Hydrometeorological Prediction Center

2004 Accomplishment Report

1. Introduction

The year 2004 was a busy one for the Hydrometeorological Prediction Center (HPC) with some experimental products becoming operational while potential new products being planned. HPC participated in several projects designed to test new products and services that may be implemented in the future. After three years of Winter Weather Experiments (WWEs), the new products developed as part of the experiments were incorporated into operations. A multiyear experimental Air Quality program began during the summer with daily HPC participation. As part of a long-term plan to produce more probabilistic products, work continued on the development of a confidence factor for HPC quantitative precipitation forecasts (QPFs).

HPC worked closely with National Weather Service (NWS) Headquarters, regional offices, and Weather Forecast Offices (WFOs) to expand the content and improve the format of medium range guidance. As a result, HPC forecasters are now providing forecasts for days four through seven that can be used as a starting point by WFO forecasters in preparing local forecasts.

As in past years, HPC worked closely with other government agencies and the media, providing briefings on a wide variety of weather events from heavy rainfall associated with landfalling tropical systems to winter weather and heat waves. An active tropical season kept HPC forecasters busy. HPC forecasters coordinated with TPC forecasters on each storm that threatened the U.S. coast. Forecasters and management provided briefings to the Federal Emergency Management Agency (FEMA), others in the emergency management community, and the media.

2. Major Accomplishments

Hydrometeorological Prediction Center Winter Weather Desk Began Operations - The HPC Winter Weather Desk became operational on September 15, 2004. The Winter Weather Desk builds on the lessons learned through three years of Winter Weather Experiments. These experiments tested concepts for collaboration between the NWS field offices and HPC with a goal of improving forecasts of winter weather. The desk became operational on the scheduled date despite the hindrance introduced by numerous tropical systems impacting the U.S. The Winter Weather Desk provides graphical and text products for use within the NWS for collaboration and a coordinated set of products for use by the general public.

The internal preliminary product suite includes depiction of accumulations for freezing rain and combined snow and sleet in 24-hour increments out three days. These graphics are intended as preliminary guidance to assist WFOs and HPC in the NWS winter weather collaborative process.

The major difference to the internal product suite compared to last year is the increase in resolution from an event total to daily accumulations.

The external product suite shows the probability that freezing rain or snow will exceed certain thresholds. The major differences to last year's products include modification of the specific threshold amounts for snow and sleet accumulations and the extension of the time range covered by the graphics from 1.5 to 3 days. Additionally a graphic depicting the preferred track of surface low pressure centers associated with significant winter weather and the uncertainty of the low positions is produced. Prior to this winter season, the low tracks graphic was issued only as an internal, experimental product.

Winter Weather Experiment 3 - The Winter Weather Desk built upon the lessons learned from three seasons of Winter Weather Experiments (WWEs). The WWE marked its third year during the winter of 2003 - 2004 with an expansion to include offices in all four of the conterminous U.S. NWS regions. With this expansion came new challenges, including the increased number of days when the HPC was simultaneously coordinating with two or three separate groups of offices experiencing different winter storms. For the first time the experiment included offices in the mountainous regions of the west, where local terrain plays a very significant role in the weather.

HPC Develops Additional Medium Range Guidance Forecasts - In order to provide a complete set of sensible weather parameters for use by NWS field offices, HPC began generating forecasts for addition additional weather parameters. In addition to its daily maximum and minimum temperature and probability of precipitation forecasts that have long been available, HPC began providing forecasts for dew point, cloud cover, wind direction and speed, and precipitation type. All of these fields were made available in gridded format as well as text messages with forecasts for individual stations.

HPC Continues Development of a Confidence Factor for QPF - The accuracy of forecaster-prepared QPFs, especially beyond 12 hours, varies considerably from forecast situation to forecast situation. Using funding provided by the Advanced Hydrologic Prediction Service (AHPS) program, HPC continued development of procedures based on the use of ensemble predictions to quantify the measure of uncertainty in the manually produced HPC forecasts. Using this confidence factor, NWS River Forecast Centers (RFCs) will be better able to determine which QPFs are more likely to add to the quality of the river forecasts and therefore extend the lead time and accuracy of flow predictions. Jung-Sun Im is developing the techniques, which will be applied to operational HPC deterministic forecasts to generate this confidence factor. The process was tested at two RFCs during the second half of 2004.

HPC Participated in the North American Monsoon Experiment - The HPC played an active role in the North American Monsoon Experiment (NAME) field campaign, which ran from June 21 through August 18, 2004. The goals of NAME are to improve understanding of the warm season circulation and to improve the prediction of warm season precipitation over North America. In support of NAME HPC extended its quantitative precipitation forecasts (QPF) for day 1 and 2 QPF to include a portion of northern Mexico north of 20 degrees North. In addition, HPC forecasters highlighted the NAME domain in the text discussions issued by QPF, medium range, and model diagnostic forecasters. HPC participated in the daily teleconference between the NAME Forecast

Operations Center in Tucson, AZ, and the other National Centers for Environmental Prediction (NCEP) centers. HPC also provided on-site support to the NAME field campaign as Jessica Clark and Mike Bodner each served 5-day tours of duty as field forecasters with the Forecast Operations Center in Tucson. Clark and Bodner also attended an organizing meeting in Tucson in late April where they gave a presentation that provided a preview to the NAME science working group of HPC's contribution to the field campaign. In late May, Mike Bodner participated in an exchange with the Servicio Meteorologico Nacional (SMN) in Mexico City.

HPC Participated in Experimental Air Quality Forecasts - From June 1 through August 31, 2004, HPC provided support to an experimental production of air quality ozone forecasts. The experiment, conducted jointly with the Environmental Protection Agency (EPA), NWS, and several states, is part of the planned operational test and evaluation leading to operational production of air quality forecasts for the Northeast. This is the first step in a proposed ozone air quality forecast that will expand across the United States between 2004 and 2009. HPC participated in a daily conference call among the participants and provided a written meteorological overview for posting on the EPA website.

Operational highlights:

HPC Provided Extensive Support During Tropical Storm Bonnie and Hurricane Charley - As the operational backup center for the National Hurricane Center (NHC), the HPC worked closely with the NHC in providing weather support to other NWS offices, emergency managers, the media, and the public during Bonnie and Charley, which threatened U.S. interests from early August through August 15. During both storms, HPC provided guidance forecasts of the storm tracks to the NHC. Additionally, HPC issued forecasts indicating the precipitation expected from the storms over the eastern U.S., as well as public advisories for Bonnie once she had weakened to tropical depression strength over the U.S. HPC was actively involved with the Hurricane Liaison Team, providing numerous video-teleconferences to FEMA and state emergency managers. Media opportunities included a live interview of HPC Director Jim Hoke on CNN shortly after the landfall of Charley, as well as print media interviews with CNN and Fox, among others.

HPC Conducted Hurricane Back-up Test - On Tuesday, August 24, 2004, the HPC conducted a backup test for the suite of products issued by the National Hurricane Center (NHC) of the Tropical Prediction Center. This test, in which HPC prepared and issued NHC's operational products, is part of a continuing effort to test HPC's backup capability and proactively root out problems in the system before the event of an actual emergency. The HPC issued tropical cyclone forecast products and discussions at 15 and 21 UTC for Hurricane Frank and Tropical Depression 9 in the eastern Pacific, as well as the tropical outlooks for the Atlantic and Pacific. The backup exercise was a success, and taught the HPC valuable lessons that will be used for future backup tests.

HPC Set Nine Precipitation Records in September - HPC set record high 24-hour QPF threat scores in September for all four Day 1 forecast categories (0.5", 1", 2" and 3"), two of three Update categories, one of two Day 2 forecast categories, and both of the Day 3 forecast categories for a total of nine new records for the month. Three of the new records were all-time high scores for any month of the year. These were the Day 1 threat scores for 2" and 3" categories, and the Update threat score for the 2" category. Several of the new records beat the old records by 50 percent or

more, and at least four of the new records replaced previous records that were set in the late 1970s and early 1980s. The HPC scores also soundly beat the best model scores in all categories - in some cases by nearly 30 percent. Truly a remarkable month!

Outreach, conferences, and visitors

HPC Director Attended Science Steering Committee Meeting - During the week of October 18, HPC Director Jim Hoke attended the Seventh Session of the Science Steering Committee of the World Weather Research Program. The meeting was held in Boulder, Colorado, at the National Center for Atmospheric Research. In his presentation to the committee, Hoke provided an overview of the HPC and the many reasons HPC is an ideal location for a Hydrometeorological Testbed (HMT). An Invited Experts Workshop, sponsored by the World Meteorological Organization (WMO), will be held at HPC in May 2005 to explore international participation in an HMT. As part of his visit to Boulder, Hoke also met with Marty Ralph, a division chief in the Environmental Technology Laboratory (ETL) of the National Oceanic and Atmospheric Administration (NOAA) and Program Manager of NOAA's Science, Technology, and Infusion Program, to discuss progress in establishing an HMT and how HPC might be able to contribute to it. Additionally, Hoke met with ETL staff members regarding their recent research activities. He also met with Space Environment Center leadership Ernie Hildner and Ron Zwickl and visited the Denver-Boulder Weather Forecast Office.

HPC Participated via Teletraining in Workshop at Weather Forecast Office Tulsa - Peter Manousos, HPC Science and Operations Officer (SOO), presented two teletraining sessions to WFO Tulsa on October 28, 2004. The training was part of a workshop attended by staff from WFO Tulsa, the collocated Arkansas-Red Basin River Forecast Center (ABRFC), and a few surrounding WFOs. The first presentation was a 30-minute overview of HPC structure and medium range forecast operations. This presentation included a case exemplifying use of operational and ensemble output to produce HPC medium range forecasts. The second presentation was a 30-minute overview of HPC's Winter Weather Desk products and services for the 2004-2005 winter season.

HPC Participated in Winter Weather Workshops at several WFOs - Peter Manousos, HPC SOO, participated in winter weather workshops at several WFOs during fall 2004 including Wilmington, OH, Taunton, MA, Binghamton, NY, Portland, ME, and Caribou, ME. His presentations discussed the strategy, generation, interpretation, and application of ensemble prediction systems in operations for both short and medium time ranges, as well as an overview of HPC products and services, a summary of their deadlines, and a discussion of major changes between the Winter Weather Desk and last year's Winter Weather Experiment 3.

HPC Provided Winter Weather Desk Teletraining to Weather Forecast Offices - HPC provided numerous short telebriefing sessions about its Winter Weather Desk before the start of the winter season 2004-2005. The sessions were about 30 minutes in length and provided an overview of HPC products and services, a summary of their deadlines, and illustrated major changes between the Winter Weather Desk and last year's Winter Weather Experiment 3.

HPC Meteorologists Provided Talks to Several Groups – HPC staff provided talks to many groups during the year including the Boy Scouts, a hospital's Kids Safe Program, and many schools. A wide variety of weather topics were discussed, including the causes of weather, cloud types, fronts, wind, acid rain, the water cycle, dangerous weather including snow storms, thunderstorms, flash flooding, tornadoes, and hurricanes. Also discussed were weather instruments and remote sensing by satellites and radar.

Presentation at the Cosmos Club - HPC and Ocean Prediction Center (OPC) Director Jim Hoke was the luncheon speaker at the Cosmos Club, Washington, DC, on April 15. The Cosmos Club was founded in 1878 "for the advancement of its members in science, literature, and art and their mutual improvement by social intercourse." Hoke's presentation, sponsored by the group's Science and Technology Committee, was entitled "The Challenge of Weather Forecasting – Past, Present, and Future". The talk highlighted the great progress made by NOAA in improving weather prediction. Following the one-hour presentation a lively question-and-answer session ensued lasting another hour. Hoke's sense he was speaking at a special place was confirmed when he saw the display of Cosmos Club members featured on postage stamps.

Volcanic Ash and Aviation Safety Conference Attendees Toured HPC - On June 23, nearly 60 participants from the Volcanic Ash and Aviation Safety Conference toured the operations areas of the HPC in the evening hours after the conference had ended for the day. HPC Director Jim Hoke and Deputy Director Kevin McCarthy served as the hosts. There were many good questions and interactions with the scientists from around the world.

Argentina's Naval Attaché Visits the HPC - On August 5, Capitan Javier Valladares, Attaché of Argentina's Navy to the United States, visited the HPC. After an introduction by Director Jim Hoke, Capitan Valladares met with Dave Feit, Chief of the Ocean Forecast Branch of the OPC and Mike Davison, Coordinator of the HPC International Desks. During his visit he also met with Jose Luis Ibarrola, South American Desk fellow from Argentina, and discussed ways they could improve on their operations.

HPC Represented at Forecaster Development Program (FDP) Meeting - Peter Manousos, HPC Science and Operations Officer, represented NCEP at the Forecaster Development Program (FDP) review meeting at the NWS Training Center on October 26-27, 2004. The primary goal of the meeting was to review the FDP (authored in 2000) and make appropriate modifications. Many updates were needed due to the onset of digital services in the NWS. The secondary goal of the meeting was to identify FDP components that should be offered in a residence course

HPC SOO was Keynote Speaker at U.S.-Canada Workshop - Peter Manousos, HPC SOO, attended the 13th U.S.-Canada Great Lakes Workshop for Operational Meteorology held at the State University of New York at Buffalo on August 18 – 20. As a keynote speaker, Peter provided an overview of the NWS' Winter Weather Experiments. His talk covered the motivation, goals, results, and lessons learned from the three Winter Weather Experiments and culminated with an outline of how these findings will impact the NWS winter weather products and services for the upcoming season.

HPC Participated in NOAA Hurricane Conference - Bruce Terry and Jessica Clark represented the HPC at the NOAA Hurricane Conference at the Tropical Prediction Center (TPC), November 29 - December 3. They presented HPC's performance during the 2004 hurricane season, as well as participated in determining what changes should be incorporated into the appropriate NWS Directive for next season.

HPC Participated in Environmental Modeling Center (EMC) Review - Peter Manousos, HPC SOO, presented the HPC perspective at the EMC 2004 Model Review on December 7. His presentation included a discussion of model performance, examples of how HPC uses EMC products, and a list of model and model development issues important to HPC.

Media Activities

January 2004 Cold Outbreak - During the January 2004 cold outbreak and winter storms over the eastern United States HPC was very busy with media requests. There were many interviews with national media outlets, including eight interviews with CNN and two with Spanish Language CNN Radio. HPC also was very active with the RFCs and WFOs throughout the country on the internet collaborative tool (12 Planet) and through telephone conference calls.

Mean Heat Index Interview – On April 15, Ed Danaher, HPC Development and Training Branch Chief, was interviewed by Discoveries and Breakthroughs Inside Science, a syndicated television science news service (http://www.aip.org/dbis). Produced by the American Institute of Physics, this service appears in more than 95 U.S. television markets with a potential audience of over 65 million viewers. Danaher described the Mean Heat Index product prepared by the HPC as well as the impact of excessive heat on the population.

HPC Participated in Phone Interviews for Thanksgiving Holiday - With the range of weather problems across the United States during the Thanksgiving weekend, HPC forecasters were interviewed by a number of national news networks for both radio and television.

HPC Media Interviews for Election Day - With a cold front extending through the Midwest and Southern Plains on Election Day, there was significant media interest in how the weather could affect voter turnout. HPC forecasters responded to requests for interviews from many media outlets, including CNN Radio, USA Today, The Saint Louis Dispatch, and Bloomberg News.

HPC Interviews Regarding Winter Weather Christmas Week - With record-breaking winter weather events Christmas week, HPC responded to many media requests for interviews. Included in these, the CBS Evening News sent a camera crew to the World Weather Building to tape interviews on December 23 and December 27 regarding the winter weather.

International Desks

During 2004 under the leadership of International Desks Coordinator Michel Davison, the International Desks trained 14 visiting forecasters -- six at the South American Desk, six at the

Tropical Desk, and two at the Africa Desk. The International Desks also hosted two summer interns.

Heavy Rains and Snow over Northwestern Mexico - On February 20, the HPC International Desks initiated a multiservice discussion involving the HPC International Desks Tropical Desk, Servicio Meteorologico Nacional (SMN) de Mexico, the USAF 25th Operational Weather Squadron (25th OWS), and the HPC Basic Weather Desk. The Tropical Desk advised all agencies of the potential for an organized rainfall and snowfall event to affect portions of northwestern Mexico between February 22 and 24. The International Desks coordinated with Itzel Lopez, SMN, an alumna of the Tropical Desk, and indicated a potential for 10 - 14 inches of snow. SMN issued weather advisories warning civil defense and federal and state governments of the risk. The event verified as forecasted, with 12 inches of snow falling over the mountains of Chihuahua. This was an unusual event, with occurrences averaging about once every seven to ten years.

HPC International Desks Provided Advance Notice of Heavy Snow in Chile and Argentina - On April 19, the HPC International Desks South American Desk warned of the potential for heavy snow on the central Andes of Chile and Argentina two days in advance. This information was coordinated with personnel of the Division Meteorologica de Chile (DMC). Benjamin Caceres, an alumnus of the South American Desk and a forecaster at the DMC, later reported 40 cm (15.7 inches) of snow on the ground over the Andes just west of Santiago, verifying the forecast. The heavy snowfall had a noticeable economic impact, as it likely blocked one of the major trading routes between Argentina and Chile for several days.

HPC International Desks Coordinator Participated in WMO Sponsored Workshop for Meteorological Instructors - In May 2004, Mike Davison, attended a WMO sponsored and funded workshop for Meteorological Instructors in Buenos Aires Argentina. During the two-week training seminar, Mike was able to interact with and share information with WMO members from Regions III and IV. Upon his return, he applied what he learned to improve the training of the HPC International Desks fellows, creating new lessons and training material that have greatly improved the training program. View a photo of the participants of the workshop. During the seminar, he also visited the forecast office that supports Argentina's Navy. The office has responsibility for search and rescue operations and depends on NOAA's products for their support.

HPC International Desks Provided Forecast of Heavy Rainfall for the Island of Hispaniola - On July 20, the HPC International Desks Tropical Desk, with the assistance of the NWS International Activities Office, advised users on the island of Hispaniola of the potential for organized rainfall to develop in association with a tropical wave. An intense tropical wave was forecast to bring 4-6 inches to the island over a 24-hour period. Mike Davison worked with the NWS International Activities Office to relay this information to the local meteorological service. These actions resulted in a lead time of at least 36 hours with both Haiti and Dominican Republic's meteorological services issuing timely alerts that minimized loss of life. Measurements of rainfall indicated rainfall amounts of nearly two inches along the coast and much higher amounts inland.

International Activities Office Personnel Visited HPC International Desks - On July 16, Mary Ann Kutny, NWS International Activities Office (IA), led a team from her office for an orientation visit to the HPC International Desks. Courtney Draggon, Caroline Covington, and Michael Glees,

recent hires to IA, accompanied Kutny. They are involved in the management of the training program and wanted to meet with the visiting fellows at the International Desks. Mike Davison briefed them on the training program, highlighting HPC's major accomplishments and training goals. Afterwards, the IA representatives were able to meet in private with the visiting fellows for a feedback / Q&A session.

HPC International Desks Participated in Forecast Workshop in Peru – Mike Davison led a numerical weather prediction workshop for meteorologists of Peru's national weather service, Servicio Nacional de Meteorologia e Hidrologia (SENAMHI). The workshop took place in Lima, Peru, from October 25-29, 2004. Over 20 students participated during the daily sessions, which included discussions of the operational application of model guidance. Davison supplemented the discussions with exercises and case studies providing hands-on experience. The training will allow Peruvian meteorologists to make better use of the guidance from the U.S. global model and their locally generated Eta model**.**

HPC International Desks Alerted South America to Possibility of Flooding Rainfall - The HPC International Desks Tropical Desk monitored an area of organized convection over northern Colombia and northwest Venezuela into the Netherlands Antilles during the week of November 15-18, 2004. This convection was associated with an elongated surface front in a pattern that was reminiscent of December 1999, when prolonged rain resulted in flash floods and mudslides. The Tropical Desk interpretation of the guidance suggested rainfall would peak around November 17 or 18, 2004, with a maximum of 6 inches for the region with locally higher amounts possible. Luis Perdomo, Venezuelan Meteorological Service and a graduate fellow of the Tropical Desk, was notified. Venezuelan meteorologists issued weather warnings and alerted civil defense authorities. Satellite estimates over the region and surface observations from the offshore islands showed maxima of 6 inches fell.

HPC International Desks Identified Risk of Heavy Rainfall - On December 6, the HPC International Desks South American Desk forecast heavy organized convective rainfall to affect the northern provinces of Argentina, southern Brazil, Uruguay, and Paraguay on December 7-12. Rainfall of 2 to 3 inches was expected with the potential for severe weather in the form of strong winds and potential for crop-damaging hail. Observations later showed rainfall of 1 to 3 inches over portions of Brazil, Paraguay, and Argentina, with most falling in the warning area. Much of the rain was associated with a line of strong thunderstorms over mid sections of South America on December 6-7.

3. Awards

DOC Bronze Medal - HPC was awarded a Department of Commerce Bronze Medal for "outstanding customer service and providing expertise and leadership to decision makers, before, during, and after Hurricane Isabel." The medal was shared with Weather Forecast Offices in Blacksburg, VA; Charleston, WV; Mt. Holly, NJ; State College, PA; Binghamton, NY; Buffalo, NY; Wilmington, NC; the Middle Atlantic River Forecast Center; the Southeast River Forecast Center; the Ocean Prediction Center; and the Eastern Region Regional Operations Center.

NOAA Diversity Spectrum Award - Edwin Danaher in recognition of his personnel commitment and significant contributions to the NOAA diversity initiative.

Isaac Cline Award - HPC Local and NCEP winner for the Regional Isaac Cline Award in the Leadership Category - Michel Davison. Mr. Davison has demonstrated an exceptionally high level of leadership, vision, management skills, and hard work as Coordinator of the HPC International Desks. Through his efforts the HPC International Desks have become extremely successfully and highly respected in the national and international weather communities.

Isaac Cline Award - HPC Local winner in the Meteorology Category – Christopher Bailey for demonstrating an exceptionally high level of scientific and technical skills in developing and implementing the techniques to generate 5 km grids from the HPC medium range forecasts.

4. Tribute to HPC Meteorological Technician Jackie Hatchett

Jacqueline Hatchett, beloved member of the Hydrometeorological Prediction Center, passed away on July 17, 2004. She was a federal civil servant for over 29 years, with the last 27 years in the National Weather Service at the National Centers for Environmental Prediction and its predecessor, the National Meteorological Center. Serving initially as a reproduction equipment technician, she became a meteorological technician in 1991. She always had a heart-warming smile and a gentle, peaceful, kind demeanor that made people feel very fortunate they worked with her. Her life was celebrated by a host of family, friends, and coworkers at a memorial service in Fort Washington, Maryland, on July 24. In remarks at the service, HPC Director Jim Hoke said "Her work ethic and dedication to getting the job done, regardless of the weather outside or the time of the day or the day of the week or whether it was a holiday, serve as examples to us all." Among other things Jackie was known and very much appreciated for her fondness of midnight shifts and her uncanny ability to fix operational reproduction equipment when it broke in the middle of the night. She is greatly missed.

5. Tribute to HPC Forecaster Art Lindner

HPC was saddened to learn of the passing of Art Lindner on November 15, 2004 after a long, inspiring battle with cancer. Many HPC forecasters and managers attended a memorial service held on December 10, 2004. Art retired in July of 2004 after a distinguished career, most of which was spent in the HPC. He began his government career with the NESDIS (National Environmental Satellite, Data, and Information Service) in 1974. He transferred to the NWS in the early 80s and became a QPF forecaster with the expanding heavy precipitation forecasting program in the Forecast Division of the National Meteorological Center, predecessor to the HPC. While he was primarily a QPF forecaster, he was familiar with most forecasting functions in the HPC and was capable of filling in on most desks. As one of the most dedicated and experienced QPF forecasters, Art served as an informal mentor to many younger forecasters. In addition to his forecasting duties, Art was involved in many case studies and research products during his career. His sense of humor and good-natured attitude was very much appreciated by his coworkers. His love of meteorology and enthusiasm for forecasting persisted throughout his career.

6. Illustrations and Pictures of HPC Staff and Events

Figure 1. HPC Winter Weather Desk Forecaster Richard Bann participates in a conference call with several WFOs.

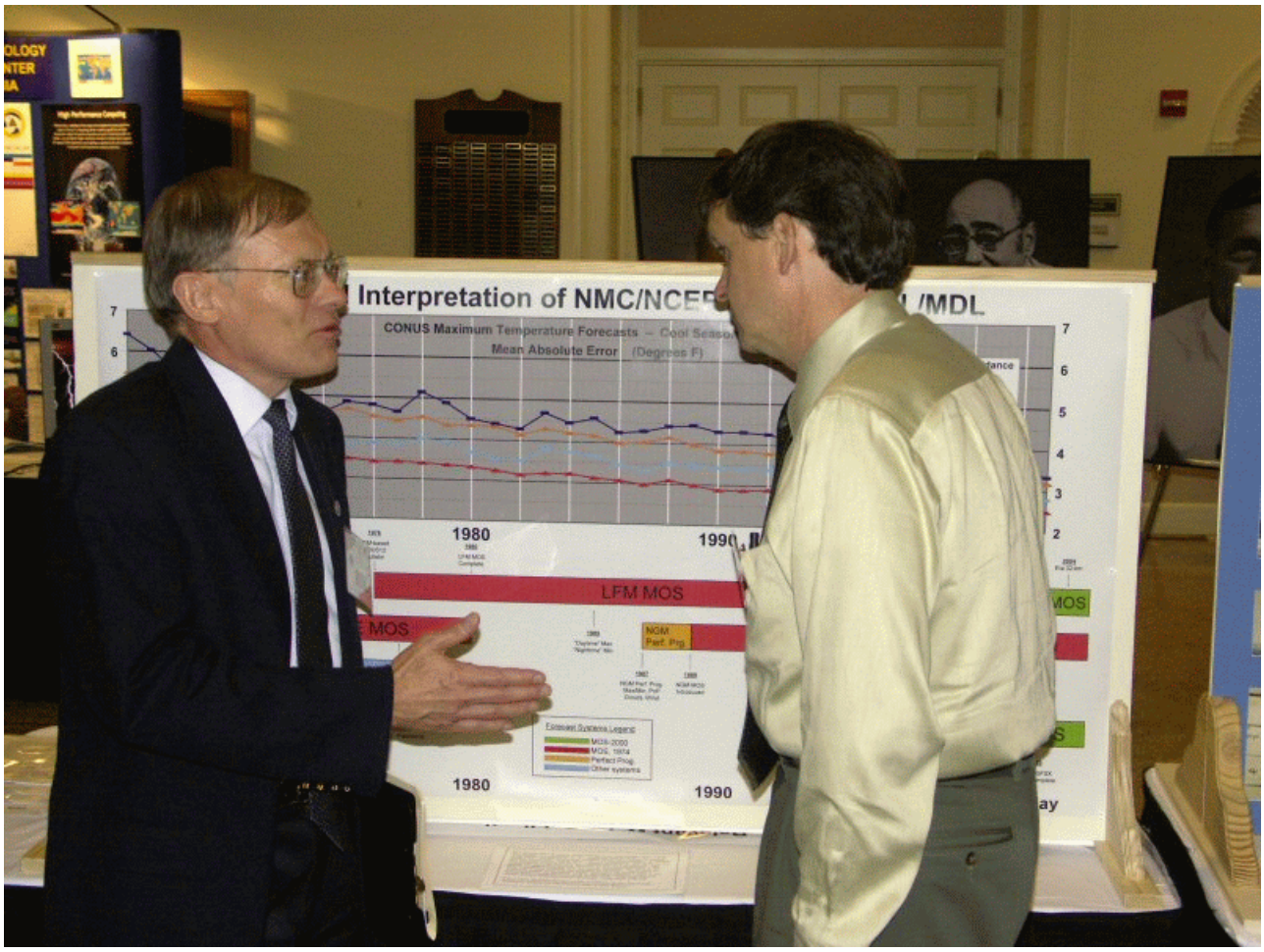

Figure 2. HPC Director Jim Hoke in a discussion with Dave Plummer, from NCEP Central Operations, at the symposium celebrating 50 years of numerical weather prediction.

Figure 3. Mike Davison, HPC International Desks Coordinator (third from left, front row), with other Meteorological Instructors at a WMO-sponsored training session in May 2004 in Buenos Aires Argentina.