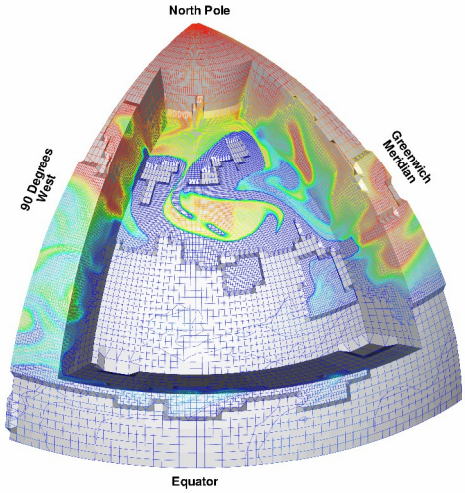

MSc Module MTMW14:

Numerical modelling of atmospheres and oceans

Week 5: Lecture Plan

5.1 Revision class

5.2 Test

5.3 Survey of real atmospheric models

Course content

Week 1: The Basics

1.1 Introduction

1.2 Brief history of numerical weather forecasting and climate modelling

1.3 Dynamical equations for the unforced fluid

Week 2: Modelling the real world

2.1 Physical parameterisations: horizontal mixing and convection

2.2 Ocean modelling

Week 3: Staggered schemes

3.1 Staggered time discretisation and the semi-implicit method

3.2 Staggered space discretisations

Week 4: More advanced spatial schemes

4.1 Lagrangian and semi-lagrangian schemes

4.2 Series expansion methods: finite element and spectral methods

Week 5: Synthesis

5.1 Revision

5.2 Test

Week 5

5.1 Revision class

- Break up into pairs and ask each other:
  - **What key things have you learned?**
  - **What things are you not sure about?**
  - **What would you like to know more about?**

5.2 Test

5.3 Survey of real models (optional)

5.3 Survey of real models

- Pick a number from 1-31
- Now look at the Atmospheric Model Intercomparison Project (AMIP)

  http://www-pcmdi.llnl.gov/projects/modeldoc/amip1/10sumtbls.html

  Find out:

  - **what schemes your model uses?**
  - **what time step and resolution/truncation it uses?**
  - **how many levels in the vertical it has?**
  - **what sort of parameterisation schemes it has?**

1. Bureau of Meteorology Research Centre Model BMRC BMRC3.7.1 (R31 L17) 1995
2. Canadian Centre for Climate Modelling and Analysis Model CCC GCMII (T32 L10) 1990
3. Center for Climate System Research Model CCSR/NIES AGCM (T21 L20) 1995
4. Centre National de Recherches Météorologiques Model CNRM ARPEGE Cy11 (T42 L30) 1995
5. Center for Ocean-Land-Atmosphere Studies Model COLA COLA1.1 (R40 L18) 1993
6. Commonwealth Scientific and Industrial Research Organization Model CSIRO CSIRO9 Mark1 (R21 L9) 1992
7. Colorado State University Model CSU CSU95 (4x5 L17) 1995
8. Dynamical Extended-Range Forecasting Model DERF GFDLSM195 (T42 L18) 1995
9. Department of Numerical Mathematics Model DNM A5407.V2 (4x5 L7) 1995
10. European Centre for Medium-Range Weather Forecasts Model ECMWF ECMWF Cy36 (T42 L19) 1990
11. Geophysical Fluid Dynamics Laboratory Model GFDL CDG1 (R30 L14) 1992
12. Goddard Institute for Space Studies Model GISS Model II Prime (4x5 L9) 1994
13. Goddard Laboratory for Atmospheres Model GLA GCM-01.0 AMIP-01 (4x5 L17) 1992
14. Goddard Space Flight Center Model GSFC GEOS-1 (4x5 L20) 1993
15. Institute of Atmospheric Physics Model IAP IAP-2L (4x5 L2) 1993
16. Japan Meteorological Agency Model JMA GSM8911 (T42 L21) 1993
17. Lawrence Livermore National Laboratory Model LLNL/UCLA MPP1 (4x5 L15) 1995
18. Laboratoire de Météorologie Dynamique Model LMD LMD6s (3.6x5.6 L11) 1995
19. Main Geophysical Observatory Model MGO AMIP92 (T30 L14) 1992
20. Max-Planck-Institut für Meteorologie Model MPI ECHAM4 (T42 L19) 1996
21. Meteorological Research Institute Model MRI GCM-IIb (4x5 L15) 1995
22. National Center for Atmospheric Research Model NCAR CCM2 (T42 L18) 1992
23. National Meteorological Center Model NMC MRF (T40 L18) 1992
24. National Taiwan University Model NTU GCM (T42 L13) 1995
25. Naval Research Laboratory Model NRL NOGAPS3.4 (T47 L18) 1995
26. Recherche en Prévision Numérique Model RPN NWP-D40P29 (T63 L23) 1993
27. State Uni of New York at Albany/NCAR Model SUNYA/NCAR GENESIS1.5A (T31 L18) 1995
28. University of California at Los Angeles Model UCLA AGCM6.4 (4x5 L15) 1992
29. University of Illinois at Urbana-Champaign Model UIUC MLAM-AMIP (4x5 L7) 1993
30. United Kingdom Meteorological Office Model UKMO HadAM1 (2.5x3.75 L19) 1993
31. Yonsei University Model YONU Tr7.1 (4x5 L7) 1995

And finally …

Any constructive feedback? Please put your comments on the feedback forms.

Hope you found the module interesting and useful.

David B. Stephenson