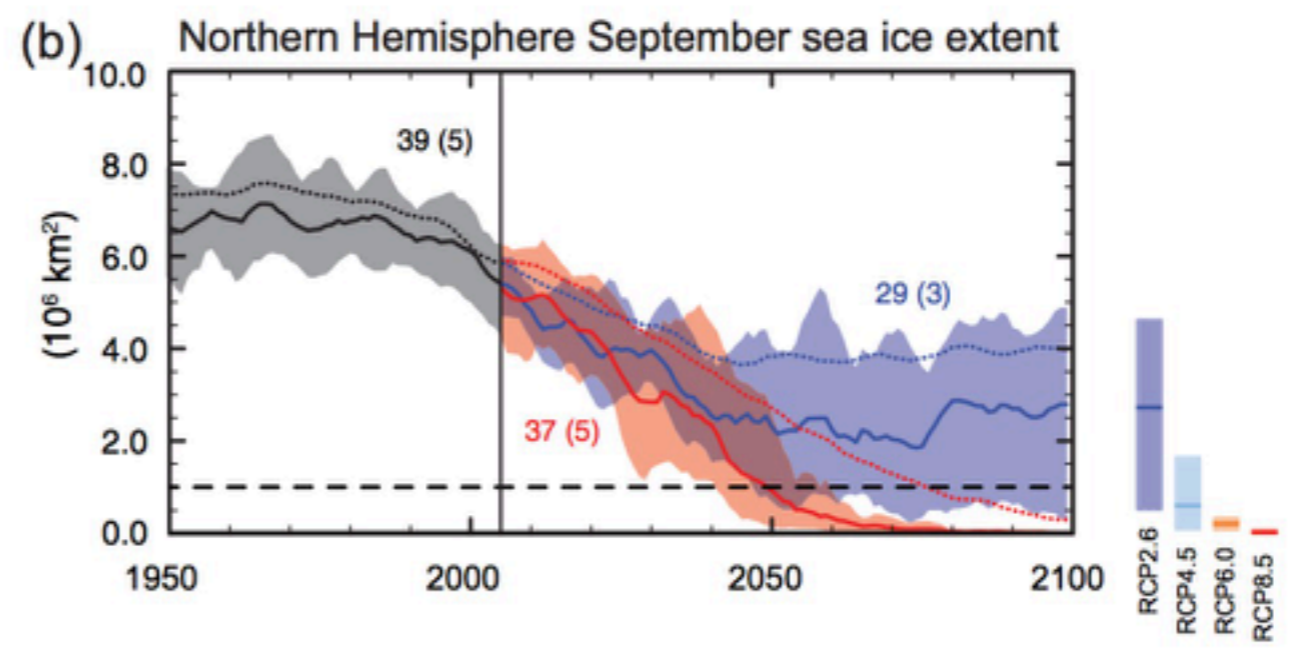
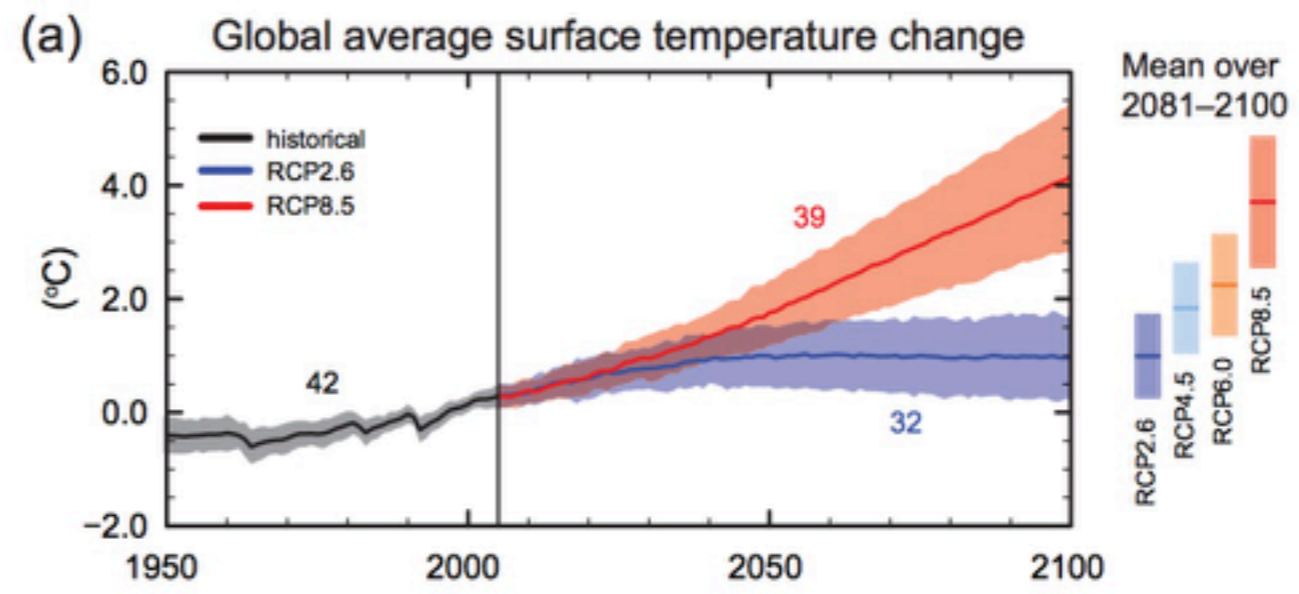
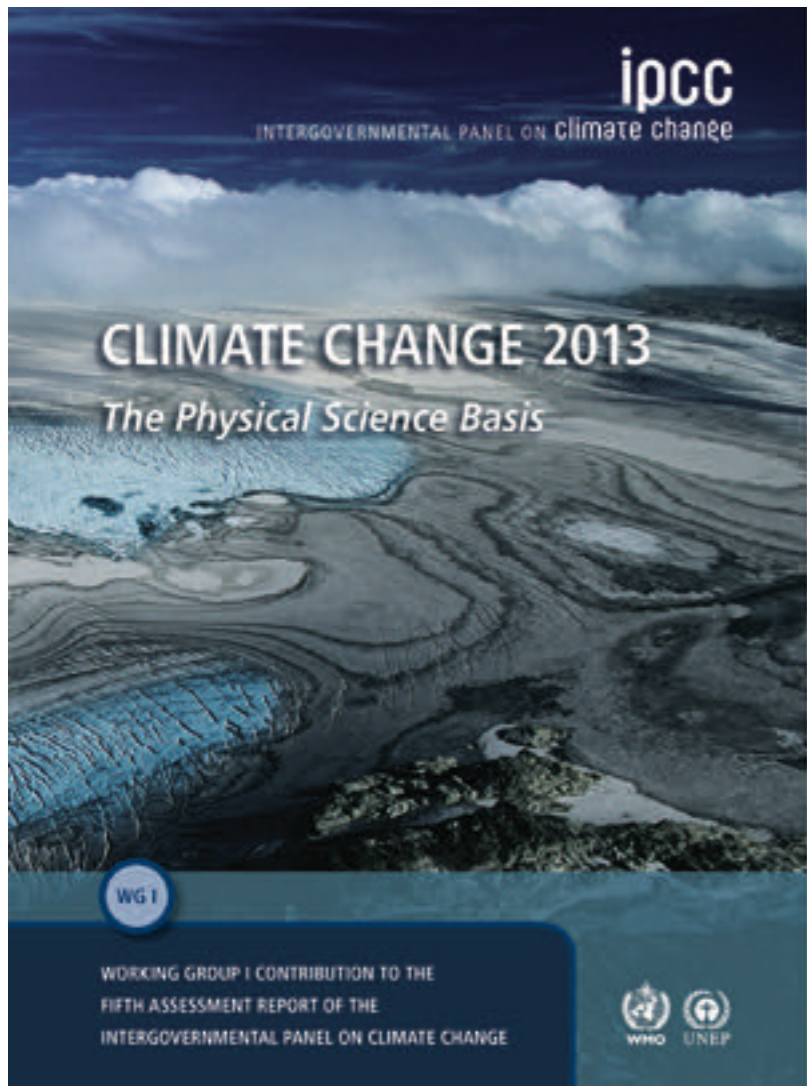


A field guide to CAO Models

- Our models are really diverse. How does each one work?
- What kinds of predictions will each of these models make possible?
- What opportunities are there to compare models across the four projects, or improve a model in one project using data from another?
- What is the relationship between the CAO models and NEMO-MEDUSA / UKESM2?

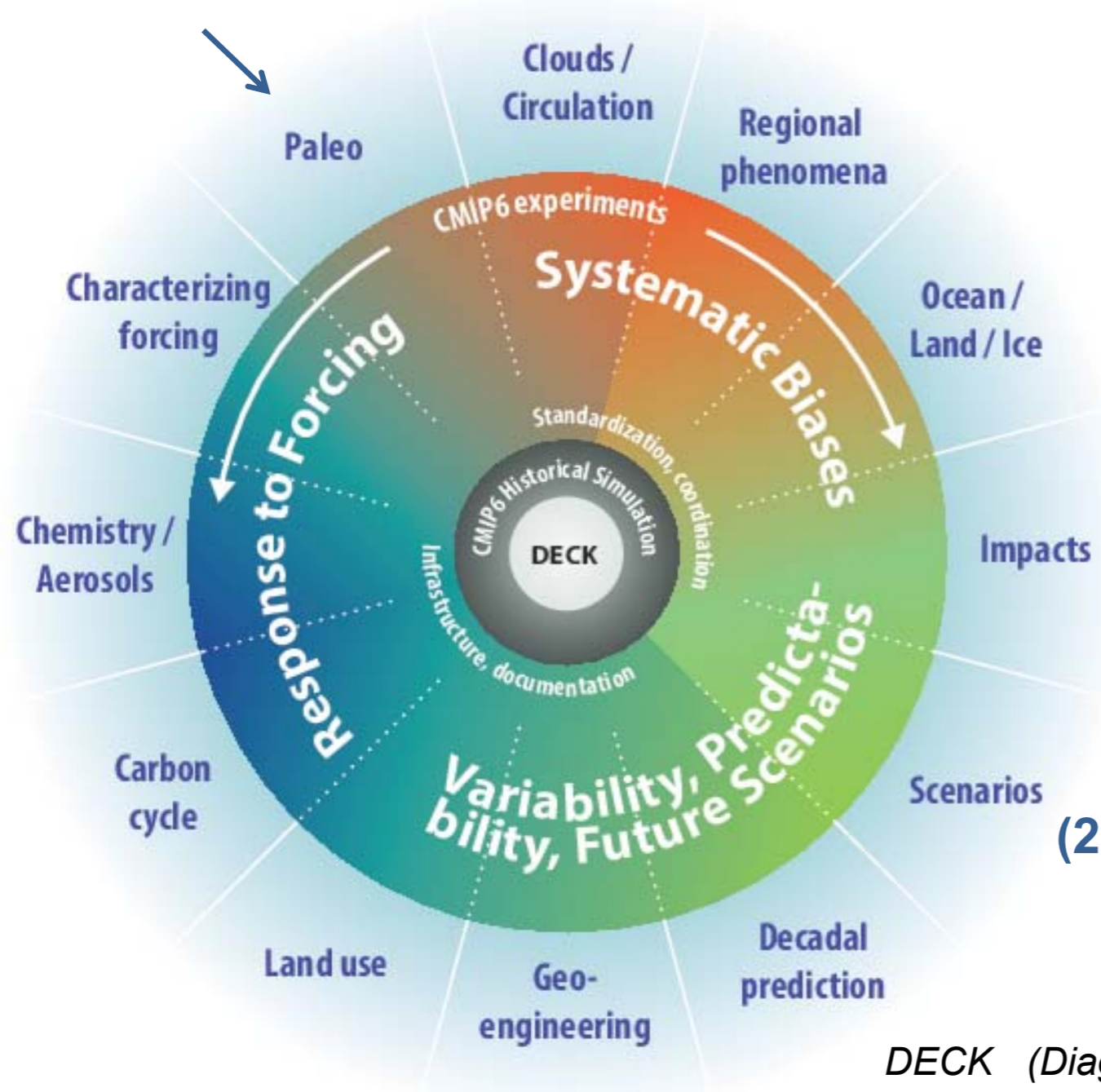
Context: UKESM2 and the CMIP process

valuable information by Andy Yool (NOC)
+ errors by Neil Banas (Strathclyde)



CMIP: a More Continuous and Distributed Organization

(3) CMIP-Endorsed Model Intercomparison Projects (MIPs)



(1) A handful of common experiments

DECK (entry card for CMIP)

- i. AMIP simulation (~1979-2014)
- ii. Pre-industrial control simulation
- iii. 1%/yr CO₂ increase
- iv. Abrupt 4xCO₂ run

CMIP6 Historical Simulation (entry card for CMIP6)

- v. Historical simulation using CMIP6 forcings (1850-2014)

(2) Standardization, coordination, infrastructure, documentation

DECK (Diagnosis, Evaluation, and Characterization of Klima) & CMIP6 Historical Simulation to be run for each model configuration used in CMIP6-Endorsed MIPs

CMIP6: Participating Model Groups

	Institution	Country		Institution	Country		Institution	Country
1	AWI	Germany	12	DOE	USA	23	MRI	Japan
2	BCC	China	13	EC-Earth-Cons	Europe	24	NASA-GISS	USA
3	BNU	China	14	FGOALS	China	25	NCAR	USA
4	CAMS	China	15	FIO-ROCM	China	26	NCC	Norway
5	CasESM	China	16	INM	Russia	27	NERC	UK
6	CCCma	Canada	17	INPE	Brazil	28	NIMS-KMA	Republic of Korea
7	CCCR-IITM	India	18	IPSL	France	29	NOAA-GFDL	USA
8	CMCC	Italy	19	MESSY-Cons	Germany	30	NUIST	China
9	CNRM	France	20	MIROC	Japan	31	TaiESM	Taiwan, China
10	CSIR-CSIRO	South Africa	21	MOHC	UK	32	THU	China
11	CSIRO-BOM	Australia	22	MPI-M	Germany	33	Seoul Nat.Uni	Republic of Korea

New in CMIP:

- 2 new model groups from Germany (AWI, MESSY-Consortium)
- 4 new model groups from China (CAMS, CasESM, NUIST, THU)
- 1 new model group from Brazil (INPE)
- 1 new model group from India (CCCR-IITM)
- 1 new model group from Taiwan, China (TaiESM)
- 1 new model group from USA (DOE)
- 2 new model group from Republic of Korea (NIMS-KMA, SAM0-UNICON)
- 1 new model group from South Africa / Australia (CSIR-CSIRO)

=====

⇒ **13 new model groups so far**

* Other models can join providing DECK and historical simulations are submitted

More models (>70)
New models
More complex models
Higher resolution models



C4MIP, OMIP, AerchemMIP: UKESM1-Ir
LS3MIP: HadGEM3-Ir

CMIP6 Historical
UKESM1-Ir

Repeat key **C4MIP, AerchemMIP**
runs with UKESM1-hybrid

CMIP-DECK
UKESM1-Ir

ScenarioMIP: UKESM1-Ir
ISMIP: HadGEM3-hr

Repeat key
ScenarioMIP runs
UKESM1-hybrid

2017

2018

2019

2020

Subsequently, UKESM1's higher resolution variants will repeat experiments for CMIP

CMIP-DECK

UKESM1-hybrid

CMIP6 Historical

UKESM1-hybrid

Part of CMIP-DECK and historical runs using UKESM1-hr

Likely not full period runs (hence not submitted to CMIP6)

NEMO-MEDUSA runs available now

1860–2100 for RCP2.6 and RCP8.5 (low and high end of future scenarios) at **1°**
(Yool et al. 2013a,b, Popova et al. 2014, Yool et al. 2015)

1980–2100 for RCP8.5 at **1/4°**
(Yool et al. 2015)

1990–2015 under hindcast (observationally derived) forcing at **1/12°**

The next few years

2018: most UKESM experiments for CMIP6 at 1°

2019–20: more limited time periods and scenarios at 1/4°

Timeline for input to UKESM2 / CMIP7:

- **Parameterisation: after end of CAO programme**
- **Adding new processes and state variables: sooner than that!**