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Eidgenössisches Departement des Innern EDI
Bundesamt für Meteorologie und Klimatologie MeteoSchweiz

COSMO software

Jean-Marie Bettems / MeteoSwiss

St Petersburg, SMC, September 2018

COSMO software

Official COSMO software

- **COSMO** → WG6 / U. Schaettler
- **INT2LM** → WG6 / D. Rieger
- **EXTPAR** → WG3b / K. Osterried *(report on Thursday)*
- **Fieldextra** → WG4 / JM. Bettems
- **VERSUS** → WG5 / ???
- **SNOWE** → WG3b / I. Rozinkina

Additional utilities

- **CALMO Meta-Model** → WG3b / I. Carmona
- **TERRA standalone** → WG3b / Y. Ziv

And more …

- **bufrx2netcdf, MEC, Rfdbk, DACE**…

20 years fieldextra…

… 1998

- **Swiss Model (HRM)** : *hydrostatic, 14km grid size, 125x125 points*
- **Cray J90 cluster at ETHZ** : *60' for 48h forecast*
- **UNICOS 9.0** : *restricted set of tools (C, fortran, sh, csh)*

- The Swiss Model popularity is increasing, tools are required to generate products out of the model output
- Decision to (1) use a *flat file system* as database, (2) generate the products *concurrently* to the computation of the model, (3) use a *single program* for all products

→ May 1998, fieldextra is born!

… 2018

- **Fieldextra** is the official **COSMO software** for model post-processing
- Many **users,** multiple **models**
  - *MeteoSwiss*: processing of KENDA, COSMO-1, COSMO-E, COSMO-7, IFS-HRES, IFS-ENS, IFS-SEAS, INCA
  - *DWD*: products based on COSMO-DE2, ICON-LAM & ICON-LAM-EPS
  - *COSMO-LEPS* production at ECMWF
  - And more : USAM, RHM, NMA, IMS…
- About **165k lines** of code
  - Still **actively developed code** (2 - 3 releases per year)

Fieldextra

Availability

- **Full code and documentation** on GitHub
  https://github.com/MeteoSwiss-APN/fieldextra
- **Standalone package** on COSMO web site (main releases only!)
  http://www.cosmo-model.org/content/support/software/default.htm
- **Full installation** at ECMWF on cca (special UNIX group cfxtra)
  /perm/ms/ch/ch7/projects/fieldextra

Fieldextra

Releases

- Latest public release is **v12.7.1** (09.05.2018)
- **Next planned release is v12.8.0 (before year end)**

Some highlights since COSMO GM 2017

- Add support for **ART products** (as requested by Jochen F)
- Computation of **vertical cross-section** along arbitrary path (NetCDF)
- Extended **lateral re-gridding** (conditional source points, generalized distance)
- Improve **OpenMP performances**
- **Cookbook** with more than 50 fully commented examples
- **NetCDF** import *(in progress)*

Fieldextra

Planned for v13.0.0 (→ Q1 2019)

- Migration from GRIB API to **ecCodes**
- Consolidation of **regression suite**
- Streamline code installation using **CMake**
- Better support of **complex namelist**

Fieldextra

Other actions

- Licences can now be granted to the **R&D community**
- Evaluation of **code life cycle**
  - Questionnaire has been distributed to the fieldextra community
  - Session at WG4 on Tuesday

Requested features, by priority

- ❑ Full support of ICON grid
- ❑ Optimization for very large problems
- ❑ More interactive documentation (WiKi)

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TERRA standalone

TERRA standalone

- Available on **GitHub** and on **COSMO web**
- Based on **COSMO 5.03**
- Maintained by **IMS** (best effort)
- Recent **bug fixes** by Daniel Regenass / MCH
- Convenient tool for **soil spin-up**
  (CALMO, NWP test suite, hydrological cycle…)
- Some work required to port the software to the latest COSMO release
  …but no resources currently assigned to this task
- **Is this functionality integrated in ICON?**

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CALMO meta-model

CALMO Meta Model

- Available on **GitHub** and on **COSMO web**
- Being improved by IMS colleagues within the frame of **PP CALMO-MAX**
- Will be synchronized with **parallel developments at ETHZ**
- Plan to port the software to **Octave**
  (currently the software is written in MatLab)

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Sharing development

GitHub

GitHub

GitHub is a **web based service** for source code management, based on git

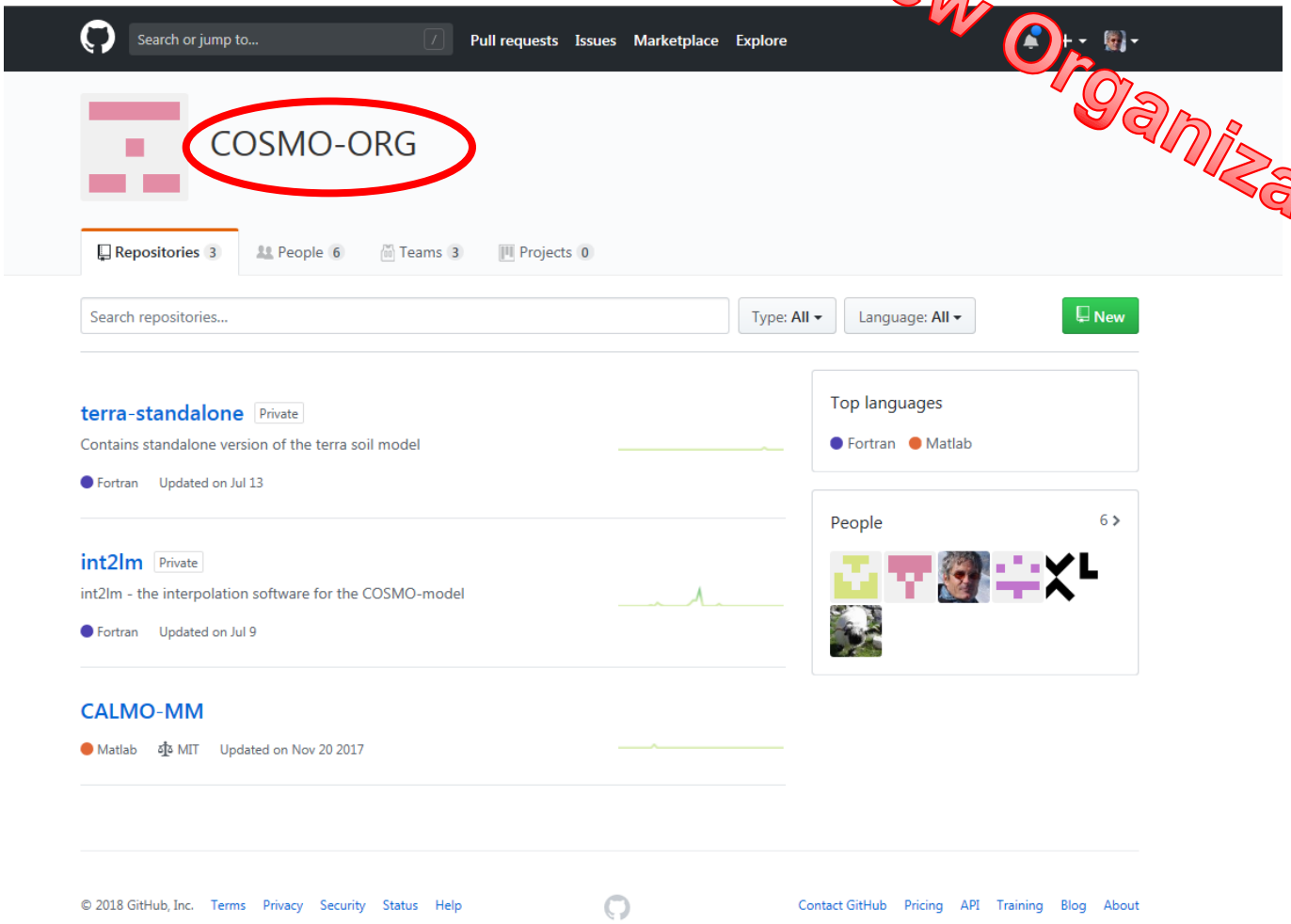
Git is a distributed **version control system** (think SVN…)

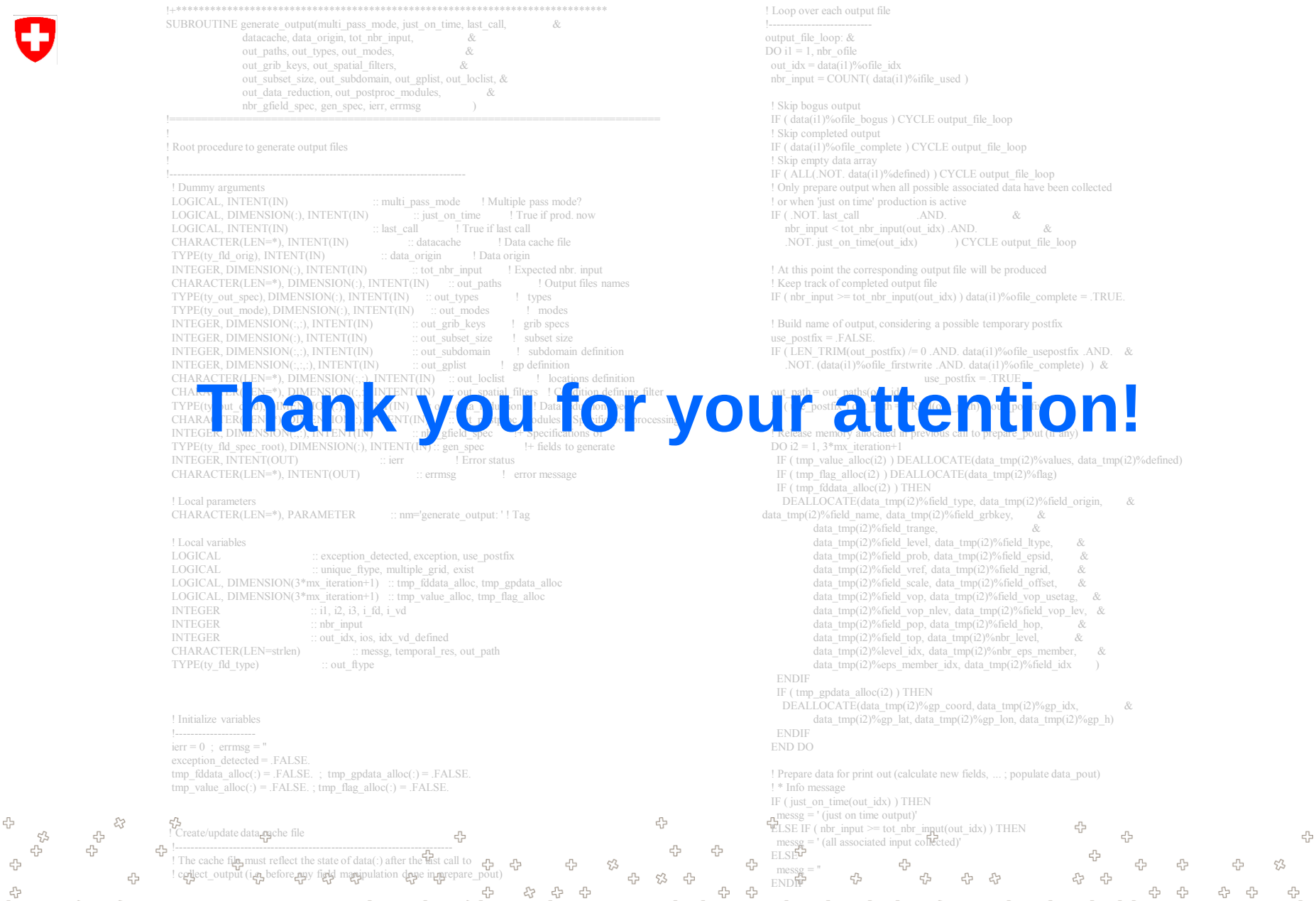
GitHub offers …

- Tools for **sharing code development in a distributed environment**
  code review , discussion board, tasks management, …
- **Easy to use information platform**
  markup language, integrated WiKi and PDF reader, commits history…
- Integration with **automatic testing procedure** (Jenkins)
- And more …

GitHub

New Organization





Thank you for your attention!