climate change initiative

→ CLIMATE MODELLING USER GROUP

Observation requirements

What do climate modellers need from observations?

October 2024

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cmug cci

CMIP Coupled Model Intercomparison Project
Model Benchmarking

ESA UNCLASSIFIED - For Official Use

Objectives of this session

CMIP Coupled Model Intercomparison Project
Model Benchmarking

esa

CMUG: Future evolution of Obs4MIPs

- Report on gap analysis and requirements
- Interviews with cross-section of modelling community
- All feedback welcome, from modellers and observation providers

ESMO: Facilitate integration and coordination of climate modelling and observational efforts

- Foster collaboration among scientists, stakeholders and decision makers
- Enhance accuracy, reliability and accessibility of climate data and projections

Today we will present the feedback we have gathered so far and ask for your input. Please let us know your thoughts now, email us after the talk or speak to us in the coffee break

- Amy: Amy.Doherty@metoffice.gov.uk
- Ranjini: r.swaminathan@reading.ac.uk

Objectives of this session

CMIP Coupled Model Intercomparison Project
Model Benchmarking

esa

Climate Modeling
- model development
- components, resolution

Observations
- Obs4MIPS
- Satellite data/ESA CCI
- Other obs

Scientific and other users
- model evaluation
- impacts and analysis
- assessment reports
- mitigation and adaptation policy
- industry e.g. insurance

Applications for climate observations

- Global models
- Regional models
- Digital twins
- Machine learning/AI
- Reanalysis
- Ensembles
- Climate services

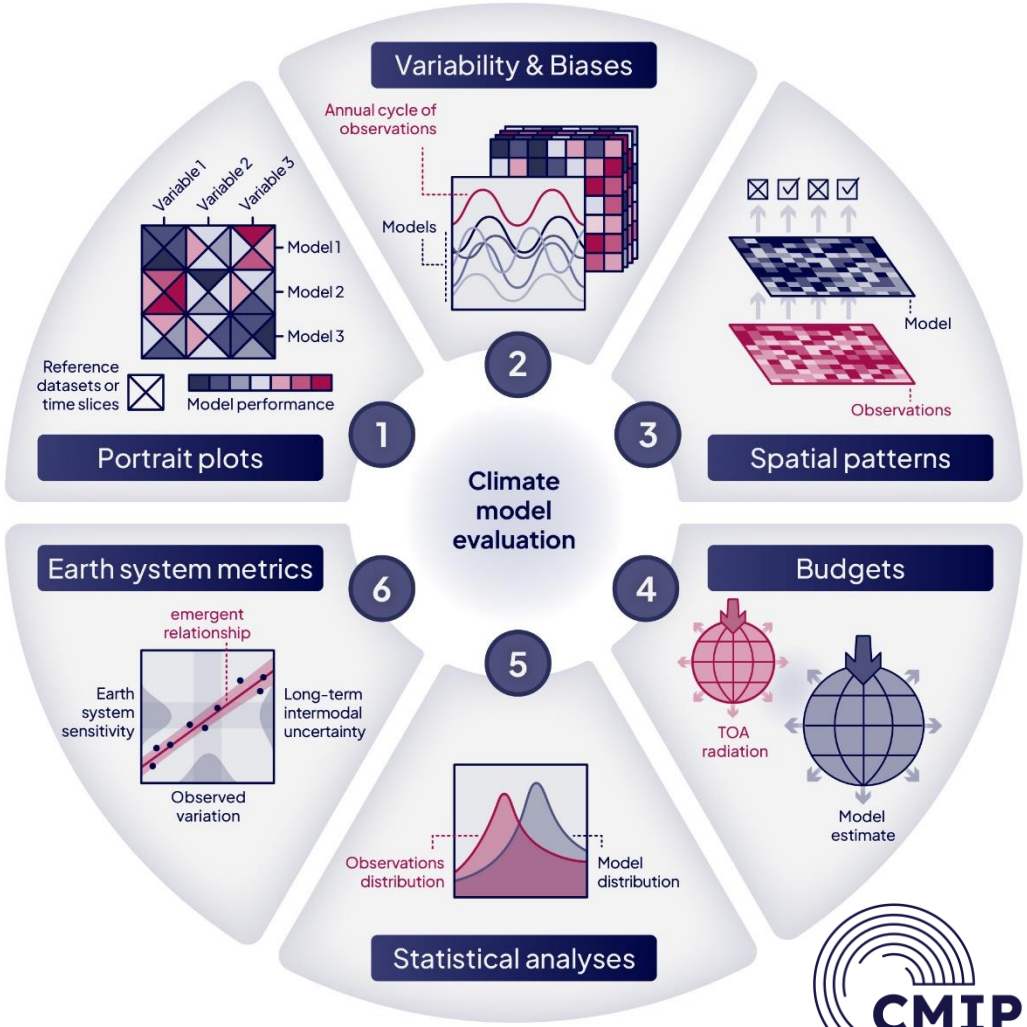
- Urban modelling
- Hydrological modelling
- Ocean biogeochemistry
- Seasonal prediction
- Land surface modelling
- Tropical cyclones
- CORDEX
- CMIP
- Paleo simulations
- Coupled modelling
- Emissions modelling
- Impact modelling

- Downscaling
- Verification
- Initialisation
- Bias correction
- Representivity
- Baseline Climatology
- Data Assimilation
- Training datasets

Requirements – from model benchmarking TT

- Documentation
  - Provenance and Usage guidance – dos and don'ts
  - Regridding, sampling, up/downscaling, uncertainty propagation information
  - Other: IAV removal, absolute vs anomalies
- Data formats and standards
- Versioning, archiving and accessibility
- Data synthesis – integrating multiple products for one variable
- Inter-community engagement
  - Identify gaps – e.g. new modeling components such as interactive fires
  - Under utilized data
  - Common goals, new missions

Requirements – from model benchmarking TT



- Rapid Evaluation Framework for CMIP7 (REF)
- CEOS
- WGORC

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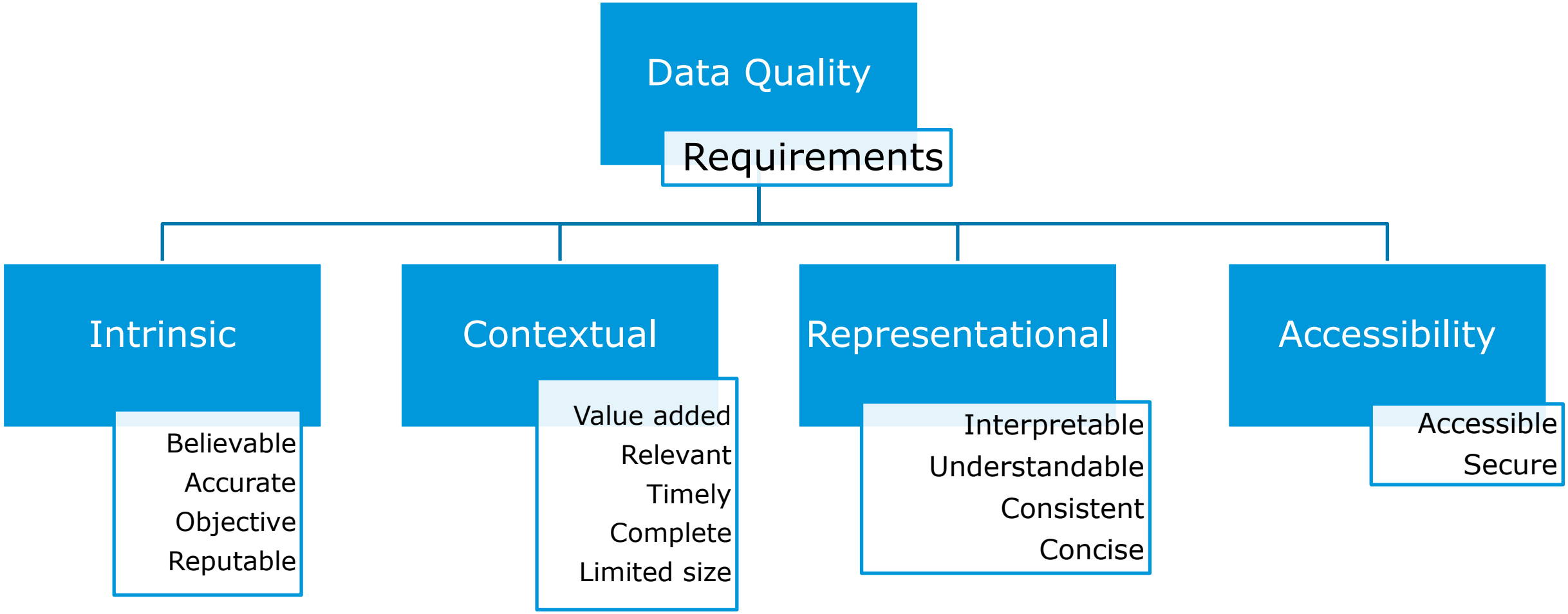
Requirements – from CMUG interviews

- Top level contents list with dataset specifications
- Datasets regularly updated
- Consistency in file format/resolution/meta data/accessing/documentation
- QC described in metadata
- Comparison of different datasets and guidance on applicability
- Higher resolution
- Tools to subset and manipulate the data before download
- Cloud computing environment to minimise data transfer and storage

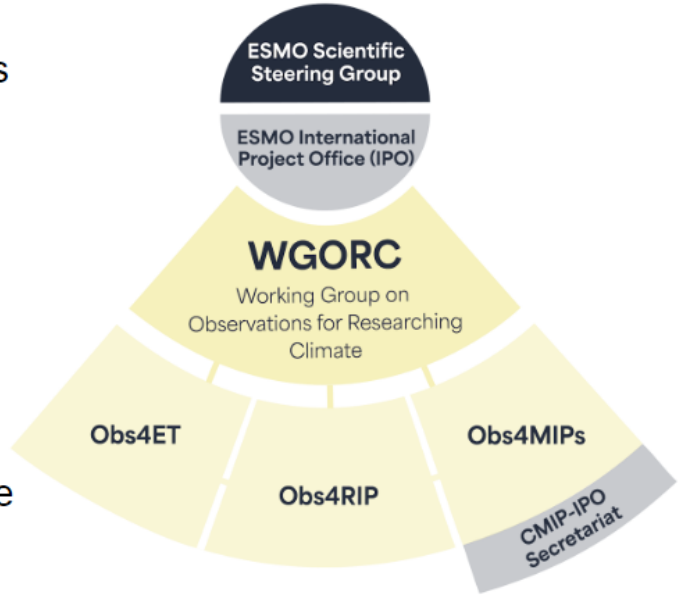
From: Wang & Strong 1996 Beyond accuracy: What data quality means to data consumers (mit.edu)



Working Group on Observations for Researching Climate (WGORC)

This WG is currently being established, there will be an **open call for WGORC panel** membership early 2025!

- A new ESMO working group to identify and address **research gaps in climate observation data** and act as a facilitator for **collaboration across diverse research and industry sectors.**
- WGORC will focus on advancing both the use and development of **reanalysis, initialization, and prediction (RIP)** data to improve climate models and enhance future forecasting capabilities.
- WGORC will also explore how **emerging technologies (ET)**, such as machine learning and AI, can enhance the use and application of climate data.



ESMO Earth System Modelling and Observations

WCRP World Climate Research Programme

WGORC Co-chairs

- **Amy Doherty**, Met Office, UK
- **Douglas Rao**, North Carolina Institute for Climate Studies, USA

Research	Communication	Dissemination
Gap analysis	Liaison	Requirements
Research ideas	User needs	Standards
Recommendations	Advice	Dataset promotion

Interactive/discussion session

- QC, standardization, documentation
- Scoping new variables and applications through engagement
- Thoughts on requirements
- Funding?

- Uncertainty characterisation – how can we standardise this?
- User access tools

- Best practice on data standards