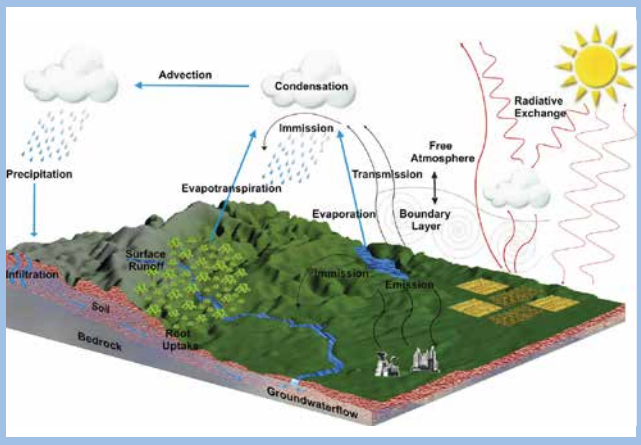
JÜLICH Forschungszentrum | JÜLICH SUPERCOMPUTING CENTRE

SIMULATION AND DATA LABORATORY TERRESTRIAL SYSTEMS

GEOSCIENTIFIC RESEARCH THROUGH HPC



- **Interactions and feedbacks in coupled geo-ecosystems**
- **Modelling of transport processes across scales and Earth system compartments**
- **Advancement of complex multiphysics and multiscale model systems**
- **Performance-portability and scaling of scientific codes, HPC-enabled workflows**
- **HPC support for the terrestrial systems and geoscientific community**

Expertise

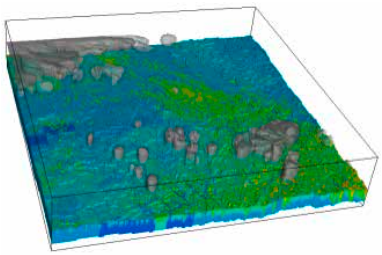
- Land surface-subsurface-atmospheric coupled modelling
- Local to continental high resolution simulation
- Model-data fusion (e.g., data assimilation)
- Impact assessments

Research

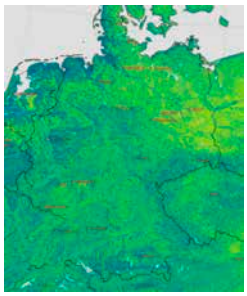
- Studying interactions between land surface processes, ecosystems and climate
- Investigating feedbacks processes across landscape scales

Model development

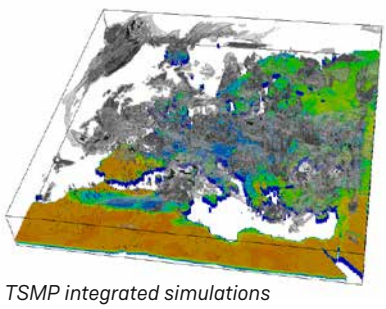
- TSMP (coupled model COSMO/ ICON, CLM, ParFlow, PDAF, OASIS)
- ParFlow (hydrology, groundwater)
- eCLM (land model)
- SERGHEI (shallow water)



TSMP integrated simulations over North Rhine - Wesphalia



Soil water content at high resolution over Germany



TSMP integrated simulations over Europe

Simulation and Data Science Support

- Mentoring for ESM compute and data projects
- HPC and accelerator porting and optimisation
- End-to-end data workflows
- HPC support for Geoverbund ABC/J

Towards Exascale - Co-Design

- TSMP Heterogeneous computing capabilities
- Performance portability
- Deep SEA & IOSEA: modular TSMP co-design for Modular System Architectures
- Pilot Lab: Dwarf development
- Joint Lab ExaESM
- National ESM Support Team

Collaborations

- Geoverbund ABC/J
- FZJ: Agrosphere (IBG-3)
- Helmholtz: Earth & Environment, Aeronautics, Space & Transport
- Germany: DKRZ, RWTH, BTU
- International: EuroHPC, LBNL

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