H P C – Big Data

High Performance Computing and Big Data for climate research

- Jens Weismüller, LRZ -

Challenges and Benefits of Supercomputing in ClimEx

- 84,000,000 core-hours
  ≈ 2,500 years on a modern Laptop

Image: redjar (Jared C. Benedict), Wikipedia

Image: pexels.com

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- What do we need instead?

Image: redjar (Jared C. Benedict), Wikipedia

Image: pexels.com

Image: Markus Müller, LRZ

Challenges and Benefits of Supercomputing in ClimEx

Total energy consumption: ~1,25 GWh

Run the wind turbine in Fröttmaning for about nine months


Image: Hihiman / Wikipedia

Power ~350 households for one year


Image: Andreas Koll / Wikipedia

~300 people flying from Munich to Montreal and back

Image: Dave Sizer / Wikipedia

Energy efficiency

Climate simulation means massive energy consumption!

How do we use energy as efficiently as possible?

Innovative cooling technology

- Temperature record high Munich: 37.1°C in August 2003
- SuperMUC: 40°C cooling water
- No active cooling

Challenges and Benefits of Supercomputing in ClimEx

The ClimEx dataset consists of ~400 TB. How much is that?

Image: Asim18 / Wikipedia

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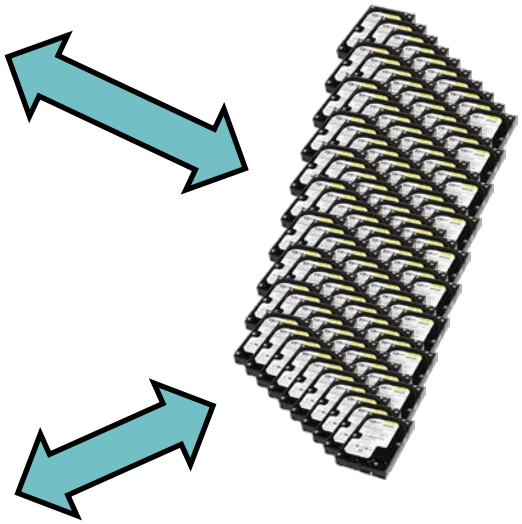
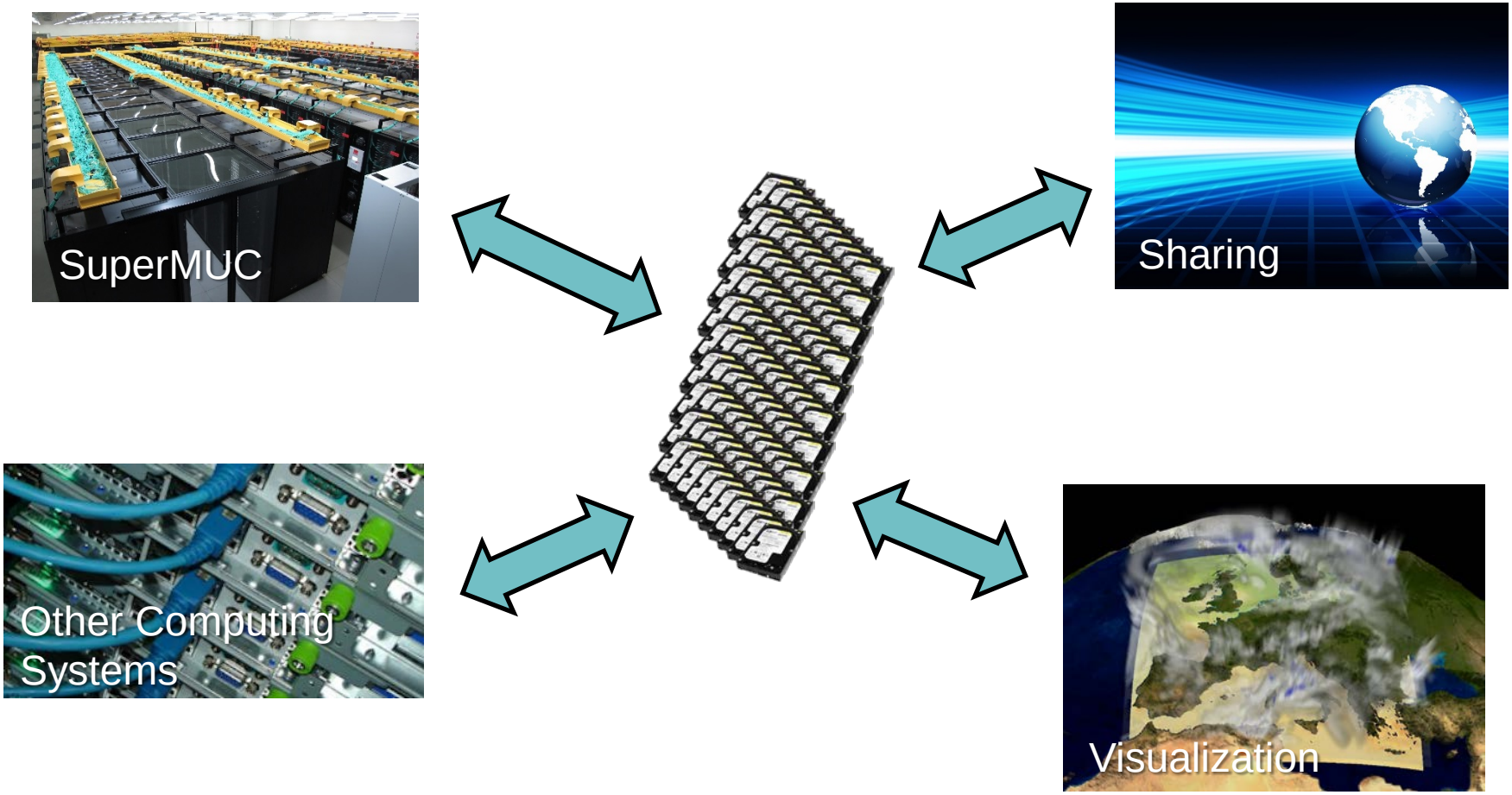
But we also need a backup…

- 100 modern harddisk?

Data exploration and accessibility



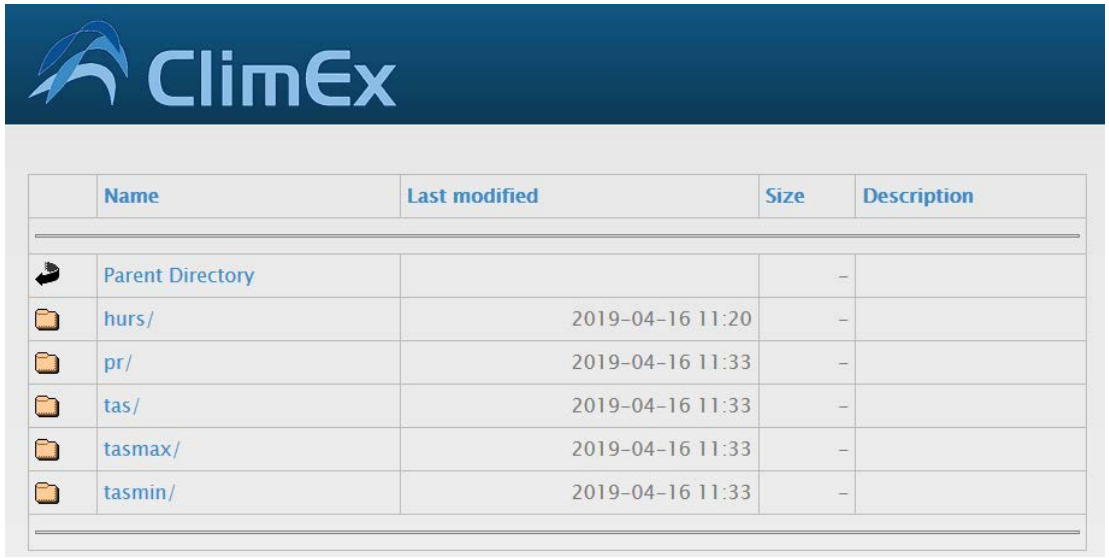
Data exploration and accessibility



Data exploration and accessibility

www.climex-project.org/en/data-access

- Web-Interface for exploring the European data



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	tasmin/	2019-04-16 11:33	-	

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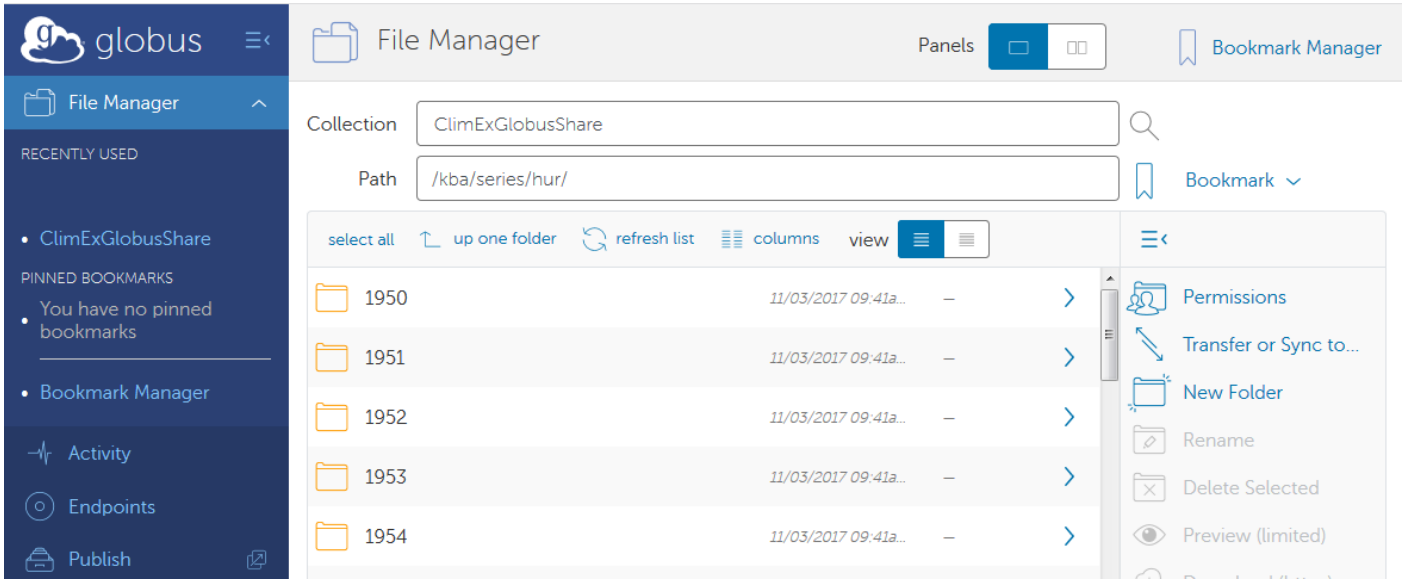
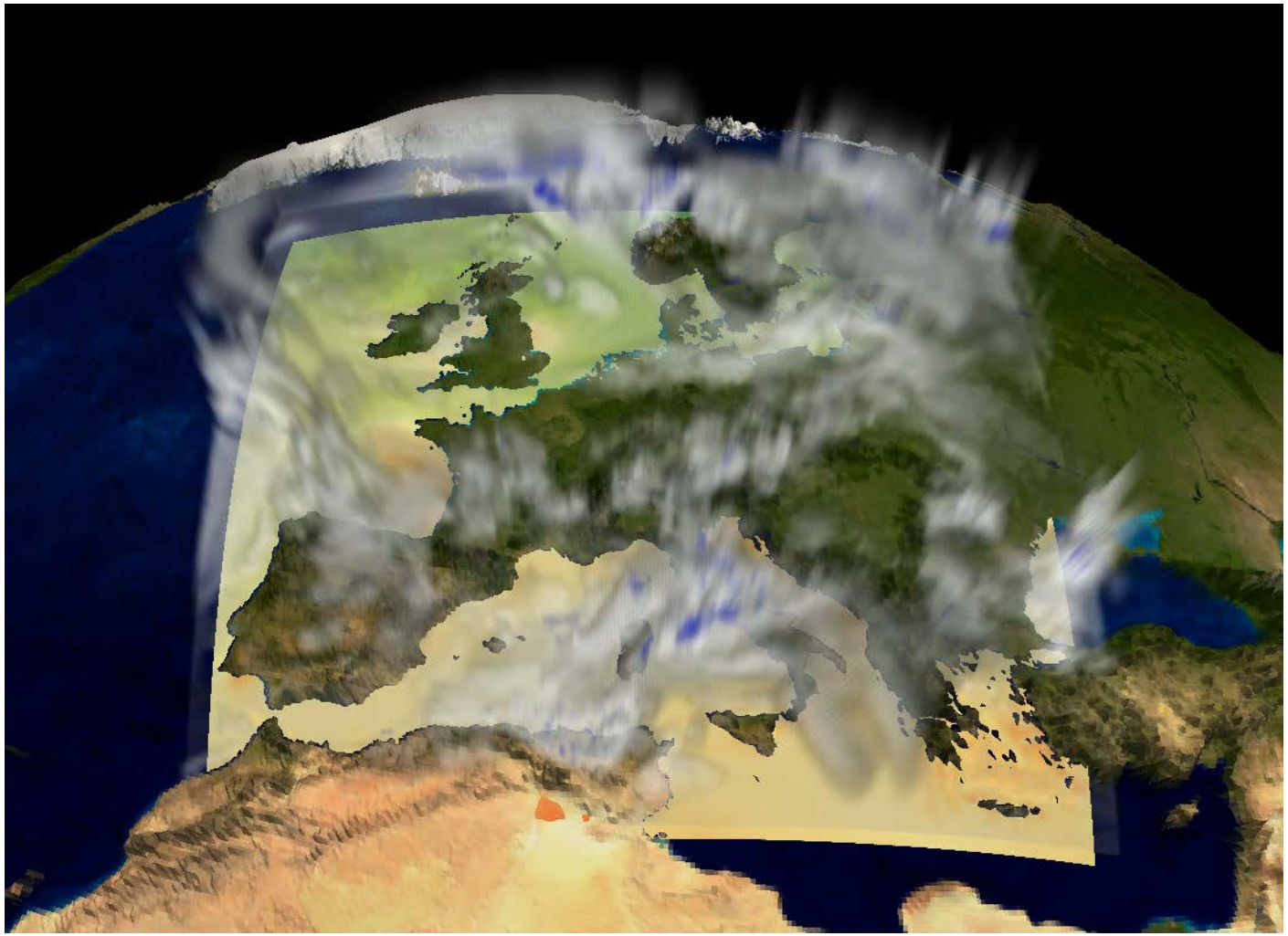
- GLOBUS access for transferring large amounts of the European data already in place



Visualisation

Match scientific data to the viewers everyday experiences



Virtual reality

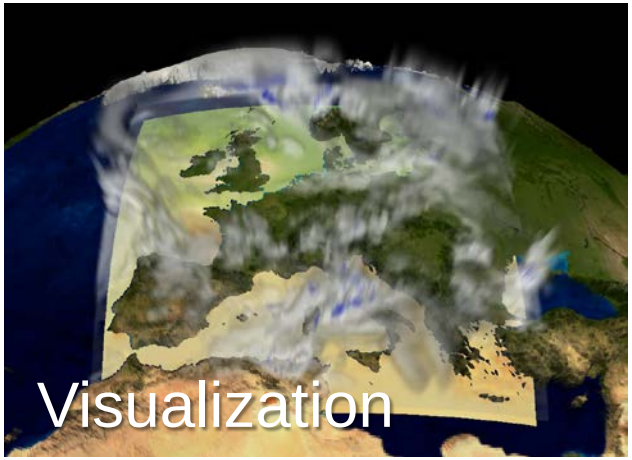

Image: LRZ

Image: Daniel Kolb, LRZ

Key messages

- CRCM5 and WaSiM ported and adapted to HPC systems
- management of a huge job farming environment
- production of huge climate simulation data set
- data provisioning to the scientific community (e.g. *Wasser Zukunft Bayern*) and stakeholders in the agriculture, forestry, energy, health … sectors
- pilot usage of new LRZ services and tools (e.g. Data Sharing, Data Science Storage)
- new data visualization approach to support the science-policy interface

Key messages



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