Developments for UKESM2

Plans for UKESM2 (early days so still evolving)

UKESM2 will be built on HadGEM3-GC5 (available ~ mid 2022)

Aim for UKESM2 to be "operational" / science ready ~ mid 2024

Primary developments:

- Workhorse model will stay at N96L85 – ORCA1L75

- Have an exploratory configuration at higher resolution (e.g. using hybrid approach)

- CASIM multi-moment cloud microphysics (if successfully adopted for GC5)

- Ability to run model with emissions of CO_2, CH_4 and Nr/N_2O

  An initial CO_2 + CH4 emission driven version of UKESM1 running (see Folberth et al. talk tomorrow)

- Interactive Greenland and Antarctic ice as part of the standard model configuration.

- Wildfires fully interactive

- Improved representation of human land use

- Nitrate aerosol

- Modal dust

- Improved stratospheric ozone

- Develop a "fast" version (after main configuration is released)

# Coupling a fire model into UKESM1

UKESM1-AMIP + INFERNO wildfires

Vegetation prescribed from UKESM1 historical run (without fires)

INFERNO fires coupled to and emitting into UKCA+GLOMAP

UKESM1 with INFERNO active and Impacting dynamic vegetation
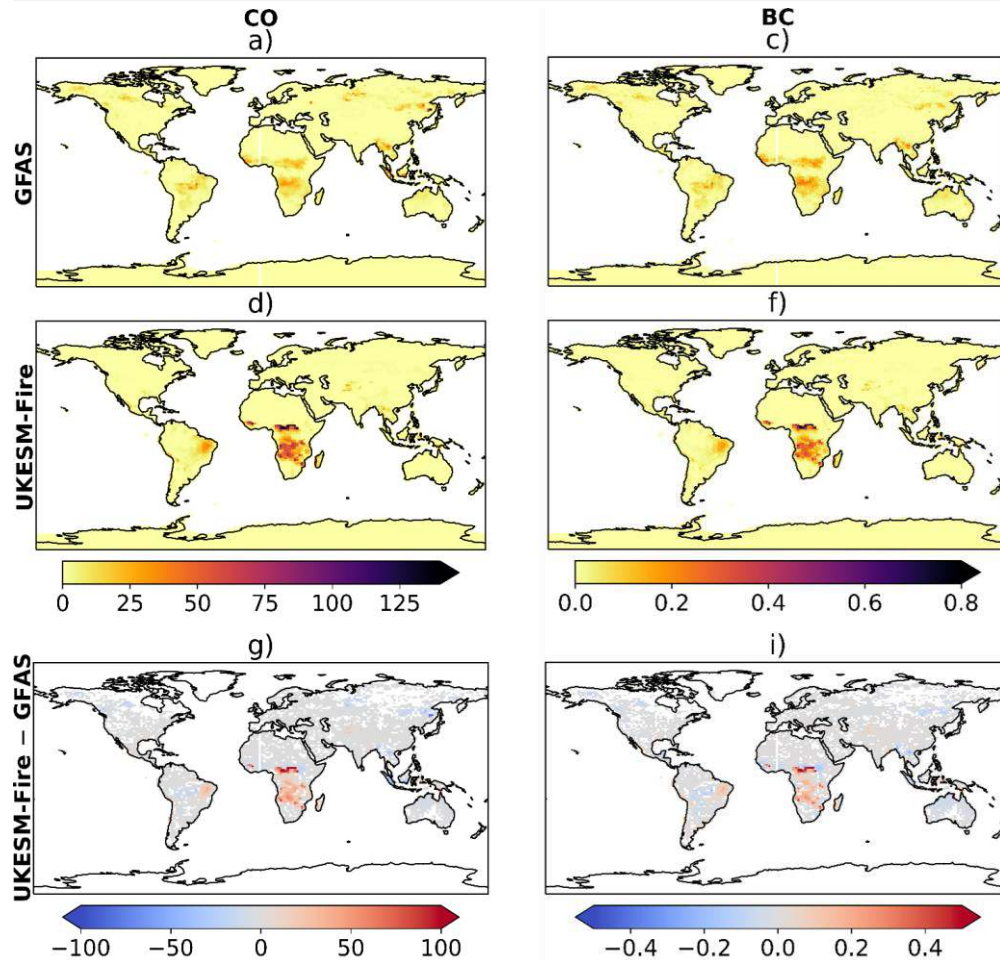
Errors in CO and BC emission in UKESM1-AMIP+INFERNO are collocated with biases in the vegetation prescribed from UKESM1 without fires
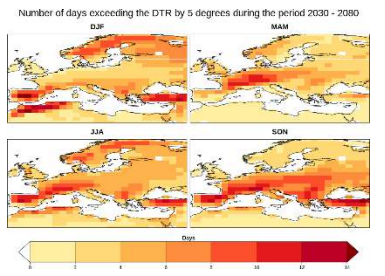
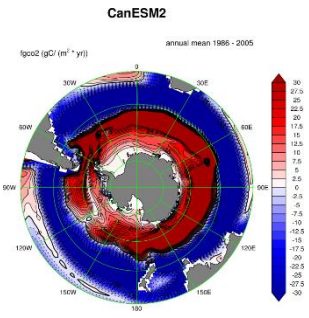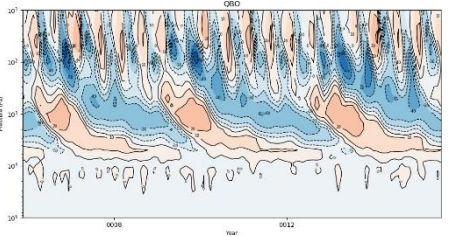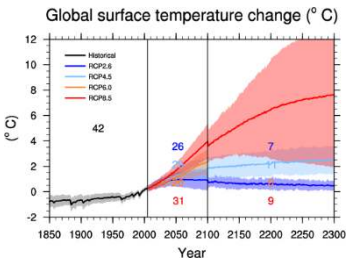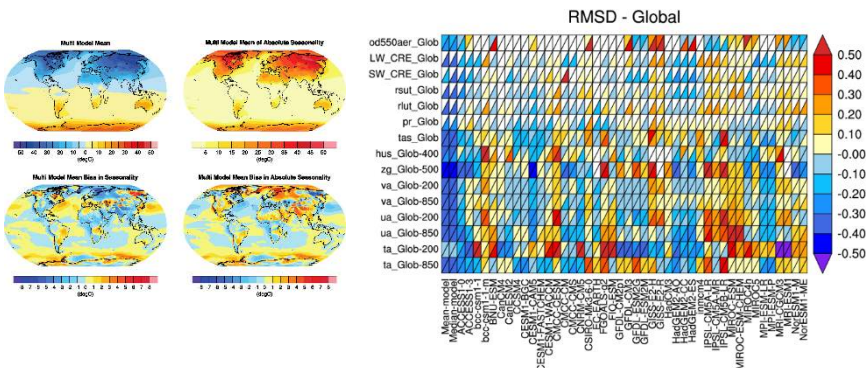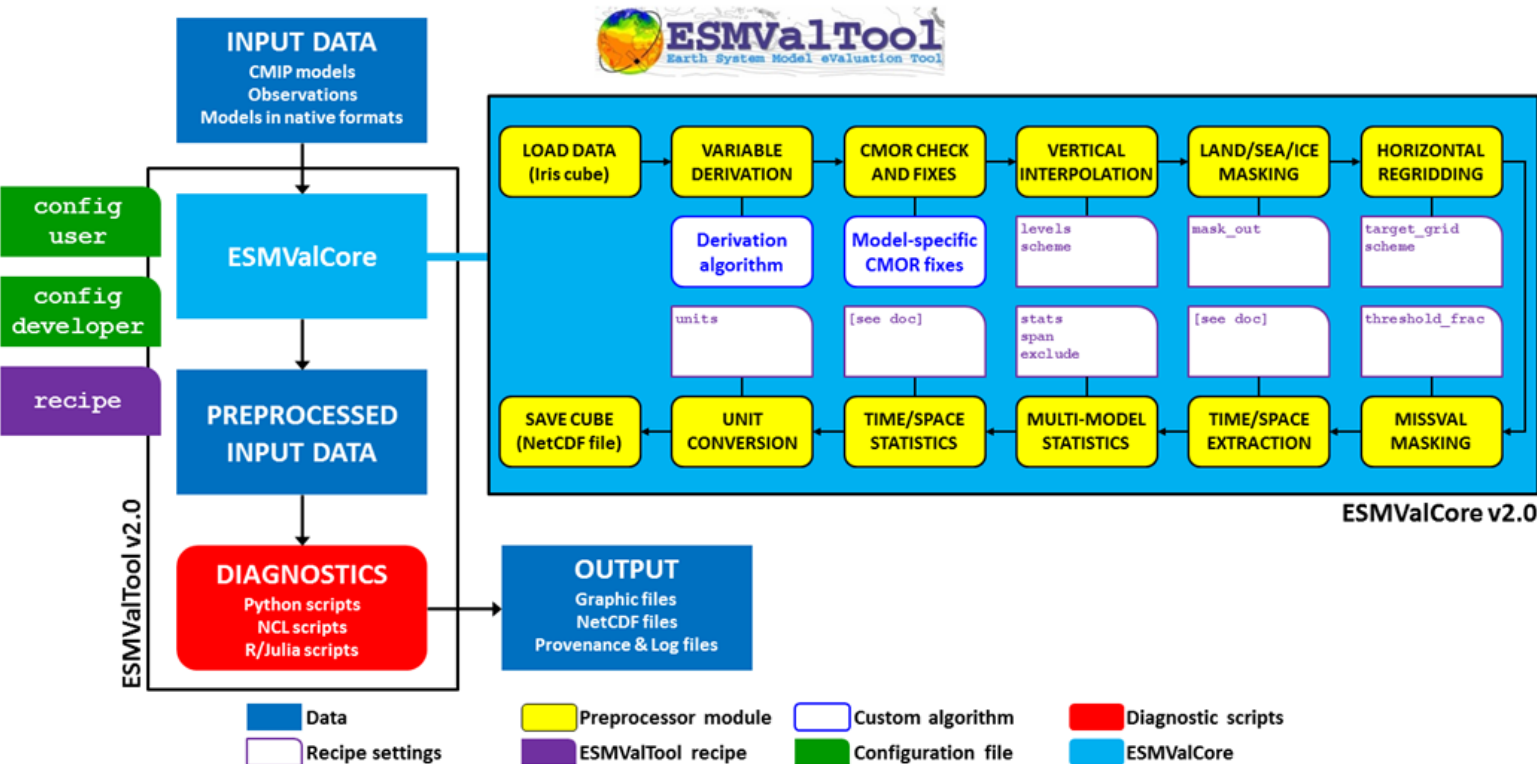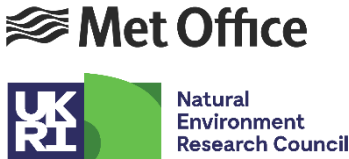These vegetation biases are improved by including INFERNO in UKESM1 and allowing it to impact veg mortality and type

🔥 **3 talks on fire development for UKESM2 tomorrow!** 🔥

© Crown copyright

3
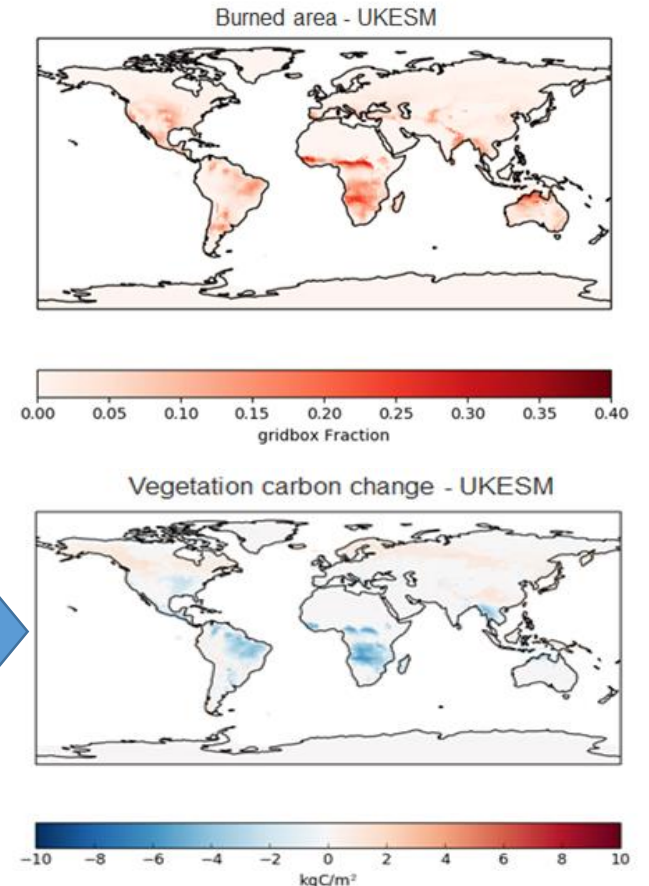
ESMValTool :
Progress and Updates

ESMValTool Overview

ESMValTool Overview

- Community driven diagnostic and performance metrics tool for evaluating Earth system Models – (v 2.0 beta now) -- expected release July 15, 2020.

- UKESM Core group members associated with ESMValtool : Valeriu Predoi and Lee de Mora (Core development Team), Ranjini Swaminathan (User Engagement Team)

- Contribution to CMIP6 (https://cmip-esmvaltool.dkrz.de) – latest CMIP6 Evaluation results

- IPCC Sixth Assessment Report (AR6) Contributions – private repository, facilitates extended diagnostic development

- Widely being adopted – MOHC, ACCLIMATE (CSSP-Brazil)

ESMValTool Updates

- Publications

  - 3 recent (extended large scale diagnostics, diagnostics for emergent constraints, technical overview) and 1 in preparation on regional impacts and extremes.

  - https://www.esmvaltool.org/references.html

- Documentation

  - Extensive and updated documentation of preprocessors and diagnostics (https://esmvaltool.readthedocs.io/en/latest/)

- Tutorials

  - In the UK by the UKESM core group (UKESM GA, NCEO, MOHC, UK CMIP6 Analysis)

  - Under preparation - Central tutorial repository using Software Carpentry

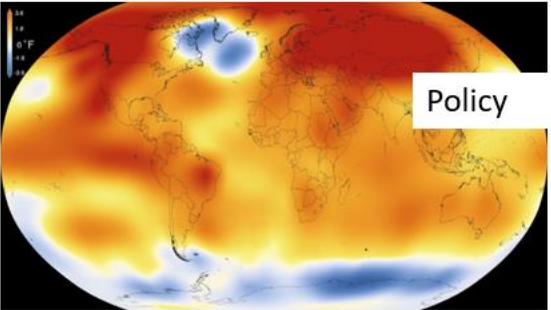# Dissemination & Engagement

Website refresh
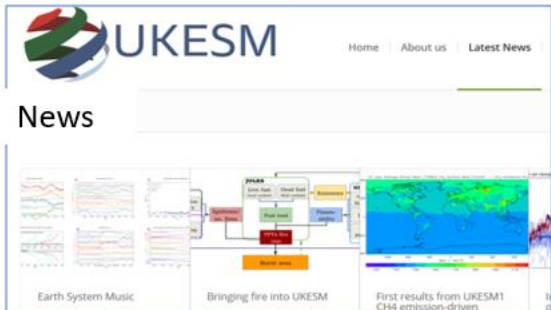
Public:

Web - developing visuals to represent ESM and a narrative on climate change risks and solutions

UKESM

Met Office

Natural Environment Research Council

I'm a Scientist Stay at home

New Scientist Live

October 2021

TECHNIQUEST

UKESM Music

NERC Public Engagement Showcase 2021

A MODEL EARTH

2050 - Jul Paris Agreement
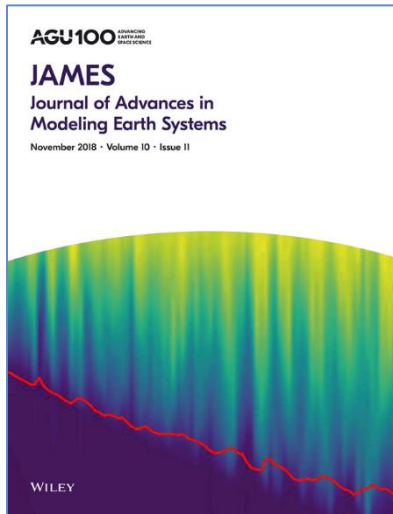
Blue Dot festival – July 2019

Science:

Publications

Road shows planned - to engage scientists & potential users

Data

UKESM1 surface air temperature anomaly

ssp119

ssp126

ssp245

ssp585

Policy:
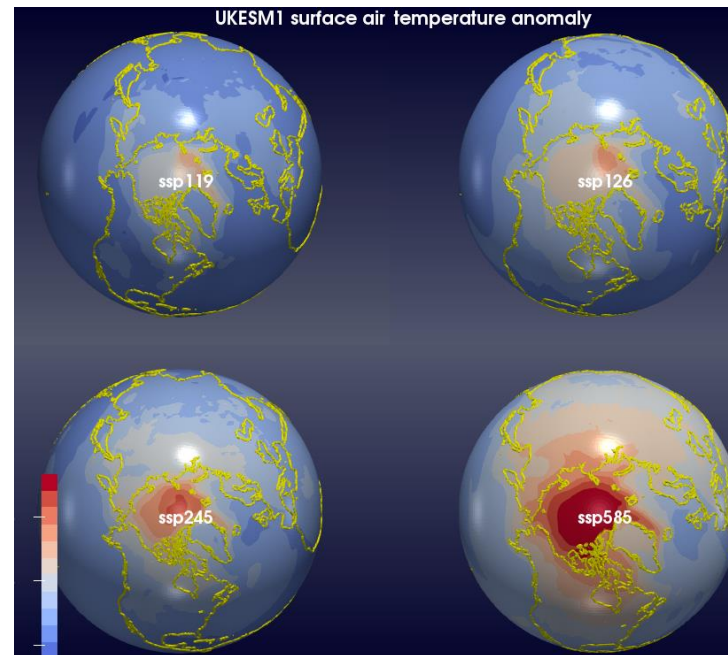
01-12 NOV 2021
GLASGOW
COP26
IN PARTNERSHIP WITH ITALY

AR6 Synthesis Report: Climate Change 2022

June 2022

and now switching to a future perspective…