ECVs for climate modelling and prediction

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Key Points

ECVs are important for:

• Detecting changes through synchronous, global monitoring of Earth's "vital signs".

• Diagnosis and attribution of those changes in conjunction with climate models.

• Stringent testing of these climate models by confronting them with observations and reanalyses

• Providing global, multi-variable observations for initialising predictions with models.

Water Vapour ECVs: Emerging anthropogenic signal in the moisture content of the earth's atmosphere

SSM/I atmospheric moisture retrievals over oceans, 1988-2006

© Cro

Santer et al, 2007
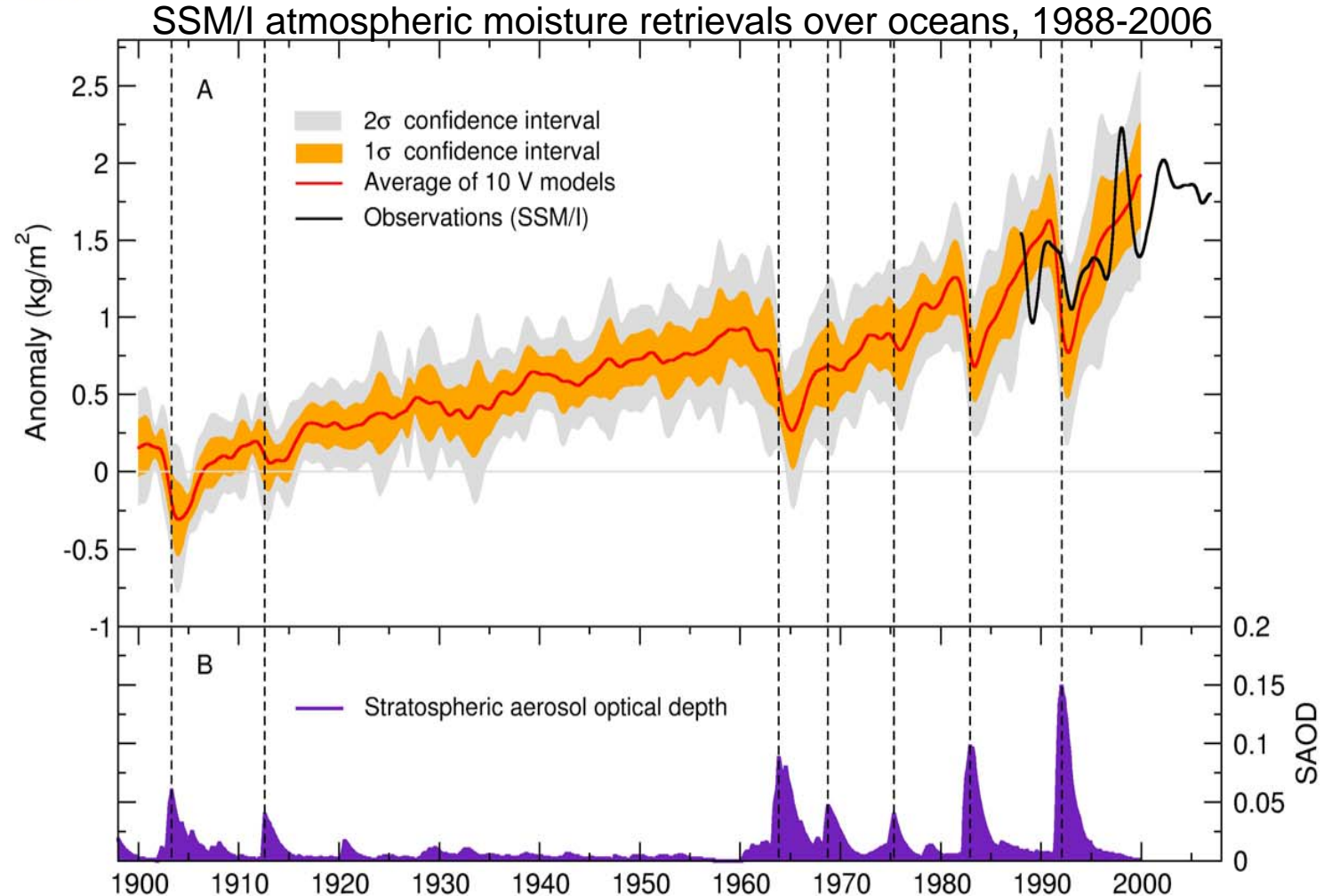
Sea Ice ECVs: Diagnosing trends and verifying different aspects of model performance
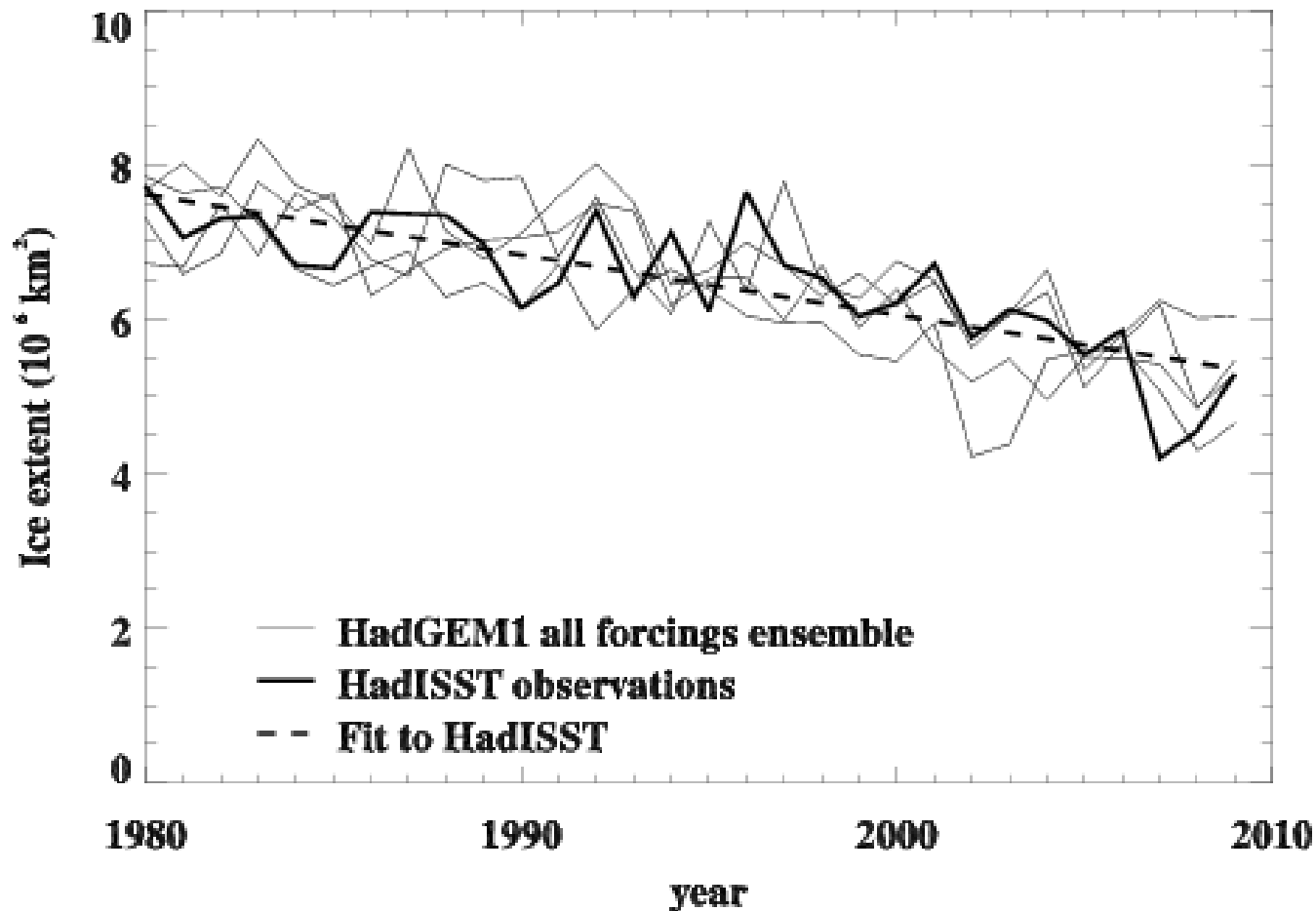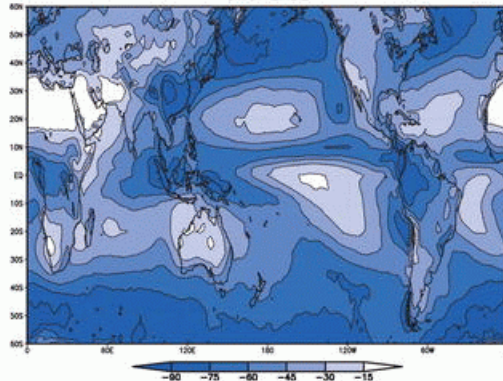

Ice areal extent
Arctic time-series (September)
Model: HadGEM1
Observations: HadISST

Earth Radiation Budget ECVs: Improving the representation of clouds and their radiative properties

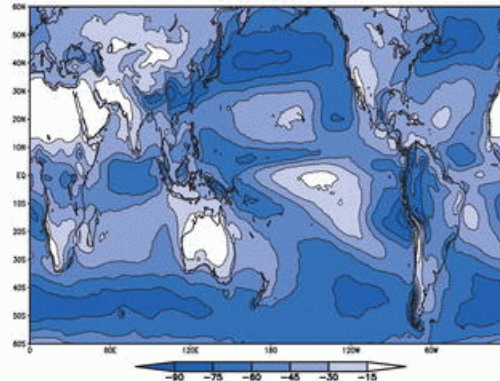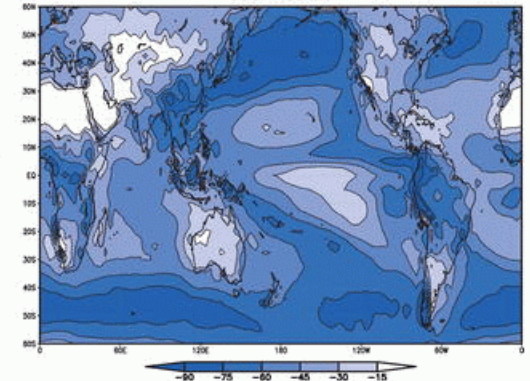**Although the cloud radiative effects look similar in these two models…**
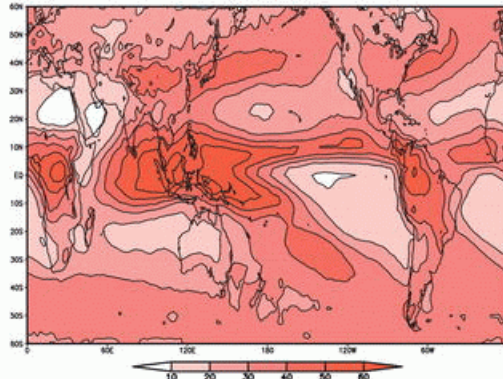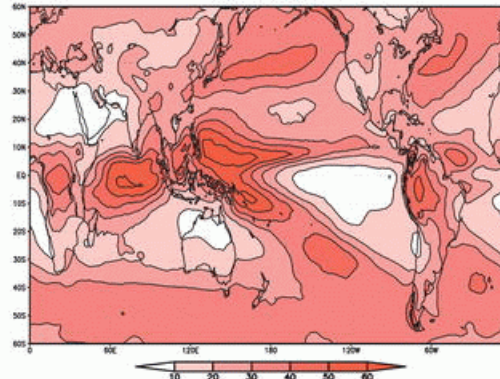

ERBE   HadGEM1   HadCM3
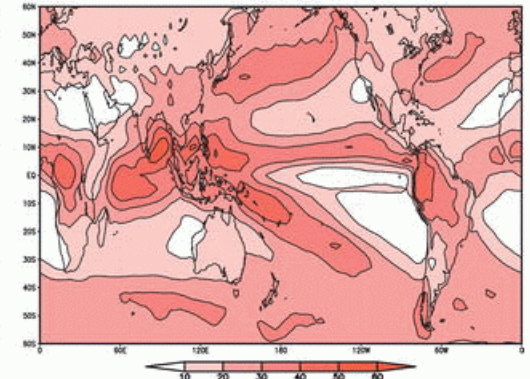
SW cloud radiative forcing

LW cloud radiative forcing

Martin et al. (2006)

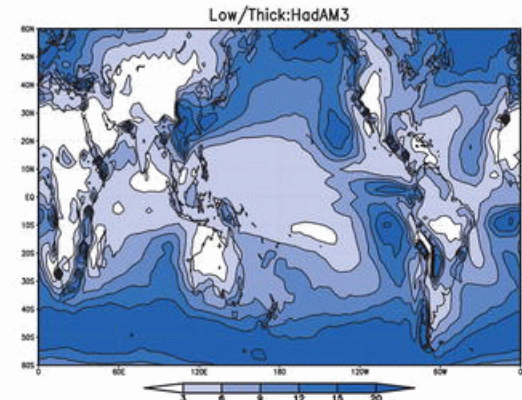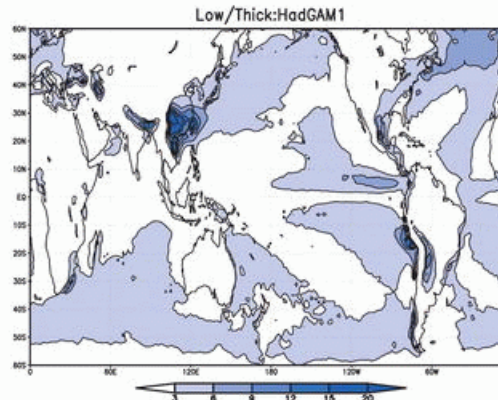# Earth Radiation Budget ECVs: Improving the representation of clouds and their radiative properties
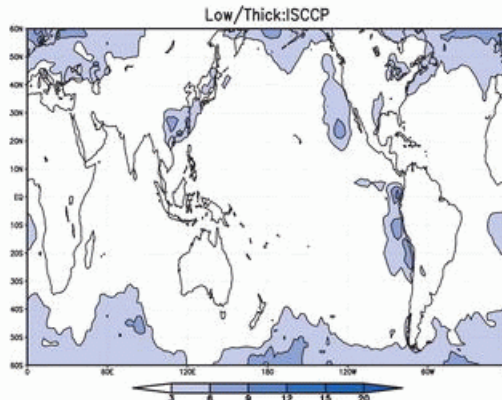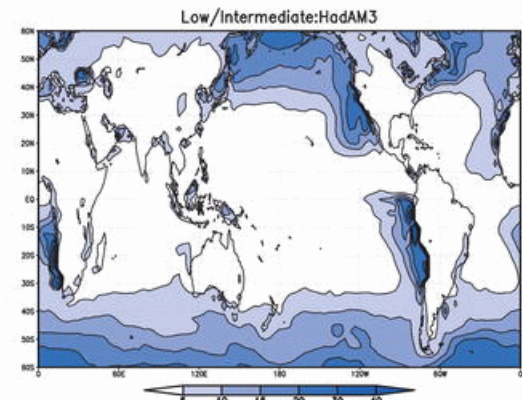
..the cloud fields certainly do not!
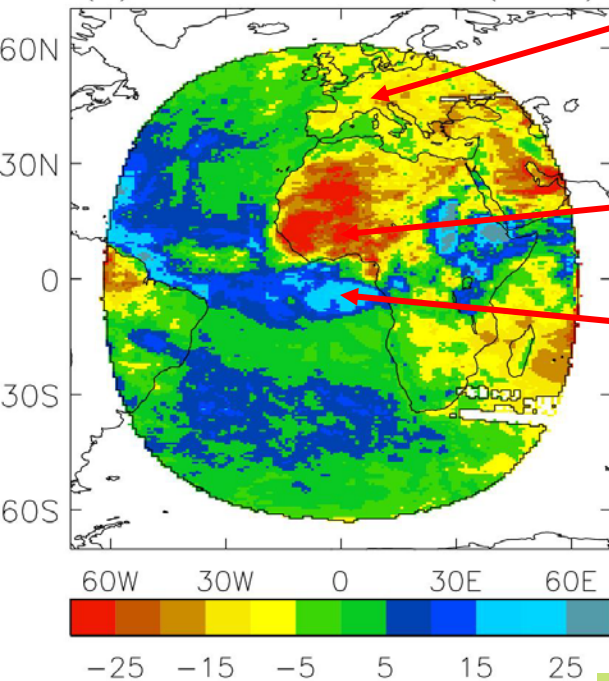

ISCCP   HadGEM1   HadCM3

Thick cloud "Stratus"

Thinner cloud "Stratocu-mulus"

Martin et al. (2006)
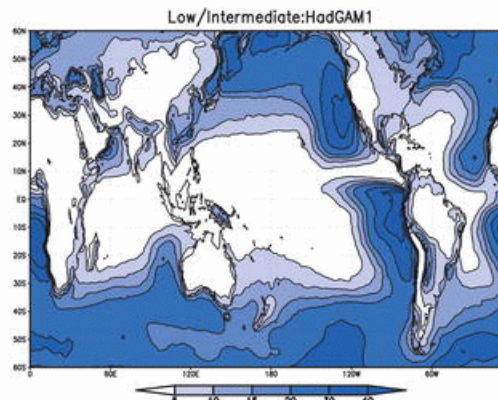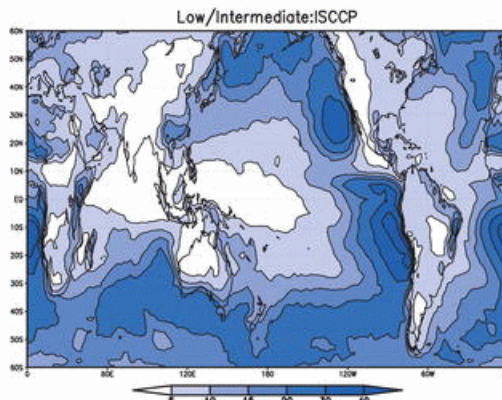
Aerosol and Radiation ECVs: Using NWP to identify climate model errors
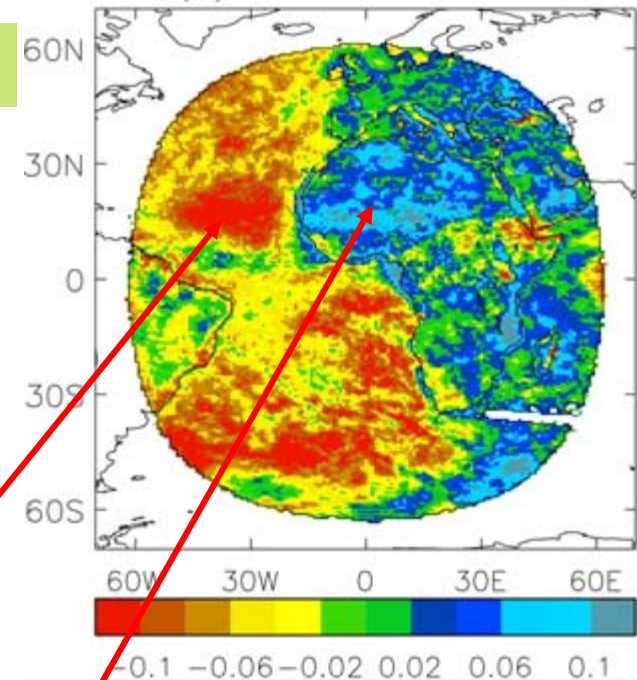

Too little cloud over Europe

No Desert Dust in Model

ITCZ Cloud too thick

Low cloud over oceans too thick & extensive
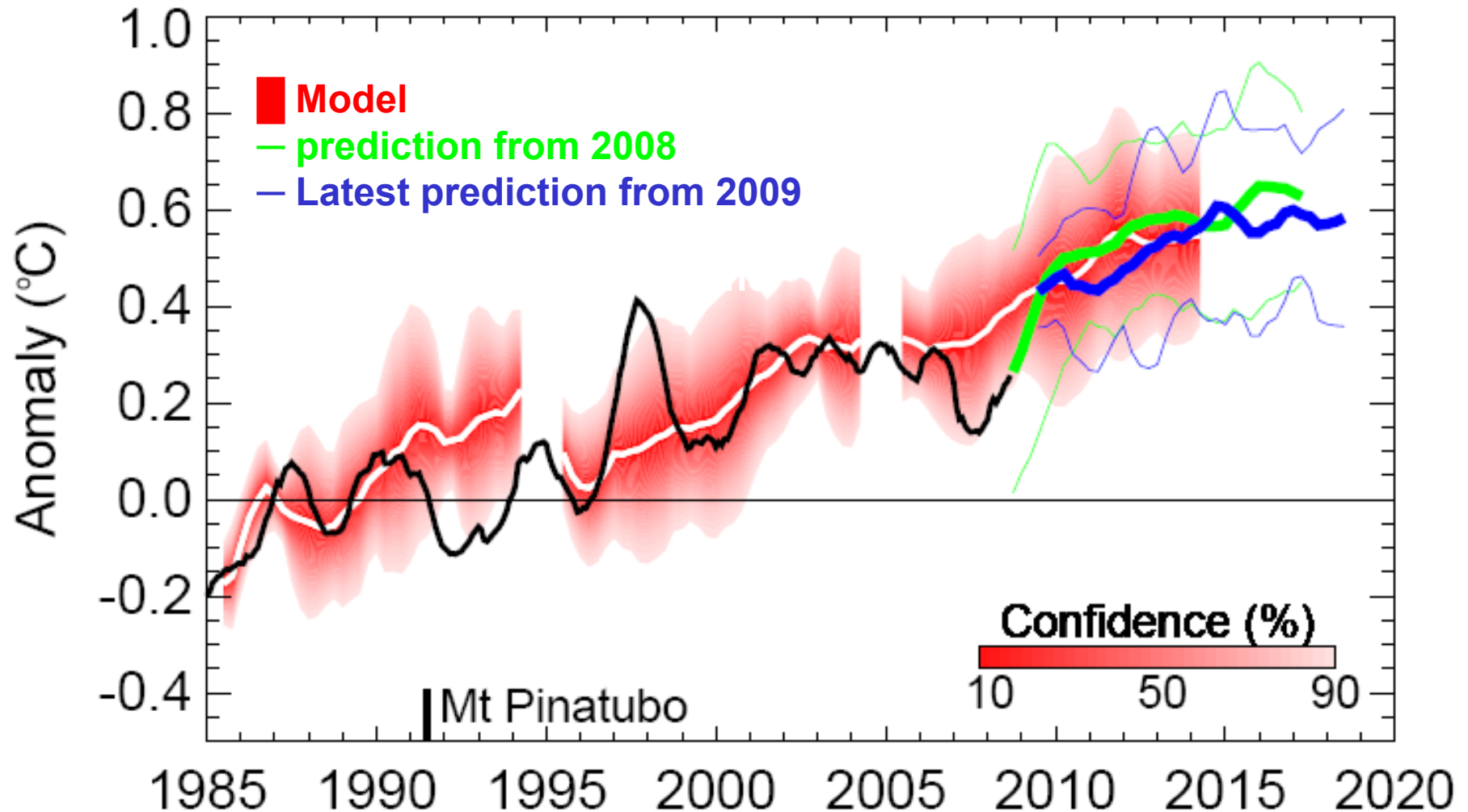
Sahara not reflecting enough Solar radiation

△OLR

△ALBEDO

Satellite (GERB) – Model   May-August 2004

ECVs for Initialising Climate Prediction

Global average temperature forecast
for the next decade

Concluding Remarks

- ECVs are a vital part of monitoring, understanding and predicting climate variability and change

- The confrontation of models with ECVs will lead to improvements in model formulation and greater skill in predicting climate variability and change

- The combination of surface based and satellite ECVs are fundamental for initialising climate predictions and for generating reanalyses