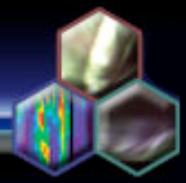
Global Auroral Imaging Access



# GAIA virtual observatory — development and practices

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# Outline

- The emergence of GAIA
  - Our data and needs
- First stable steps using only one leg
  - Proof of concept
- Learning how to use two or more legs to speed up the exploration
  - Distributed system

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# The auroral oval from space

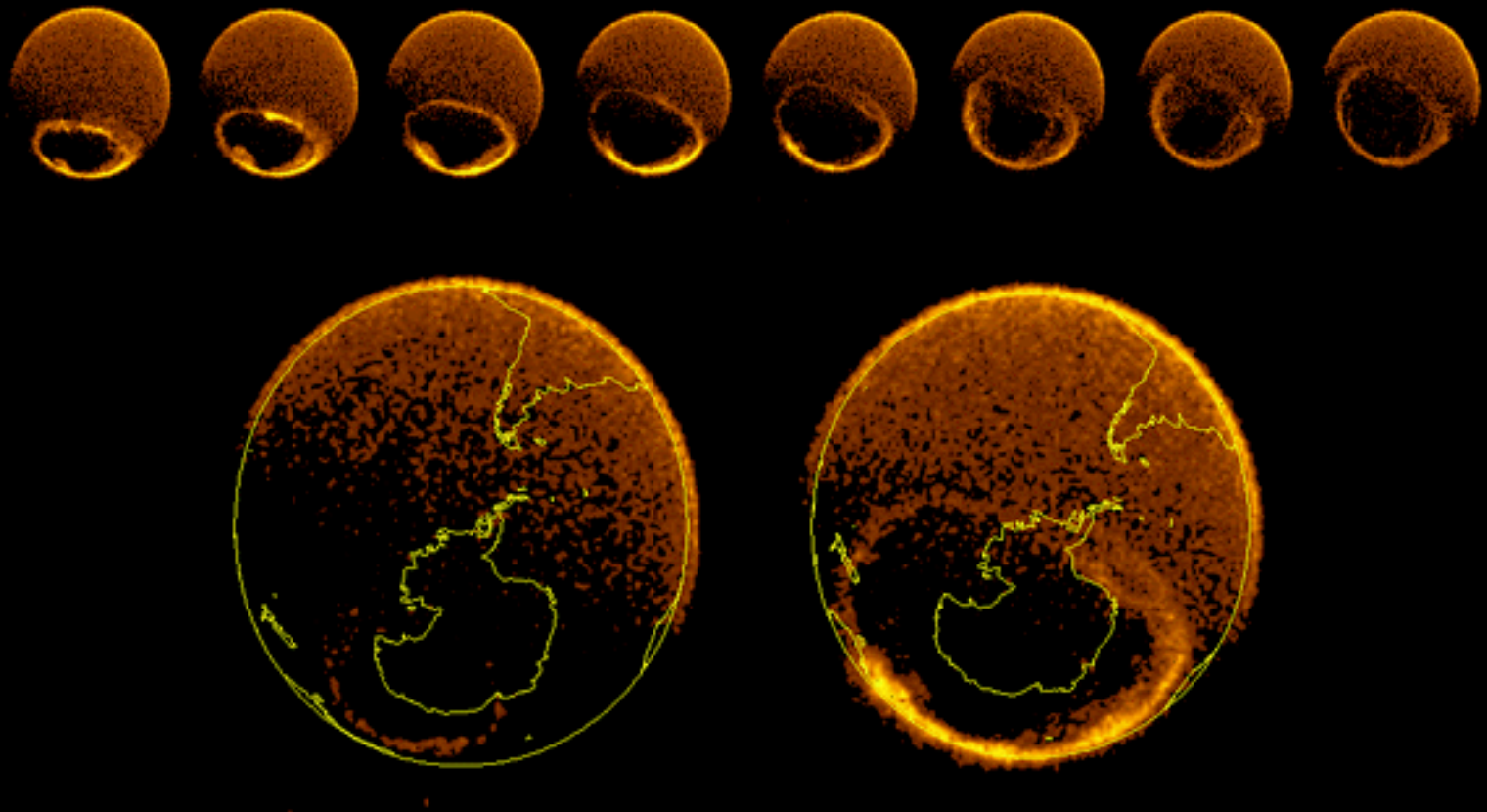

Photo: NASA/Dynamics Explorer

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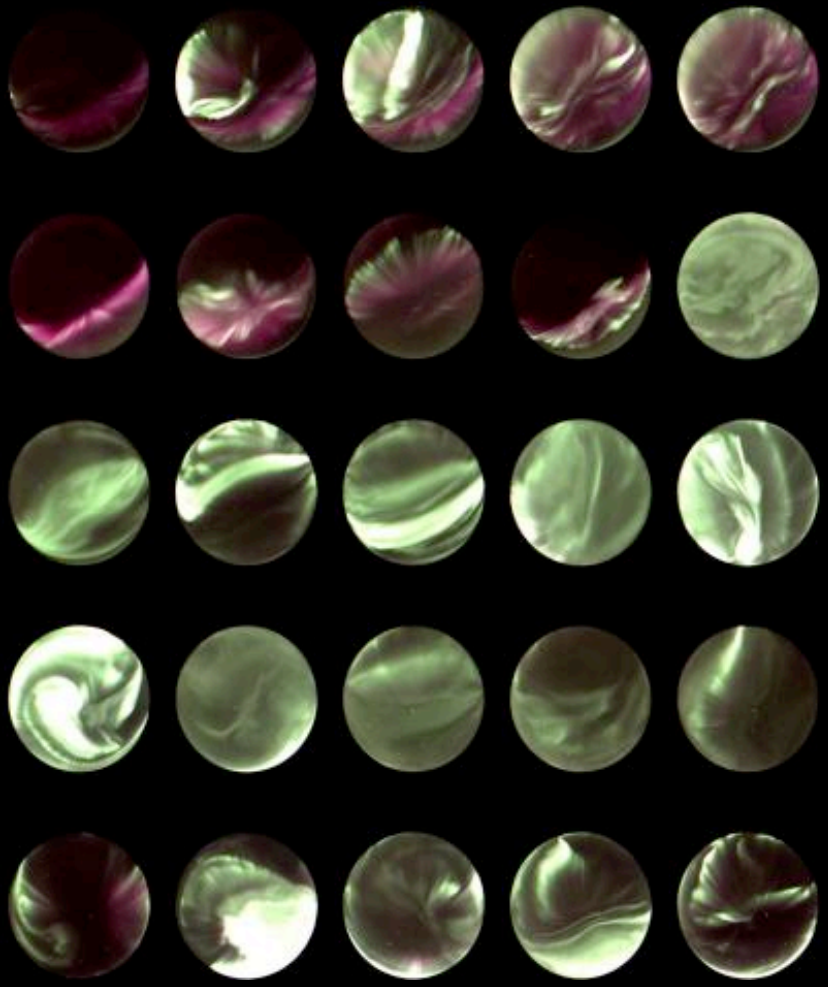
# Data from auroral imagers



Colour auroral all-sky images from Athabasca, AB, Canada

Extreme wide-field optics are used to capture the whole sky in one image

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- Images are a difficult data format
  - **Almost all image analysis in auroral research is done manually**
- Not all instruments are capable of continuous operation
  - Data availability?

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# GAIA virtual observatory

- Provides access to the summary data of **all major** auroral imaging and riometer networks
  - not limited to these main instrument types
- A centralised database containing information about data availability
  - side-by-side view of multiple/all data sources

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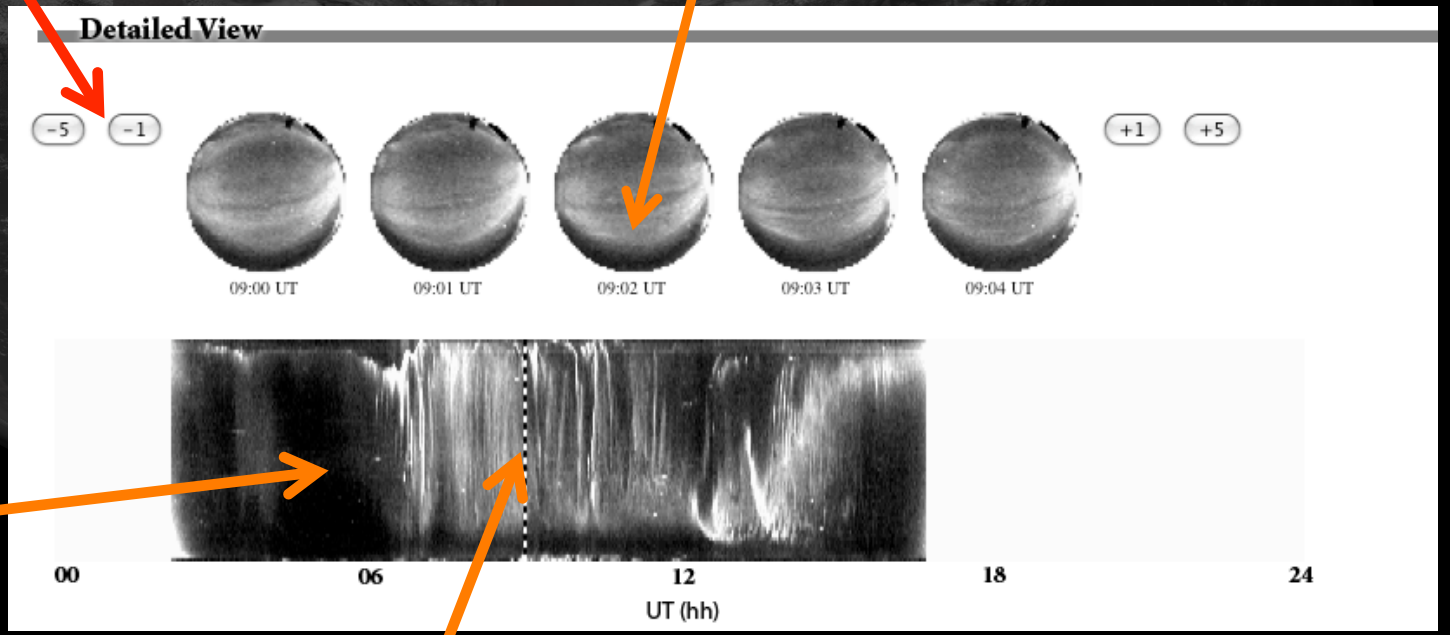
# First steps — what do we want?

Small “thumbnail” images at one minute time resolution

Backward/forward 5 or 1 minute




A summary plot (keogram) covering the whole day

Time bar (09:02 UT)

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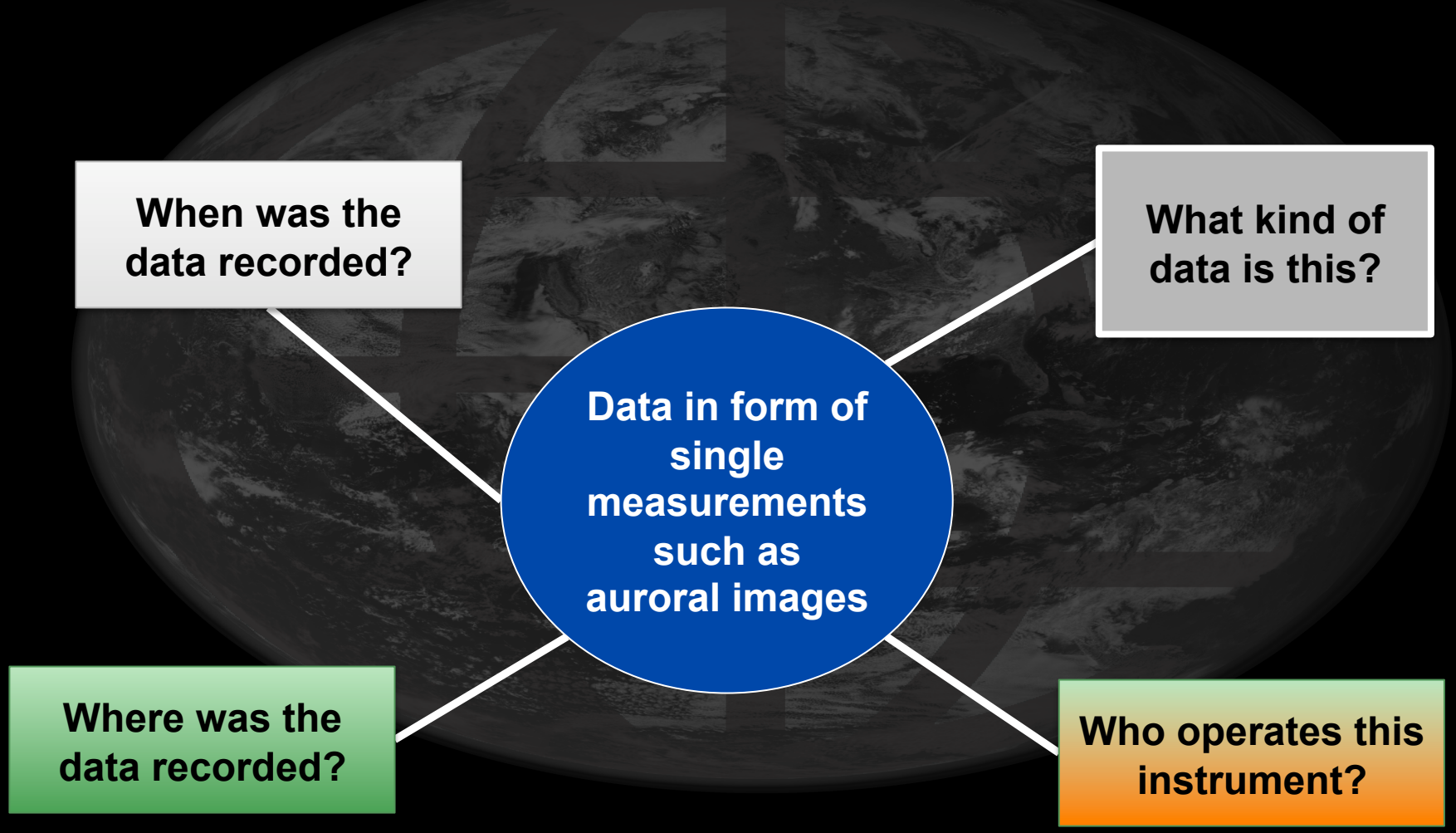
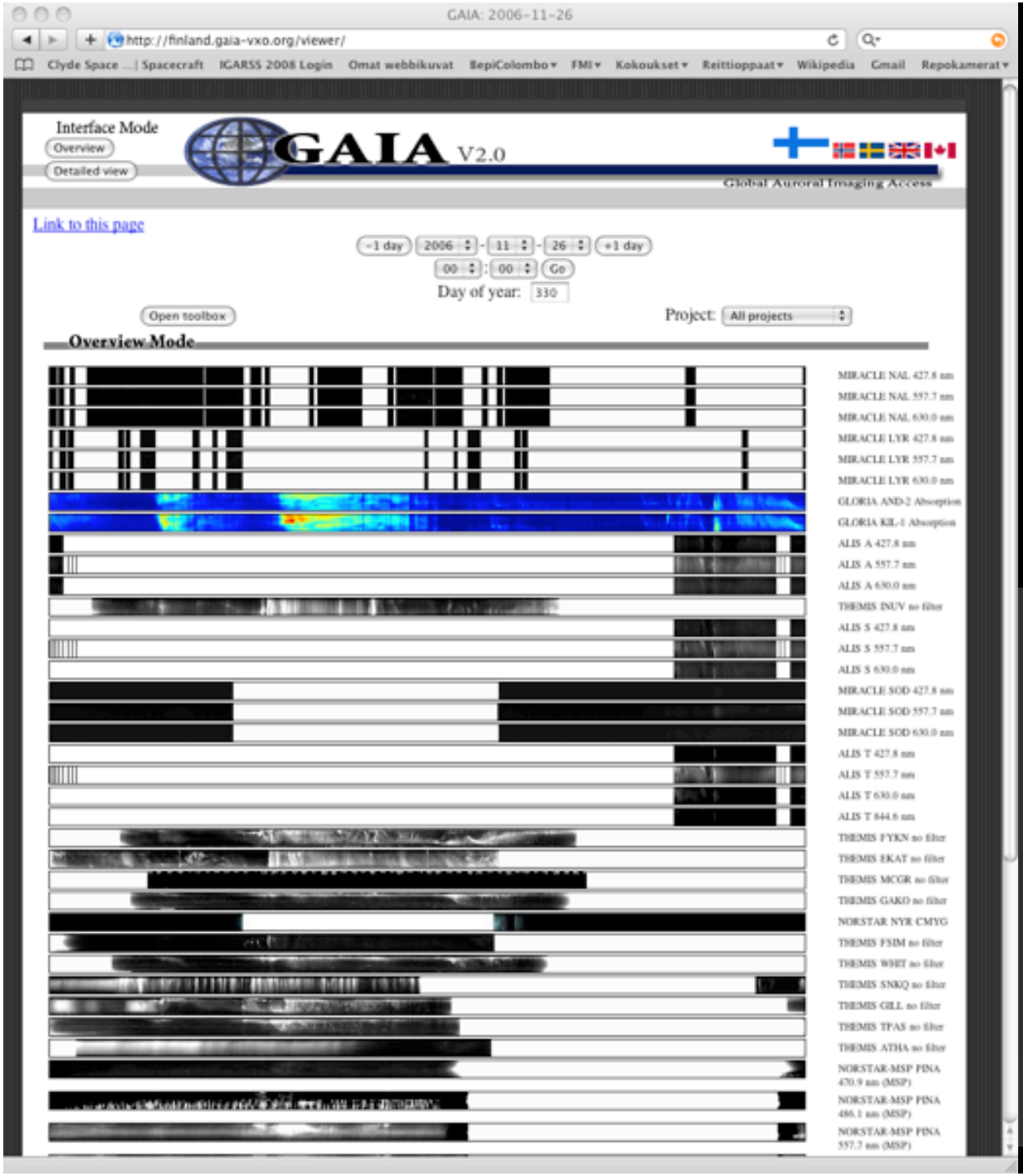
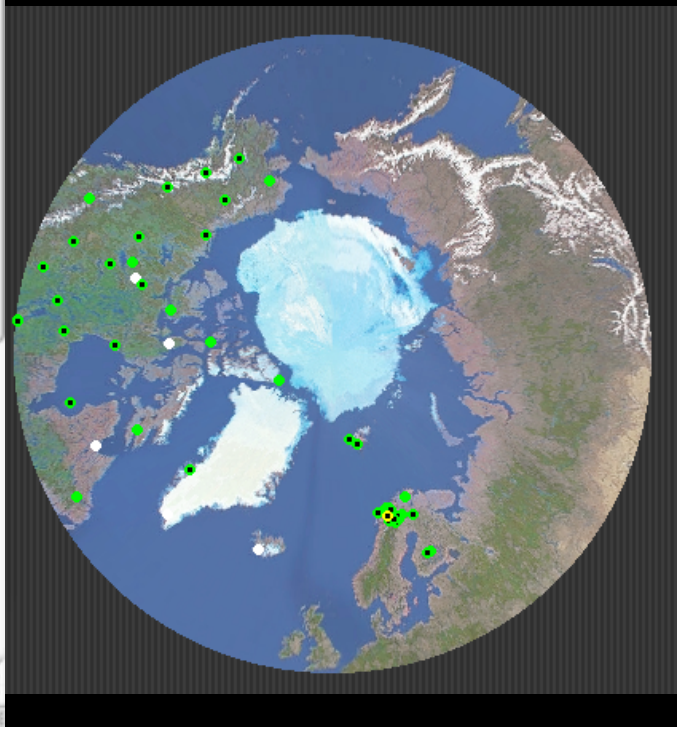
# Metadata — key to success

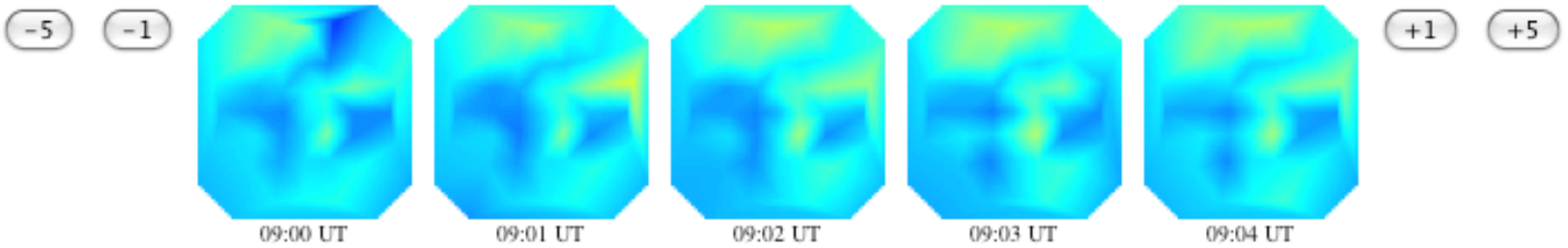


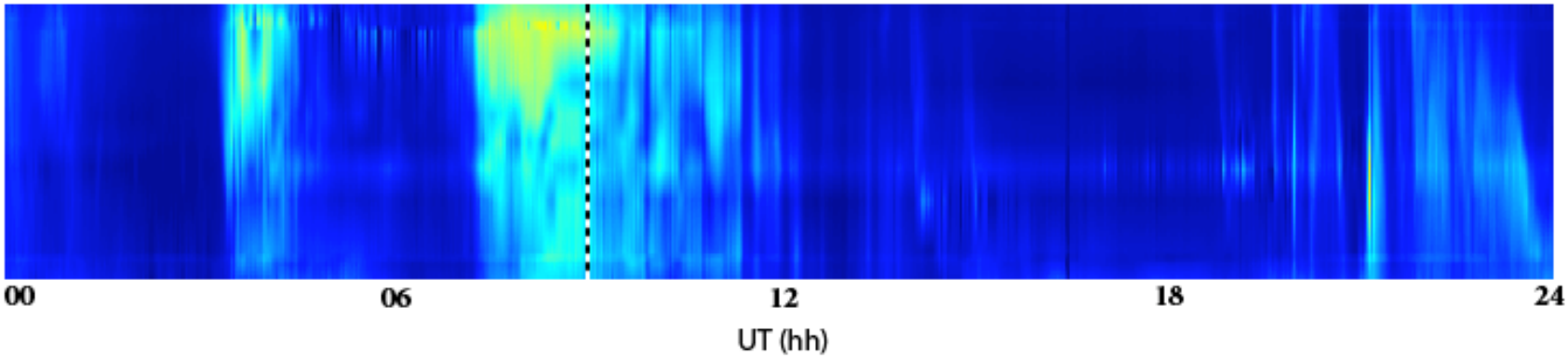



# Data availability for 26 Nov 2006

Two sites from Antarctica that also have data are not shown on this map…






Colour Palette Selector

Channel default | None

GLORIA / AND-2 / Absorption credits

Project PI: Farideh Honary

Project contacts: UK IRIS, Steve Marple

Project institute: Lancaster University, United Kingdom

Data requests: Data availability | Beam data/plots | Image data/plots

How to get more data?

Who are the contacts?

Change colour palettes

# Technical choices

- All required software needs to be freely available
  - This includes GAIA server software
- Distributed system
  - Knowledge of data location: mirrors vs. nodes
- Provide only basic functionality facilitating efficient scientifically meaningful browsing
  - Additional modules and web services can be used to implement more complex tasks

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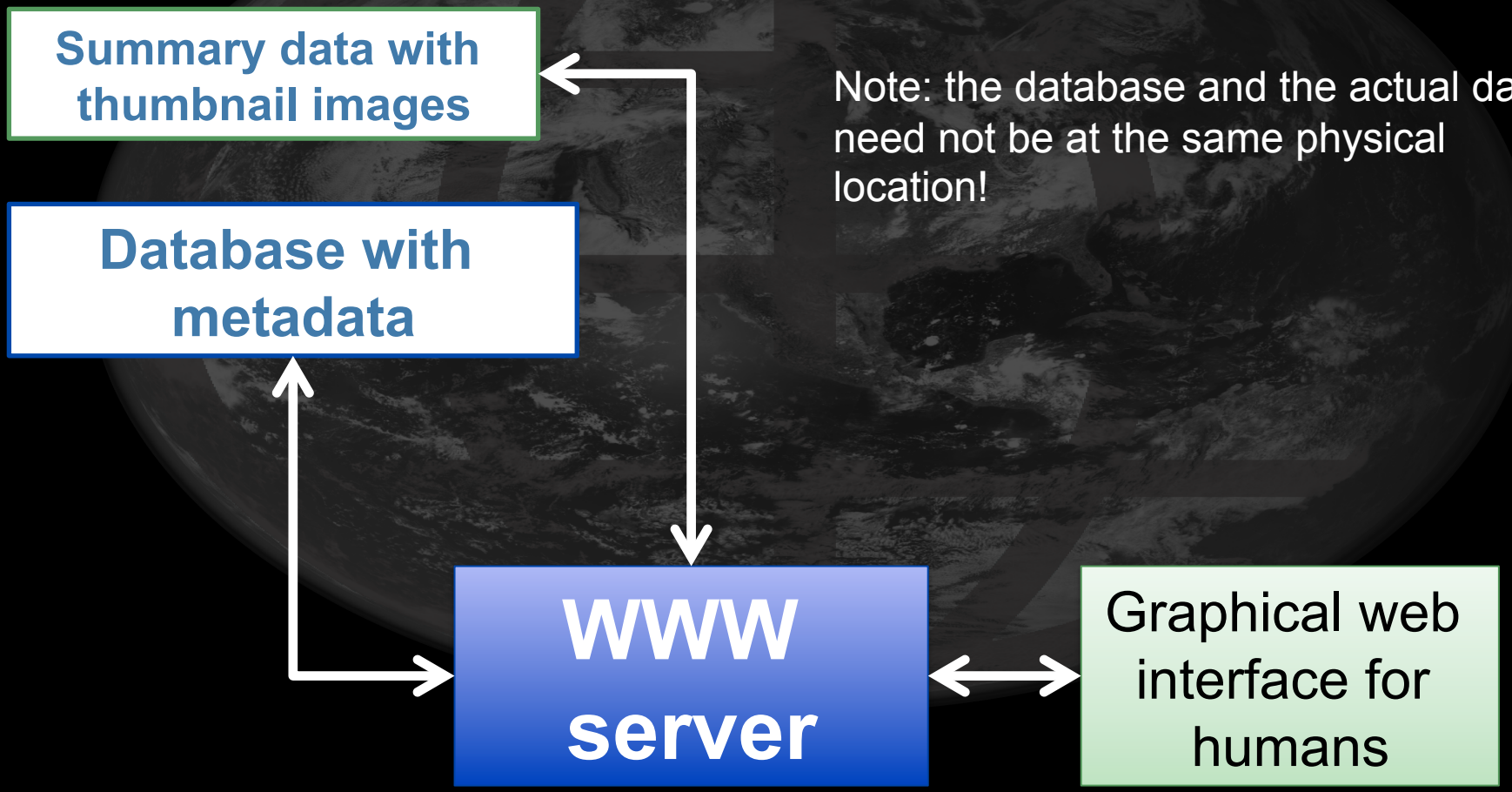
# GAIA v1.0




Note: the database and the actual data need not be at the same physical location!

# Development needs

- GAIA v1.0 was a worthwhile experiment but things needed to be changed
  - *“you need to do it at least once to know how you should not do it”*
- Only one WWW server
  - The setup could not be used with multiple distributed servers without a complete re-write

# Challenges

- The #1 challenge: differences between web browsers
  - we used XML and *sarissa*, which is a cross-wrapper library for popular browsers
- Database organisation planning
  - not difficult in itself but deciding what metadata to include and exclude took time

# Challenges

- Data formats: there is no agreed format for solar-terrestrial summary data!
- We decided to require that data are provided in a strict GAIA format
  - +**Simple and allows trivial implementation!!**
  - – A separate conversion from raw data to GAIA format is needed
    - A conversion is required in any case where summary data will be put publicly available

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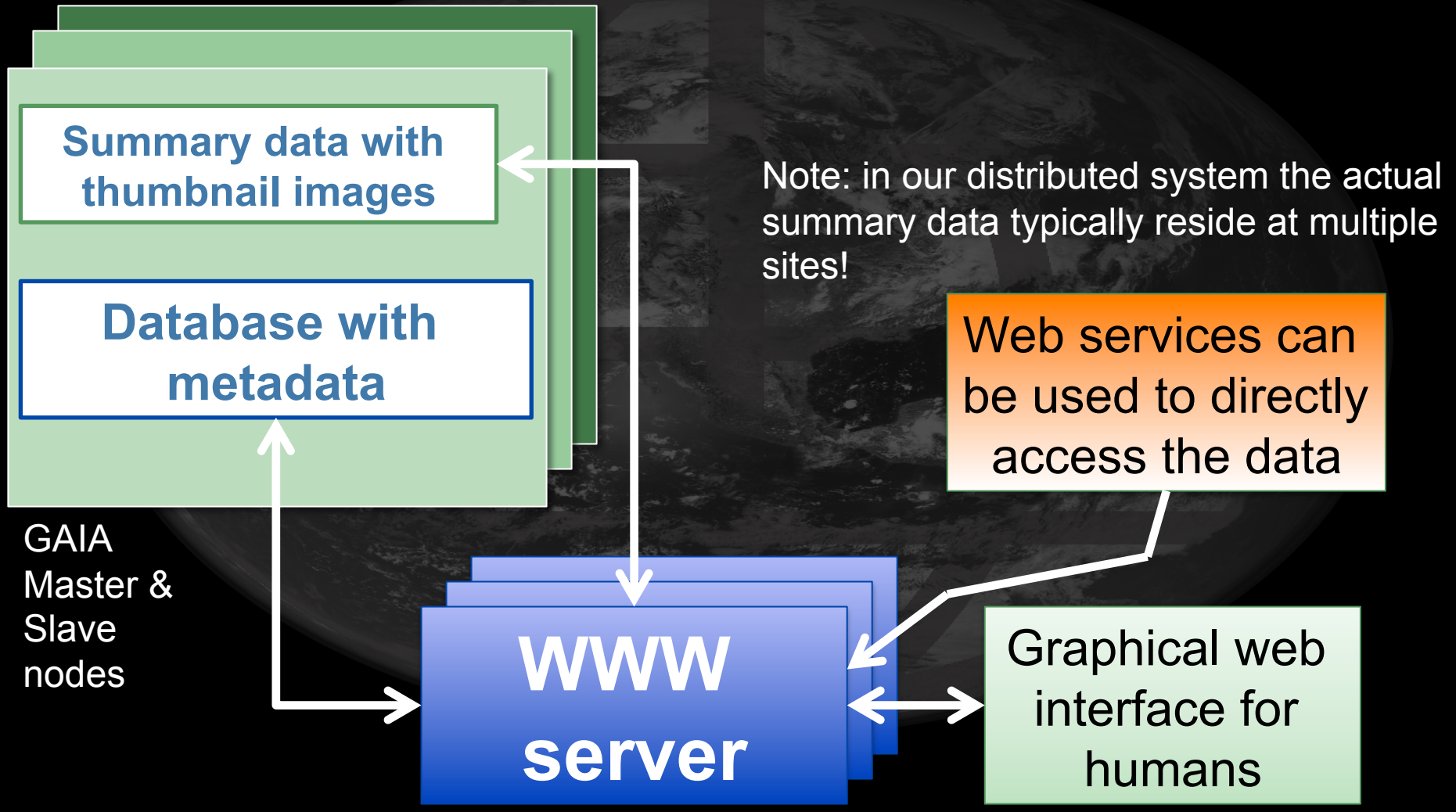
# GAIA v2.0



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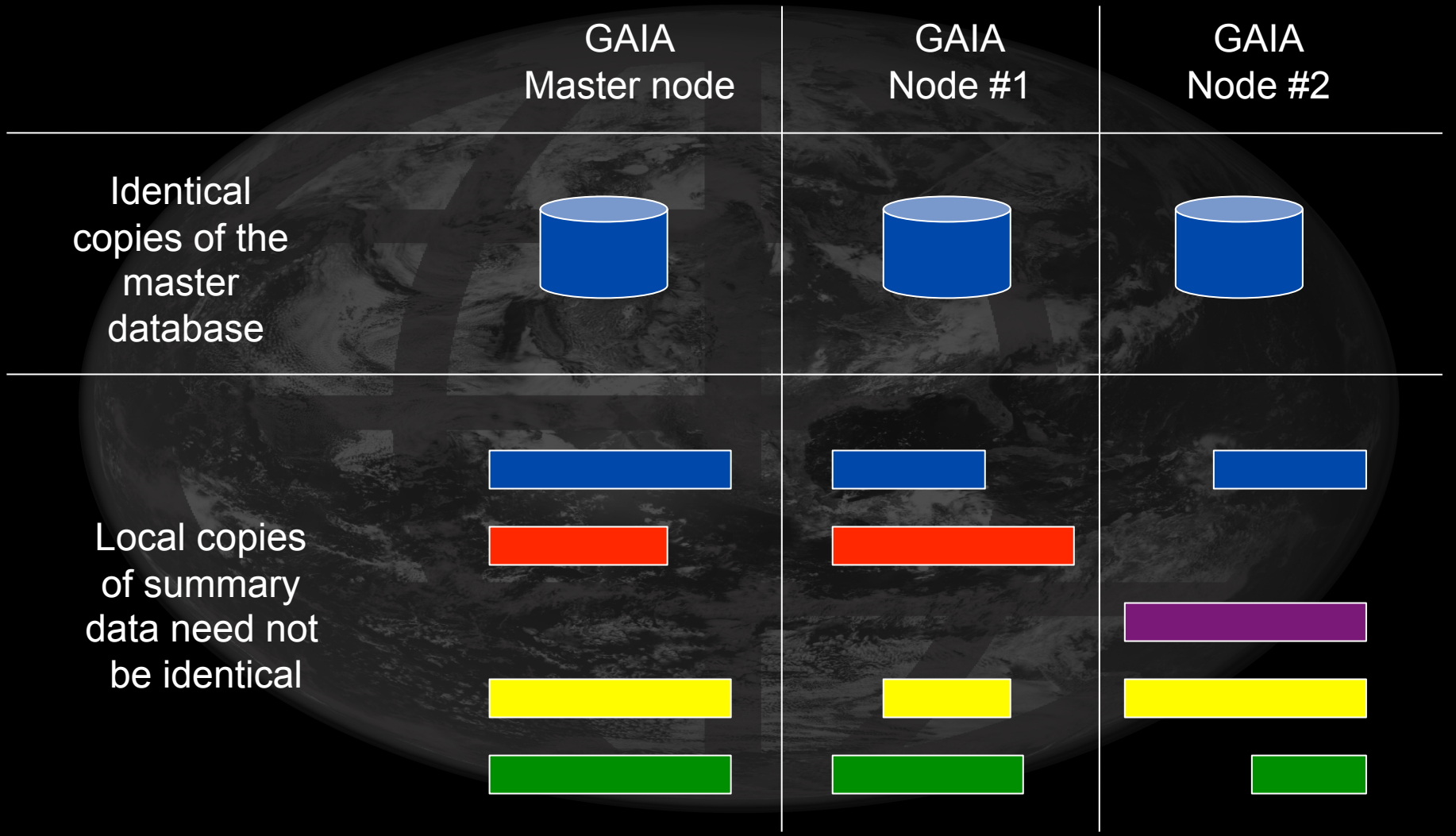


*(GAIA shows data from the geographically nearest node)*

# Summary

- Learning from “bad choices” in GAIA v1 was beneficial for planning v2
  - The first version allowed us to really concentrate on our needs and wants
  - “Learning by doing”
- Summary data, technical documentation and software can be found at

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