The climateprediction.com project:
The climateprediction.com project aims to perform million member
time-ensemble integrations of a climate model. Each member of the
ensemble will have a different representation of the physical processes
in the atmosphere and ocean and a different forcing scenario. The
distribution of the responses of the ensemble members will demonstrate
which physical processes have most impact on the climate system (as
represented by the model) and will be used to estimate the uncertainty
in predictions of climate change.

The million member ensemble of complex climate models is beyond the
capability of most current computer systems. The aim of
climatoprediction.com is to use idle time on home and office PCs.

The academic release:
In order to maximise participation the main climateprediction.com
experiment will be released under Windows. A preliminary, and much
smaller scale, release will be to the academic community and will run
under Linux. It is this release that is the focus of this poster. The
preliminary experiment will test the response of a version of the UK
Climate model with different parameter values for the cloud and
precipitation physics to doubled CO2.

The academic release is designed to provide experience in several
areas:
• What is the sensitivity of the model to the values of cloud and
precipitation parameters?
• Most climate models are run on super computers with 64-bit precision.
How different is the climate in a 32-bit PC environment?
• What is the best way to handle and analyse data from such large
ensembles of a 3 dimensional coupled climate model?

Generating an Ensemble:
An important factor in determining the response of the climate system
to anthropogenic or natural forcing is the strength of cloud feedbacks.
The representation of cloud processes in climate models is an area
with inherent difficulties and uncertainties. Studying the response of
the model to different values for some of the cloud parameters
focuses on model physics to which the climate response is sensitive
and about which there are large uncertainties.

The experiment will run with ensemble members which have different
values for the following parameters:
• Critical Relative Humidity (a parameter related to the assumed cloud
cover distribution in a grid box)
• Accretion constant (related to the growth of rain droplets and as a
consequence the lifetime of clouds)
• Condensation nuclei concentrations (affecting the water holding
capacity and lifetime of clouds)
• Ice fall velocity

If low, medium, and high values are taken for the four parameters
then the possible combinations generate a 81 member ensemble for
release to the academic community.

The model used for the assessment of the sensitivity of the climate
system to the cloud and precipitation parameters will be an atmosphere
model coupled to a slab ocean already used at the Met Office (HadSM3).
The use of a slab ocean allows for ocean-atmosphere feedbacks, but
avoids the long integration times needed with a full ocean. The model
integrations performed for each ensemble member are shown in figure 1.

One of the aims of the initial release is to verify the climate of the
model integrated on a 32 bit machine is comparable to the same
model run on a 64 bit machine. Figure 2 shows the atmosphere-
ocean heat flux convergences calculated on a Linux PC and a Cray
super computer for the same basic model. The fields are similar,
though more quantitative comparisons are obviously needed.

The model executable and initial conditions have all been packed
into a tar file for distribution. The running model will need about
100MB disk space and the thirty years of model integration will take
about three months to run at low priority on a PC.

The distribution of the experiment to the academic community will be
early in 2001. If you have a Linux PC and want to be involved keep
an eye on http://www.climateprediction.com/academic.