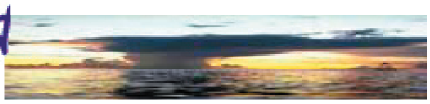
Coupled Ocean-Atmosphere Processes and European Climate

COAPEC



http://coapec.nerc.ac.uk

Newsletter No 3: June 2003

The third of an irregular series of Newsletters with brief reports on meetings and projects associated with the NERC's COAPEC thematic Programme

Programme News

COAPEC has now passed the three year mark and there have been some changes in the core team. In April we said *a bientot* to Pierre-Philippe Matthieu, who moved to Frascati, Italy to work on Earth Observation for the European Space Agency. Another farewell is imminent - Mat Collins will leave us in August to return to the Hadley Centre (in Exeter) to work on ensemble climate prediction. Both are sad to leave the team and have had a very interesting and productive 3 years but felt that it was time to move on. They both wish COAPEC good luck for the future. Mat expects that he will continue to be involved in the programme through a number of projects and students as he remains in "UK Climate Science".

Obviously this leaves the core team considerably under-staffed. Whilst we continue to search for a new core team member, who can specialize in the "Bridging the Gap" area, the community is asked to be patient if support requests to Bablu and Alan are a little slower than usual.

Web Site updates

In order to help our remaining core team organise their support time, and also to ensure that we are providing support across the COAPEC community, there is now a Support Web Page for you to enter your requests. Any requests logged will be listed, along with the response from the core team, so you may find the answer you need anyway! Simply go to the COAPEC web site (http://coapec.nerc.ac.uk) and click on the "Support" link.

The link to "Programme Awards" now also contains a complete list of awards and the names of the key workers. If you spot any errors, please let me know.

Meetings and Workshops

This year's annual meeting will be a part of the Royal Meteorological Society biennial conference at UEA, Norwich, 1-5 September. To supplement this meeting, there are a number of workshops planned, in addition to one that occurred earlier in the year. Details can be found later in the newsletter, together with the provisional scheduling of COAPEC talks and posters at the Met. Soc. meeting.

Seasonal Predictability of North Atlantic Climate in the ECMWF System II Forecasting System

Steve George (seg@met.reading.ac.uk), CGAM, Department of Meteorology, University of Reading.

Evidence from statistical analyses of observations, and from atmospheric model simulations, suggests some predictability of European climate on seasonal timescales. This predictability arises primarily from the influence of changing ocean conditions. A study is performed to assess seasonal predictability of the ECMWF "System II" coupled model during ENSO

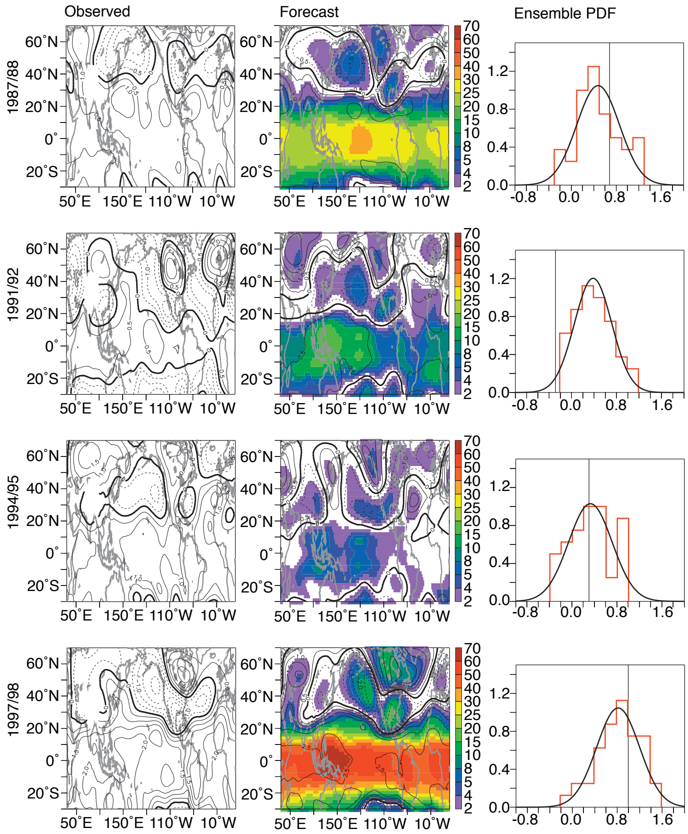


Figure 1. Observed and forecast winter (DJF) 500 mb GPH anomalies for El Niño years. First two columns show contoured analysis and forecast ensemble mean fields. Coloured overplot values indicate t-values (values not significant at the 2σ level are blanked). The final column shows probability distributions (PDF's) derived by computing the pattern correlation of each ensemble member with the ensemble mean for the winter of interest (a Z transform is applied to make the statistics approximately Gaussian). The vertical line indicates the pattern correlation of the observations with the ensemble mean.

years. Specific regions of interest are defined as North Atlantic (20-85˚N, 110-35˚E) and North Pacific (20-85˚N, 260-110˚W).

Anomaly analysis is performed on 14 years of winter (DJF) hindcasts. Each forecast has a November start and consists of 40 ensemble members. Skill is assessed with respect to ECMWF ERA15 and operational analysis fields. A t-statistic is used to assess the significance of ocean forcing with respect to the stochastic "weather" signal, and pattern correlation is used to investigate the models skill in predicting circulation patterns within the two regions (see figure 1).

For a forecast system to provide useful information beyond climatology the following criteria must be met:

1) High average t-score over the regions of interest (suggesting the model has high predictability within itself) (t_{avg})
2) High probability of anomaly pattern given the forecast ensemble (P_{fobs})
3) Low probability of anomaly pattern given the climatology (P_{cobs})

Over the North Atlantic these conditions are best fulfilled in the winters of 1997/98 (El Niño: P_{fobs}=0.64, P_{cobs}=0.02, t_{avg}=4.94) and 1999/00 (La Niña: P_{fobs}=0.92, P_{cobs}=0.29, t_{avg}=2.95). The t_{avg} mean/stdev for all years is 2.21/0.93.

Results from the complete analysis lead to the conclusion that the model exhibits high seasonal predictability in the tropics and over the North Pacific during ENSO years. Over the North Atlantic there is evidence of potential predictability, especially in El Niño Years. The probability of the observational anomaly pattern given the forecast ensemble is less than 5% in only 1 ENSO event out of 8 (1991/92).

A new Coupled Model for Addressing North Atlantic Ocean Atmosphere Interaction

Manoj Joshi (sws99mmj@met.reading.ac.uk), David Marshall and Brian Hoskins, Department of Meteorology, University of Reading

A key issue in understanding the climate of the North Atlantic region is the role of small-scale processes, such as heat advection in the narrow Gulf Stream. Most coupled atmosphere-ocean models of the North Atlantic are limited in their ability to properly simulate these phenomena, because the computational time needed to run them places limits on their horizontal ocean resolution. These models therefore not only fail to resolve the northward transport of heat in the Florida Current, but also fail to properly resolve ocean Kelvin waves, thought to be important in rapidly communicating changes in high latitude forcing of the meridional overturning circulation to low latitudes.

We avoid the computation problems associated with high-resolution ocean modelling by sacrificing vertical resolution and physics in the ocean. We couple the Reading Intermediate General Circulation Model (IGCM, Forster *et al.,* 2000), having a resolution of T31 and 15 layers, to a high resolution reduced-gravity ocean model having a lateral resolution of $^1/_6$˚ (Johnson and Marshall, 2002). The IGCM can reproduce relevant atmospheric phenomena such as the North Atlantic storm track. The dynamically active component of the ocean extends from 65˚N to 30˚S, has a depth of 500 m and can simulate key dynamical processes such as ocean gyres, boundary currents and Kelvin and Rossby waves. Embedded within the surface layer is a dynamically passive mixed layer of depth 100 m, within which heat is passively advected and exchanged self-consistently with the atmosphere. A net meridional northward transport is incorporated through prescribing appropriate boundary conditions at the northern and southern boundaries of the ocean model.

Over the remainder of the planet, a slab ocean with a mixed layer depth of 100 m is implemented. A buffer region lies between the two regimes to provide a smooth transition between the shallow water ocean and the slab. Note that the use of a one-layer ocean model also reduces the thermal inertia of the coupled system by orders of magnitude compared to a 3D ocean model, and spin up of the coupled system takes place in O(10) model years.

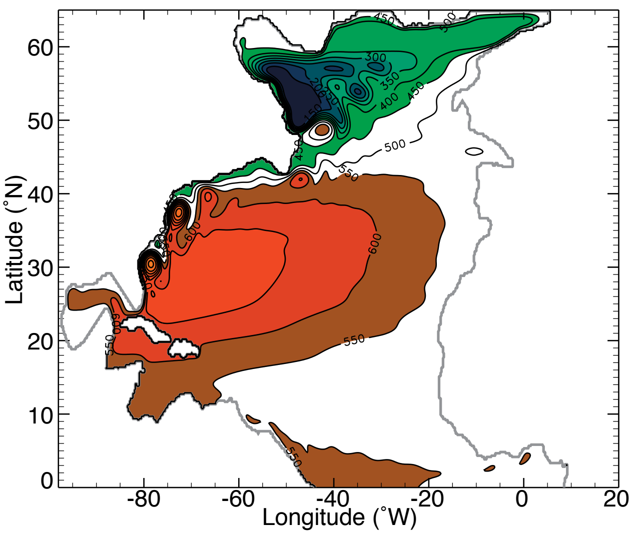


Figure 2. Layer thickness (m) in the northern hemisphere of the ocean model after 50 years of spin-up.

The coupling is at an advanced stage and very preliminary results have proved encouraging. The ocean model is spun up for 50 years using fixed wind stresses from the IGCM. The two models are then run together.

Figure 2 shows layer thickness (equivalent to geostrophic streamlines) in the northern hemisphere of the ocean model after 50 years of spin-up. The sub-polar gyre is visible off the east coast of Canada, as is the anticyclonic gyre off the east coast if the USA. Some eddy activity is also present along the western boundary. Preliminary results from the coupled system show that the temperature does not drift; results from the coupled system will be presented at this year's Royal Meteorological Society Conference in UEA.

References:

Forster P.M. De F, M. Blackburn, R. Glover, K.P. Shine (2000). An examination of climate sensitivity for idealised climate change experiments in an intermediate general circulation model. *Clim. Dyn.*, **16**, 833-849.

Johnson H. and D. Marshall (2002). A theory for the surface Atlantic response to thermohaline variability. *J. Phys. Oceanogr.,* **32**, 1121-1132.

Closing the Heat Budget of the SOC Climatology

Jeremy P. Grist (jyg@soc.soton.ac.uk) and Simon A. Josey, Southampton Oceanography Centre

The development of improved fields of the ocean-atmosphere heat exchange is an important part of the COAPEC program. Our project seeks to improve the existing Southampton Oceanography Centre (SOC) climatology, which has a global mean net heat flux bias of 30 Wm^{-2}, using two different approaches. The first approach uses independent estimates of ocean heat transport to constrain the fluxes, the second seeks to remove the bias through improvements to the formulae and method used to estimate the fluxes. Using the first approach we have produced a balanced version of the SOC air-sea flux climatology which is now available for the wider COAPEC community to use (Grist and Josey, 2003).

To balance the climatology, we have adopted the inverse analysis method of Isemer *et al*. (1989) and adjusted the ocean heat transport implied by the SOC climatology to agree with hydrographic estimates at different latitudes. Isemer *et al*. (1989) were limited to estimates of heat transport at only three latitudes in the Atlantic. We have taken advantage of the increased number and geographical range of hydrographic

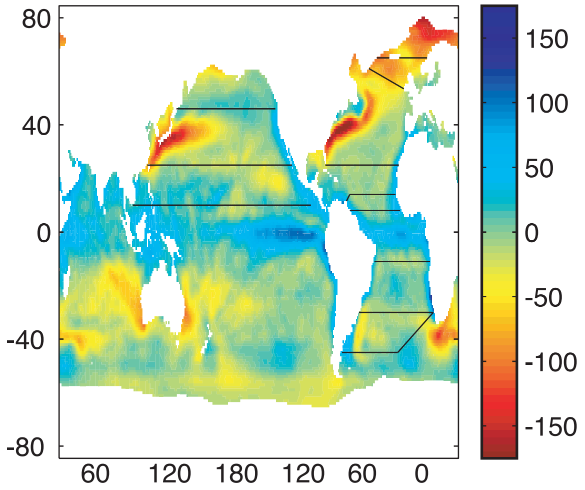


Figure 3. The net heat flux (Wm^{-2}) from the adjusted version of the SOC Climatology. Also shown are the locations of the 10 hydrographic constraints (solid lines) used in the inverse analysis.

sections during the period of the SOC climatology (1980-93), utilising up to 10 constraints throughout the Atlantic and the North Pacific (see figure 3).

When all 10 constraints are applied, the magnitude of the bias in the heat budget is reduced substantially from 30 Wm^{-2} to 5 Wm^{-2}. Separate hydrographic observations indicate that this imbalance may still be too large. In particular, repeat hydrography at 24˚N in the Atlantic has revealed a change in temperature of about 0.2˚C to a depth of approximately 1000 m between sections taken in 1981 and 1992 (Bryden *et al*., 1996). This would imply a bias of no more than 2 Wm^{-2} in the net heat flux over the same period. With this in mind we have repeated our analysis, including an additional constraint that the global heat budget should balance to within ±2 Wm^{-2}. The resulting solution required a 19% increase in the latent heat flux, a 6% reduction to the shortwave flux and less significant adjustments to the other components (Grist and Josey, 2002; 2003).

The adjusted flux fields obtained with this solution have a global mean net heat flux of -2 Wm^{-2} and are available from http://www.soc.soton.ac.uk/JRD/MET/coapec.php3. The new fields agree to within 7 Wm^{-2} with independent large scale area average heat flux estimates obtained from a more recent hydrographic section at 32˚S. Good agreement is also found with recent estimates of the net heat flux obtained using residual techniques and from atmospheric model reanalyses (see figure 4). However, comparisons of the adjusted fluxes with measurements from air-sea flux buoys have given more mixed results, discussed in detail in Grist and Josey (2003), which indicate that further improvements are required.

Ongoing work in this project is focused on both improving the inverse analysis method and applying

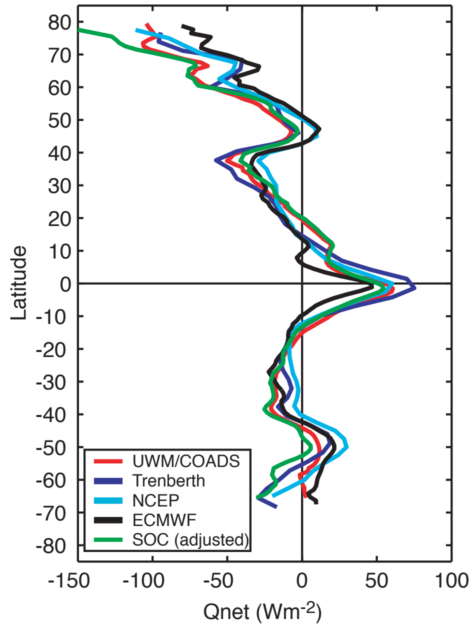


Figure 4. Zonally averaged net heat flux from the adjusted version of the SOC climatology and other recent climatologies.

recent improvements to the flux formulae (*e.g.* Josey *et al.*, 2003) which should allow a significant proportion of the original bias to be removed without the need to constrain the fluxes.

References

Bryden, H.L, M.A. Griffiths, A.L. Lavin, R.C. Millard, G. Parrilla and W.M. Smethie (1996). Decadal Changes in Water Mass Characteristics at 24 N in the Subtropical North Atlantic Ocean. *Journal of Climate*, **9** (12), 3162-3186.

Grist, J.P. and S.A. Josey (2002). Balancing the SOC climatology using inverse analysis with spatially fixed parameter adjustments. *Southampton Oceanography Centre Internal Document* **No. 80**, 38 pp. + figs.

Grist, J.P. and S.A. Josey (2003). Inverse analysis adjustment of the SOC air-sea flux climatology using ocean heat transport constraints. *J. Climate*, in press.

Isemer, H.-J., J. Willebrand and L. Hasse (1989). Fine adjustment of large scale air-sea energy flux parameterizations by direct estimates of ocean heat transport. *J. Climate*, **2**, 1173 - 1184.

Josey, S.A., R.W. Pascal, P.K. Taylor and M.J. Yelland (2003). A New Formula For Determining the Atmospheric Longwave Flux at the Ocean Surface at Mid-High Latitudes. *J. Geophys. Res.*, **108** (C4) 10.1029/2002JC001418.

The North Atlantic Oscillation and Coupled Ocean-Atmosphere Interactions in the Tropical Atlantic of HadCM3

Len Shaffrey (swrshaff@met.reading.ac.uk) and Rowan Sutton, CGAM, Department of Meteorology, University of Reading

The North Atlantic Oscillation (NAO) is the dominant mode of atmospheric variability over the North Atlantic Ocean. The response of the Atlantic Ocean to the NAO has been studied in HadCM3, the Hadley Centre's coupled climate model. When the NAO is said to be in its positive phase there is a strengthening of the surface westerlies over the mid-latitude North Atlantic Ocean and a strengthening of the easterly trade winds over the subtropics. The winds associated with a positive NAO induce a tripolar SST pattern in the North Atlantic, with cooling at high latitudes and in the subtropics and warming in the mid-latitudes.

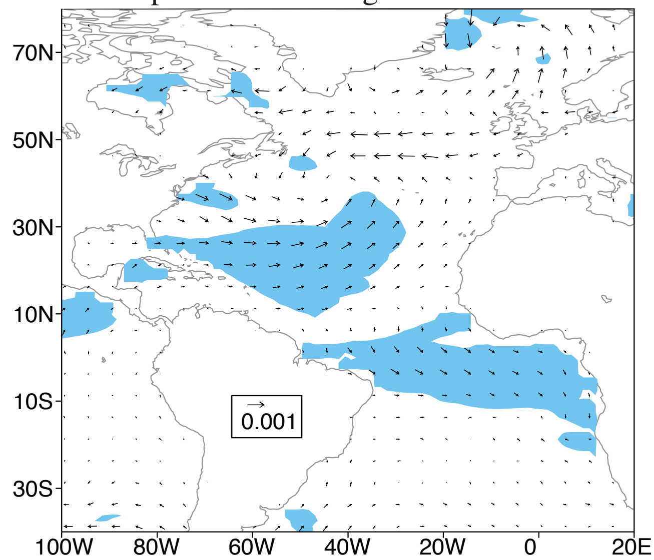


Figure 5. The lagged regression of annual mean surface windstress against the annual mean NAO index (Lisbon-Iceland MSLP) with the NAO leading by a lag of one year. The reference vector has a length of 0.001 N m^{-2} mb^{-1} and shading denotes regions where either the zonal or the meridional component of the windstress regression is 95% significant.

The response of the North Atlantic to the NAO has been well documented in models and observations. However, the lagged response of the tropical Atlantic Ocean to the NAO in HadCM3 provides some interesting and novel results. One year after a positive NAO there are northerly and easterly winds over the tropical Atlantic Ocean (figure 5). The northerly winds are particularly strong along the western coastline of Africa, driving coastal downwelling and warming the SSTs in the southern tropical Atlantic Ocean (figure 6). The warm SSTs in the southern tropical Atlantic force a southward shift in the Atlantic ITCZ (Inter-tropical Convergence Zone) and more atmospheric convection over the warm SSTs along the African coastline (not shown). The atmospheric convection will drive more northerly winds along the African coastline.

One year after a positive NAO, the feedback between the SSTs in the southern tropical Atlantic Ocean, the coastal downwelling and the tropical atmospheric circulation, gives rise to long-lived warm SST anomalies in the southern tropical Atlantic Ocean. These long-lived SST anomalies also drive changes in the mid-latitude atmospheric circulation. One year after

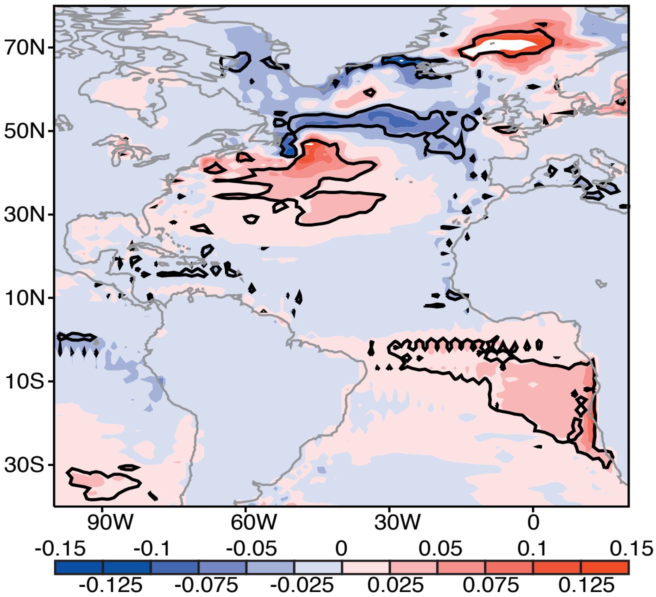


Figure 6. The lagged regression of annual mean SST against the annual mean NAO index with the NAO leading by a lag of one year. The contour interval is 0.025 K mb^{-1} and the bold line denote regions where the regression is 95% significant.

a positive NAO there is a significant weakening of the easterly trades over the subtropical North Atlantic (figure 5), which in turn drives an anomalous equatorward Ekman transport in the subtropical Atlantic Ocean. The occurrence of long-lived SST anomalies in the tropical Atlantic, originally forced by the NAO but which feedback onto the atmosphere, has implications for climate predictability.

Preliminary Results from the CHIME Coupled Climate Model

Alex Megann (apm@soc.soton.ac.uk), Bablu Sinha and Adrian New, Southampton Oceanography Centre

The Coupled Hadley-Isopycnic Model Experiment (CHIME) is a new UK coupled climate model, developed to investigate the effects of the vertical representation of the ocean component of a climate model. The model is identical to the Hadley Centre's HadCM3 climate model, except for its use of a hybrid-coordinate ocean model instead of HadCM3's z-coordinate (constant depth levels) ocean model. The hybrid-coordinate model has layers of constant potential density in the ocean interior, transitioning to constant-depth level near the surface. It is expected to maintain the advantages of purely isopycnic models (namely conservation of water properties over large length and time scales) while permitting the higher vertical resolution near the surface characteristic of traditional z-coordinate models.

The first main integration of CHIME is now well underway (over 10 years at the time of writing), and we aim to complete a control run of two hundred years by the end of 2003. In March of year 10 of the model run, the North Atlantic Current can be clearly seen in sea surface elevation (figure 7), approximately following the 90 cm height contour from the Gulf Stream separation off the eastern seaboard of the US, across the North Atlantic, and finally passing into the Norwegian Sea between Iceland and Scotland. Wintertime deep mixing can be seen in the SST (figure 8) in the Labrador Sea and south of Iceland, which contributes to the formation of North Atlantic Bottom Water. Further south, a tongue of mixing down to 300-400 m is visible across the Subtropical Gyre; this produces the characteristic mode waters in the gyre

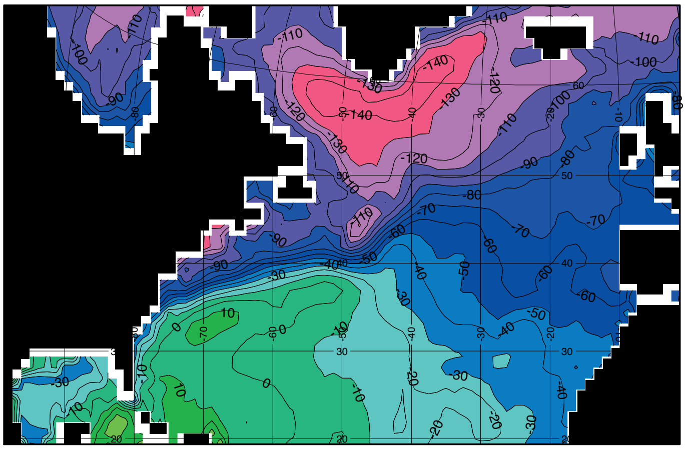


Figure 7. Sea surface elevation in the North Atlantic in March, ten years into the model run.

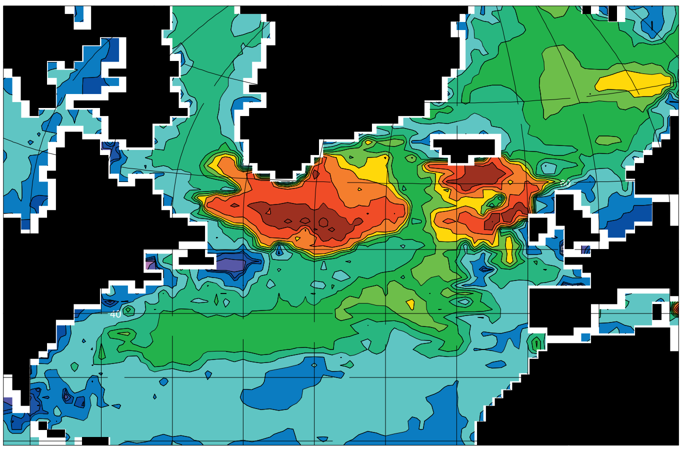


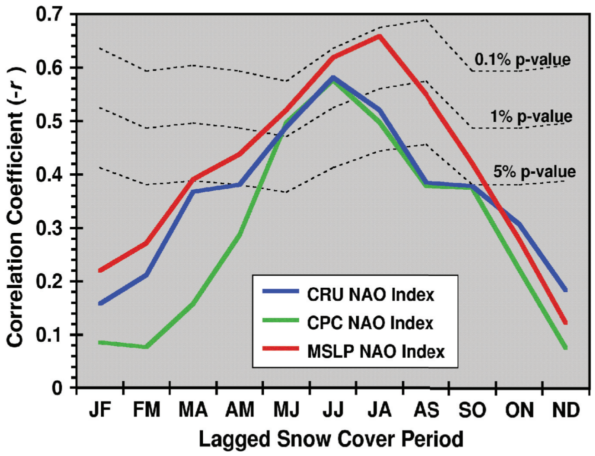
Figure 8. Mixed layer depth, again in March of year 10.

Preliminary analysis of the output shows markedly higher interannual variability compared with the same ocean model forced by climatological surface fluxes. In particular, an ENSO-like signal is present in the equatorial Pacific, which was absent in ocean-only runs. Overall, the ocean model shows a general slow warming (0.18°C in the first ten years) which needs further investigation, but is otherwise performing well, in terms of circulation, seasonal cycle and ice cover.

Summer Snow Extent Heralding of the Winter North Atlantic Oscillation

Mark Saunders (mas@mssl.ucl.ac.uk), University College London

Winter climate over the North Atlantic and European sector is modulated by the North Atlantic Oscillation (NAO). Saunders *et al*. (2003) find that the summer extent of snow cover over northern North America and northern Eurasia is linked significantly ($p < 0.01$) to the upcoming winter NAO state (figure 9). Summers with high/low northern hemisphere snow extent precede winters of low/high NAO index phase. A plausible mechanism for the linkage is that it arises from the summer snow-associated formation of anomalous longitudinal differences in surface air temperature with the subpolar North Atlantic which in turn lead to circulation changes. However, the existence of another underlying root influence which forces the variability in summer snow cover as well as associated linking climate variables can not be ruled out. Numerical model experiments with prescribed snow cover conditions are required to resolve this question. These findings suggest the seasonal predictability of North Atlantic winter climate may be higher and extend to longer leads than thought previously.



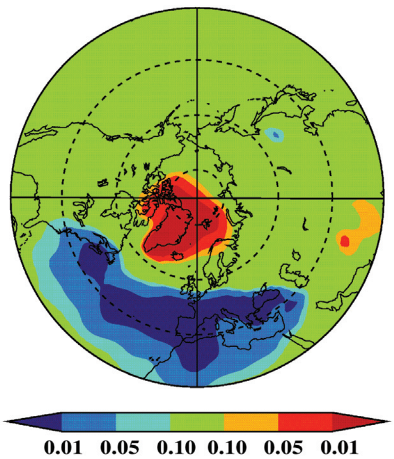


Figure 9. The link between summer northern hemisphere snow extent and the coming winter NAO 1972/3-2001/2. (above) The correlation between lagged northern hemisphere snow cover and winter NAODJF indices for bi-monthly snow cover periods ranging from JF (January-February) through to ND (November-December). The negative correlations from detrended time series are plotted. Dashed lines display the confidence levels of non-zero correlation between snow extent and the MSLP NAODJF index assessed using a 2-tailed Student's t-test after correction for autocorrelation with lags out to 15 years included. (below) The correlation pattern significance between detrended time series of June-July northern hemisphere snow extent and the following winter (DJF) northern hemisphere gridded sea level pressure. Significances are corrected for autocorrelation as in (a). Colour shading also denotes where the correlation is either positive (orange through red) or negative (light through dark blue). Copright [2003] American Geophysical Union.

References

Saunders, M. A., B. Qian and B. Lloyd-Hughes (2003). Summer snow extent heralding of the winter North Atlantic Oscillation, Geophys. Res. Lett., **30**(7), 1378, doi:10.1029/2002GL016832.

Meetings and Workshops

Royal Meteorological Society meeting: 1-5 September 2003, UEA, Norwich

COAPEC is not holding a dedicated Annual Meeting this year. Instead, COAPEC encouraged its members to submit abstracts to the Royal Meteorological Society Meeting, to be held on 1-5 September at UEA, Norwich.

There was a good response to the call from across the COAPEC community, resulting in papers and posters throughout the Climate Sessions of the meeting.

The full agenda has not yet been released, but the following list gives the provisional scheduling of COAPEC talks and posters that I know of.

Tuesday 2 Sep:

S1 Modelling the Earth System

Talks by: D. Frame and P. Miller.

Poster by: N. Faull.

S1 Stratosphere-Troposphere Interaction

Talk by: M. Ambaum.

S1 Media Meteorology

Talk by: D. Frame.

Wednesday 3 Sep.

S4 Mid-latitude Climate Variability and the NAO

Talks by: T. Mosedale, L. Shaffrey and S. George.

Posters by: E. Tyrlis, M. Joshi and H. Snaith.

S5 Decadal Climate Variability

Talks by: G. Bigg and C. Old.

Posters by: L. Sime and L. Shaffrey.

Thursday 4 Sep.

S6 Climate Prediction from Seasons to Centuries

Talks by: T. Osborn and D. Stainforth.

Posters by: M. Saunders and D. Frame.

S7 Oceans and Climate Variability

Talks by: M. Wadley, C. Wilson, S. Osprey, A. Hogg and J. Grist.

Posters by: A. Megann, B. Sinha and M. Levine.

Friday 5 Sep.

S8 Tropical Climate: The Pacific, ENSO and the MJO
Talks by: A. Matthews and M. Joshi.

S9 Tropical Climate: The Indian and Atlantic Regions
Talk by: I. Handoh.
Poster by: P. O'Mahony.

Don't forget to register by 27 June to avoid the late registration fee.

COAPEC Workshop on Coupled Atmosphere-Ocean Models and their Validation

Mat Collins.

On the 17th March 2003 COAPEC organised a workshop with the principle aim of exchanging ideas about the validation of coupled atmosphere-ocean models. The workshop was hosted by the Department of Meteorology at University of Reading and was attended by around 80 scientists from all over the UK. The programme for the day was as follows.

10:00 - Coffee
10:30 - Introduction - Mat Collins (COAPEC core team, CGAM)
10:45 - Observational datasets / methods - Simon Tett (Hadley Centre)
11:15 - ERA40 - Sakari Uppala (ECMWF)
11:45 - Atmosphere models - Gill Martin (Hadley Centre)
12:05 - Ocean models - Malcolm Roberts (Hadley Centre)
12:25 - HadGEM1 - Chris Durman (Hadley Centre)
12:45 - Lunch
2:00 - The benefits of modularity: PRISM and HadOPA - Eric Guilyardi (CGAM)
2:30 - CHIME - Alex Megann (SOC)
2:45 - FORTE - Bablu Sinha (COAPEC core team, SOC)
3:00 - FAMOUS - Chris Jones (Hadley Centre)
3:15 - C-GOLDSTIEN/GENIE - Bob Marsh (SOC)
3:30 - An Eddy Resolving QG model - Andy Hogg (SOC)
3:45 - Tea
4:15 - UM on Beowulf Clusters - Alan Iwi (BADC)
4:30 - ERA products at the BADC - Ag Stephens (BADC)

The workshop began with two presentations focused on data sources for model validation. Simon Tett explained some of the difficulties in producing gridded datasets from observations and also argued that we must be more critical of the models we use to make predictions. Sakari Uppala then gave an overview of the new ERA40 re-analysis product. In the discussion following Sakari's talk, the issue was raised that the global mean net heat flux into the ocean is significantly non-zero in ERA40 and that this can be a problem when comparing with coupled models.

We then heard from the Hadley Centre, who have a great deal of experience of building and validating coupled models. Gill Martin showed us the range of tools used in validating the atmosphere model including single column versions of the model, aqua-planet and dynamical core tests, AMIP experiments and initial tendency evaluation in weather forecast mode. Malcolm Roberts then showed some recent results from HadCEM, which has an eddy-permitting ocean component. Although increasing resolution does help in reducing some errors, the main errors in the mean climate can be traced to the atmosphere component, highlighting the coupled nature of the problem. Then Chris Durman highlighted the great deal of effort being put into developing the next generation Hadley Centre model, HadGEM1, including the use of "tiger teams" to target particular model errors.

After lunch the talks mainly focused on efforts to produce a hierarchy of new coupled models. Eric Guilyardi showed some results from a matrix of models that share common components that suggests an important role for the atmosphere in setting the amplitude and period of ENSO. Alex Megann then showed some initial results from CHIME, a hybrid-isopycnal ocean model coupled to HadAM3 and Bablu Sinha showed some initial results from FORTE, which can be thought of as a more intermediate coupled model with somewhat simplified components. Next, Chris Jones presented perhaps the first objective "tuning" of a lower resolution version of HadCM3. By varying a pre-determined number of model parameters known to greatly affect the model climatology and minimising a cost-function representing the mean climate of the model, he was able to rapidly converge on a suitable set of parameters and produce a model that is suitable for long integrations or large ensembles. The technique could be used by other intermediate modelling groups to optimise their model set-up. Finally before tea, Bob Marsh and Andy Hogg both gave presentations about more simplified couple models that can be used, for example, to perform parameter sweeps to look for multiple equilibria and for process studies.

After tea we heard from Alan Iwi, who introduced the new COAPEC Beowulf PC cluster and plans for running HadCM3 on it, and from Ag Stephens who showed how we can access ERA and other datasets from the BADC web site: http://badc.nerc.ac.uk/data/ecmwf-e40.

It was clear from the workshop that, with a few notable exceptions, the critical validation (or evaluation as one of the participants remarked afterwards) of models that is required in our subject area in order to have confidence in the science and predictions is still in its relative infancy. Hopefully the workshop did generate some ideas and has motivated more groups to look more critically at their models. I write this from the Earth Simulator in Japan, where I am lucky enough to be on a short visit as part of a UK-Japanese collaboration. The potential for the Earth Simulator, and other mega-simulation projects such as climate*Prediction*.net, to produce high-profile breakthroughs in the science of climate prediction means we must be crystal clear about what our models can and cannot do.

Fluxes workshop

A second workshop, on "Fluxes in COAPEC" will be held at UEA on 23 June.

The agenda for the workshop will be:

10.30–11.00	*Arrival and Coffee/Tea*	
11.00–11.10	Bablu Sinha, (SOC)	Introduction
SESSION 1:	**Observed fluxes/transports Chair/Reporter: Sinha/Iwi**	
11.10–11.20	Grant Bigg (UEA)	Changes in NCEP latent heat fluxes near the ice edge in the late 1990s?
11.20–11.30	Jeremy Grist (SOC)	Towards a Balanced Description of the Air-Sea Heat Exchange Through Inverse Analysis of the SOC Flux Climatology
11.30-11.40	Karen Heywood (UEA)	Towards heat and freshwater fluxes in HadCM3 and WOCE sections
SESSION 2:	**Freshwater/Salinity Chair/Reporter: Iwi/Collins**	
11.40–11.50	Martin Wadley (UEA)	Variability of salt fluxes through the Denmark Strait in the HADCM3 control integration
11.50–12.00	Bablu Sinha (SOC)	Surface fluxes, heat and fresh-water budgets and watermass transformation in HadCM3
SESSION 3:	**Heat/SST Chair/Reporter: Collins/Sinha**	
12.00-12.10	Chris Old (ESSC)	Surface fluxes and water formation using T-Class diagnostics applied to HadCM3 data
12.10-12.20	Itsuki Handoh (UEA)	Surface heat fluxes in the "coupled" tropical Atlantic warm/cold event
12.20-12.30	Adam Blaker (SOC)	The impact of variations in the THC related cross-equator heat transport on the SST 'dipole'
12.30-14.00	*LUNCH*	
14.00-14.20	**DISCUSSION**: interaction/collaboration/synthesis between projects.	
SESSION 4:	**Related Programmes Chair/Reporter: Sinha/Iwi**	
14.20–14.40	Rob Goddard (U. Newcastle)	SOLAS: the Surface Ocean-Lower Atmosphere Study
14.40–14.50	David Woolf (SOC)	What CASIX wants to do
14.50–15.00	**DISCUSSION**: Links between COAPEC, SOLAS and CASIX	
15.00–15.30	*Tea/Coffee*	
SESSION 5:	**Fluxes and models Chair/Reporter: Iwi/Collins**	
15.30-15.40	Nick Faull (U. Oxford)	Flux adjusted coupled models for climate change experiments
15.40-15.50	Scott Osprey (RAL)	Stochastic forcing of the HOPE model - two steps forward, two Steps Back
15.50-16.00	**DISCUSSION**: direction/scope of further research & conclusions	
16.00	*End of Workshop*	

Workshop on Seasonal Predictability

A third workshop is planned for later this year - provisionally November-December - to address issues relating to Seasonal Predictability. If you are interested in this workshop, or have ideas for other topics, please get in touch with the science coordinator.

Core Team visit to the Earth Simulator

Mat Collins, together with Lois Steenman-Clarke from CGAM, visited the Earth Simulator located in Yokohama just outside Tokyo in Japan in June. The Earth Simulator is the worlds' most powerful supercomputer, composed of 640 connected NEX SX6 machines each with 8 processors and has a theoretical peak performance of 40 Tflops. The machine has been built by the Japanese government with the sole aim of simulating and predicting climate and climate change. The trip was part of a joint UK-Japanese collaboration to run the Hadley Centre coupled model there. At this early stage a limited number of high-resolution atmosphere-only experiments were performed and results will be available to the COAPEC community to analyse if they wish to. For more information on the Earth Simulator see www.es.jamstec.go.jp.

Notes from the Editor

If you have comments on the newsletter, or contributions for further editions, then please send them to me, the Science Coordinator :

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http://coapec.nerc.ac.uk