AMIP NEWSLETTER

No. 1 WGNE Atmospheric Model Intercomparison Project September 1991

An information summary and activities description for the Atmospheric Model Intercomparison Project (AMIP) of the World Climate Research Programme's Working Group on Numerical Experimentation (WGNE). Technical and computational support for AMIP is being provided by the Environmental Sciences Division of the U. S. Department of Energy through the Program for Climate Model Diagnosis and Intercomparison (PCMDI) at the Lawrence Livermore National Laboratory (LLNL) where this Newsletter is edited by Larry Gates. (Address: PCMDI, L-264, LLNL, P.O. Box 808, Livermore, CA 94550).

AMIP Background and Contacts

While the WGNE has for many years coordinated the intercomparison of the performance of operational numerical weather prediction models, recognition of the need for a comprehensive intercomparison of climate models led to an informal meeting of experts on modeling standards and intercomparison in Boulder in August 1989. Based on the recommendations of this meeting, at its fifth session in Hamburg in September 1989 the WGNE developed a draft plan of action for an AMIP that was formally approved by the Joint Scientific Committee of the World Climate Research Programme at its eleventh session in Tokyo in March 1990. In August 1990 the implementation of AMIP was made a priority activity of the then newly-established PCMDI at LLNL, with the support of the Atmospheric and Climate Research (now Environmental Sciences) Division of the U.S. Department of Energy. A WGNE AMIP Panel consisting of Lennart Bengtsson, George Boer and Larry Gates (Chairman) was formed by WGNE at its sixth session in Melbourne in September 1990 in order to provide overall guidance to the project.

AMIP Inaugural Meeting

The inaugural meeting of the AMIP was held 4-5 April 1991 at the Claremont Hotel in Berkeley, California; about 45 persons attended, representing 23 atmospheric modeling groups in eight countries. In addition to the modeling groups' representatives and PCMDI/LLNL staff, Lennart Bengtsson of the Max Planck Institute for Meteorology in Hamburg represented the Working Group on Numerical Experimentation's AMIP Panel (whose other members are George Boer and Larry Gates), and Mike Riches represented the Atmospheric and Climate Research (now Environmental Sciences) Division of the US Department of Energy (DOE) in Washington, DC. It was principally through DOE's support that such a large (and perhaps a record) number of atmospheric modelers were able to gather in one room. Acknowledgement is also due Mabel Moore of LLNL for her efficient management of the meeting's travel and facility requirements.

In brief, AMIP calls for the simulation of the ten-year period 1979-1988 by all atmospheric GCMs, using initial conditions as realistic as possible for 1 January 1979 and the observed sea-surface temperature and sea-ice distributions as boundary conditions. It is anticipated that operational models will use initial conditions from an initialization for 1 January 1979, and that climate models will take initial conditions either from the results of an earlier simlation for January or from January climatology. (These differences, of course, will result in some contamination of the results for January 1979.) It is also assumed that appropriate time and space interpolation will be performed on the monthly-averaged AMIP SST and sea-ice dataset that is available at PCMDI (and which has been distributed in atlas format). Each model is also to use the same values of the equivalent CO_2 concentration (345 ppm) and solar constant (1365 Wm^{-2}). All participating groups are asked to calculate the monthly averages of a set of selected standard output variables for each month of the simulation, and to write a six-hourly history of state variables and accumulated quantities for archival storage at PCMDI for possible use in subsequent analyses and intercomparisons. Updated versions of the AMIP participation list and the AMIP standard model output are given in this Newsletter.

In addition to providing an unprecedented opportunity for realistic and detailed validation of the ability of current GCMs to simulate the mean climate and a wide variety of associated variabilities and statistics on global and regional scales (especially when reanalysis is available), AMIP is expected to provide a benchmark against which alternate (and possibly improved) models or model versions may be evaluated.

AMIP Participation Status

At this writing there are a total of 27 atmospheric GCMs participating in AMIP; the current status of the participants' integrations is given in the table below. (See also the model properties list given in this Newsletter.)

Here we note that seven models' AMIP runs are now in progress (including four at LLNL), with five groups' integrations scheduled to begin at NERSC/LLNL over the next several months. Everything considered, it is felt that AMIP is off to a successful start; it now appears that the basic integrations may well be completed by late 1992 or early 1993, after which attention will increasingly focus on their analysis and intercomparison.

The initial allocations of computer time on the NERSC CRAY-2 made by the US DOE last winter were intended to be sufficient to run the first 5 years of the AMIP integrations (except in the cases of a few groups whose AMIP model's resolution was undecided at that time). Although DOE guidance is not yet available, it is anticipated that a second round of allocations will be made during the coming winter that will be sufficient to complete the second 5 years for these groups and to complete the entire ten years for the several groups that have since joined AMIP (although new requests to DOE may be required).

For a variety of reasons it has not proven possible to maintain the LLNL computing queue that was originally established; instead, each modeling group planning to use NERSC is asked to inform PCMDI when they are ready to start their AMIP integration, and a computer account (and visit if desired) will be set up as soon as possible. All participants planning to use the CRAY-2 at NERSC/LLNL should prepare their models to run in the UNICOS operating system, which will be only system available after December 1991.

WGNE/PCMDI Atmospheric Model Intercomparison Project Participation Status

Group	Contact(s)	Model	Computing Schedule / Status @LLNL	Elsewhere
BMRC	McAvaney	R31 L19	in progress	
CCC	Boer	T32 L10	- - -	
CNRM	Mahfouf/Cariolle	T42 L30		in progress
COLA	Straus	R40 L18	in progress	
CSIRO	Hunt	R21 L9		- - -
CSU	Randall	4°x5° L17	completed	
DNM	Galin/Dymnikov	4°x5° L7	to start 1/92	
ECMWF	Ferranti/Burridge	T42 L19	in progress	
GFDL	Wetherald	R30 L9		- - -
GFDL/DERF	Miyakoda	T42 L18		in progress
GISS	Lo/Del Genio	8°x10° L9		- - -
GLA	Lau/Fiorino	4°x5° L17	- - -	
IAP	Zhang/Zeng	4°x5° L2	to start 11/91	
LANL	Kao	R15 L20	- - -	
LMD	Le Treut	3.6°x5.6° L11	- - -	
MGO	Meleshko	T30 L14	to start 10/91	
MPI	Dümenil/Schlese	T 42 L19	to start 9/91	
MRI	Kitoh/Tokioka	4°x5° L15	- - -	
MSFC	Fitzjarrald	T42 L12	- - -	
NCAR	Williamson	T42 L18	in progress	
NMC	van den Dool/Kalnay	T 40 L18		- - -
NOARL	Rosmond	T42 L18		- - -
SUNYA	Wang/Liang	R15 L12	- - -	
UCLA	Mechoso	4°x5° L17	- - -	
UGAMP	Blackburn/Slingo	T42 L19	to start 12/91	
UILL	Schlesinger	4°x5° L7	- - -	
UKMO	Rowell	2.5°x3.75° L20		in progress

AMIP SST and Sea-ice Dataset

The foundation of AMIP is the use of a common sea-surface temperature and sea ice dataset by all participating models. The data chosen for this purpose are the set of 120 monthly-averaged SST and sea ice distributions during 1979-1988 as specifically prepared for AMIP by NMC's Climate Analysis Center in cooperation with COLA at the University of Maryland on a 2°x2° global grid, using all available in-situ, climatological and satellite observations. For identification purposes, these data should be referred to as the "COLA/CAC AMIP SST and Sea-Ice Dataset" or as the "AMIP SST" dataset for short. An atlas of these data has been distributed, and documentation of the data's origins and analysis is available upon request from PCMDI.

These data are available from PCMDI in the form of two data arrays for each month of the period beginning January 1979 through December 1988. The first array is a temperature (SST) array on a global 2 degree longitude by 2 degree latitude resolution. (For convenience, all grid points are assigned a temperature, including "fictitious" values over land and ice.) The second array is a sea-ice mask which consists of zero values for open ocean and unity for ice covered ocean (sea-ice). (Note there is no land mask in this array.) The tape containing these data is written in ASCII at 6250 bpi with 80 character records, blocked 10 records per block.

These data can be read by the following FORTRAN statements if the SST and icemask arrays are dimensioned (180, 91):

```
      READ (1, 1) MONTH, IYEAR
    1 FORMAT (2I20)
      READ (1, 2) ((SST(I, J), I=1, 180), J=1, 91)
    2 FORMAT (16F5.2)
      READ (1, 3) ((ICEMASK (I, J), I=1, 180), J=1,
      91)
    3 FORMAT (80I1)
```

Grid boxes are ordered with the first data element in each array centered at 0 degrees longitude and -90 degrees latitude, etc., the last data element in each array is centered at 358 degrees longitude, and 90 degrees latitude.

The suggested procedure for transfering these data to a given model grid is as follows:

1) Project or average the SST (first array) to your model grid.

2) Transform the sea-ice mask to your model grid.

3) Identify open ocean SST on your model grid by masking out sea ice (step 2) and then masking out land with your model land mask. (Some SST interpolated near the edges of the sea-ice mask may appear too cold due to the use of data beneath the ice; it is suggested, however, that these SST not be changed.)

Summary of AMIP Model Properties

For convenience of reference, the following table provides a "quick look" at selected properties of the atmospheric general circulation models (AGCMs) of the current 27 AMIP participants. Absent from the table are features that all models have in common, namely a global atmosphere, primitive-equation dynamics, a seasonal cycle, and realistic geography and orography. By agreement, all AMIP models also use the same solar constant (1365 W m^{-2}) and equivalent carbon dioxide concentration (345 ppm), and the same distributions of sea-surface temperature and sea ice (see above). All AMIP participants are requested to correct or update this information for use in a more definitive future summary.

In surveying these model properties, we note that 17 of the 27 AMIP models employ spectral representations, and that a typical horizontal resolution is 300-400 km. Most models include 10 or more vertical levels in a modified sigma or hybrid sigma-pressure coordinate system. All but 6 simulate the diurnal cycle, and many include multiple soil layers to portray variations of surface temperature and soil moisture. There is a wide range in methods for parameterizing radiation, with some of the differences being related to the treatment of clouds. In most of the models cloud formation is determined by a humidity-based diagnostic, but in some a prognostic scheme based on liquid water content is used. There is also considerable variation in the parameterization of convection, with moist convective adjustment (MCA) or some type of Kuo or Arakawa-Schubert (A-S) scheme being the most common choices. For those models that include explicit horizontal diffusion, increased scale selectivity is achieved by the use of fourth or sixth-order diffusion schemes or by the use of wave cut-off limits in the application of second- order schemes. Finally, we note that all but 7 models include the parameterized effects of gravity-wave drag, for which there are several methods in use. (A bibliography of the sources indicated in the table is available on request from Tom Phillips at PCMDI.)

AMIP Model Properties

Group/Model	Horizontal Resolution	Vertical Coord./Levels	Diurnal Cycle	Radiation Scheme
BMRC	R31	σ/19	Yes	Lacis-Hansen, Fels-Schwarzkopf
CCC/GCMII	T32	Hybrid/10	Yes	Fouquart-Bonnel, Morcrette et al.
CNRM	T42	Hybrid/30	Yes	Geleyn-Hollingsworth
COLA	R40	σ/18	Yes	Harshvardhan et al.
CSIRO/CSIRO9	R21	σ /9	Yes	Fels-Schwarzkopf
CSU	4x5	Modified σ/17	Yes	Harshvardhan et al.
DNM	4x5	σ/7	Yes	Manabe-Strickler, Lacis-Hansen, Feigelson
ECMWF/Cy36	T42	Hybrid/19	Yes	Morcrette
GFDL	R30	σ/9	No	Lacis-Hansen, Rodgers-Walshaw
GFDL/DERF	T42	σ/18	No	Fels-Schwarzkopf
GISS/Model II	8x10, 4x5	σ/9	Yes	Lacis-Hansen
GLA/Version8	4x5	σ/17	Yes	Lacis-Hansen, Harshvardhan-Corsetti
IAP	4x5	Modified σ/2	Yes	Ramanathan et al.
LANL	R15	σ/20	Yes	Ramanathan et al.
LMD/M206	3.6x5.6	σ/11	No	Fouquart-Bonnel, Morcrette
MGO/MGOHI	T30	σ/14	No	Karol et al.
MPI/ECHAM	T42	Hybrid/19	Yes	Hense et al., Rockel et al.
MRI	4x5	Hybrid/15	Yes	Lacis-Hansen, Shibata-Aoki
MSFC/CCM1	T42	σ/12	No	Kiehl et al.
NCAR/CCM2X	T42	Hybrid/18	Yes	Briegleb, Kiehl et al., Slingo
NMC/MRF	T40	σ/18	Yes	Lacis-Hansen, Fels-Schwarzkopf
NOARL/NOGAPS	T42	Hybrid/18	Yes	Davies, Harshvardhan et al.
SUNYA/CCM1	R15	σ/12	No	Kiehl et al., Wang et al.
UCLA	4x5	Modified σ/17	Yes	Katayama, Harshvardhan et al.
UGAMP	T42	Hybrid/19	Yes	Morcrette
UILL	4x5	σ/7	Yes	Oh-Schlesinger
UKMO/Unified	2.5x3.75	Hybrid/20	Yes	Slingo, Slingo-Wilderspin

AMIP Model Properties - continued

Group (repeated)	Cloud Scheme	Prognostic Cloud Water	Convection Scheme*	Horizontal Diffusion	Gravity-Wave Drag	Number Soil Layers, for Temp./Moisture †
BMRC	Slingo, Rikus	No	Kuo	2nd-order	Palmer et al.	2/1
CCC	McFarlane et al.	No	MCA	2nd-order	McFarlane	1/1
CNRM	Geleyn et al., Tiedke	No	Bougeault	6th-order	Clary	2/2
COLA	Slingo, Hou	No	Kuo	4th-order	Alpert et al.	2/3
CSIRO	Gordon-Hunt	No	MCA	2nd-order	Chouinard et al.	3/2
CSU	Randall et al.	No	A-S	2nd-order	No	1/1
DNM	Smagorinsky	No	Kuo	2nd-order	No	1/1
ECMWF	Slingo	No	Tiedtke	4th-order	Miller et al.	2/2
GFDL	Wetherald-Manabe	No	MCA	4th-order	Hayashi	0/1
GFDL	Gordon	No	MCA	4th-order	Pierrehumbert	3/1
GISS	Hansen et al.	No	Hansen	No	Hansen et al.	2/2
GLA	Slingo	No	A-S	No	No	2/3
IAP	Zeng et al.	No	A-S	2nd-order	No	1/1
LANL	Ramanathan et al.	No	MCA, A-S	2nd-order	No	5/2
LMD	Le Treut-Li	Yes	MCA, Kuo	4th-order	Boer et al.	1/1
MGO	Slingo	No	Kuo	2nd-order	McFarlane	3/2
MPI	Sundqvist	Yes	Tiedtke	2nd-order	Palmer et al.	5/1
MRI	Tokioka et al.	No	A-S	2nd-order	Palmer et al.	4/4
MSFC	Kiehl et al.	No	MCA	4th-order	McFarlane	0/1
NCAR	Slingo	No	Hack	4th-order	McFarlane	4/P
NMC	Slingo	No	Kuo	2nd-order	Alpert et al.	3/1
NOARL	Slingo	No	A-S	4th-order	Palmer et al.	1/0
SUNYA	Kiehl et al.	No	MCA	4th-order	No	0/1
UCLA	Suarez et al.	No	A-S	2nd-order	Palmer et al.	0/P
UGAMP	Slingo	No	Kuo	6th-order	Palmer et al.	2/2
UILL	Oh - Schlesinger	Yes	A-S	No	No	1/1
UKMO	Smith et al.	Yes	Gregory	4th-order	Palmer et al.	4/1

* A-S = Arakawa-Schubert, MCA = Moist Convective Adjustment

† An entry of zero (0) indicates there is no provision for soil heat/moisture storage; an entry of P indicates soil moisture is prescribed.

AMIP Standard Output (Revised)

An important aspect of AMIP is the agreement by participating groups to prepare a common or standard set of output variables, in order to facilitate systematic model validation and intercomparison. As given in the table below, this standard model output consists of the global distribution of a set of surface and two-dimensional variables (Set 1), the global distribution of a set of atmospheric variables at selected pressure levels (Sets 2 and 2a), and the distribution of the zonal averages of a set of variables in the meridional-vertical plane (Set 3). The revisions of this list relative to that distributed at the April 1991 AMIP meeting are inculsion of the surface air temperature in Set 1, the inclusion of the streamfunction and velocity potential in Set 2, the inclusion of the geopotential height at 500 hPa (Set 2a), and the inclusion of the mean meridional streamfunction in Set 3.

The time averages of all quantities are to be calculated for each calendar month of the ten-year period 1979-1988. It should be noted that for some variables (marked by a dagger †) the monthly mean of the daily variance (sampled every six hours for diurnal models and once daily otherwise) is also to be calculated, while other variables (marked by an asterisk *) are to be represented by their total monthly accumulations. These latter quantities will permit the accurate determination of the monthly budgets of momentum, heat and fresh water flux at the surface, as well as the net radiative budget at the top of the atmosphere. (In this connection we may also note that the method II cloud radiative forcing is defined as the difference between the top-of-the-atmosphere net rediative flux with clouds present and that without clouds; this forcing can thus be accurately determined from the monthly accumulated radiation fluxes, but requires running a model's radiation code twice at each physics time step.)

These standard output data should be submitted to PCMDI in computer-compatible labeled files for storage and for the preparation of graphics in accordance with WGNE formats. The WGNE standard for global maps (as in Sets 1 and 2 above) is a format (F1) with latitude displayed on a linear ordinate from 90S to 90N and with longitude displayed on a linear abscissa from 180 W to 180 E (i.e., with the Greenwich Meridian in the middle), with an overall aspect ratio of 2:1 (longitude/latitude). The WGNE standard for meridional cross-sections (as in Set 3 above) is a format (F2) with pressure displayed on a linear ordinate from 1000 hPa to 10 hPa and with latitude displayed on a linear abscissa from 90N (on the left) to 90S (on the right), with an overall aspect ratio of 2:1 (latitude/pressure). Since the linear pressure ordinate does not adequately resolve the stratosphere in many models, a useful supplemental WGNE format for meridional cross-sections is one whose ordinate is linear in ln p. If this format is used in addition to the WGNE standard, the ordinate should extend over the pressure range 1000 hPa to 10 hPa and the display should have an aspect ratio of 2:1 (latitude/pressure) with 90 N on the left. Suggestions for other formats supplemental to the WGNE standards are welcome.

In addition to the production of the standard output described above, each AMIP participating group is expected to prepare a six-hourly history of state (i.e., the distributions of the variables needed for restart, such as velocity, geopotential, temperature, humidity, surface pressure, soil moisture and snow mass), along with the six-hourly accumulations of the appropriate variables for archival storage at PCMDI. In order to be compatible with the standard output, these history variables should be in the same units as indicated above.

AMIP Contacts

Questions, suggestions and comments on AMIP are welcome, and may be directed to the following PCMDI staff:

General information	--	Larry Gates tel: (510) 422-7642 fax: (510) 422-7675
Computer time allocation and scheduling	--	Jerry Potter tel: (510) 422-1832 fax: (510) 422-7675
Programming, storage and software	--	Bob Mobley tel: (510) 422-7649 fax: (510) 422-7675
Validation data	--	Stan Grotch tel: (510) 423-6741 fax: (510) 422-7675
Model documentation	--	Tom Phillips tel: (510) 422-0072 fax: (510) 422-7675

[Please note the change of area code from 415 to 510 effective 2 September 1991.]

AMIP Standard Output (Revised)

(Monthly means for each month of 1979-1988)

Set	Variable	Units	Contour interval (reference contour)
Set 1.	Global distribution of means of surface and 2-D variables		
	† sea-level pressure	hPa	5 (1000)
	† (ground)temperature	°C	5 (0)
	† surface air temperature	°C	5 (0)
	total cloudiness	fractions	0.1 (0.1)
	total precipitable water	mm	5 (5)
	soil moisture	cm	2.5, 5, 10, 20, ...
	snow mass	kg m^{-2}	20 (20)
	* precipitation	mm day^{-1}	2.5, 5, 10, 20, ...
	* evaporation	mm day^{-1}	2.5, 5, 10, 20, ...
	* wind stress components	Nm^{-2}	0.5 (0)
	* sensible heat flux	Wm^{-2}	10 (0)
	* net surface short-wave flux	Wm^{-2}	50 (0)
	* net surface IR flux	Wm^{-2}	50 (0)
	* top-of-atmosphere net short-wave flux	Wm^{-2}	50 (0)
	* OLR	Wm^{-2}	50 (0)
	cloud radiative forcing (method II)	Wm^{-2}	50 (0)
Set 2.	Global distribution of means at 850 hPa, 200hPa		
	† temperature	°C	5 (0), 2 (-50)
	† geopotential height	m	20 (1500), 160 (12000)
	† specific humidity	g kg^{-1}	1 (1), 0.1 (0.1)
	† zonal wind	ms^{-1}	5 (0), 10 (0)
	† meridional wind	ms^{-1}	2 (0), 2 (0)
	† streamfunction	$10^6 m^2 s^{-1}$	10 (0)
	† velocity potential	$10^6 m^2 s^{-1}$	1 (0)
Set 2a.	Global distribution of means at 500 hPa		
	† geopotential height	m	80 (5500)
Set 3.	Meridional-vertical distribution of zonal means §		
	temperature	°C	5 (0)
	specific humidity	g kg^{-1}	1 (1)
	relative humidity	0/0	10 (10)
	cloudiness	fractions	0.1 (0.1)
	zonel wind	ms^{-1}	5 (0)
	meridional wind	ms^{-1}	2 (0)
	meridional streamfunction	10^9kg s^{-1}	20 (0)

* Accumulated

† Including monthly mean of variance of daily average

§ At the standard pressure levels 1000, 850, 700, 500, 400, 300, 250, 200, 150, 100, 70, 50, 30, 20, 10 hPa

Assembly of AMIP Validation Data

The availability of appropriate observational data with which to validate the performance of atmospheric models is an important aspect of AMIP. To this end, PCMDI is undertaking the assembly of monthly-averaged datasets for the AMIP period for as many modeled variables as possible. A primary source for the conventional aerological variables (temperature, geopotential, wind and humidity) are the operational analyses of ECMWF and NMC, a source that will be considerably enhanced when the results of reanalysis are available. It is planned to place these data in a common computer-accessible storage format at PCMDI, and to develop (and make available) software for interpolation to (other) model grids and for graphical display.

Other monthly-averaged data for variables such as precipitation, show cover, radiation and cloudiness are also being assembled for as much of the AMIP period as possible. These AMIP validation data are part of a more general model-oriented electronic climate data base that is being assembled by PCMDI.

All participants are invited to identify observational data sets that they feel would be useful in AMIP model validation, and to direct PCMDI's attention to sources from which such data may be obtained.

Plans for AMIP Model Diagnosis and Intercomparison

In cooperation with AMIP participants, it is anticipated that the PCMDI will prepare computer-accessible files of the monthly-averaged variables and related quantities in standard format as requested by WGNE. Using the validation data base described above, the PCMDI will assess the models' systematic errors insofar as possible, again in cooperation with the participating groups. It is also envisaged that PCMDI will take the initiative in the preparation of suitable multiply-authored summary reports for WGNE and of condensed versions for possible journal publication. Although a wealth of important information on the models' individual and collective performance will be provided by the "basic" or standard AMIP statistics, deeper insight into the physical mechanisms involved in (and responsible for) a model's performance requires a more focussed diagnosis of the results.

While it is difficult to anticipate all such "advanced" diagnoses that may eventually be undertaken, a number of candidates suggest themselves. For example: spectral analysis of the global budgets of heat, momentum and moisture, including the associated energetics and diabatic heating; analysis of surface fluxes and land surface processes; diagnosis of cloud-radiative interactions; analysis of regional seasonal transitions, including monsoons; analysis of stratospheric processes, including sudden warmings; diagnosis of low-frequency tropical variability, including ENSO; analysis of regional processes and phenomena, including those in high latitudes; analysis of the frequency distribution of selected processes, including extreme events.

Building upon the preliminary expressions of interest in such diagnoses made at the inaugural meeting in April 1991, all AMIP participants are invited to describe the diagnostic studies that they plan to carry out with their model's AMIP results. Ideally, each group will propose to take the lead in a specific "advanced" diagnosis and intercomparison in cooperation with (all) other AMIP participants, and drafts of such proposals are especially welcome. The PCMDI is prepared to support these activities through the provision of programming and computational assistance in data acquisition, processing, display and distribution.

Next AMIP Meeting

It is planned to hold the second AMIP meeting on 20 and 21 February 1992 at the Claremont Hotel in Berkeley, in conjunction with a meeting of the DOE/Cess climate model feedback analysis effort - now called FANGIO - that will meet on 17 and 18 February 1992 at the same place. (The intervening day 19 February will be set aside for informal discussions.) As before, PCMDI/DOE will support the attendance of a representative from each modeling group participating in AMIP.