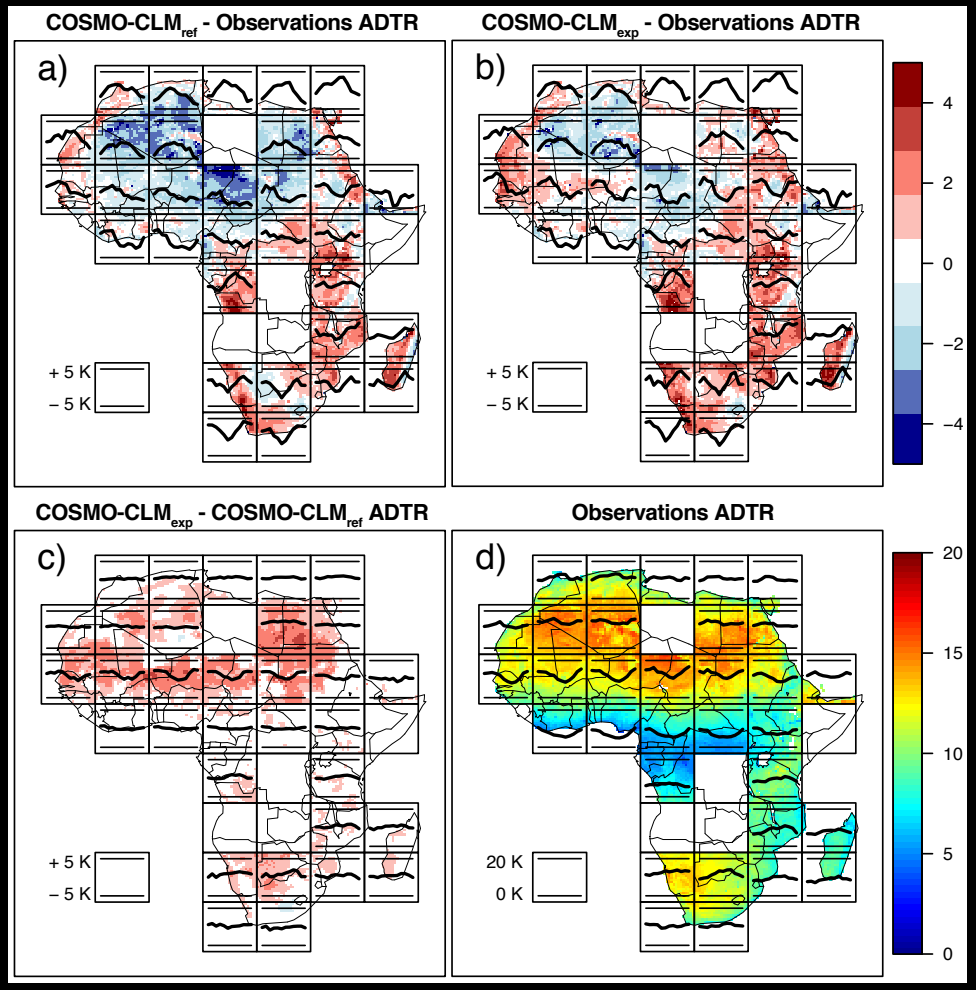
CURRENT STATUS 2.2

2.2	COSMO	N/A	Soil thermal conductivity dependent on soil moisture	[CLM] JP. Schulz (Uni Frankfur

- Introduction of dependency of soil thermal conductivity on soil water content (currently a constant conductivity representing a medium soil wetness is assumed)
- As a consequence the ground heat flux is reduced in dry regions, and enhanced in wet regions
- Work done by Jan-Peter Schulz
- Will be implemented in COSMO 5.0
- Tests for COSMO-DE, COSMO-EU, and COSMO-CLM in Africa

CURRENT STATUS 2.2

2.2	COSMO	N/A	Soil thermal conductivity dependent on soil moisture	[CLM] JP. Schulz (Uni Frankfur



CURRENT STATUS 2.3

2.3	COSMO	N/A	Carbon cycle	[CLM] B. Ahrens (Uni Frankfurt

- Soil carbon cycle
- Work done by Jana Schröder
- First version implemented in offline TERRA
- Some tests were made, but no evaluation
- Jana left the group for maternity leave

CURRENT STATUS 2.4

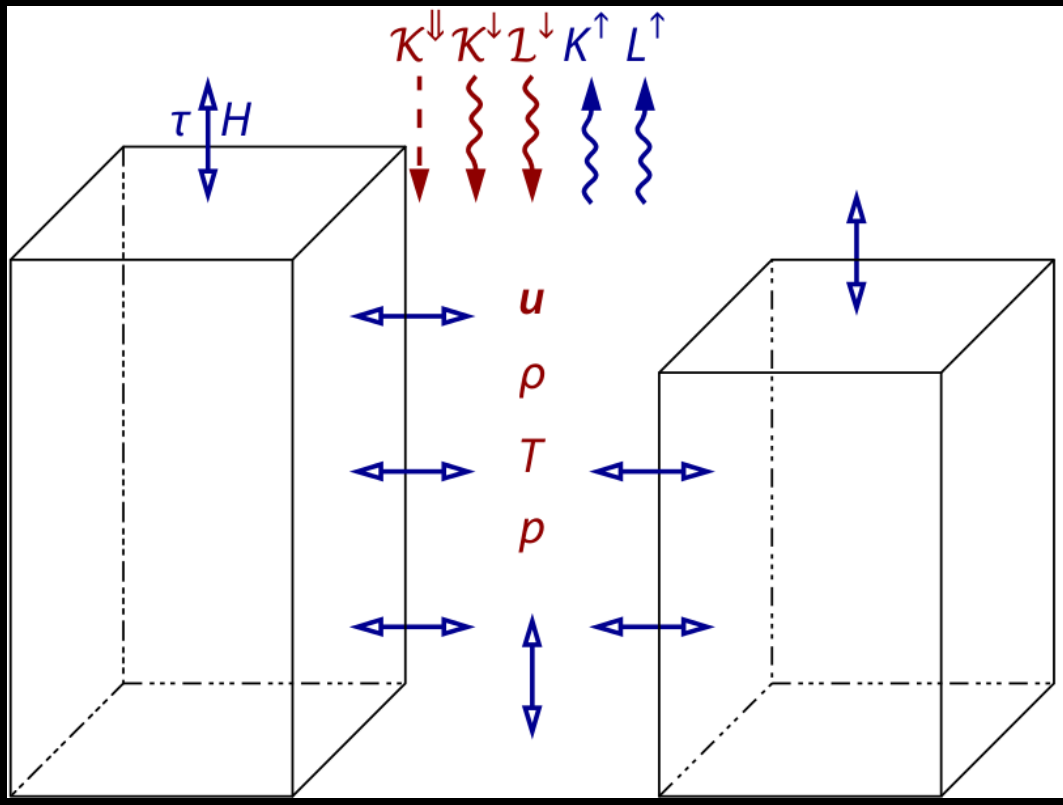
2.4	COSMO	N/A	Dynamic vegetation	[CLM] B. Ahrens (Uni Frankfurt

- Currently is nobody working on this topic
- It is intended that Jan-Peter Schulz will work on this topic in the near future

CURRENT STATUS 2.5

2.5	COSMO	N/A	Urban scheme BEP	[CLM] S. Schubert (PIK)

- Urban parametrization scheme DCEP (Schubert et al. 2012)
- Multi-layer street canyon model:



Input of DCEP:

$L^{\downarrow}$: longwave rad. (down)
$K^{\downarrow,\Downarrow}$: shortwave rad. (down)
u: wind velocity
ρ: air density
T: air temperature
p: air pressure

Output of DCEP:

$L^{\uparrow}$: longwave rad. (up)
$K^{\uparrow}$: shortwave rad. (up)
H: sensible heat flux
τ: momentum flux

CURRENT STATUS 2.5

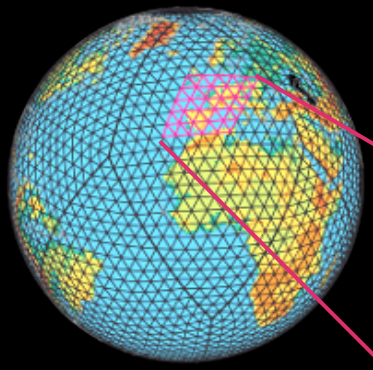
2.5	COSMO	N/A	Urban scheme BEP	[CLM] S. Schubert (PIK)

- DCEP successfully evaluated with flux measurements (poster, submitted paper)
- Applied to analyse urban heat island mitigation measures (presentation Wednesday 17:00, paper in print in Meteorologische Zeitschrift)
- Code will be made available
- Currently, precipitation effects being implemented into DCEP

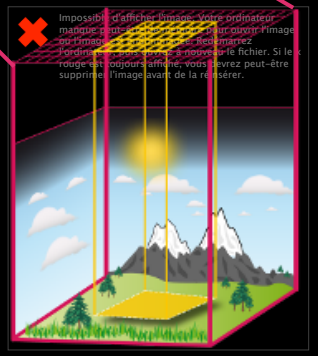
CURRENT STATUS 2.6

2.6	COSMO	N/A	Urban scheme TEB	[CLM] K. Trusilova (DWD)

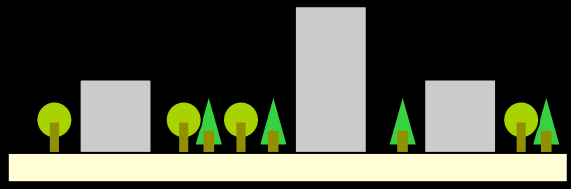
- New model for downscaling global climate projections to city-scale
- Work done by Kristina Trusilova (DWD)



Global climate model



Regional climate model COSMO-CLM

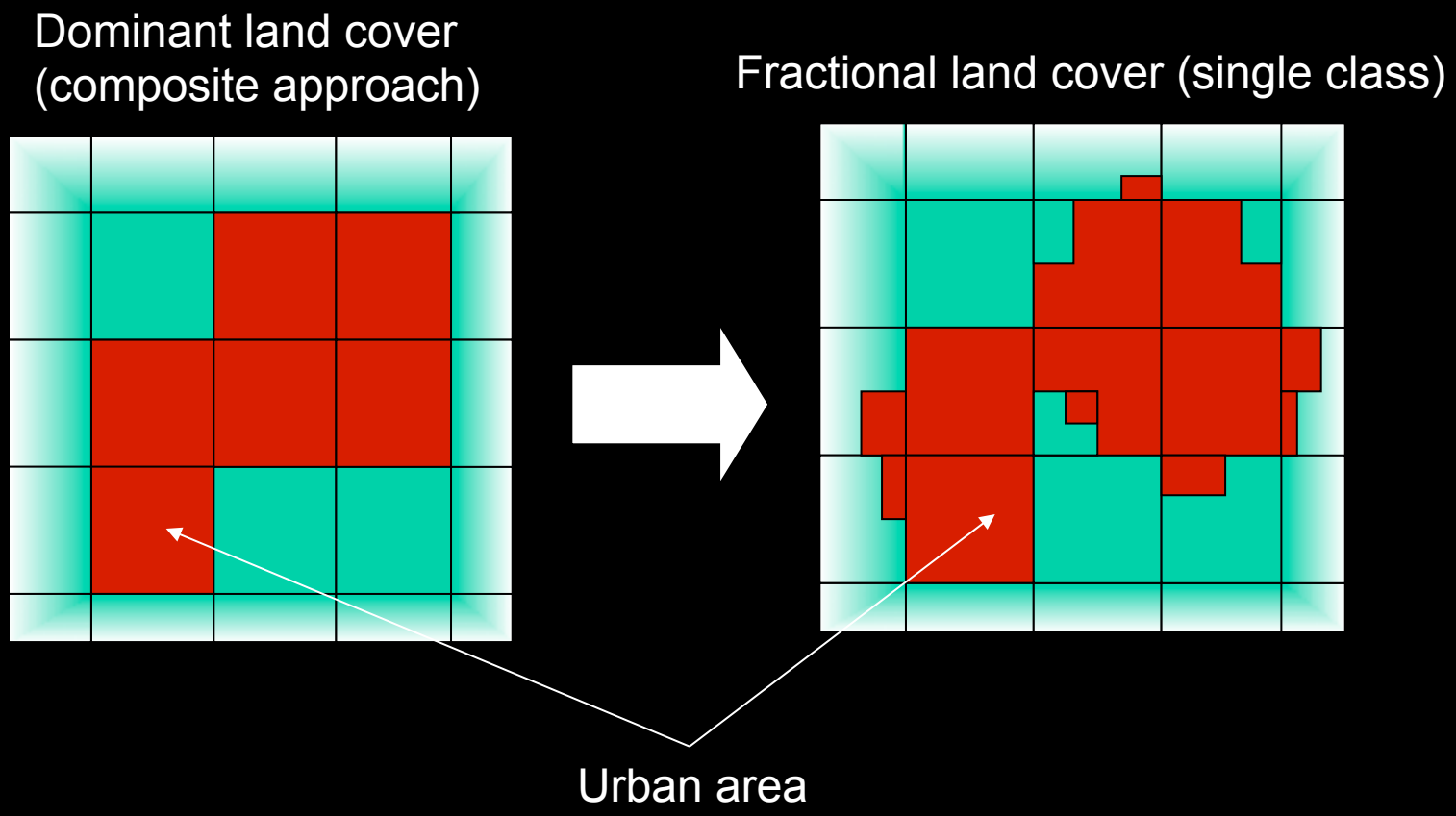


parameterization for urban land

CURRENT STATUS 2.6

2.6	COSMO	N/A	Urban scheme TEB	[CLM] K. Trusilova (DWD)

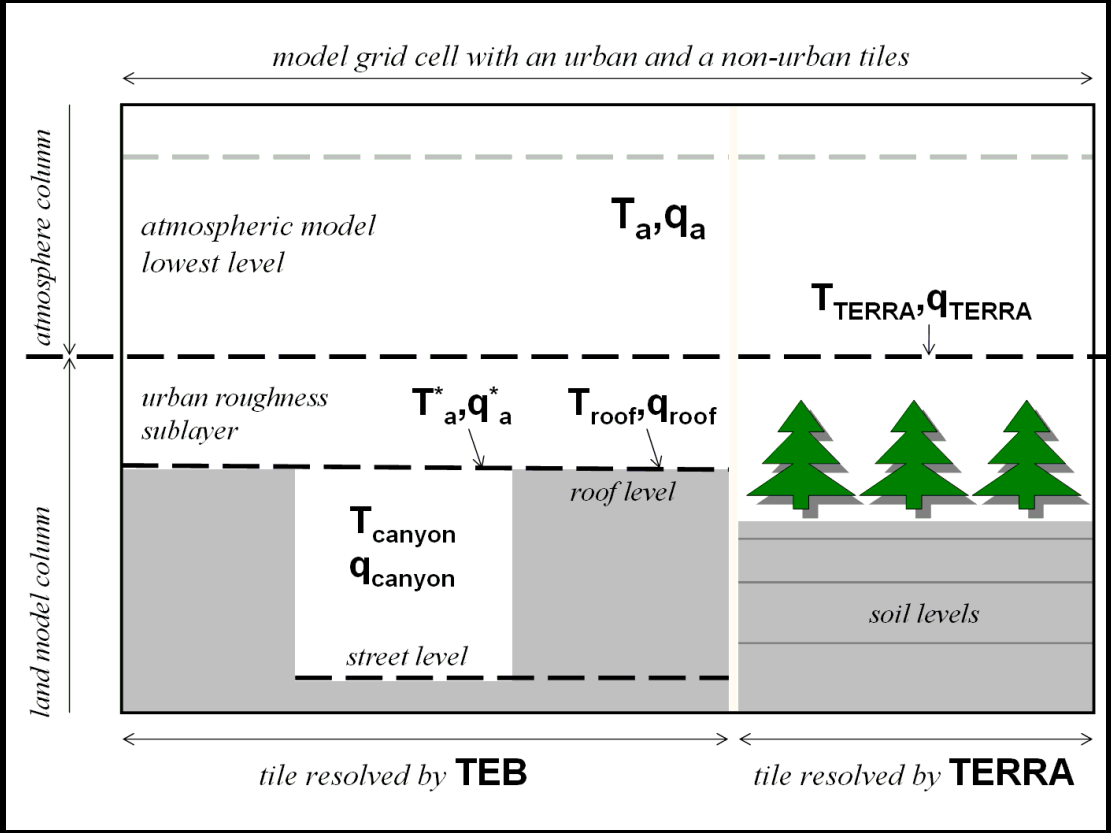
- Implementation of tile-approach for fractional land cover



CURRENT STATUS 2.6

2.6	COSMO	N/A	Urban scheme TEB	[CLM] K. Trusilova (DWD)

- Implementation into standard version due to too high computational cost not intended



CURRENT STATUS 2.7

2.7	COSMO	N/A	Parameterization of urban effects	[CLM] H. Wouters (KU Leuven)

- Urban parameterization in TERRA-ML, including an impervious water storage
- Work done by Hendrik Wouters (KU Leuven)
- 'Offline' evaluations were performed for urban sites of Marseille, Toulouse and Basel
- COSMO-CLM/TERRA 'Online' evaluation for Flanders, Belgium

CURRENT STATUS 2.7

2.7	COSMO	N/A	Parameterization of urban effects	[CLM] H. Wouters (KU Leuven)

Outlook

- Urban land-use scenarios for Belgium
- Urban Air quality modelling
- It is intended to implement it into standard TERRA-ML, but this still needs extra efforts in close cooperation with the main developers of TERRA-ML

CURRENT STATUS 2.8

2.8	COSMO	N/A	River routing model	[CLM] J. Volkholz (PIK)

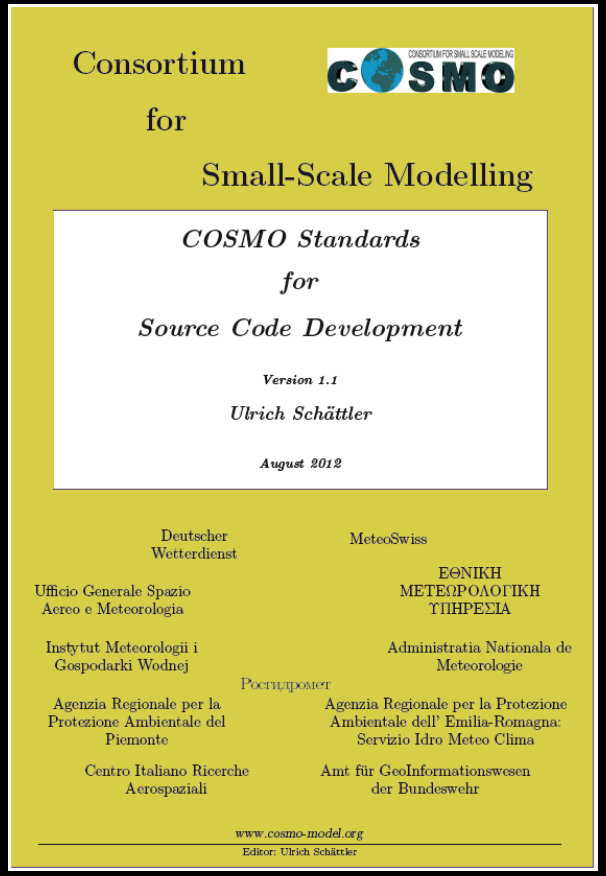
- Implementation of wetlands
- Work done by Jan Volkholz (PIK)
- Currently project suspended, but tests in South American region are planned

TERRA-ML OFFLINE

- Netcdf input (but still no netcdf output) [F. Kalinka]
- Bug fixes, which have to be documented
- New type of lower boundary condition for thermal part of TERRA-ML [J. Toedter]
- Implementation of data assimilation scheme for TERRA-ML [J. Toedter, Wednesday 10:20]

SOURCE CODE DEVELOPMENT

- Basis for successful implementation of new developments should be the official “COSMO standard for source code development”


Consortium for Small-Scale Modelling

COSMO Standards for Source Code Development

Version 1.1

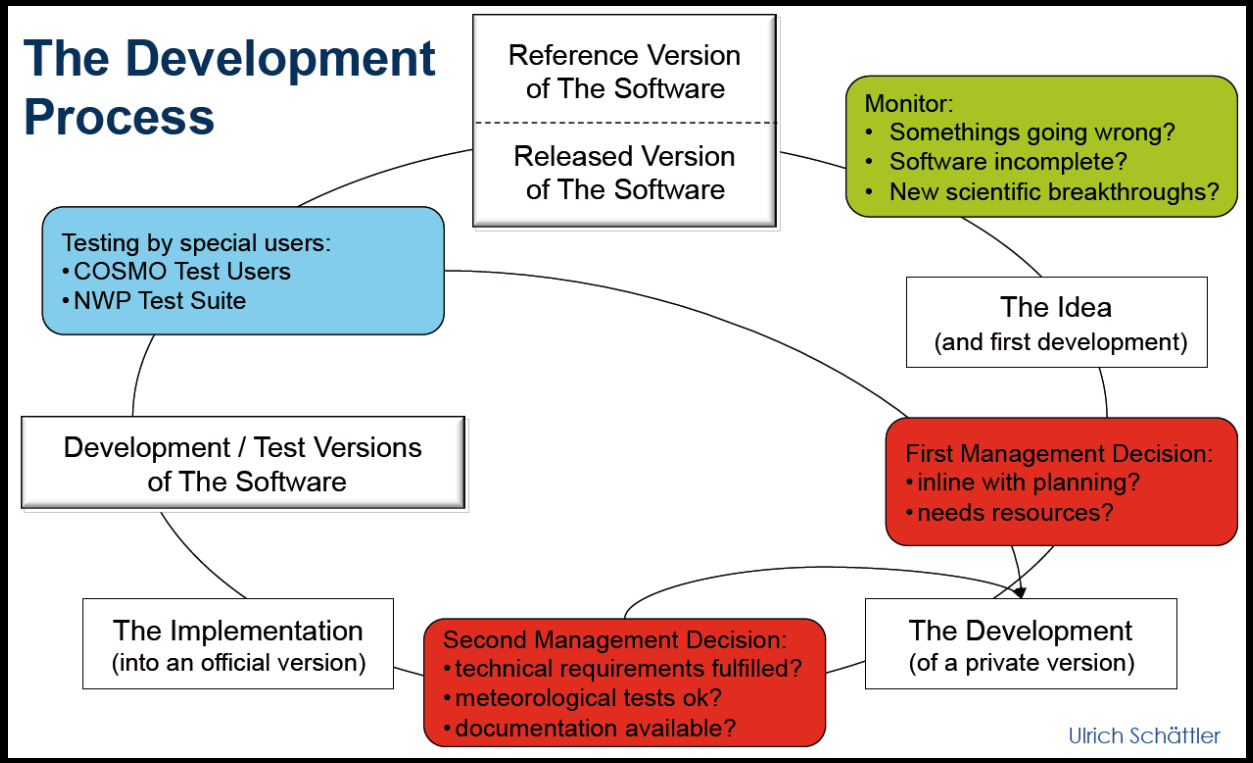
Ulrich Schättler

August 2012

Deutscher Wetterdienst
MeteoSwiss
Ufficio Generale Spazio Aereo e Meteorologia
ΕΘΝΙΚΗ ΜΕΤΕΩΡΟΛΟΓΙΚΗ ΥΠΗΡΕΣΙΑ
Instytut Meteorologii i Gospodarki Wodnej
Administratia Nationala de Meteorologie
Росгидромет
Agenzia Regionale per la Protezione Ambientale del Piemonte
Agenzia Regionale per la Protezione Ambientale dell' Emilia-Romagna: Servizio Idro Meteo Clima
Centro Italiano Ricerche Aerospaziali
Amt für GeoInformationswesen der Bundeswehr

www.cosmo-model.org

Editor: Ulrich Schättler



SOURCE CODE DEVELOPMENT

Questions concerning implementation procedure?

Are there new TERRA developments?

Please contact me: kothe@iau.uni-frankfurt.de