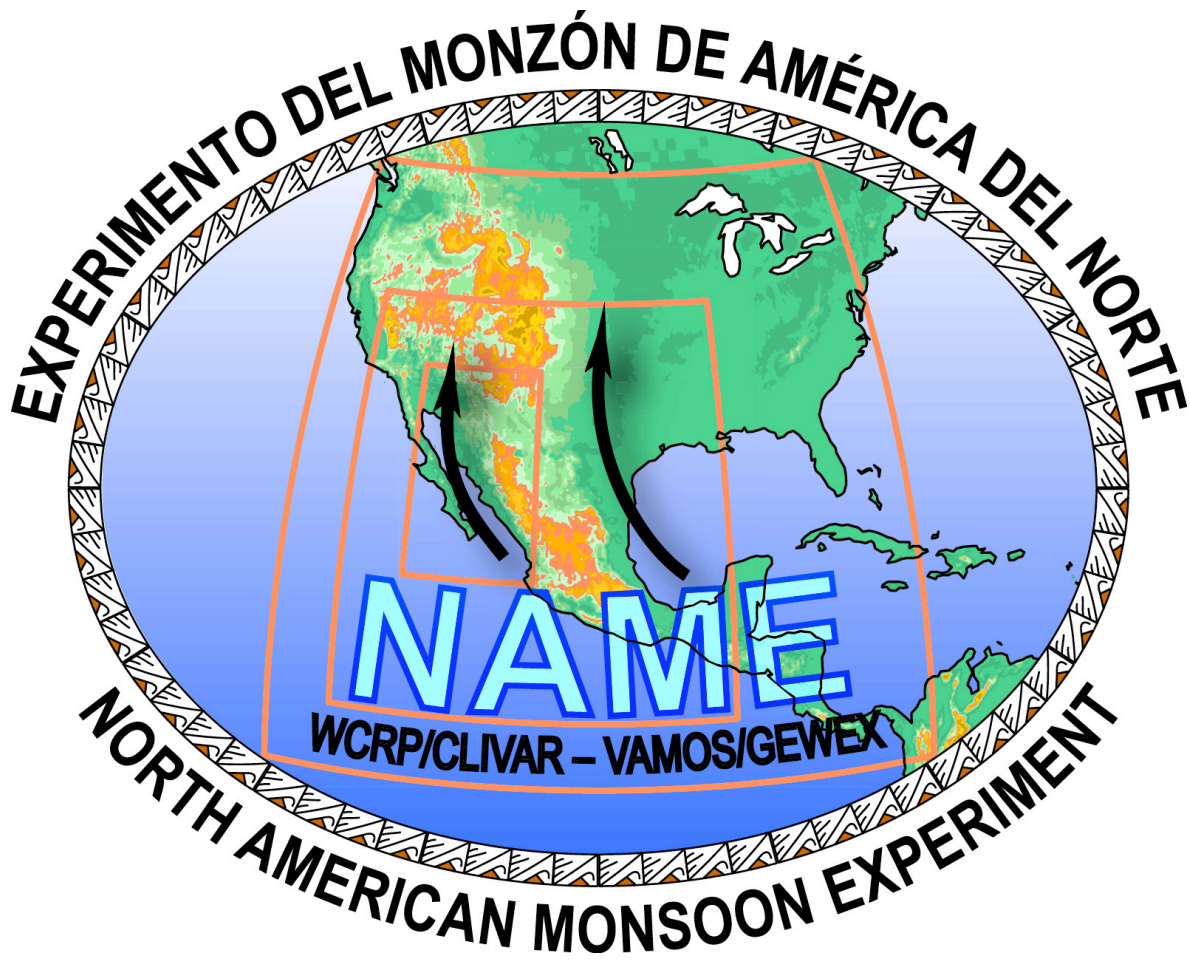


Meeting Report from the 10th Meeting of the NAME Science Working Group



Miami, Florida USA
Mar. 27, 2008

Introduction

The North American Monsoon Experiment (NAME) research program is now in its 9th year of formal activities. As a mature research program the NAME SWG is now tasked with synthesizing much of the research and progress that has been made over the program lifetime and begin to define a strategy for transitioning and sunsetting NAME programmatic activities. In discussion with NOAA-CPO program managers, the NAME-SWG expects to sunset formal program activities during FY2009. The 10th meeting of the NAME Science Working Group (SWG10) was held on the afternoon of March 27, 2008 in Miami, Florida in conjunction with the 11th meeting of the VAMOS Panel. The purpose of holding this meeting in conjunction with the 10th VAMOS panel meeting was to improve coordination between NAME science and other programmatic activities of VAMOS. The goals of the NAME SWG-10 meeting were as follows:

- 1) Continue synthesis of emerging North American Monsoon scientific and prediction findings
- 2) Coordinate relevant, unresolved NAME science issues with those of the Intra-Americas Seas CLimate research Program (IASCLiP)
- 3) Review and refine the NAME Forecast Forum activities and products
- 4) Finalize plans for the NAME regional climate observing system design
- 5) Begin finalization of NAME programmatic activities and planning for the sunset of formal NAME activities.

The sections below detail the proceedings of the 10th NAME SWG meeting. Specific action items emerging from the SWG-10 meeting and its attendant Executive session are listed in Appendix A and include the following:

1. Solicit additional forecast contributions to the NAME Forecast Forum
2. Define a few key science questions which will be useful for FY09 priorities for the NOAA CPPA Program (as requested by Jin Huang)
3. Finalize the NAME observing system design and link to other programs
4. Solicit interest from appropriate journal for a special issue on land-atmosphere interactions and ecohydrological processes in the North American Monsoon region
5. Finalize transition of relevant NAME issues to IASCLiP
6. Finalize articulation of NAME Legacy and plan the capstone meeting of the North American Monsoon Experiment. From this meeting, produce a capstone synthesis document of NAME research.

Several of these items have already initiated with other expecting address and completion in the coming 2-3 months. The meeting agenda and list of presentations and speakers is provided in Appendix B.

Discussion of NAME programmatic activities:

Activities of the NAME Science Working Group and the NAM research community conducted since the 9th SWG meeting held in 2007 were discussed. These accomplishments included:

- Southwest Weather Symposium held during September in Tucson, AZ. This symposium, funded in part by COMET and the U. of Arizona, brought together 115 attendees from the U.S. National Weather Service and the University community to discuss issues and processes related to southwestern U.S. weather. Approximately 40% of the presentations made were directly monsoon related and many of these presentations have been posted to the meeting website at <http://www.atmo.arizona.edu/~swhs/> or are now linked through NAME website.
- Expansion of NAM monitoring and prediction activities. During 2007 the work plan for the NAME Forecast Forum was drafted and finalized by the NAME SWG and representatives at the NOAA Climate Prediction Center (CPC). Details on the NAME Forecast Forum are provided below. Also during 2007, NOAA CPC significantly expanded its resources for Global Monsoons and Global Hazards monitoring and prediction. The NAME Forecast Forum has now directly been linked to these efforts within CPC.
- Initiation of several regional ‘societal applications’ projects. Building a rapidly growing body of NAME physical science research several new societal applications projects have been proposed and funded. Each of these projects aim to transfer improvements in understanding of NAM climate variability and/or forecast products to various user communities throughout the NAM-affected region. These projects are largely lead by scientists from U. Arizona, U. Sonora, IRI, NOAA/ESRL and NCAR.
- The NAME research program continues to generate numerous publications in the peer-reviewed and programmatic literature. During the past year the following publications have been created:
 - Chidong Zhang and Eric Maloney contributed an article to the VAMOS Newsletter on intra-seasonal variability of the NAM
 - A special issue of CLIVAR Exchanges was solicited, organized and submitted which contained 8 original articles from NAME SWG members. This special issue will be published during the spring of 2008.
 - A special issue in Remote Sensing of the Environment on results from the SMEX04/NAME field campaign was published in late 2007. The special issue contained 12 articles related to the remote sensing of surface soil moisture, canopy structure and flux characteristics from the 2004 NAME EOP.
 - All NAME SWG members and NAM researchers were encouraged to continue to submit their recent publications and

references to the NAME publications web page through the official NAME website at (www.eol.ucar.edu/name/documentation/publications.html).

In absentia, NAME SWG member Erik Pytlak provided a summary update from the NAME Forecast Operations Center which included:

- An announcement of a new NAM Monsoon webpage developed and hosted by the Tucson, AZ, NWS WFO which will formally be released in June 2008. The new webpage will contain significantly more content on the monsoon than previous pages.
- The historic ‘official’ monsoon onset criteria for southern Arizona has been abolished in favor of a transition to a fixed ‘monsoon season’ lasting from June 15 – September 30. The historic dewpoint criteria proved excessively problematic in communicating with the public and raising awareness of monsoon related hazards. This new definition is now in-line with other ‘hazard’ season characterizations such as is used for the Atlantic Hurricane season at NOAA/NHC.
- A request was also made from the NAME FOC to rebuild some of the existing collaborations with the Mexican SMN which have decayed since the departure of Miguel Cortez and the large amount of staff reduction and turnover at the SMN.

NAME SWG member Art Douglas provided a summary on recent developments within the Mexican SMN which included:

- Update on the operation of the Mexican upper air sounding network. Thanks to the efforts of NAME researchers (Kingtse Mo, in particular) and the collaboration of Art Douglas and SMN director Micheal Rosengaus, the operational collection and communication of Mexican sounding data has been fully restored and budgeted for the next 5 years. Data impact studies provided by NAME field data and NCEP data assimilation systems conclusively found that this sounding network was essential for the production of any reliable forecasts of NAM activity. *This achievement is to be looked upon as one of the most important contributions of NAME research to maintaining and improving prediction capabilities in the NAM.*
- Operational data collection of daily precipitation measurements has been steadily decaying in recent years. Since the 2004 NAME Enhanced Observing Period approximately 200 stations have ceased making measurements. Furthermore, regional water district reporting back to SMN in Mexico City has become infrequent with large regions missing on certain days. The increasing gaps in rainfall data, coupled with intermittent lapses in the transmission of data from the SMN to NCEP has resulted in significant problems in operational analysis and data assimilation activities. SMN is working to correct the transmission problem but the loss of reporting stations is yet unresolved.

- Mexican observatory data, previously, has not been digitally recorded in Mexico. Tom Karl of NCDC, in collaboration with agency members in Mexico is now moving forward with an effort to rescue and digitize observatory data which include (temperature, wet bulb temperature, precipitation, cloud fraction, wind, station pressure, insolation)
- A new cross-equatorial flow index has also been created by Art Douglas and the SMN. This index has been developed for application to Eastern Pacific Tropical Storm monitoring and prediction.

NAME SWG member Kingtse Mo provided an update on NAM-related activities occurring at NCEP which include:

- During 2007, Wei Shi and Kingtse Mo of CPC initiated a NAM summary at the end of the monsoon season. This summary has been given internally at NCEP but she has now offered to open up this summary activity to others in the NAM research and prediction community. Past and future summaries will be posted to the NAME Forecast Forum website.
- A brief discussion on North American Drought Monitor (NADM) activities was provided. It was recommended that NAME, in particular the NAME Forecast Forum, utilize some of the NADM products such as standardized precipitation index, standardized runoff index values in their monitoring activities.
- Land surface model initialization testing has been conducted at NCEP which point to increases in ensemble forecast skill if ensemble runs are initialized with GLDAS using the identical Noah LSM that is used during the forecast cycles as opposed to alternate land surface models.

NOAA CPPA Program Manager Jin Huang provided guidance (in absentia) on FY09 priorities and opportunities from the NOAA CPPA program. The SWG chair presented these comments to the NAME SWG as follows:

- The NAME SWG needs to define a few key science questions which will be useful for FY09 priorities. (The response to this request was undertaken as an action item from the NAME SWG-10 meeting.)
- CPPA may be able to support a few projects in the N. American monsoon area. Priority areas include:
 - Unified linkage of N. and S. American Monsoons
 - Linkages to global monsoon systems
 - Linkages to the Intra-Americas Seas region
 - Contributions to climate model improvements
 - Continued use and analysis of NAME data is encouraged
- The next CPPA PIs meeting will be held on Sep. 29-Oct. 1 in Silver Spring, MD. All CPPA-funded PIs and interested parties are encouraged to attend.

Research reports of continued synthesis of emerging NAM scientific and prediction findings:

- Seasonal modes and predictability (Chris Castro): Coherent large-scale forcing mechanisms of the North American Monsoon System (NAMS) do exist, and recent NAME-related research suggests potential for improved seasonal predictability on the intraseasonal to interannual timescales. This is highly desired by a number of local stakeholders in the core monsoon region, as monsoon timing and intensity is important in terms of severe weather, wildfire, water use and supply, and ranching and agriculture. The forcing mechanisms to consider are: 1) Large-scale atmospheric teleconnections, 2) the Madden Julian Oscillation (MJO), 3) synoptic transients (i.e. easterly waves, tropical cyclones, and inverted troughs), 4) moisture transport from the Atlantic and inter-Americas seas, and 5) land surface feedback processes. During the SWG10 meeting a presentation reviewing the first three of these factors was provided. Mid-latitude atmospheric teleconnections associated with interannual and interdecadal variability in the Pacific are present in the early part of the summer (June and July). These teleconnections modulate the position of the monsoon ridge and frequency of synoptic transients during this period. Wet and early (dry and late) monsoons tend to occur with La Niña-like (El Niño-like) conditions, and this relationship is opposite to summer precipitation in the central U.S. It was shown that a regional climate model (RCM) with a grid spacing equivalent to the North American Regional Reanalysis, can effectively represent this interannual variability in monsoon rainfall. Therefore, a RCM, or high resolution GCM, is deemed necessary to represent the physical processes of warm seasonal rainfall, namely the diurnal cycle of convection.

Based on the summary above more skillful NAMS prediction therefore requires three components which must be reasonably represented in a dynamical forecasting system: 1) dominant modes of Pacific sea surface temperature variability, as a surface boundary condition to an atmosphere general circulation model; 2) North American boreal summer teleconnections, and their time evolution through the season; 3) use of a regional climate model, or alternatively a high-resolution general circulation model, to resolve summer rainfall processes. Current NAME-related research is moving in these directions. In terms of statistical forecasting, it was also shown that a Combined Pacific Variability Mode index, based on the dominant modes of Pacific sea surface temperature anomalies, appears to be good predictor of monsoon onset and strength in the antecedent winter and spring period.

- NAMAP-2 (Mapes, Gutzler and Schemm)
Work related to evaluation and assessment of models under the NAMAP-II project is nearing completion. An initial summary of the results is forthcoming in the CLIVAR Exchanges special issue on NAME. The NAMAP-II group is also preparing a manuscript for submission to the J. of Climate summarizing the NAMAP-II results. The principle findings from the NAMAP-II evaluations are summarized as follows:

- Most global models improved their depictions of the onset and seasonal cycle of rainfall in the core monsoon region, although some models missed simulation of the month of maximum rainfall during 2004.
- Differences in the amounts of monthly averaged precipitation are large between both groups of regional and global models.
- Convective component of rainfall is much more dominant compared to grid-resolved precipitation in global models than regional models. Differences in this partitioning affect simulated diurnal cycles with the global models being phase-shifted more towards daytime activity compared with regional models.

After a brief review of some standard NAMAP-2 metrics from the recent Gutzler et al. paper in CLIVAR Exchanges, the land-atmosphere interaction study of Patrick Kelly and Brian Mapes was presented. The radiation budget of the NAME/Mexico region was intercompared among the models, and compared to available observations. Processes controlling the partitioning of this energy into sensible vs. latent heat flux were also compared. Models tend to have too much net radiation (despite a low surface albedo), and some have apparently excessive sensitivity of evaporative fraction to recent rain (perhaps due to puddles or canopy moisture). Models which show excessive diurnal heating of the atmosphere by the land also tend to have excessive seasonal warming of the lower troposphere, and excessive 500 mb heights. This suggests that local, diurnal studies might actually be useful to calibrate aspects of the seasonal performance of models.

- NAME land surface studies (Vivoni, Lettenmaier, Lawrence)
Significant progress has been accomplished on the land surface hydrological studies related to the North American Monsoon Experiment.

(1) Vivoni et al. reported on the relationship between hydrological conditions and surface turbulent fluxes at the Rayon (Sonora) eddy covariance site installed during NAME EOP 2004 and subsequently operated in summer 2006 and 2007. The primary conclusion was the strong soil moisture dependence of the surface flux partitioning, as quantified by the Bowen Ratio. In addition, evidence was shown for how the mean soil moisture conditions in the tower footprint are closely linked to the surface fluxes. Furthermore, the temporal evolution of the turbulent fluxes was related to the vegetation dynamics during the monsoon period and to biomass conditions. It appears that the vegetation greenness affects directly the relationship between evapotranspiration and soil moisture that is parameterized in a static fashion in most climate and hydrology models.

(2) Vivoni et al. reported on preliminary simulations of distributed soil moisture conditions in the Sierra Los Locos basin (100 sq. km - Sonora) for the NAME EOP 2004 and summer 2007. Recent field investigations, instrument deployments and watershed characterizations of the region were discussed and tied into improvements in the model simulations of soil moisture at internal measurement

sites. The primary conclusion was that the distributed model is capable of capturing soil moisture temporal variations at different spatial locations, though additional work is required to properly capture intense dry-downs in the region. A data impact study of a new high density rain gauge network showed the improvements made in the model simulations of soil moisture spatiotemporal patterns. Ongoing work is being carried out for proper model parameterization in the region over the periods 2004-2007.

(3) Lettenmaier et al. reported on the development and implementation of the University of Washington West-Wide Hydrological Forecast System that now includes the entire region of Mexico. Two products were discussed and examples shown. In the first product, a soil moisture nowcast is generated over the region (including NAME Tiers 1, 2 and 3) based on automated weather observations from the US and Mexico and using the VIC hydrological model. Soil moisture nowcasts are presented as percentiles of the soil moisture climatology generated by the VIC model over a 50-year period. In the second product, soil moisture nowcast are used in an ensemble forecasting system to produce long-lead time streamflow forecast in the region, with approximately 13 forecast points (stream gauges) in the NAME region. The major conclusion of this study is that soil moisture nowcasts in winter and spring have little impact on the predictability of summer streamflows.

- Climate Change and the NAM (Cavazos)
NAME SWG member Tereza Cavazos provided a summary overview of recent research related to climate change implications on the N. American Monsoon. This work was largely based on the synthesis of findings from publications of climate change simulations that contributed to the recent 4th Assessment Report (AR4) of the Inter-governmental Panel on Climate Change. The findings presented are summarized as follows:
 - Only a small handful of models produced a credible NAM with respect to the seasonal cycle and spatial extent of summer rainfall in current climate simulations.
 - Large differences exist in both the spread and magnitude of changes in NAM warm season precipitation projections.
 - Given strong intermodel differences and a general lack of model fidelity, it is strongly recommended that specific model selection, as opposed to multi-model averages, are critical to making inferences on climate change impacts on the NAM.
 - Recent work by Joseph and Nigam (2006) suggests that the HadCM3 can produce a credible NAM and some characteristics of ENSO related inter-annual variability.
 - There is very significant uncertainty (as represented by a lack of model agreement) with respect to extremes in tropical temperature and precipitation in the IPCC models.

- Current trends in observational data suggest a shortening of the monsoon season but a concomitant increase in the intensity of monsoon precipitation events. These two factors serve to balance one another resulting in only small, regionally-dependent changes in total monsoon precipitation.

These findings suggest that significant care must be taking in preparing inferences about climate change impacts on the NAM hydroclimate and the much work remains on providing a physical basis for climate change in the NAM region.

NAME Executive Business:

The Executive Session of the NAME SWG10 was held immediately following the general session. Several program specific items were discussed and from these discussions a list of action items (Appendix A) was created. The topics discussed in detail are listed as follows:

- Update on the NAME Observing System Design: The chair of the SWG provided a very brief update on the status and plan for completion of the NAME Observing System Design. This update included a brief review of NAME observations and preliminary list of priority elements of a proposed observing system design. Obtaining general agreement, it was decided that the chair would prepare a draft design document for circulation to the NAME SWG and relevant members of the NAM research and forecasting community in the U.S. and Mexico. The design would emphasize components of both the real-time and climate observing network deemed essential for improving weather and climate diagnoses and predictions of NAM behavior. Development of this draft plan is listed as an action item below in Appendix A. Following approval by the NAME SWG and other relevant parties the plan will be submitted to NOAA NWS and the Mexican SMN as a formal recommendation from NAME.
- SWG Membership Rotation: During the SWG10 meeting it was acknowledged that the tenure and programmatic life of NAME was coming to a close within 1-1.5 years. In lieu of managing another round of membership rotations, it was proposed that members wishing to remain on the SWG for the remaining period would be able to do so and that no new elections would be held. This motion was passed by the NAME SWG but needs to be approved at the VAMOS level. The remaining duties of SWG members would be to continue the synthesis and development of NAME research and publications and assist in the planning of a capstone meeting for the NAME program following the 2009 monsoon season.
- Defining the legacy of NAME:
A lengthy discussion was held on defining what the ‘Legacy’ of NAME will be and how this legacy should be articulated. Several accomplishments were put forward as key contributions of the NAME program and these points will continue to be synthesized during the remainder of the NAME program. It was

proposed that in conjunction with the NAME capstone meeting, a final program summary should be prepared for publication in a general readership venue such as the Bulletin of the American Meteorological Society. Continued articulation of the legacy of NAME, the planning of a capstone meeting and the summary paper are listed as action items in Appendix A.

- Upcoming NAME related meetings: A brief review of upcoming NAME-related meetings and workshops was also provided. These meetings include:
 - Ensenada Monsoon Region Climate workshop April 10-11, 2008
 - CPPA PIs meeting Sep. 29-Oct. 1, 2008 in Silver Spring
 - NAME capstone meeting in the 2009-2010 timeframe

Appendix A. Summary of Action Items from the NAME SWG10 Meeting

1. Solicit additional forecast contributions to the NAME Forecast Forum
2. Define a few key science questions which will be useful for FY09 priorities for the NOAA CPPA Program (as requested by Jin Huang)
3. Finalize the NAME observing system design and link to other programs
4. Solicit interest from appropriate journal for a special issue on land-atmosphere interactions and ecohydrological processes in the North American Monsoon region
5. Finalize transition of relevant NAME issues to IASCLiP
6. Finalize articulation of NAME Legacy and plan the capstone meeting of the North American Monsoon Experiment. From this meeting, produce a capstone synthesis document of NAME research.

Appendix B. NAME SWG10 Meeting Agenda

Mar. 27, 2007 1:30-4:15 pm

NAME SWG-10 (Parallel with MESA SWG)

- a. Update on NAME programmatic activities
 - Brief Introduction (Gochis)
 - Review and refine the NAME Forecast Forum activities and products (Gochis)
 - Update on SMN activities (A. Douglas)
 - Update on NCEP monsoon activities (Schemm, Mo, Higgins)

- b. Research reports continue Synthesis of emerging NAM scientific and prediction findings
 - Seasonal modes and predictability (Castro)
 - NAMAP-2 (Mapes with input from Gutzler)
 - NAME land surface studies (Vivoni, Lettenmaier, Lawrence)
 - Climate Change and the NAM (Cavazos)

- c. Update on the NAME regional climate observing system design (Gochis)

4:15 pm Break

4:30 pm – 6:00 pm

NAME Executive meeting: Planning for the sunset of NAME in 2010 and transition to IASCLIP

- Membership Issues (SMN liaison)
- Update on special publications and conference sessions
- Discussions on linkages with other VAMOS programs and the VAMOS modeling plan
- Planning a NAME capstone meeting (2010 timeframe)

Meeting ends