FlowZoom:
In-Situ Big Data Analysis
for Flow and Climate Simulations

Tino Weinkauf   KTH
Erwin Laure   KTH
Philipp Schlatter   KTH
Ingrid Hotz   LiU
Rodrigo Cabellero   SU
Gunilla Svensson   SU

SeRC

Swedish e-Science Research Centre

Flow and Climate Simulations
high computational costs

Flow Simulation around Airplane
1 second fully resolved flight
computed on KTH's Beskow

computation time: **500 years**
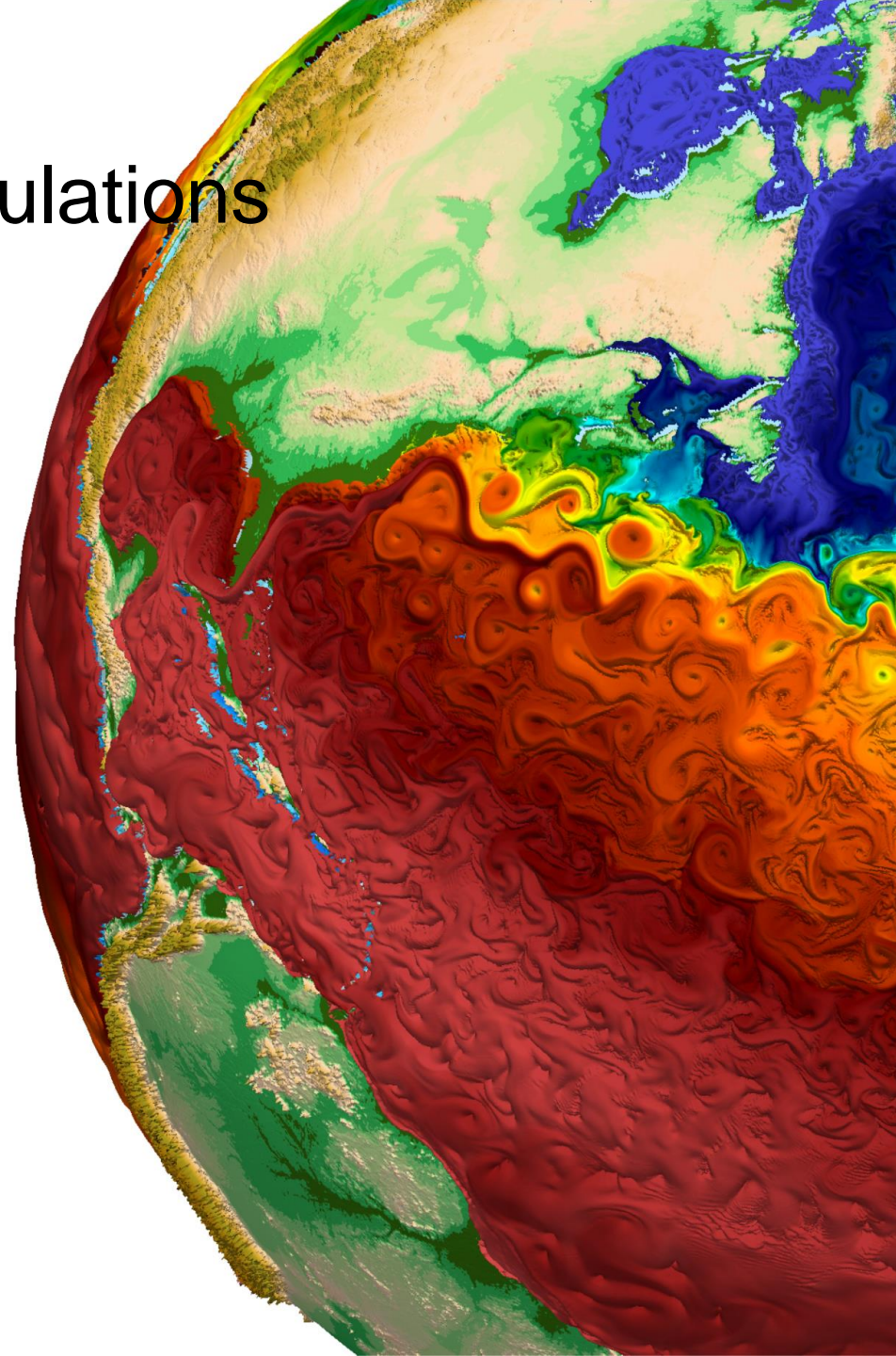*data size:*   **100 petabyte**

Beskow

Flow and Climate Simulations
high computational costs

Simulation of Earth's Climate
Turbulence modelling necessary

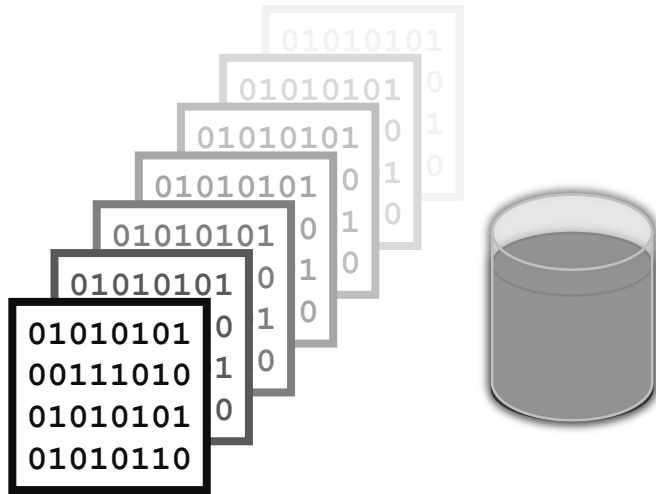*computational needs exhausted
for decades to come*

Flow and Climate Simulations
current barriers to progress

Data Size
overwhelms storage systems

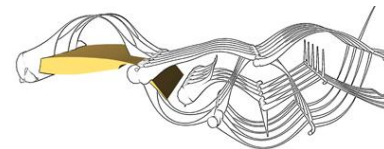## Data Complexity
overwhelms analysis tools

Simulation **Feature Extraction**

data too large to in-situ
save in full resolution

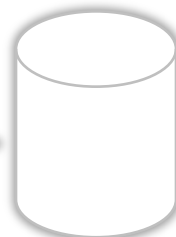*versatile framework for defining features*

notion of feature strength

track over time

Interactive Visualization

filter
comparison
hypothesis generation & testing
presentation

Overview and Consortium
5 PhD students over 5 years

Impact to
Industry and Society

e-Science
Applications

e-Science
Tools

Aerospace Industry
Automotive Industry
Manufacturing Industry
Medical Diagnosis Tools

Future
Climate
Research

Forestry Industry
Insurance Industry
Severe Weather Warnings
Climate Change Projections

Prof. Schlatter
**Flow
Turbulence**

Prof. Svensson
Prof. Schlatter
**Atmospheric
Turbulence**

Prof. Svensson
Prof. Caballero
**Climate
Weather**

Phase I

Phase II

Phase III

Phase II

Phase I

Prof. Laure
High-Performance
Computing

Prof. Weinkauf
Feature-based
Data Analysis

Prof. Hotz
Interactive
Visualization