

CMIP6: Toward understanding past, present and future climate

a distributed organization:

1. Establish a set of CMIP **ongoing** model development evaluation and characterization experiments to gain basic information about model performance and sensitivity (CMIP)
 - done by most groups as part of the development cycle.
 - revisited whenever a new model was developed
 - The basis for the Model Intercomparison Projects
 - Evolve only slowly (10-15 yr time scales)
 - CMIP Panel continues to manage the details of these experiments
2. Organize sets of experiments to address science questions within the context of the WCRP Grand Challenges and AIMES input specific to CMIP6:
 - Systematic biases
 - Response to forcings
 - Variability, predictability and future scenarios
3. Around these experiments build CMIP6 with additional, specialized intercomparisons (“MIPs”) that would make use of the same standards and infrastructure.
 - Individual MIPs work with CMIP Panel to coordinate details of experimental design and variable lists and etc.; each MIP would designate which experiments would contribute to the CMIP6 science questions and thus target for wider participation of many modeling groups, and they could have other specialized experiments for their own communities
 - CMIP Panel has oversight and identifies the elements of the MIP experiments that are part of CMIP6

communication

- CMIP Panel facilitates communication between MIP co-chairs and the model group contacts to help with coordination between MIPs, and between the MIPs and the modeling groups

CMIP Panel:

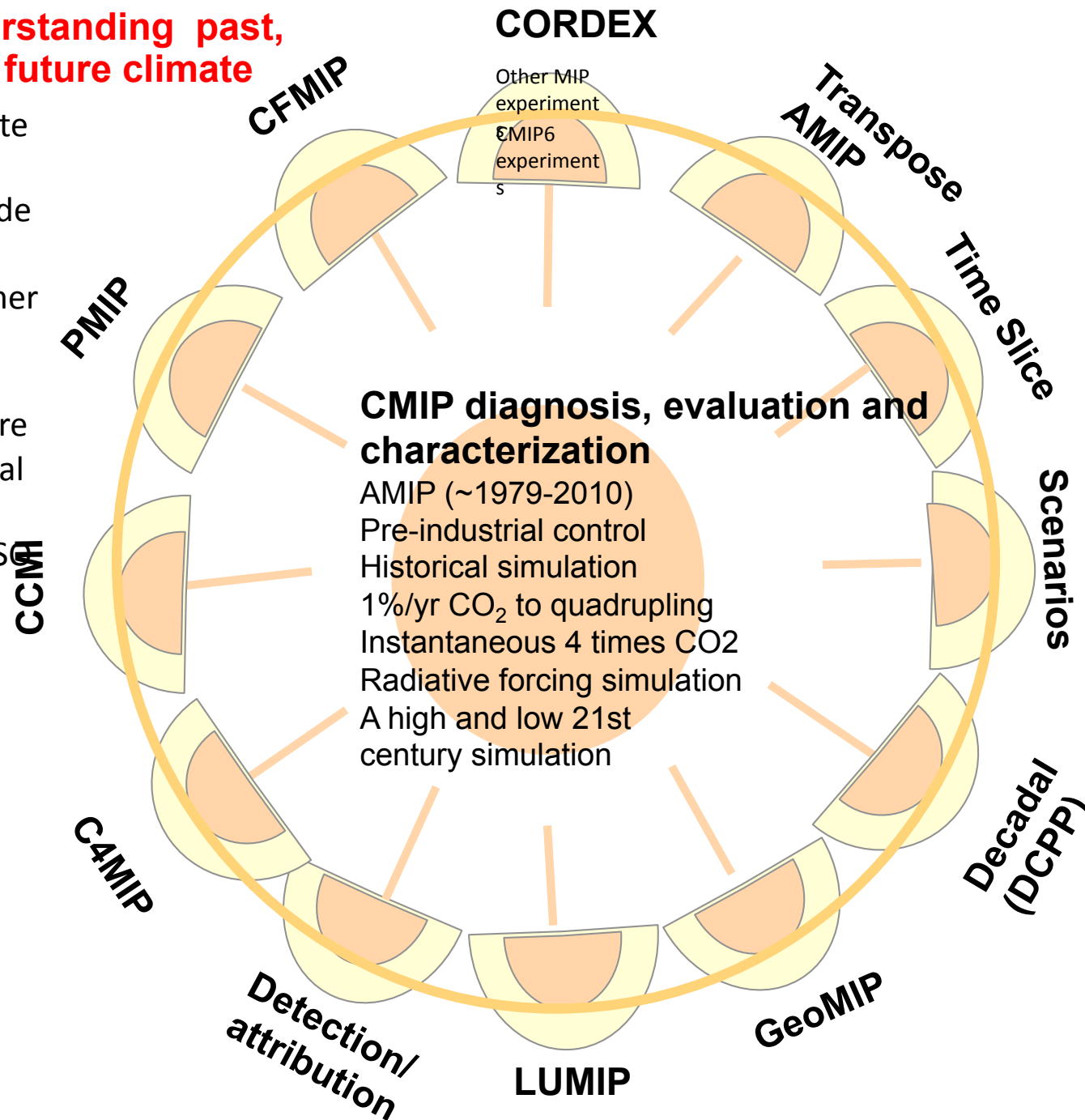
- Coordinate diagnosis and evaluation simulations with the community
- approve experiments and variable lists etc. that are to be part of CMIP6
- Coordinate with WCRP Grand Challenges

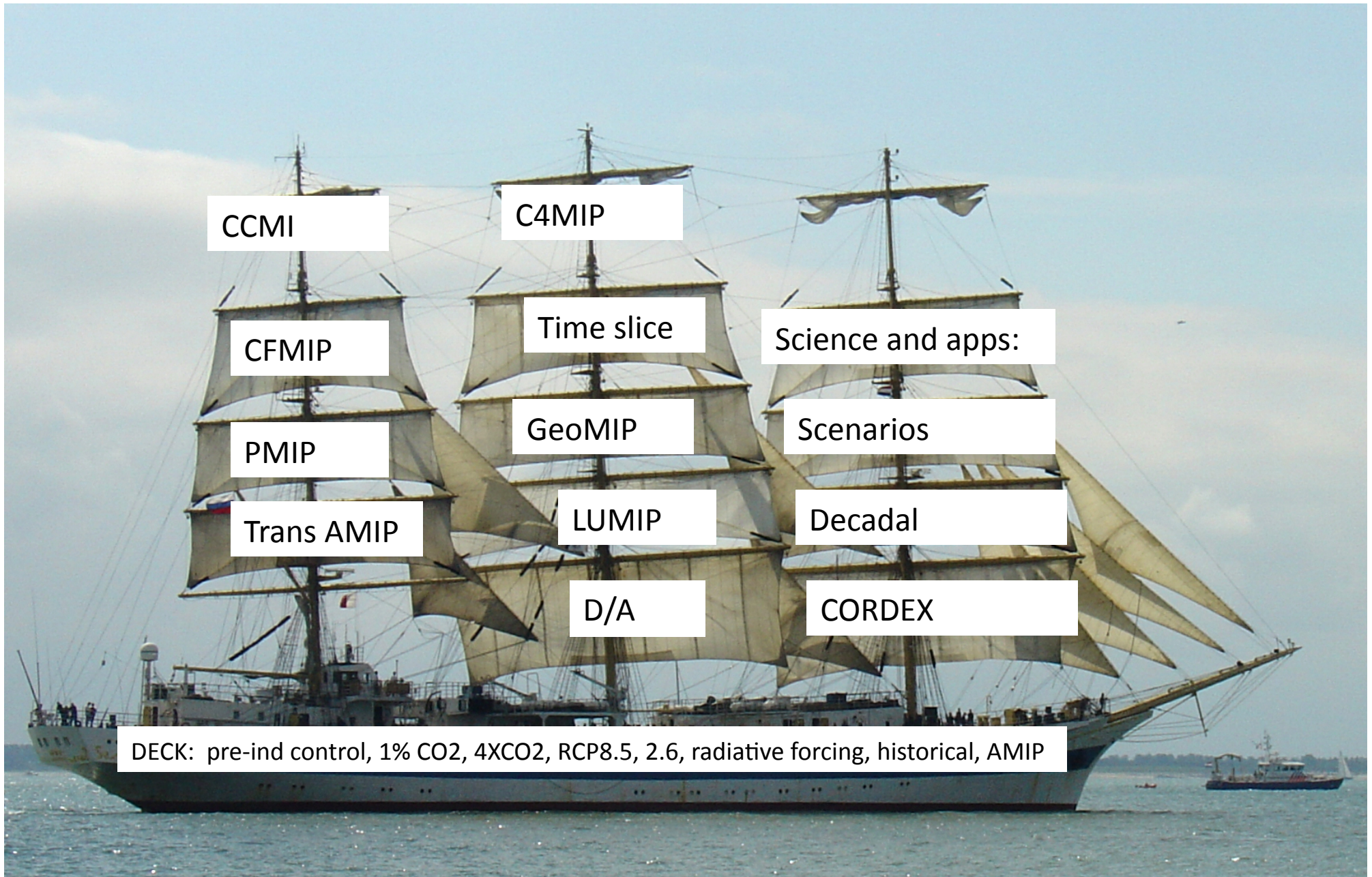
MIPs:

- Address WCRP Grand Challenges and science questions
- Suggest model simulations to address these science questions
- Work with CMIP Panel for output list for CMIP6 data request, and supply rationalization for relevance of experiments to address science questions
- MIPs determine which experiments are run when

CMIP and CMIP6: Toward understanding past, present, and future climate

The MIPs designate which are CMIP6 experiments (inside the orange circle) and which are other experiments not part of CMIP6 (yellow)...and there could be additional MIPs (e.g. CORE-forced ocean, ENSO etc.)





CCMI

C4MIP

CFMIP

Time slice

Science and apps:

PMIP

GeoMIP

Scenarios

Trans AMIP

LUMIP

Decadal

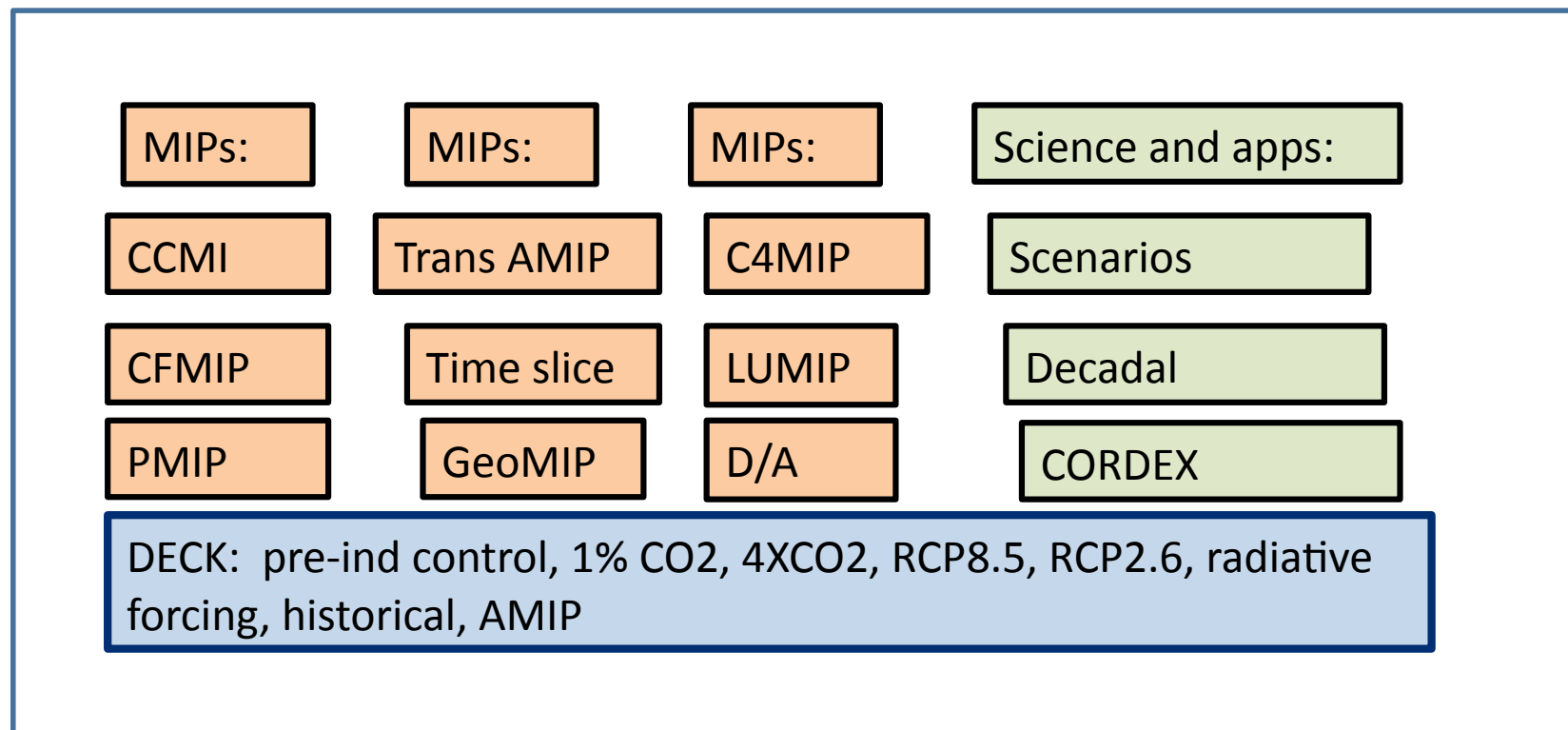
D/A

CORDEX

DECK: pre-ind control, 1% CO₂, 4XCO₂, RCP8.5, 2.6, radiative forcing, historical, AMIP

CMIP6: Toward understanding past, present and future climate

(Diagnosis, Evaluation and Characterization of Klima: DECK)



-Science and
next generation
of models

MIPs

CFMIP
GeoMIP
PMIP
ACCMIP
CCMI
AEROCOM
....

MAIPs

Climate change
simulations

- scenario runs
- regional downscale
- IPCC, applications

Decadal predictions

- global and regional
- post processing
- IPCC, applications

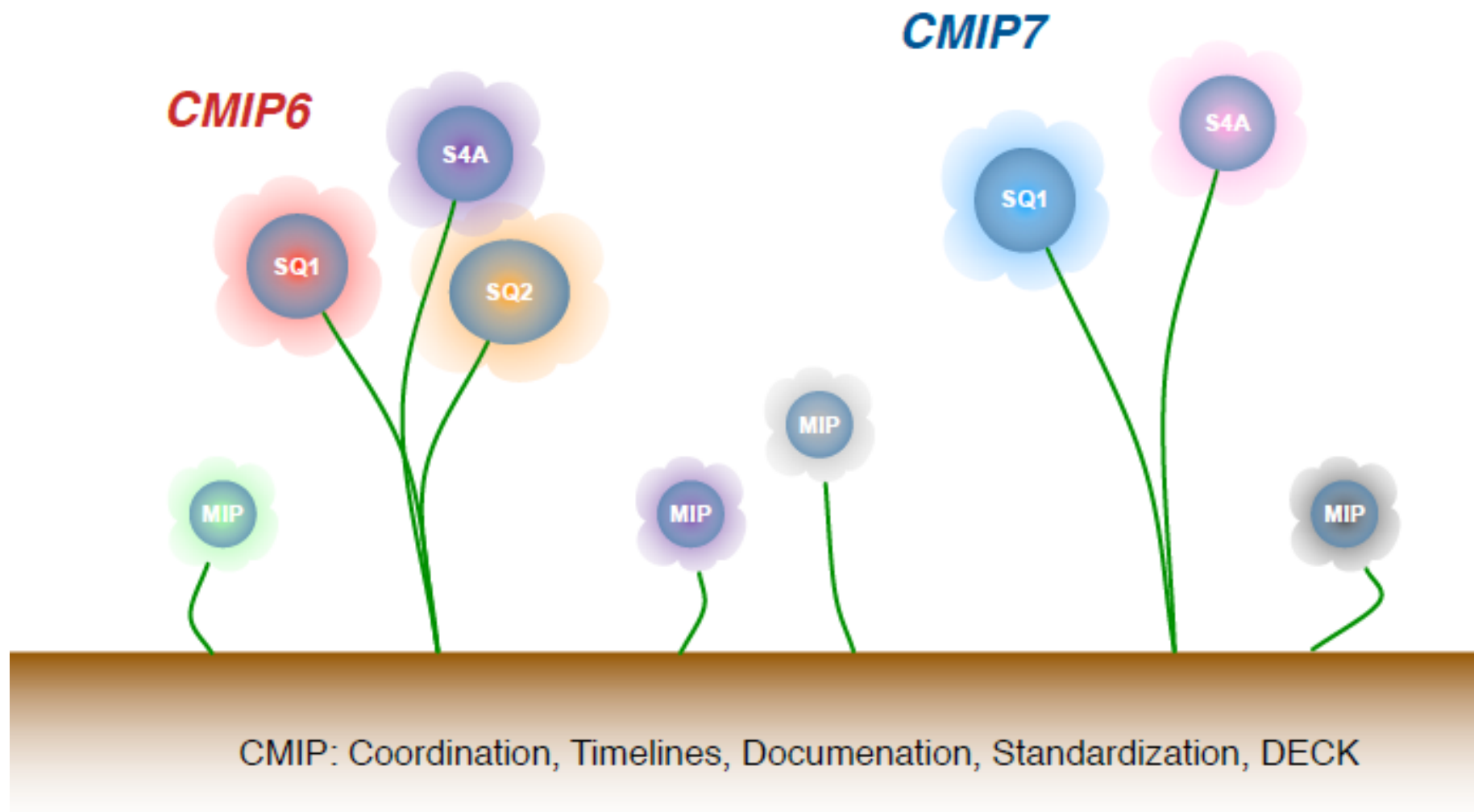
-Science and
service

- data for research
+ climate services
- timeliness

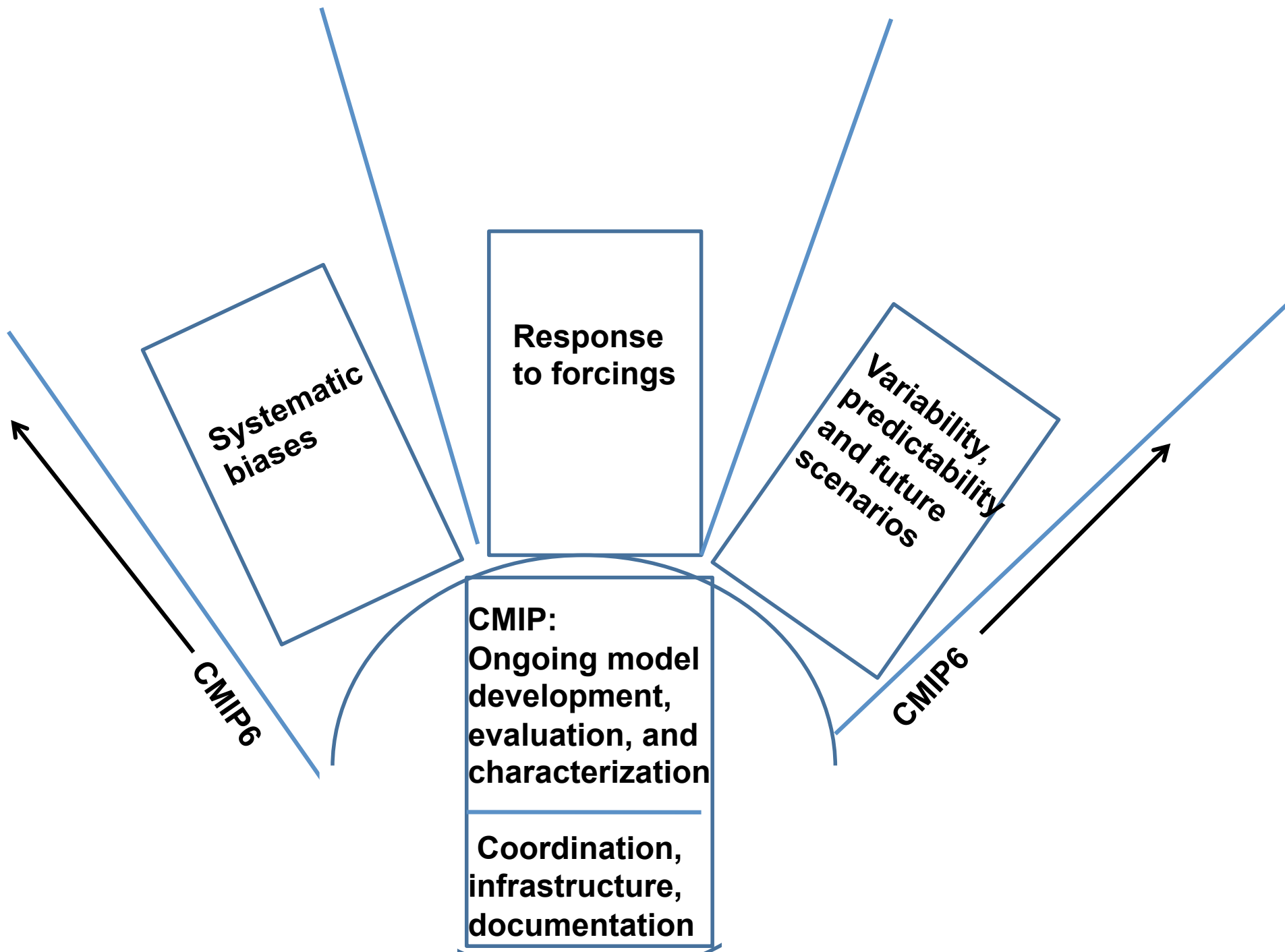
DEC

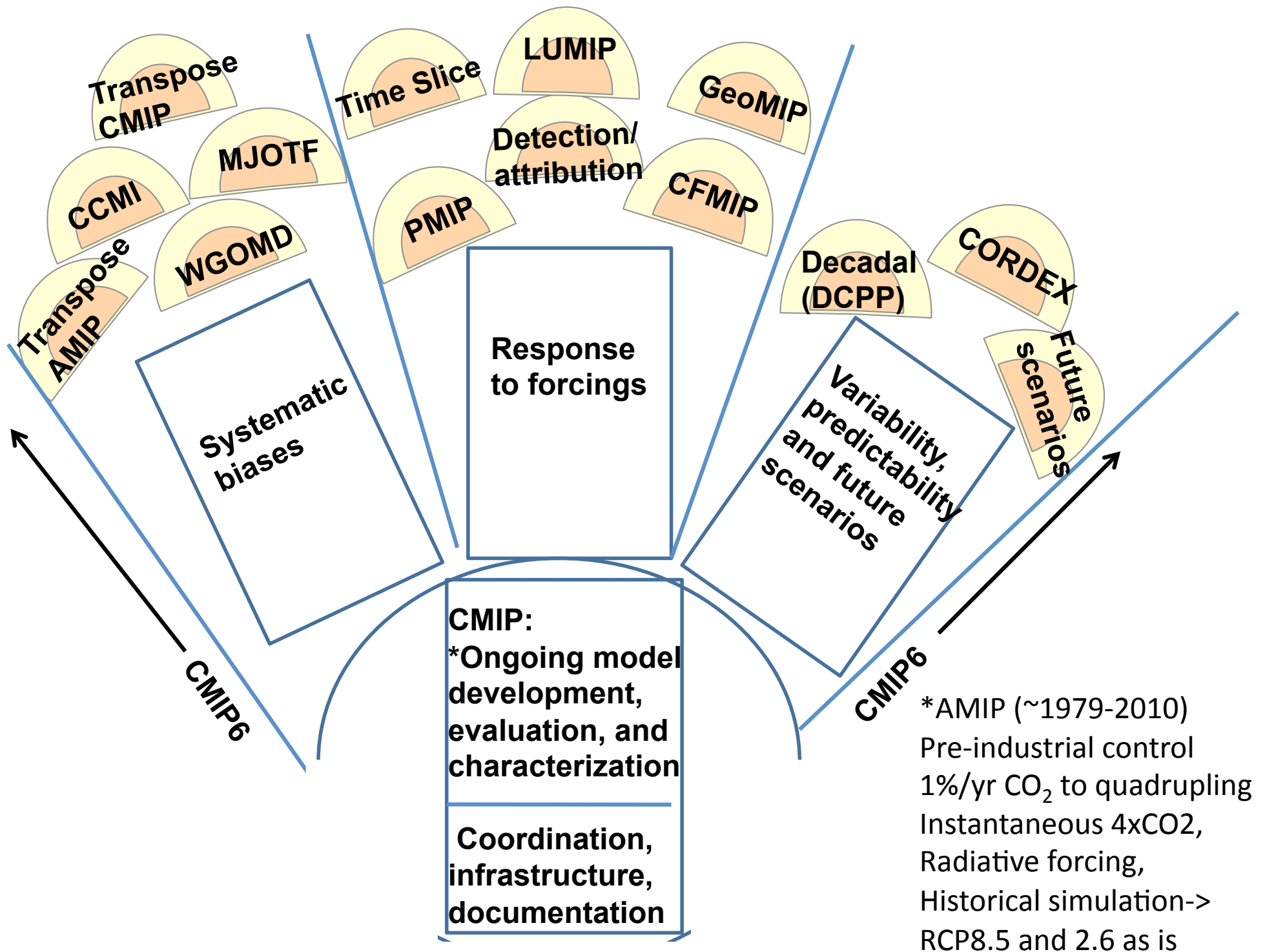
- Coordination
- Timelines
- Data and
archiving

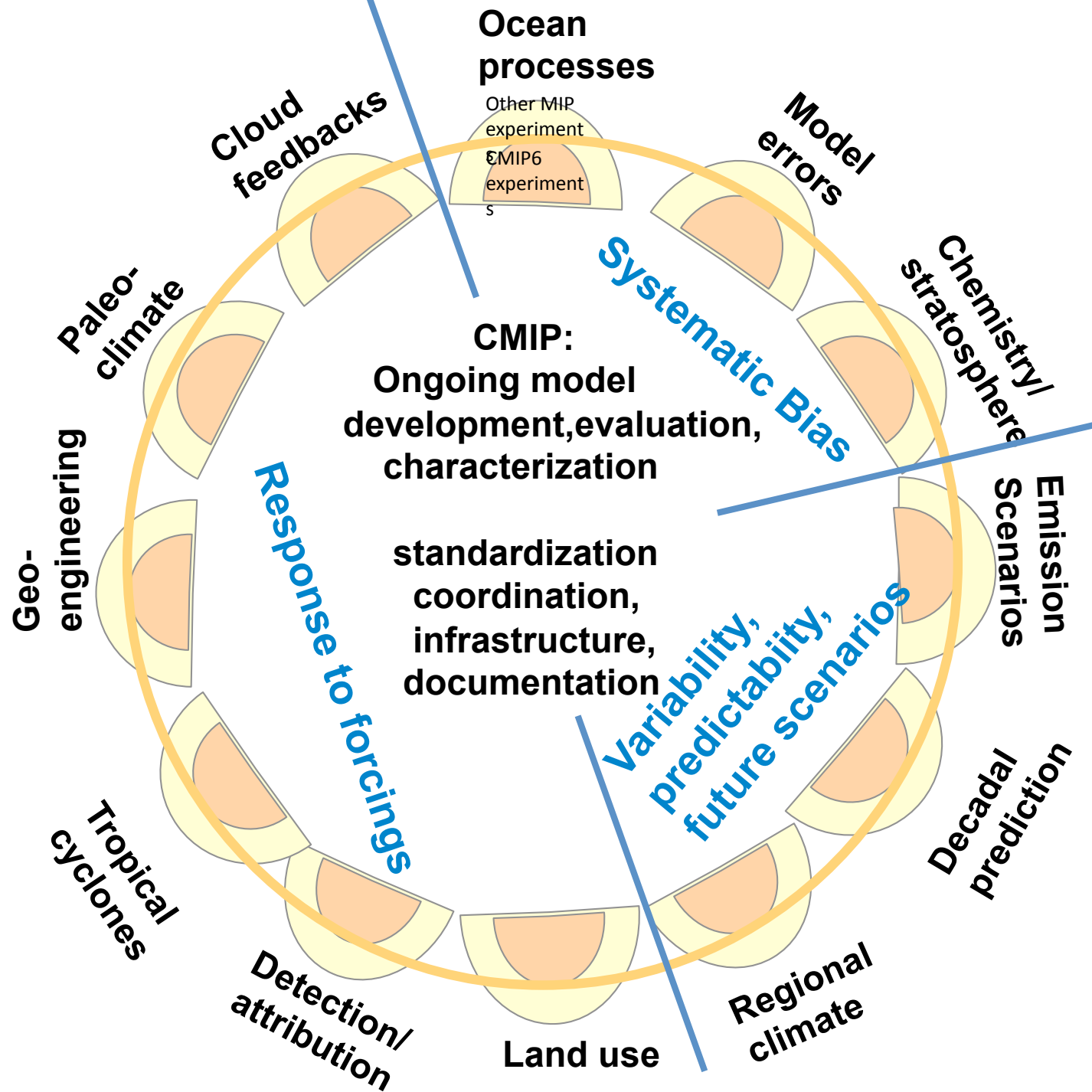
CMIP



SQ1: Interpretation of systematic biases in coupled models;
SQ2: Understanding the impact of forcings on the climate of the 20th and 21st century;
S4A: Science for applications







Ongoing model development, evaluation, and characterization experiments

*AMIP (~1979-2010), Pre-industrial control, 1%/yr CO₂ to quadrupling, Instantaneous 4xCO₂, Radiative forcing, Historical simulation-> RCP8.5 and 2.6 as is (concentrations for AOGCMs, emissions for ESMs)

Ongoing model development, evaluation, and characterization experiments

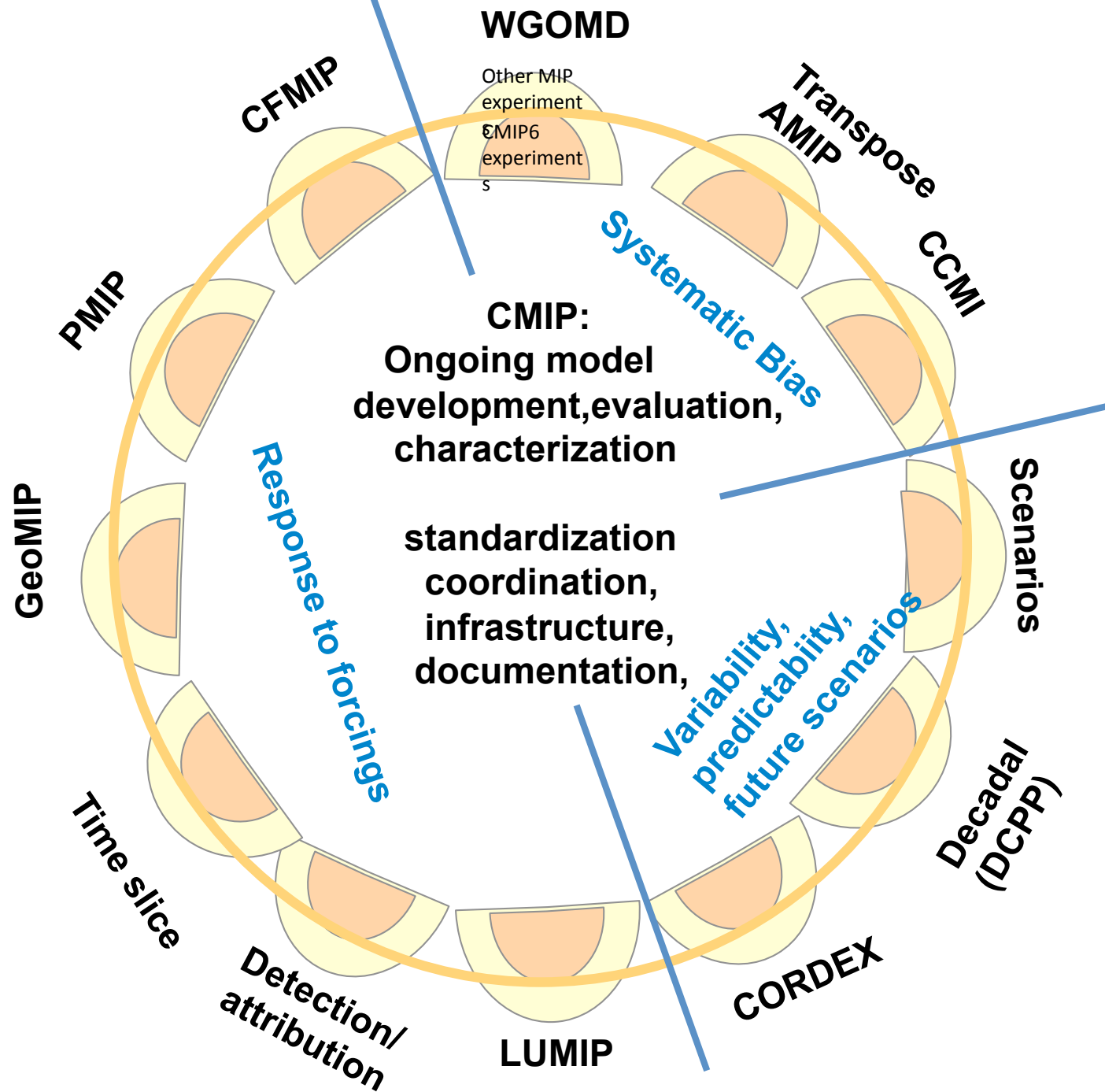
*AMIP (~1979-2010), Pre-industrial control, 1%/yr CO₂ to quadrupling, Instantaneous 4xCO₂, Radiative forcing, Historical simulation-> RCP8.5 and 2.6 as is (concentrations for AOGCMs, emissions for ESMs)

Scenario MIP

A **pair of two new scenarios** (high/low) run by all models with new 20th century (to 2015) and 21st century forcings (new emissions and concentrations need to be generated)



Scenario MIP matrix, modeling groups that subscribe run a **pair of two additional new scenarios** (models selected to sample scenario pair space)



Framing CMIP6 within the WCRP Grand Challenges and AIMES

Clouds, Circulation and Climate Sensitivity
Changes in Cryosphere

Climate Extremes

Regional Climate Information

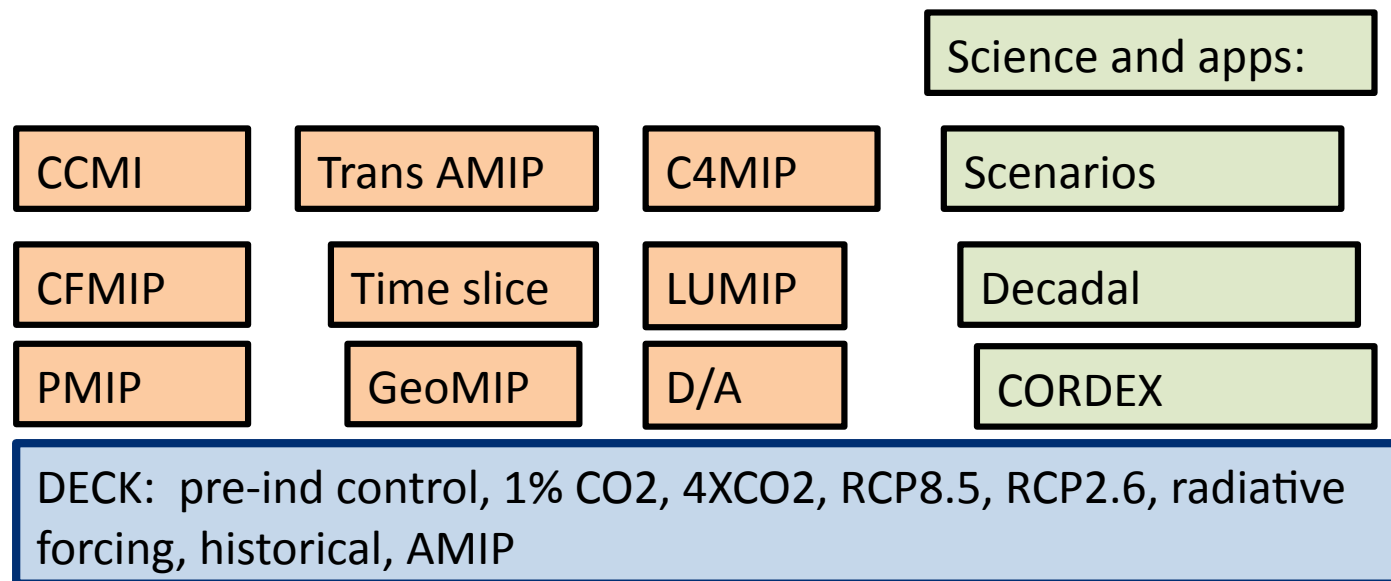
Regional Sea-level Rise

Water Availability

e.g. Carbon cycle grand challenge

CMIP6: Toward understanding past, present and future climate

(Diagnosis, Evaluation and Characterization of Klima: DECK)



Science Foci for CMIP6

Grand Challenges

1. Interpretation of systematic biases in coupled models

- WGOMD (forced ocean experiments)
- Process outputs
- TAMIP/TCMIP

2. Understanding of the impact of forcings on the climate of the 20th and 21st century

- Radiative Forcing (AMIP type)
- Individual Forcings (prescribed concentration of CO₂, aerosol, ozone? specified land use, solar?)

MIPs