

Climate monitoring of the free atmosphere: past mistakes and future plans

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Recent efforts to reconcile observed free-atmosphere climate variations with those observed at the surface will be discussed. This will draw heavily on work undertaken for the first U.S. Climate Change Science Program report. The major advance in interpreting apparently disparate temperature trend estimates since the last IPCC report has been a more thorough understanding of the large uncertainty in historical changes aloft. From a climate monitoring perspective we are searching for temperature trends of order 0.1K/decade, requiring an accuracy of the order 0.01K on these timescales in our reconstructions. This has not been achieved historically from either ground-based radiosonde or satellite-based MSU/AMSU observing platforms nor from current climate reanalyses products which aim to optimally combine these and other data. Hence for climate monitoring purposes it is essential that we instigate an observing system or system of systems that enables us to provide more rigorous constraints upon future long-term changes if the expensive efforts underway to monitor our global environment are to prove optimal. This includes both ground-based and satellite based monitoring and the development of a reference network which can provide strong constraints on time-varying biases. Work in progress by the WMO Global Climate Observing System, NOAA and other agencies to provide this architecture will be summarised. This is planned to result in a proposal by the end of 2005 and the setting up of a reference upper air network by 2009. This has been accorded the highest priority in the GCOS Implementation Plan, available at <http://www.wmo.int/web/gcos/gcoshome.html>. Any reference network will also have clear benefits for users outside the direct climate community. Finally, GCOS climate monitoring principles for satellites will be outlined. Feedback will be welcomed.

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