

What is the Tyndall Centre for Climate Change Research? This new trans-disciplinary research centre was launched in November 2000 to undertake integrated research into the consequences of climate change for society and to seek, evaluate and facilitate sustainable solutions. It brings together climate scientists, social scientists, engineers and economists from nine academic institutions around the UK in a unique collaborative research effort.

In its first year of operation, the Tyndall Centre has consolidated its research strategy into four main themes. It has established communication and managerial networks across its UK sites and brought together researchers from many disciplines to respond to the challenge of climate change. Tynd-All has been launched to disseminate information from the Tyndall Centre and its first round of 20 research projects worth £1.9 million, which are now underway. The research themes are outlined below, and will be elaborated on in future issues of Tynd-All.

The Tyndall Centre's headquarters are at the School of Environmental Sciences at the University of East Anglia (UEA), with two regional offices at the University of Manchester Institute of Science and Technology (UMIST), and the University of Southampton and Southampton Oceanography Centre (SOC). The full Tyndall consortium also includes the University of Cambridge, NERC's Centre for Ecology and Hydrology (CEH), SPRU — Science and Technology Research Unit — at the University of Sussex, the University of Leeds' Institute for Transport Studies (ITS), Cranfield University's Complex Systems Management Centre and the Energy Research Unit at the CLRC Rutherford Appleton Laboratory (RAL). The Centre's core funders are the Natural Environment Research Council (NERC), Engineering and Physical Sciences Research Council (EPSRC) and Economic and Social Research Council (ESRC), with additional support from the Department of Trade and Industry (DTI).

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Tyndall research themes

1. Integrating frameworks

This is a systems approach theme which brings together information from distinct disciplines and scales, and organises it into a coherent system needed for climate change decision-making. It will allow the exploration of how different choices affect future social, economic and climatic conditions at global and regional scales. The framework will be made up of representations of the main physical and socio-economic elements of the climate

system. Ongoing interaction with stakeholders will identify relevant questions and check the usefulness of answers to feed back into the simulation system. Researchers will analyse the framework's validity, considering uncertainty and ensuring large errors are not propagated through the system. The framework will allow a wide range of climate change issues to be addressed in ways that are convenient for stakeholders; for example, through 'virtual decision theatres' or other interactive methods.

2. Decarbonising societies

This theme involves trans-disciplinary assessments of ways to reduce emissions of greenhouse gases, and to subsequently limit the increase in their concentration in the atmosphere. This will provide information to help achieve national and global emissions reduction targets. Researchers are investigating the many technical, economic, social and policy issues that need in-depth evaluation and integration for large reductions in emissions to occur. For

example, they are exploring ways to remove carbon from the atmosphere and considering promising technologies for new and renewable energy sources. The research will compare practices across organisations and communities, and extend techniques to other countries and the globe. The work will lead to an integrated assessment of the prospects for significant decarbonisation in the UK and internationally over the coming century.

3. Adapting to climate change

This theme assesses how people and the environment can adapt to unavoidable changes in climate, whether gradual and continuous or abrupt and extreme. Information is needed to help put protective measures into action that minimise impacts and prevent dangerous climate change. Researchers are examining the vulnerability of organisations, ecosystems and countries to climate change,

and their ability to adapt. They will investigate critical thresholds beyond which adaptation will be difficult, such as abrupt changes in ocean circulation or the melting of polar ice sheets. The costs and benefits of adapting to climate change will be considered in light of uncertainty and timing of adaptive measures. Climate change will have different impacts on various parts of society, so researchers are also investigating questions of justice and equity.

4. Sustaining the coastal zone

This theme is concerned with understanding key coastal zone processes around the UK and other countries. The results will provide options for adapting to coastal change and methods to control it. Researchers are assessing the vulnerability of the UK coastline and developing computer simulations of the coasts of East Anglia and a small

Caribbean island. They will explore the right mix of coastline defence options that respect also the ecological integrity of the coastline. Radically new management strategies must be supported by wide participation, so new methods of stakeholder involvement will be required. The case study results will be scaled up to larger sections of coastline within the UK and also for small island states.

Research highlights

5. Round 1 research projects commence

20 projects worth £1.9 million have commenced in the Tyndall Centre's first round of research. The projects range from improving the way renewable energy enters the national grid, understanding the effect of sea-level rise on

coastal biodiversity, to assessing how households will respond to new transport technologies. The full list of research projects is available online at:
www.tyndall.ac.uk/tynd_research/tyndall_research_projects.shtml.

6. Study completed on climate change impacts on British Overseas Territories

The UK's Department for International Development (DFID) commissioned a report on the potential impacts of future climate change on British Overseas Territories, other small island states and their neighbourhoods. Researchers Chris Sear (University of Greenwich), Mike Hulme, Neil Adger and Kate Brown (Tyndall Centre and UEA) focused on Anguilla, Montserrat and the Turks and Caicos Islands

in the Wider Caribbean, St Helena and Tristan da Cunha in the South Atlantic and the Pitcairn Islands in the South Pacific, but also considered issues relevant to other island states that have regional relevance. They found that all three regions are likely to warm by up to 5°C by 2100, which — with global sea level rise and other changes such as increasingly severe tropical storms — will impact on natural resources and marine ecosystems, and subsequently affect livelihoods.

Forthcoming events and activities

7. Climate Change: science, impacts & policy responses

Organised by Imperial College, the Tyndall Centre and Oxford University, 15-19 April 2002. This 5 x 1-day workshop is intended for professionals, particularly in government and industry, who are seeking a more in-depth

understanding of the issues surrounding climate change. The modular structure allows senior executives to attend the single days of the most interest to their company. For more information visit www.ad.ic.ac.uk/cpd/climate.htm

8. International Conference on Climate Change and the Built Environment: Tyndall Centre North, UMIST, Manchester; 8-9 April 2002 (see www.umist.ac.uk/research/tyndall/north_events_details.html#080402 for more information)

9. Development Policy and Research

The Tyndall Centre and the International Institute for Environment and Development are hosting a one-day symposium in London on *Adaptation to Climate Change: Setting the Agenda for Development Policy and Research*

on 25th October 2001. The invitation-only function brings together practitioners and agencies from the development community to explore the implications of the latest IPCC assessments, and agenda and priority setting in climate change adaptation. More information: s.torok@uea.ac.uk

10. Tyndall Headquarters and Tyndall North Seminar series: See www.tyndall.ac.uk/tyndall_centre_hq/hq_events.shtml for a full list of Tyndall seminars at UEA. See www.umist.ac.uk/research/tyndall/north_events.html for a full list of Tyndall North seminars at UMIST. Tyndall South seminars are also held on occasion at Southampton.

Announcements

11. Tyndall Round 2 funding

As part of our newly consolidated research strategy, the Tyndall Centre will within the next month be announcing arrangements for funding of our second round of projects.

This round will invest up to £900k with non-Tyndall research partners to work collaboratively with us. For the announcement of opportunity, sign up to our Tyndall e-alert service (www.tyndall.ac.uk/tynd-all_form.shtml).

12. European Climate Forum

The Tyndall Centre is one of seven founding European research centres in the European Climate Forum (ECF). The ECF is forging alliances between leading scientists, NGOs, industries and others to research and debate climate change challenges for the sustainability transition. The scientific members of the ECF are the Tyndall Centre plus Potsdam Institute for Climate Impact Research, Max Planck

Institute for Meteorology in Hamburg, Hamburg University's Centre for Marine and Climate Research, Fondazione ENI Enrico Mattei in Milan, Nansen Environmental and Remote Sensing Centre in Bergen and Paul Scherrer Institute, ETH Zurich. An initial preparatory meeting of the ECF took place in Brussels on 12 July, and the Forum was formally launched on 3 October in Potsdam. See the prototype ECF Website (www.arns.de/ecf).

13. New Tyndall Centre Website

The Tyndall Centre Website (www.tyndall.ac.uk) has been updated. New features include a list of initial research projects and researchers, opportunities for collaboration, publication lists, travel directions to Tyndall sites and frequently asked questions.



14. Prestigious award for Tyn researcher

The Leverhulme Trust has awarded a Philip Leverhulme Prize to Neil Adger, from the Tyndall Centre and the University of East Anglia's CSERGE, who is Co-manager of Research Theme 3 (Adapting to Climate

Change). The £50,000 prizes recognise research achievement by young scholars and were awarded to 35 researchers in seven areas in 2001. They recognise the world-class achievement of outstanding researchers who have made substantial and original contributions to fundamental knowledge.

15. Project fact sheets

Summaries of each Round 1 Tyndall research project are available online (www.tyndall.ac.uk/publications/fact_sheets/fact_sheets.shtml). Contact the External Communications Manager (s.torok@uea.ac.uk) if you would prefer to be posted copies of any of the project brochures.

16. Tyndall Visiting Fellows

Dr Jonathan Barnett from the University of Canterbury, New Zealand, visited the Tyndall Centre's headquarters at the University of East Anglia for two months. He worked with Dr Neil Adger on Integrated Systems on Vulnerability and Security, with a focus on the Pacific Islands. The

Tyndall Centre's second Visiting Fellow, Dr John Latham from NCAR in Colorado, is visiting UMIST's Department of Physics. He will be assessing the feasibility of a proposed technique for compensating for global warming by controlled enhancement of the reflectivity and longevity of maritime stratocumulus clouds.

17. Tyndall Research Studentships

Organisations are collaborating with the Tyndall Centre to fund Tyndall Research Studentships. To date, the Environment Agency is the collaborating organisation for Sebastian Carney (supervised at UMIST by Simon Shackley), Shell International is the collaborating organisation for Joy Aeree Kim (with co-funding from the

British Council and supervised at UEA by Mick Kelly and Neil Adger) and the Bangladesh Centre for Advanced Studies is the collaborating body for Lisa Schipper (jointly supervised at UEA by Declan Conway and Kate Brown). For more information on studentships see www.tyndall.ac.uk/tyn_research/research_studentships/rs.shtml

18. Global Change Student Poster Prize

Sophie Nicholson-Cole from the University of East Anglia's School of Environmental Sciences and a Tyndall Centre affiliated PhD student won a Student Poster Prize at the Global Change Open Science Conference in Amsterdam. Her poster, entitled 'Representing climate

change futures: developing the use of images for visual communication', was selected from more than 1000 posters by a panel of judges to be the best poster in one of eight themes, on the basis of scientific content and overall presentation.

Highlights of recent events and activities



19. Environment Minister returns to Tyndall Centre

After launching the Tyndall Centre in November, Environment Minister Michael Meacher returned to the Tyndall Centre

Headquarters in Norwich with local MPs Ian Gibson and Charles Clarke during the May election campaign. The group were briefed on Tyndall Centre activities and met students to discuss environmental and education concerns. The visit featured on BBC Radio, TV and the local papers.

20. Research Councils Director General visits Tyndall

Dr John Taylor, the Director General of Research Councils in the OST, spent an afternoon at the Tyndall Centre Headquarters in May to discuss climate change issues with

Tyndall and UEA researchers. The trans-disciplinary nature of the Centre is clearly something that he is keen to encourage in future Research Council initiatives.

21. House of Commons report on Climate Change

Tyndall researchers contributed advice to the House of Commons Science and Technology Committee's Third Report about Scientific Advice on Climate Change, which mentions the Tyndall Centre as a new source of information on responses to the impact of climate change. The report is available online at the UK Parliament Website (www.publications.parliament.uk/pa/cm200001/cmselect/cmsstech/14/1402.htm).

22. Public Events

Tyndall Centre researchers have participated in a number of public events, including:

- Mike Hulme (Tyndall Centre HQ) and Nigel Arnell (Tyndall South and University of Southampton) spoke at a British Association Science & Public Affairs Forum on climate change in December 2000 at London's Institute of Physics;
- The Tyndall Centre co-sponsored a January meeting at the Royal Society, hosted by the Foundation for Science and Technology, focusing on policy issues associated with climate change;
- In February, Simon Shackley (Tyndall North and UMIST) debated the topic 'Man-made climate change - myth or reality?' at the Northwest Energy and Environment Show;
- The Tyndall Centre helped organise the Norwich leg of a public roadshow hosted by New Scientist magazine in April, where scientists and journalists discussed a range of environmental problems;
- Mike Hulme joined French and British speakers in Paris in June to debate the topic 'Y'a plus de saisons!' ('there are no seasons anymore!') at an event organised by the British Council.

23. Norwich Research Park Symposium

A Symposium on sustainable approaches to climate change was organised in July by the Tyndall Centre and the Norwich Research Park, the cluster of Norwich research organisations including the University of East Anglia, Institute of Food Research, John Innes Centre, Sainsbury

Laboratory and the Norfolk and Norwich University Health Care NHS Trust. Scientists attending the event discussed the contributions that biologists, chemists, plant scientists and others can make to climate change responses. The day of presentations was followed by a wine reception and further opportunity to discuss ideas and joint ventures.

24. Can Britain adapt to climate change?

Climate experts and a panel from the business community led a discussion forum during National Science Week in



March 2001 on the challenges of climate change for UK businesses. The event, hosted by the Department of Trade and Industry (DTI) in London, was organised by NERC, ESRC, EPSRC and the Tyndall Centre, and

opened by Professor David King, Chief Scientific Adviser

to the UK Government and Head of OST. Mike Hulme gave an overview of climate change, Merylyn McKenzie Hedger (UK Climate Impacts Programme) discussed climate change impacts in the UK, and Frans Berkhout (Tyndall Centre and SPRU) provided thoughts on ways to cope with climate change. Panel members Dr Mike Farrimond (UK Water Industry Research), Chris Fay (Advisory Committee on Business and the Environment), John Parker (Association of British Insurers) and Tim Broyd (WS Atkins plc) highlighted some of the issues and challenges posed by climate change for their sector, in a session chaired by Alex Kirby (BBC Online).

25. Newsmakers: highlights of Tyndall Centre media appearances

- Melvin Cannell (CEH) and John Shepherd (SOC) were members of the Royal Society Working Group that prepared the Society's report on carbon sinks – John Shepherd discussed the report with Reuters, Radio 4's Today programme and BBC online.
- A Leeds University press release discussing the environmental and social costs of road and rail transport compared with the charges generated media interest in Chris Nash (ITS), including The Independent newspaper and Radio 4.
- A Nature paper by Dr Jenny Gill (UEA) showing that the life expectancy of black-tailed godwits is drastically affected by whether they choose to winter on the South or East coast of the UK, received coverage in Norfolk papers and The Times Online.
- The Tyndall project of SOC's Michael Tsimplis, David Woolf, Peter Challenor and Adonis Velegrakis (on the vulnerability of the UK coastline) received media attention following a press release about their Laboratory of Satellite Oceanography, including the Sunday Times, The Mail, Radio 4 and Meridian.
- Goran Strbac and Graeme Bathurst received coverage in the Financial Times, Power UK and other journals following a press release relating Nick Jenkins' (UMIST) Tyndall project to the UK's new electricity trading arrangements.
- Following media releases about the first round of Tyndall projects, Jean Palutikof (UEA) discussed the effect of changes in windstorm frequency on the insurance and forestry industries on BBC TV and Simon Shackley (UMIST) discussed his carbon sequestration project as far away as South Africa.
- A number of other Tyndall researchers commented on their involvement in IPCC reports, the US stance on Kyoto, abrupt climate change and climate change in general.

26. Books and book chapters

Tyndall Researchers are in **bold**. A full list of publications is online at www.tyndall.ac.uk/publications/pub_list_2001.shtml



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- Barker, T** and Srivastava, L. (2001) Sector costs and ancillary benefits of mitigation. pp. 561-600 *In Climate Change 2001: Mitigation*. (Metz, B., Ogunlade, D., Swart, R., Pan, J. eds.) IPCC Working Group III. Cambridge University Press: Cambridge.
- Brown, K.**, Tompkins, E. and **Adger, W. N.** (2001). Trade Off Analysis for Participatory Coastal Zone Management. Overseas Development Group and CSERGE, University of East Anglia, (ISBN 1 873933 16 9). pp.109 + CD ROM version.
- Giorgi, F., Hewitson, B., Christensen, H. J., **Hulme, M.**, Von Storch, H., Whetton, P., Jones, R., Mearns, L. O. and Fu, C. (2001). Regional climate information evaluation and projections. pp. 583-638 *In Climate change 2001: the scientific basis* (eds.) Houghton, J. T., Ding, Y., Griggs, D. J., Noguer, M., van der Linden, P. J., Dai, X., Maskell, K. and Johnson, C.A. (eds.) (2001). Contribution of WG1 to the IPCC Third Assessment, Cambridge University Press, Cambridge, UK, 944pp.
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- Lal, M., Harasawa, H., Murdiyarso, D., **Adger, W. N.** *et al.* (2001). Asia. pp. 533-590 *In Climate Change 2001: Impacts, Adaptation and Vulnerability*. (McCarthy, J. J., Canziani, O., Leary, N. A., Dokken, D. J. and White, K. S. eds.) IPCC Working Group II. Cambridge University Press: Cambridge.
- Schneider, S. and Sarukhan, J. with Adejuwon, J., Azar, C., Baethgen, W., **Hope, C.**, Moss, R., Leary, N., Richels, R. and van Ypersele, J.-P. (2001) Overview of impacts, adaptation and vulnerability to climate change. pp. 75-104 *In Climate Change 2001: Impacts, Adaptation and Vulnerability*. (McCarthy, J. J., Canziani, O., Leary, N. A., Dokken, D. J. and White, K. S. eds.) IPCC Working Group II. Cambridge University Press: Cambridge.
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- Smith, J.B., **H.J. Schellnhuber**, and M.M.Q. Mirza (2001) Vulnerability to Climate Change and Reasons for Concern: A Synthesis pp. 913-970 *In Climate Change 2001: Impacts, Adaptation and Vulnerability*. (McCarthy, J. J., Canziani, O., Leary, N. A., Dokken, D. J. and White, K. S. eds.) IPCC Working Group II. Cambridge University Press: Cambridge.
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- Vellinga, P. and E. Mills with G. Berz, L. Bouwers, S. Huq, L. Kozak, **J. Paultikof**, B. Schanzenbacker, and G. Soler (2001) Insurance and Other Financial Services pp. 417-450 *In Climate Change 2001: Impacts, Adaptation and Vulnerability*. (McCarthy, J. J., Canziani, O., Leary, N. A., Dokken, D. J. and White, K. S. eds.) IPCC WG II. Cambridge University Press.
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27. Journal papers

- Adger, W. N.**, Benjaminsen, T. A., **Brown, K.** and Svarstad, H. (2001) Advancing a political ecology of global environmental discourses. *Development and Change* **32** (4), 687-715.
- Adger, W. N.** (2001). Scales of governance and environmental justice for adaptation and mitigation of climate change. *Journal of International Development* **13** (7), 921-931.
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Jordan, A. J. (2001) Is There A Climate For Policy Change? The Contested Politics of a Low Carbon Economy. *Political Quarterly*, **72**, 2, 249-254.

Thornley J. H. M. and **Cannell M. G. R.** (2001) Soil carbon storage in response to temperature: an hypothesis. *Annals of Botany*, **87**, 591-598.

28. Technical reports

(Reports on research projects completed by Tyndall staff.)

Carter, T.R., **Hulme, M.**, Crossley, J.F., Malyshev, S., New, M.G., Schlesinger, M.E. and Tuomenvirta, H. (2000). Climate change in the 21st century: interim characterizations based on the new IPCC emissions scenarios. *Finnish Environment Institute Report. No. 433*, Helsinki, Finland, 148pp.

Hulme, M., Crossley J. and Lu, X. (2001). *An exploration of regional climate change scenarios for Scotland*. The Scottish Executive Central Research Unit, Edinburgh, 50pp.

Sear, C., **Hulme, M.**, **Adger, N.** and **Brown, K.** (2001). The Impacts of Global Climate Change on the British Overseas Territories. Report to DFID OUT, 38pp + Annexes.

29. Briefing notes

(Reports bringing together issues and perspectives spanning more than one Tyndall Centre research project.)

Hulme, M. (2001). Emissions Scenarios: What are they and what do they tell us? *Tyndall Briefing Note 1*.

Graeme Bathurst and **Goran Strbac** (2001). The value of Intermittent Renewable Sources in the first week of NETA. *Tyndall Briefing Note 2*.

30. Working papers

(Reports reflecting work in progress at the Tyndall Centre, or new research projects awaiting formal publication.)

Mitchell, T. and **Hulme, M.** (2000). A Country-by-Country Analysis of Past and Future Warming Rates. *Tyndall Centre Working Paper 1*.

Hulme, M. (2001). Integrated Assessment Models. *Tyndall Centre Working Paper 2*.

Berkhout, F., **Hertin, J.** and **Jordan, A.** (2001). Socio-economic futures in climate change impact assessment: using scenarios as 'learning machines'. *Tyndall Centre Working Paper 3*.

Barker, T. and Ekins, P. (2001). How high are the costs of Kyoto for the US economy? *Tyndall Centre Working Paper 4*.

Barnett, J. (2001). The issue of 'Adverse Effects and the Impacts of Response Measures' in the UNFCCC. *Working Paper 5*.

Goodess, C., **Hulme, M.** and **Osborn, T.** (2001). The identification and evaluation of suitable scenario development methods for the estimation of future probabilities of extreme weather events. *Tyndall Centre Working Paper 6*.

Sorrell, S. (2001) Making the link: climate policy and the reform of the UK construction industry. *SPRU Electronic Working Paper 67*.

31. Symposium Synopses

(Summaries of conferences and other scientific meetings in which the Tyndall Centre has been involved.)

Dockerty, T. and **Torok, S.** (eds) (2001). Sustainable approaches to climate change. *Tyndall Centre Symposium Synopsis 1*.

32. Popular articles

Berkhout, F. and **Torok, S.** (2001). Insurance and climate change: can business adapt? *Global Reinsurance*.

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Hulme, M. (2000). Choice is all. *New Scientist*, **168**, 4/11/2000, p.56.

Hulme, M. and Dwyer, I. (2000). UK Climate research set fair. *Science and Public Affairs*, December 2000, 22-23.

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Jenkins, N. (2001). Energy: the changing climate. Editorial, *Power Engineering Journal*, **15** (3), 122-123.

Torok, S. (2001). A climate of choice? *NERC News*, Spring 2001, 16-17.

Torok, S. (2001). Global warming: are humans really changing the Earth's climate? *Outstanding*.

Torok, S. and **Hulme, M.** (2001). Twentieth Century Climate Change. BBC Weather Centre feature article, www.bbc.co.uk/weather/features/climate_change4.shtml