Dr. Martin Willett
Research Scientist
Met Office FitzRoy Road
Exeter Devon
EX1 3PB United Kingdom
Tel: 44 (0)1392 884547
Fax: 44 (0)870 9005050
Email: martin.willett@metoffice.gov.uk
Web: http://www.metoffice.gov.uk

Modelling the transition from suppressed to deep tropical convection: Comparison of global NWP and climate models with TOGA-COARE (GCSS WG4 Case 5).

Martin Willett[1], Peter Bechtold[2], David Williamson[3], **Jon Petch**[1] and Sean Milton[1]

[1] Met Office, UK
[2] ECMWF, UK
[3] NCAR, USA

One component of tropical convection that NWP and climate models often fail to capture are suppressed periods of shallow convection and congestus, and the transitions between suppressed periods and more active deep convection. The aims of GCSS WG 4 Case 5 are: (i) to determine the processes that are important for the transition from suppressed to deep, (ii) to determine the role that shallow and mid-level convection play in this transition; and (iii) to see how parametrization schemes cope with this transition. Case 5 uses selected periods of the TOGA-COARE experiment to assess and contrast the effectiveness of a variety of SCMs, CRMs, and NWP and climate models in capturing this transition.

We concentrate on predictions with the Met Office Global Unified Model (UM), ECMWF's IFS and NCAR's CAM3. Forty-eight hour forecasts were made starting from 00UTC on each day between 8th January and 28th January 1993 encompassing a transition between suppressed and deep convection. The starting conditions are from the EMCWF's ERA 40 reanalysis.

A comparison is made between the global models' forecasts and the observations from the TOGA-COARE experiment, and an assessment is made of the accuracy with which the global models capture suppressed periods, deep convection, and the transition from suppressed to deep convection. The role of various physical processes in this transition are examined using detailed diagnostics. The global UM forecast and UK Met Office's SCM are also compared. The SCM uses the same physics as the UM but the forcing is derived from the TOGA-COARE observations. Finally, the impacts of recent changes to the UM's convection and boundary layers schemes are also discussed in the context of these TOGA-COARE simulations.