FOR COMPLETION BY PARTNERS FOR EACH RELEVANT WORK PACKAGE

# 6-month progress report

## Period: 1 September 2004 to 28 February 2005

**Prepared by:** **Catherine Senior** **on:** **16-02-2005**

**For partner:** **METO-HC**

**In WP:** **4.1**

| **Partner's key personnel in this WP** | | |
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| **Partner's resources used in this period** | **Funded** | **Unfunded** |
|---|---|---|
| Person months effort | 1 | 1 |
| Approximate total costs | €8300 | €8300 |

## Summary of achievements this period:

We have analysed cloud feedbacks in 2x$CO_2$ mixed-layer experiments as part of the Cloud feedback Inter-comparison project (CFMIP) in order to develop methodologies for application to the ENSEMBLES multi-model system when available. An initial analysis of climate sensitivity suggests that the range of responses in slab models has not reduced since the IPCC TAR. Cloud feedback is still the biggest uncertainty, but clear-sky feedbacks still make a significant contribution. The magnitude of the positive cloud feedback is the biggest feedback uncertainty and this appears to be mainly driven by changes in lower level cloud.

Enhanced release of $CO_2$ from soils due to increased temperatures may lead to a positive feedback between climate change and the carbon cycle, resulting in much higher $CO_2$ levels and accelerated global warming. However, the magnitude of this effect is uncertain and critically dependent on the response of soil respiration to changes in climate. Previous studies with the Hadley Centre's coupled climate-carbon cycle GCM (HadCM3LC) have used a simple, single-pool soil carbon model to simulate the response. In ENSEMBLES we compare with the more sophisticated 'RothC' multi-pool soil carbon model driven with the same climate data. The results show strong similarities in the behaviour of the two models, although RothC tends to simulate slightly smaller changes to global soil carbon amounts for the same forcing. RothC simulates global soil carbon stocks decreasing by 54 GtC by 2100 in a climate change simulation compared with 80 GtC decrease in HadCM3LC. The multi-pool carbon dynamics of RothC cause it to exhibit a smaller magnitude of response to both increased organic carbon inputs and changes in climate. We conclude that the projection of a positive feedback between climate and carbon cycle is robust to using these very different representations of soil carbon dynamics but the magnitude of the feedback is dependent on the form of the soil carbon model.

## Summary of anticipated future problems and solutions (if any):

None

## Any issues to be raised with, or advertised to, other WPs/RTs:

None