OBSERVING AND DETECTING CLIMATE CHANGE
(INCORPORATING THE MARGERY LECTURE)

WEDNESDAY 17 OCTOBER 2007

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Why monitor climate? The Margary Lecture – Prof Simon Tett, University of Edinburgh
Monitoring climate is expensive and requires that observing systems are ran with attention to long-term stability. Climate is changing rapidly and even if, from today, no CO2 was emitted the climate would continue to change. Though there is a broad consensus between Climate models that future climate will warm there is huge uncertainty in the magnitude of this warming. In order to better constrain future climate models and understand how climate change plays out high quality climate records, with comprehensive uncertainty estimates, are needed.

Land and marine temperature changes since 1850 and earlier European extensions – Prof Phil Jones, University of East Anglia
The IPCC AR4 report has concluded that the warming of the climate system is unequivocal. The surface temperature warming has been 0.76 ± 0.19 deg C between 1850-99 and 2001-5. The talk will discuss the surface temperature record developed by CRU and the HC over the last 25 years. How is it put together? How many stations are used over land and why are SST data (and not marine air temperatures) used over the ocean. Recent work has also assessed the errors of estimation of monthly and annual estimates, and the talk will discuss the components of the errors (station and SST homogeneity and biases and errors due to poorer coverage in earlier decades).
http://www.cru.uea.ac.uk

Measuring ocean heat content changes – Prof Keith Haines, University of Reading
The oceans have the biggest heat capacity in the Earths climate system, as well as the capacity to dynamically redistribute heat content. Estimating ocean warming and interpreting its origin over past decades is made more difficult by the sparsity of the observations and the tendency for local temperature changes to be dominated by dynamical convergence and divergence on both short and long timescales. We present

some new work splitting ocean heat content into warming above isotherms and isotherm deepening and discuss the implications for measuring global ocean warming along with errors.

Changes in observed climate extremes during the past century – Dr John Caesar, Met Office, Hadley Centre john.caesar – at - metoffice.gov.uk

In the past, comprehensive global analyses of extreme events have been limited by the availability of good quality daily station data. Initiatives over recent years have substantially increased the coverage of suitable observations in both space and time, allowing us to investigate changing extremes on a global scale. This talk will cover the evidence for long-term changes in the extremes and distributions of daily temperature. Heavy precipitation events and observed changes in drought will also be discussed, along with changes in mid-latitude and tropical storms and severe local weather phenomenon.

Upper air temperature trends: is the truth out there? – Prof Peter Thorne, Met Office, Hadley Centre peter.thorne- at -metoffice.gov.uk

In the early 1990's it was widely reported that the troposphere was cooling relative to the surface - in direct contradiction to climate model predictions. This result was used by many to cast doubt on the reality of climate change. However, those with expert knowledge of the underlying raw observations knew that there were likely to be very substantial uncertainties in the reported trends. In the last ten years significant dataset construction efforts by a number of groups have elucidated upon the issue. This talk will summarise the raw observations, the efforts made to construct climate datasets from these, and a chronology of our understanding of the issue in light of these developments from 1990 to the present day.

Use of satellites to monitor, diagnose and predict climate change – Prof Alan O'Neill , University of Reading

Earth Observations (EO) from space offers a unique vantage point to monitor, diagnose and predict climate change in a global and consistent way, even in remote regions where no in-situ, long-term surveys can be performed. Data records are in many cases now long enough that, when properly cross-calibrated, climate variability and trends in different parameters can be tracked and inter-related both regionally and globally. Examples include satellite-derived evidence of atmospheric temperature trends, regional variations in sea-level rise, melting of ice sheets, deforestation, desertification, stratospheric ozone depletion, and related environmental issues such as trans-boundary pollution. By providing regional data in a global context, satellite data affords both climate change attribution and provides the basis for strategies for mitigation and adaptation. The increased demands for regional climate change predictions on decadal timescales cannot

be met adequately without significant developments in techniques to initialise coupled climate models with EO data.

Attribution of observed changes in climate – Dr Peter Stott, Met Office, Hadley Centre peter.stott- at -metoffice.gov.uk

This talk will discuss the evidence that led the IPCC AR4 in 2007 to make a stronger statement on attribution of observed climate change than was possible at the time of the Third Assessment Report in 2001. In addition it will present further evidence obtained since the publication of the AR4 that the pattern of observed changes in the climate system paints a physically consistent picture of a climate system responding to anthropogenic forcing, including recent work attributing changes in the hydrological cycle and the moisture holding capacity of the atmosphere. The ability of climate models to simulate many observed changes increases confidence in their use for predictions of future climate change.