JÜLICH Forschungszentrum | JÜLICH SUPERCOMPUTING CENTRE

# EARTH SYSTEM SCIENCE AND SUPPORT
## BRINGING EARTH SYSTEM SCIENCE TO EXASCALE HPC



Earth System Model (ESM) developments are supported and advanced by JSC, being one key high-performance computing application since decades and of large societal relevance. Three groups are tasked with bridging the ESM communities to the HPC infrastructure, providing dedicated high-level support, and developing new solutions for scientific and technical insights:

- **Simulation and Data Laboratory Climate Science**
- **Simulation and Data Laboratory Terrestrial Systems**
- **Research Group Earth System Data Exploration**

### Simulation and Data Lab Climate Science

· Atmospheric modelling
· Porting, optimization, modularization
· HPC-attached meteorological data cloud
· Research data management
· Education and training
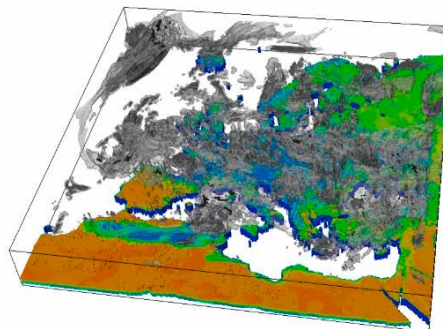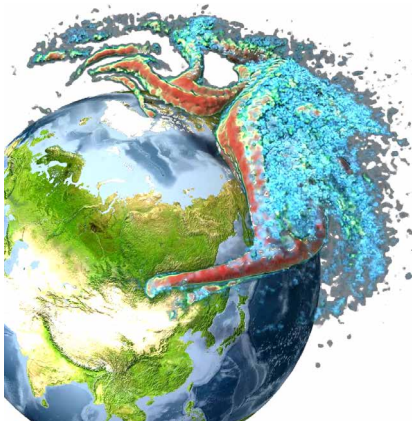




### Simulation and Data Lab Terrestrial Systems

· Integrated simulations of mass, momentum and energy transfer processes between land, water and the atmosphere
· hydrology, land surface modelling and ecology
· Coupling, DSLs, porting, hetero-geneous computing
· Education and training

### Research Group Earth System Data Exploration

· Machine learning for air quality and weather
· Analysis and forecasting of atmospheric data
· Deep learning
· FAIR big data solutions



3 problem classes addressed with deep learning
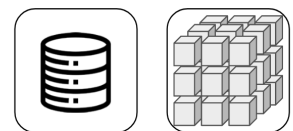


Designing databases and data cubes for environmental data (and make them accessible through performant web services)

### Joint Lab Exascale Earth System Modelling

The Joint Lab Exascale Earth System Modelling will foster collaboration among Earth System Scientists and Computer Scientists to achieve scalability of codes and workflows in the exascale era. It is coordinated by JSC.

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Mitglied der Helmholtz-Gemeinschaft