Number		Presenter	Presenter Affiliation	Title	Abstract	Email
1	Michael Natoli	Michael Natoli	ESSIC/CICS-MD	Regional responses to the MJO over South America in the CFS Reanalysis	This study examines the responses in temperature and precipitation over South America due to variations in the Madden-Julian Oscillation (MJO). The data analyzed was acquired from the Climate Forecast System Reanalysis (CFSR), covering every day from January 1979 to June 2010 for precipitation data, and through December 2010 for temperature data. Global composites were created for each of the eight MJO phases as the oscillation progresses eastward across the planet. Focusing on South America, anomalies in temperature and precipitation are studied for two seasons, May-September and November-March. The use of two extended seasons was decided in order to highlight responses that may only occur during wet or dry seasons and still include enough active MJO events going into the composites to get statistically significant results. Over South America in both seasons the results tend to blend into two different states each made up of three consecutive phases of the MJO with one transition phase in between. In other words, phases 8, 1, and 2 tend to show similar patterns in temperature and precipitation responses while phases 4, 5, and 6 show similar patterns, but opposite to those of phases 8, 1, and 2. Finally, phases 3 and 7 appear to be transition phases, showing intermediate results with weaker signals over. The same transition patterns are seen to an extent in both seasons and for both variables. Additionally, the data for November-March corresponds well to a strong response in the South American summer monsoon. Potential causes of these anomalies are also speculated by looking at deviations in zonal wind, velocity potential, and stream function for each of the eight phases.	mikeb.natoli@gmail.com
2	Dan Gianotti	Dan Gianotti	Boston University	Potential Predictability of Precipitation: Occurrence or Intensity?	Although the historical precipitation record is a highly noisy data set it displays many non-stationary characteristics, suggesting the opportunity for low-frequency climate prediction. Potential predictability is determined from rain gauges in the contiguous United States through comparison with interannually-stationary time series generated by stochastic models of daily precipitation. The models are parameterized using model selection criteria to optimize the parsimony/fit trade-off for proper variance reconstruction, and are allowed to vary from day-to-day to recreate potential predictability on seasonal analysis windows. The variance signals are decomposed into occurrence (triggering) and intensity, to determine where the major potential predictability signals can be found. In some regions, the component signals are found to be more significant than their combined (standard definition) potential predictability.	gianotti@bu.edu
3	Hitoshi Sato	Hitoshi Sato	Japan Meteorological Agency	Performance of the new JMA one-month EPS	The Japan Meteorological Agency plans to upgrade its one-month ensemble prediction system (EPS) in March 2014. The main changes are an increase of the horizontal resolution from TL159 (110 km) to TL319 (55 km), an introduction of stochastic physics scheme, and a revision of SST and sea ice concentration data prescribed as lower boundary conditions. Performance of the EPS is evaluated using 5-member ensemble hindcasts with one-month forecast length during the period 1981-2010. Atmospheric and land initial conditions for the experiments are provided from JMA's new reanalysis data named JRA-55. Preliminary results from the experiments indicate improved representation of the model climate and a significant improvement for the forecast scores in the extra-tropics. Further detailed verification is in progress, and will be presented in the workshop.	sato.hitoshi@met.kishou.go.jp
4	Pingping Xie	Pingping Xie	NOAA/CPC	NOAA In Situ – Satellite Blended Analysis of Sea Surface Salinity: Development of a Prototype Technique	A technique has been developed to produce analyses of sea surface salinity (SSS) over the global ocean through blending information from in situ measurements and satellite retrievals. Three data sets are employed as inputs to the blended analysis: in situ SSS measurements aggregated and quality controlled by NOAA's National Oceanographic Data Center (NODC); and passive microwave (PMW) retrievals from both the Aquarius/SAC-D and SMOS satellites, received and post-processed at NOAA's Center for Satellite Applications and Research (STAR). The in situ SSS measurements used here are mainly from the Argo program, but also include measurements from tropical moored buoys (TAO/TRITON, PIRATA, RAMA), CTDs, and gliders. The blended analysis comprises two sequential steps. First, the biases in the satellite retrievals are removed through probability distribution function (PDF) matching against temporally / spatially co-located in situ measurements. The blended analysis is then achieved through optimal interpolation (OI), where the analysis for the previous time step is used as the first guess while the in situ measurements and the bias-corrected satellite retrievals are employed as the observations to update the first guess. Cross-validations are conducted by randomly removing in situ SSS measurements and validating the blended analysis against the withheld in situ data. Results show improved accuracy of the blended analysis, compared to the individual inputs, with reduction in bias and random errors over most of the global oceans. However, uncertainty of large magnitude in the blended analysis exists for high-latitude oceans and coastal regions where the in situ networks are sparse and current-generation satellite retrievals have limitations. The blended monthly SSS analysis, called the NOAA "Blended Analysis of Sea Salinity" (BASS), is constructed for a three year period from 2010 through 2012. Our in situ – satellite blended SSS analysis shows good agreements with the NODC in situ - based analysis over most of the tropical and sub-tropical oceans, with large differences observed for high-latitude oceans and along coasts. Combined empirical orthogonal function (EOF) analysis of the SSS from the BASS analysis, precipitation (P) from CMORPH and evaporation (E) from OAFlux reveals global patterns of the co-variability between the SSS and oceanic fresh water flux (E-P) in association with the evolution of the El Niño – Southern Oscillation (ENSO).	pingping.xie@noaa.gov
5	KANTE Ibrahima Kalil	KANTE Ibrahima Kalil	KANTE Ibrahima Kalil	Comparative study of the West African Continental, Coastal and Marine, Atmospheric Profiles of during the Summer of 2006	We used sounding data of the Multidisciplinary Analysis of the African Monsoon experience in summer 2006 at continental and coastal sites of West Africa, respectively, to analyze the vertical profiles of relative humidity, temperature, dew point, and speed and wind direction for the JJAS rainy period. The vertical gradient method is applied to the profiles of some thermodynamic parameters estimated from sounding data to do a comparative study of the structure and thermal properties, moisture, and static stability of the atmospheric boundary layer of inland, coastal, and marine sites to show consistent differences related to geographic factors.In vertical profiles of relative humidity, the intensity is higher in Dakar than in Niamey particularly in the core of the season. There are dry intrusions in the low levels at the beginning and end of the season in Dakar, which do not exist in Niamey. The mixing layer on the continent during the day can reach a height greater than 1100 m, and the inversion layer height can exceed 1700 m. Therefore, the maximum thickness of the boundary layer is observed on the continent during the day, while at night the marine boundary layer is the thickest. The diurnal evolution shows that the mixing layer thickness decreases during the night over the continent but increases at the coast and at sea. In the night at the continental site there is a division of the mixing layer with a consistent residual mixing layer. Continental boundary layer is more unstable during the day, while at night it is the marine boundary layer that is more unstable than the coastal and inland ones.Keywords: Sounding data, Atmospheric boundary layer, mixing layer, Continental vertical Profile, Coastal vertical Profile, Potential temperature Profile, Equivalent potential temperature profile	ibrahima1kk@yahoo.fr
6	Joong-Bae Ahn	Joong-Bae Ahn	Division of Earth Environmental System, Pusan National University, Busan, South Korea	Improvement of 1-month lead predictability of the wintertime AO using a realistically varying solar constant for a CGCM.	The impact of solar constant variation on the predictability of the Arctic Oscillation (AO) is investigated in terms of 1 month lead hindcast data obtained from a coupled general circulation model. The 1 month lead hindcasts produced from a realistic initial solar constant experiment (Solar Run, SR) and from a climatological solar constant experiment (Control run, CR) are comparatively analysed. The 1 month lead hindcasts were initiated from mid-November, mid-December and mid-January of each year for the period 1980—2009. The hindcast of the SR showed better skill than that of the CR in terms of forecasting not only the AO index but also the atmospheric circulation pattern related with the AO. This shows that the prescription of realistic solar constant as the initial condition is necessary for improved AO prediction.Acknowledgements : This work was carried out with the support of Rural Development Administration Cooperative Research Program for Agriculture Science & Technology Development under Grant Project No. PJ009353 and Korea Meteorological Administration Research and Development Program under Grant CATER 2012-3083, Republic of Korea.	jbahn@pusan.ac.kr
7	Yan Xue	Yan Xue	Climate Prediction Center/NCEP/NOAA	The NCEP/GFDL Observing System Experiments for Tropical Pacific Observing System: Early Results	The NCEP/GFDL Observing System Experiments for Tropical Pacific Observing System:Early ResultsYan Xue, Arun Kumar, David BehringerNCEP/NWS/NOAAGaberial Vecchi, Xiaosong YangGFDL/OAR/NOAAThe TAO/TRITON array is the cornerstone of the ENSO observing system because it systematically measures upper ocean temperature, salinity, velocity and air-sea fluxes that contribute to the dynamics of ENSO, and are essential for ENSO monitoring and prediction. One tool to assess the value of the TAO data in the presence of the Argo data is to conduct Observing System Experiments (OSEs). We conduct coordinated OSEs and hindcast experiments using the NCEP and GFDL ocean data assimilation systems and seasonal forecast models for the post-Argo period 2004-2011. The relative roles of the TAO and Argo data towards constraining the upper ocean thermal structure and ocean currents in ocean reanalysis are assessed. Hindcast experiments initialized from the OSEs are used to show if the seasonal forecast skill of the current generation seasonal forecast models are able to show the benefits of enhanced ocean observing systems.Four OSE runs are made, in which no observations (CTL), all observations (XBT, moorings, Argo) (ALL), all except the moorings (noTAO), and all except the Argo (noArgo) data are assimilated. Hindcast experiments are initialized with oceanic conditions from the four OSEs around January 1, April 1, July 1 and October 1 during 2004-2011. For each start time, an ensemble of 6 (10) coupled forecasts with perturbed initial conditions is integrated up to 9 (12) months ahead using the seasonal forecast model at NCEP (GFDL). For the OSE runs, we examine the mean bias, standard deviation, root-mean-square error and anomaly correlation with observations. The error statistics contrasted between a pair of OSE runs are used to assess the impacts of different ocean observing systems on the ocean analyses. For the hindcast experiments, we examine the systematic bias, root-mean-square error and anomaly correlation of the tropical Pacific SST. The results from the two seasonal forecast systems are compared and the common characteristics on the impacts of different observing systems on ocean analysis and forecast skill will be summarized. This project is part of the efforts to build a multi-model capability in NOAA for assessing impacts of ocean observing systems on seasonal forecast.	yan.xue@noaa.gov
8	Xingren Wu	Xingren Wu	EMC/NCEP/NWS/NOAA and IMSG	Sea Ice in the NCEP Climate Forecast System Reanalysis	Sea-ice is known to play a significant role in the global climate system. For a coupled reanalysis, it is important that the realistic distribution of sea-ice is represented. NCEP has carried out a climate forecast system reanalysis (CFSR). The CFSR includes a coupled model with the NCEP global forecast system, a land model, an ocean model (GFDL MOM4), and a sea-ice model. The sea-ice model is based on Hunke and Dukowicz (1997) for sea-ice dynamics and Winton (2000) for sea-ice thermodynamics. In this work, we present the NCEP coupled model, how sea ice has been assimilated in CFSR, the characteristics of the sea-ice from CFSR, and the improvements of sea-ice needed for future reanalysis.Sea-ice analysis takes a six-hour model guess field, then merges with observational sea-ice concentrations to produce a new initial condition. Ice analysis has been reprocessed using quality control and an a posteriori filter to prevent the failure when there was a feedback between the ice analysis and the sea surface temperature analysis (Grumbine, 2009).Sea-ice concentration has been assimilated so there is no doubt that the ice field is very close to the observations for sea-ice concentration and ice coverage. The sea-ice thickness distribution in CFSR is also reasonable. Large reductions in sea-ice are obtained in CFSR for both the summer of 2007 and the summer of 2008 in ice concentration and thickness over the Arctic, which corresponds to warmer temperatures. Because of the realistic sea ice distribution and other improvements in CFSR, the coupled reanalysis has been improved in many aspects compared to the previous R1 and R2 (NCEP/NCAR Reanalysis-1 and NCEP/Doe Reanalysis-2). In the future when the sea-ice thickness data are available they shall be assimilated into the reanalysis system.	Xingren.Wu@noaa.gov
9	Mong-Ming Lu	Mong-Ming Lu	Central Weather Bureau, Taiwan	The Operational Monthly and Seasonal Climate Forecast System and Development at CWB Taiwan	The CWB Seasonal Climate Forecast System version 1 (CFSv1) developed at the Research and Development Center at Central Weather Bureau of Taiwan started its operational run in December 2009. It is a two-tier forecast system consists of 3 major components: statistical-dynamical SST forecast module (CWB-OPGSST), global atmosphere forecast system (GFS), and statistical downscaling module. CWB-OPGSST uses a point-wise multi-linear regression multi-model super ensemble scheme with 4 statistical models and 2 intermediate air-sea coupled dynamical models to predict sea surface temperature between 60S and 60N. In addition to CWB-OPGSST, the SST generated by NCEP CFS (NCEP-SST) is used as another forecasted condition. Two atmospheric generation circulation models (AGCM), CWB Global Forecast System (CWB-GFS) and ECHAM5, are used to predict the atmosphere part. The operational system CWB 2-tier CFS1 is formed by 4 suites of different combinations of forecasted SST and AGCM, n amely, CWB-GFS/CWB-OPGSST, CWB-GFS/NCEP-SST, ECHAM5/CWB-OPGSST, and ECHAM5/NCEP-SST. Each suite has 10 members, differentiated by different initial conditions for the atmosphere and ocean occurring on 10 sequential days. Each member integrates for 7 months. For the hindcast runs the atmospheric initial conditions are obtained from NCEP Reanalysis-2, while for the forecast runs the initial conditions are obtained from NCEP GDAS available at NCEP. Singular Vector Decomposition (SVD) method is used to downscale large-scale parameters to 9 weather stations in Taiwan. A new version of the CFS is under development with an operational scheduled in 2016. The CWB-GFS in CWB CFSv2 is the same as the GFS for operational weather forecasts but with lower resolution. The total ensemble members will increase from 40 to 125. The target stations of statistical downscaling will increase from 9 to 24. A new focus of the on-going development is to extract information that can be used for risk m anagement associated with high-impact weather.	lu@rdc.cwb.gov.tw
10	Jesse Meng	Jesse Meng	NOAA/NCEP/EMC	Improving the land surface climatology of the Climate Forecast System Reanalysis	The NCEP Climate Forecast System Reanalysis (CFSR) soil moisture has been evaluated against the soil moisture data from the NCEP Global Reanalysis 2 (R2), the NCEP North American Land Data Assimilation System (NLDAS), and surface observations. It is concluded that the CFSR soil moisture yields an improved representation of land surface climatology and climatological anomalies over R2. However, the evaluation also indicates the need for further improved design and execution of the CFSR Global Land Data Assimilation System (GLDAS) including, for instance, spin up, continuous single-stream simulation, and land surface physics upgrades. To achieve this goal, a single-stream GLDAS-replay experiment has been conducted using a more sufficient 15-year spin up initial land states and executed continuously through the entire period of CFSR (1979-2010). Results show that the retrospective single-stream GLDAS-replay (GLDAS2) is able to preclude the known discontinuity of the multi-stream CFSR, e.g., 1999, 2005. The temporal anomaly correlation between GLDAS2 and NLDAS (0.82) is also improved from that between CFSR and NLDAS (0.79) across the contiguous United States domain (CONUS). The improvement is more significant when the evaluation is made on smaller sub regions, in particular, the cold and dry regions where longer spin up period is required. More detail evaluation results will be given in this presentation. This retrospective GLDAS2 can provide an enhanced global land surface climatology reference and enhanced land surface initial conditions for the coupled CFS/GLDAS seasonal prediction experiments to assess the historical, current, and predicted global hydroclimate anomalies and drought information and to support the global drought research activities. The strategy of improving the land surface climatology representation can be addressed in developing the next generation global reanalysis.	jesse.meng@noaa.gov

Number		Presenter	Presenter Affiliation	Title	Abstract	Email
11	Marcio Cataldi	Marcio Cataldi	Operador Nacional do Sistema Eterico (BRAZILIAN POWER SYSTEM OPERATION PLANNING) Brasileiro	PRELIMINARY RESULTS OF THE APPLICATION OF NCAR / CAM 3.0 IN THE BRAZILIAN POWER SYSTEM OPERATION PLANNING	Hydro power generation represents the major energy source in Brazil, which makes the Brazilian Interconnected Power System (BIPS) operation planning to depend on basins' hydrological conditions and, consequently, on the climate's natural variability on such basins. The Brazilian Power System Operator – ONS is in charge of this planning and makes use of seasonal climate forecasts from CPTEC / INPE Global Model. However, these predictions have only an average trend for the next three months. Thus, for BIPS's energy operation it is required to forecast the precipitation monthly anomalies. To obtain these monthly forecasts, ONS has implemented the model NCAR / CAM 3.0 using "cloud-computing" resources based on HPC - High Performance Computing. CAM 3.0 runs were made having as initial condition GFS / NCEP analyzes and having as a boundary condition the Sea Surface Temperature - SST forecasts from NCEP's coupled modeling system. It has been used SST's boundar y conditions for 4 months and as initial conditions the fields U, V, Q and Ts. The files with initial and boundary conditions were interpolated using Matlab ® system for spatial resolution T85, used in CAM 3.0. In the runs, it has been used 5 members, varying the data of CFS model analyses and SST forecasts. Forecasts have always been prepared considering a 30 to 15 day horizon ahead of the month to be predicted. The results obtained in the period from February to April, 2013 were quite satisfactory for most BIPS's basins, with the model able to capture correctly the signs of precipitation anomalies, including regions where climate models typically do not have a good "skill". However, even by applying statistical scaling adjustment, forecasted totals, in general, overestimated observed ones. These results, although preliminary, have shown the need for the use of regional climate modeling to obtain better quantitative forecasts.	cataldi@ons.org.br
12	Sojiro Sunako	Sojiro Sunako	Sophia Graduate School of Global Environmental Stadies	Numerical Study on Global Warming with Heat Fluxes over Glaciers in the 10 to 300km Domain	THE scientific community has been issuing serious warnings about global warming for several decades, and many studies continue to contribute to this subject. The evidence supporting global warming has been evaluated in various places and at different times; in fact, the rate of ice melt in polar areas has become an index of global warming. The topographic changes of Himalayan glaciers and environmental and topographical changes in this region have also been studied and were the focus of our previous study [1][2]. Other approaches related to hydrology have included computer simulations around small areas such as Imja Lake. The previous study evaluated the mezzo-scale problem at about 5km to 30km using a LANDSAT image at that scale for suitable analysis. Our ultimate research objective is to establish an accurate method for evaluating heat flux over the earth by evaluating local heat fluxes with Satellite thermal images, since the heat flux is one of the most important parameters related to global warming.	souzirousunako@yahoo.co.jp
13	Li Xu	Li Xu	Center for Ocean-Land-Atmosphere studies	The Differences in cloud response and cloud radiative feedback by explicit resolved cloud and conventional cloud parameterization	A fully-coupled climate system model with explicit resolved cloud, the super-parameterized community climate system model (SP-CCSM), is firstly used to study the cloud change and cloud radiative feedback to anthropogenic climate change in an extreme CMIP5 scenario, abrupt 4xCO2. The explicitly simulated cloud, by embedded 4km resolution cloud resolving model (CRM) at each atmospheric column, displays significant different changes with the conventional CCSM in which cloud processes are not resolved. The total cloud at two models show opposite changes with surface warming. The differences at low cloud change contribute the most discrepancies. Ice phase high cloud also display significant changes. Compared with the explicit CRM output, conventional cloud parameterization will underestimate the negative cloud forcing which as to cooling earth system to abrupt 4xCO2 and overestimate the radiative feedback with surface warming, and final lead an underestimation the clim ate sensitive. The "explicit" representation of cloud processes in SP-CCSM displays a clear strong net negative cloud forcing -1.57 W/m2 without a significant feedback with surface warming. These large differences indicate a very fundamental uncertainty in future climate projection by conventional climate models that still rough estimate cloud by parameterization.	lixu@cola.iges.org
14	Joong-Bae Ahn	Joong-Bae Ahn	Division of Earth Environmental System, Pusan National University, Busan, South Korea	The anomalous structures of atmospheric and oceanic variables associated with the frequency of North Pacific winter blocking.	From Empirical Orthogonal Function (EOF) analysis of the atmospheric and oceanic variables over the North Pacific during the northern hemispheric winter (1960—2009), we were able to determine that the second mode of the EOF is related to North Pacific winter blocking. Our composite analysis reveals that the structures of the variables during winters with contrasting frequencies of blocking events are systematically different and show quite opposite pattern in the North Pacific. During winters with frequent blocking occurrence, a north—south dipole pattern of geopotential height anomaly is formed, and the associated westerly winds are weakened (strengthen) north (south) of 35N. These factors bring variations of ocean advection and ocean surface heat flux, resulting in a dipole pattern of Sea Surface Temperature (SST), with a warm anomaly north of 35N and a cold anomaly to the south. The effect of SST on blocking is examined using an Atmospheric General Circulatio n Model (AGCM) experiment. In the experiment, the SST anomaly related to blocking is applied as a boundary forcing of the AGCM to investigate the effect of SST on the formation of blocking. From the experiment, we also concluded that the winter blocking is not induced by North Pacific SST forcing, although consistent linkage between oceanic and atmospheric variables is evident.Acknowledgements : This work was carried out with the support of Rural Development Administration Cooperative Research Program for Agriculture Science & Technology Development under Grant Project No. PJ009353 and the Korea Meteorological Administration Research and Development Program under Grant CATER 2012-3083, Republic of Korea.	jbahn@pusan.ac.kr
15	Corredor Llano X. and Sánchez Rodriguez I. C.	Corredor Llano X. and Sánchez Rodriguez I. C.	Institute of Hydrology, Meteorology and Environmental Studies of Colombia (IDEAM)	Jaziku - Statistical inference software for the teleconnections analysis	We present a statistical tool developed in Python language (with some libraries and software as NCL[1] and HPGL[2]), that allows assessing teleconnections between weather variables with the many indicators of global climate variability phenomena. This software is divided into three modules, the first module called "Data analysis" evaluates the exploratory statistical and homogeneity of the time series, the second module called "Climate" follows the composite analysis methodology proposed by NOAA (National Oceanic and Atmospheric Administration [3]) it evaluates the teleconnections between the explanatory variable and explained, thus obtaining probability scenarios altering local weather patterns over the historical average values for several resolutions, and with this information and the forecast of global phenomena, in the last module called "Forecast" the software makes the seasonal forecast. The set of such local information can b e interpolated by several methods favoring regional analysis for decision makers. Jaziku is a free and open source software, and therefore can be improved and adapted for different purposes, for example, could be implemented by any weather service.Keywords: Jaziku, Data analysis, Composite analysis, Climate variability, Teleconnections, Seasonal forecast, Software, Python.[1] Ncar Command Languages, in: http://www.ncl.ucar.edu[2] High Performance Geostatistics Library, in: http://hpgl.aoizora.org[3] National Oceanic and Atmospheric Administration (NOAA) , University Corporation for Atmospheric Research (UCAR)). Creating a Local Climate Product Using Composite Analysis - Print Version of Webcast -(En Linea). 1997-2010:COMET Website at http://meted.ucar.edu/, 1997.	xcorredorl@unal.edu.co
16	Anushiya Jeganathan	Anushiya Jeganathan	Research Scholar	Influences and predictability of Global Climate Indices over South Peninsular Indian Rainfall	Long term rainfall trend (1813-2006) of South Peninsular India and the influence of global indices has studied. The mean annual rainfall of the south peninsular India (SPI) is 1518 mm/year and has significant increasing trend. Monsoon rainfall is the major contributor (59%) to annual rainfall shows increasing trend which is statistically significant at 95% confidence level. Summer rainfall which contributes 14% of total rainfall shows decreasing trend while, both Winter and Post monsoon rainfall shows insignificant increasing trends. The influence of IOD, MEI, PDO, NAO, PNA, WP, Nina 3.4, and El Modoki over South Peninsular Indian rainfall also studied. Annual rainfall has a positive correlation with Nina 3.4 and significant negative correlation with monsoonal PDO and PNA. Monsoon has negative correlation with almost all global climate indices. While Post monsoon rainfall shows significant positive correlation with MEI, WP and Nina 3.4. MEI correlation has statis tically significant at 99% confidence level. Among MEI, WP, and Nina 3.4, Nina 3.4 has high positive correlation with post monsoon rainfall.	anushiya.cc@gmail.com
17	Guojun Gu	Guojun Gu	ESSIC, University of Maryland	Long-term global precipitation changes and patterns: Global warming vs interdecadal climate variability	This study explores how global precipitation vary on the long-term/interdecadal time scales, in particular to what extent the spatial structures of precipitation variability relate to surface temperature change. Both the GPCC global land precipitation analysis (1901-present) and the GPCP precipitation with global coverage (1979-present) are applied. The NOAA reconstructed global precipitation product is used as well for its long-record (1900-2010) and global coverage. Furthermore, the outputs from the CMIP5 and AMIP5 runs are used to assess the impact of green-house-gas (GHG) and other radiative forcings related global warming on global precipitation and evaluate the capabilities of the state-of-the-art global models in simulating observed global precipitation changes.Global mean sea surface temperature (SST) and land surface temperature have increased during the past century. However, there are several time periods (including the recent past decade) in which the temperature increase becomes weak or even stalled. EOF analysis of global SST for the past century indicates that in addition to the first mode showing the global temperature increase, the second and third modes tend to represent ENSO and decadal-time-scale variabilities in the global oceans. Moreover, these decadal/multi-decadal-time scale oscillations seem to include the signals from both the Pacific Decadal Variability (PDV) and the Atlantic Multi-decadal Oscillation (AMO). Therefore, the long-term variations of global precipitation are a combination of GHG related global warming and these two physical modes: PDV and AMO. In particular, the precipitation and water vapor patterns of change during the past three decades (1979-present) tend to differ from what can be deduced from GHG related global warming especially in the tropical Pacific basin, further confirming this combined effect.	ggu@umd.edu
18	Qingyun ZHANG	Qingyun ZHANG	Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing 100029,China.	The Study on Anomalous Blocking High over the Ural Mountains area and Its related to AO in Boreal Winter	Atmospheric blocking pattern is one of the most important circulation systems in mid-high latitudes and has long been recognized as a physical process of profound dynamical interest and of great practical relevance to operational forecasting (Tibaldi, S., and F. Molteni, 1990). The blocking high over the Ural Mountains (URB) is one of the important circulation pattern over Asian mid-high latitudes and has important effects on the East Asian weather and climate. The Arctic Oscillation (AO) is the most important tele-connection patterns in mid-high latitudes. The relationships between URB and AO in the boreal winter were studied. There was negative correlation between the geopotential height over Ural Mountains region and the AO index in January during 1960-2008 for statistically significant. The frequence of Ural blocking high tends to more (less) and the intensity of Ural blocking high strengthened (weaken) during negative (positive) AO periods. However, in some c ases, the strengthened URB occurred positive AO phases (such as in January1984\1988\2005 and 2008), the atmospheric circulation characteristics for the strengthened URB and positive AO events were investigated. The study pointed out the center of the Icelandic Low moved to eastern 30W(climate mean lie western 30W) maybe play a more important role in strengthened URB and positive AO events. Further analyses indicate that the stengthened zonal wind in high latitudes and weakened zonal wind in mid-latitudes over the North Atlantic Ocean will be propitious to the center of Icelandic Low moved to eastern 30W, and meantime the amplitude of zonal wavenumber 2 were intensified which favors the positive geopotential height anomalies occurred over the Ural Mountains area (60E).Key words: Ural blocking high, AO pattern, Icelandic Low	zqy@mail.iap.ac.cn
19	Meng-Pai Hung	Meng-Pai Hung	CPC/NCEP/NWS/NOAA	Prediction of the MJO events from CFSv2 during DYNAMO Intensive Observing Period	This study analyzes the prediction of the Madden-Julian Oscillation (MJO) events during the DYNAMO Intensive Observing Period (1 October 2011 - 15 January 2012). We will first assess the overall performance of the model in predicting the three MJO events during this period. We will then focus on the event during late November to early December 2011 to investigate the impacts of model physics. Experiments for this event are carried out to test the use of (1) alternative convection schemes, (2) different settings for convection parameters, and (3) different configurations for the ocean.	Mengpai.Hung@noaa.gov
20	Ricardo Fonseca	Ricardo Fonseca	Earth Observatory of Singapore, Nanyang Technological University, Singapore	Evaluation of Regional Climate Downscaling over the Maritime Continent	It is widely known that Regional Climate Models (RCMs) have difficulties in representing the large-scale features and that this problem can be mitigated by relaxing the atmospheric circulations within the model domain to the global domain in which the RCM is embeded. This process is known as nudging. This technique has never been evaluated over the Maritime Continent, a region of complex topography and land-sea contrasts that plays an important role in global climate variability. The Weather Research and Forecasting (WRF) model was used to dynamically downscale NOAA Climate Forecast System Reanalysis (CFSR) over the Maritime Continent at mesoscale resolution (24km) using different nudging techniques (vis-a-vis grid and spectral nudging) with the aim of determining the optimal solution that prevents WRF from drifting away from the large-scale driving fields while still letting the model generate useful small-scale features. The rainfall rates from the WRF runs were compared to the estimates from the Tropical Rainfall Measuring Mission (TRMM) while the potential temperature variation, horizontal wind and specific humidity at different pressure levels were compared to the ones from NOAA CFSR. The model's performance was assessed using the error diagnostics proposed by Koh et al. (2012), in particular the error decomposition, correlation-similarity and wind error anisotropy diagrams. These normalized error metrics are easy to compute and can be used to evaluate the performance of a regional climate model.	RMFonseca@ntu.edu.sg
21	Laifang Li	Laifang Li	Duke University	Atlantic origins of summer rainfall prediction skill over the Southeastern United States	Climate Prediction of warm season precipitation in the Southeastern United States (SE US) remains inaccurate due to the complicated rainfall generation processes and unreliable statistical inference on the rainfall probability behavior. In this study, a statistical framework (i.e., 3-component Normal mixture model) is constructed and realized using Bayesian statistical inference with Markov Chain Monte Carlo algorithm. In the framework, the 3 Normal components correspond to the statistical behavior of the summertime light, moderate, and heavy rainfall over the SE US. The new framework successfully captures the probability distribution of SE US summer precipitation, and thus can provide reliable statistical inference.Based on the new framework, the predictability of light, moderate, and heavy rainfall intensity is assessed by applying support vector machine (SVM) prediction model. The SVM is a machine learning algorithm, which utilizes the combination of nonlinear kernels to optimize the multivariate regression. In the SVM prediction model, both the Pacific (ENSO, PDO, and PNA) and Atlantic (AMO, tropical Atlantic SSTA, NAO and North Atlantic Subtropical High (NASH) western ridge index) predictors are used. On average, the SVM model simulates observed rainfall statistics reasonably well, with the predicted rainfall approximating a y=x relationship to observations. In addition, the SVM model demonstrates improved rainfall prediction compared with multivariate linear regression model, indicating that the nonlinear relationship between rainfall and predictors should be considered in order to improve SE US summer rainfall prediction.We further explore the sensitivity of SVM rainfall prediction to the predictors by comparing the predictions with merely the Pacific or Atlantic predictors. The analysis shows that the Pacific predictors only contribute to the prediction of light rainfall; while Atlantic factors could predict most summer rainfall over the Southeast. The results highlight the importance of North Atlantic in regulating the SE US summer rainfall behavior. Further analysis finds that the light and heavy rainfall can be well predicted given the Atlantic SST indices in the precedent spring, whereas the prediction skills of moderate rainfall vanish if the NASH western ridge index is excluded.In conclusion, the SVM model generates promising skills in predicting the SE US summer rainfall statistics, due to its ability to capture the nonlinearity of the climate influence on the rainfall. Furthermore, the sensitivity analysis suggests that the Atlantic Ocean provides the vast majority of the predictions skills: the North Atlantic SST could be a potential source of prediction skills for light and heavy rainfall; while the NASH dynamics largely determines the moderate rainfall behavior.	laifang.li@duke.edu

Number		Presenter	Presenter Affiliation	Title	Abstract	Email
22	Jiayu Zhou	Jiayu Zhou	NWS/OST	Recent Science Advancement for Guidance on Weather-Climate Service	The idea of whether or not to pursue an independent climate service has lingered around in recent years. Scientific guidance is needed in strategic planning for the agency's future.Recent studies on observed variability characterized by spectral composites reveal that only the average of short-term climate/macroweather (10 days to 10-30 years) converges to normal, based on which products of probabilistic prediction ("farcasting", an emerging term) with expected shallow uncertainty are well justified for application uses. However, the long-term climate processes (10-30 years to 100,000 years) are "weather-like", of which the variability grows with increase of time scale. This important character is known to be missing in current Earth system model simulations due to lack of internal long-term processes that interact with boundary conditions and are coupled with external forcings.Accordingly, the planning for NOAA climate service development is advised to focus on short-term climate/macroweather in connection with the weather forecast improvement under a unified modeling and seamless prediction framework. In the long-term climate projection arena, because of the dominance of the deep uncertainty, more basic researches are required before the projections are ready for reliable services.	jiayu.zhou@noaa.gov
23	Kenneth Rumi Ayadiani	Kenneth Rumi Ayadiani	School of Integrated Climate System, Univerisity of Hamburg Germany. Nigerian Meteorological Society (NMS)	TROPICAL STORMS CYCLOGENESIS: THE SOUTH ATLANTIC PARADOX	TROPICAL STORMS CYCLOGENESIS: THE SOUTH ATLANTIC PARADOXSome of the basic conditions that necessitate the formation of Tropical Storms are such that make the South Atlantic Ocean unfavourable for their evolution. These are mainly due to the lack of near surface spinning capacity by the regional atmosphere to initiate them and the tendency of winds aloft to shear off warm air concentration in the vicinity of a developing storm that could trigger them. These supposed unfavourable conditions especially in a situation of less than a 26.5 degree Celsius of Sea Surface Temperatures make the inhabitants of the adjoining regions somewhat save from their associated cataclysm. However, this atmosphere of save heavens could not linger perpetually but only endured until about a decade ago when Hurricane Catarina defiled the norm and struck Brazil in May 2004. This paper is not just an attempt to investigate the inconsistency that the scenario poses for the predictability of such extreme weather event but analyzes its implication for the conce pt of Climate Change induced Global Warming. The fate of other regions that are hitherto considered as free zones, especially those with low adaptive capacity to cope with the impacts of extreme weather phenomenon was also looked into should such an unexpected happens.	kenrumi4us@yahoo.com
24	Simon S.-Y. Wang	Simon S.-Y. Wang	Utah State University	COULD THE 2012 DROUGHT HAVE BEEN ANTICIPATED? – A NASA NEWS INITIATION ON EXTREMES	The 2012 drought may not have been predictable as based on current schemes employed for such purposes, but it may have been anticipatable due to knowledge of key precursors such as favorable (remote) SST patterns, and reduced regional soil moisture and winter snow packs. A working group was assembled under the NASA Energy and Water cycle Study (NEWS) to examine the extent to which the 2012 drought could be anticipated and to put recent severe droughts in perspective.A recent NOAA report analyzing the drought of 2012 in the central US has concluded that the drought was not inherently predictable, representing a very anomalous atmospheric circulation pattern. It is important to recognize that this 'predictability' is based on what happened in the atmosphere, and further, depends on the capabilities of the predictive schemes currently employed by NOAA. The current prediction schemes emphasize the role of the large-scale atmospheric circulation, but the extent to which the long wave patterns and subsequent short wave (or low-level jet) effects can be predicted in advance remains unclear. These schemes generally lack full consideration of the local surface state, especially the effect of precursor anomalies in key elements such as soil moisture and snow pack. It is also not clear how well they account for the effects of either interannual or lower-frequency SST anomaly patterns.The role of the aforesaid precursors, combined with knowledge of their state, allow some assessment of the 'likelihood' of drought that is not currently being considered. For example, by late winter of 2012 much of the central US was already experiencing dry conditions, including reduced soil moisture, and the snowpack in the Rockies was well below normal. SST patterns appear to have been largely neutral. While the manifestation of the resultant drought also critically dependent on the large-scale atmospheric circulation that subsequently developed, it is clear that the region was preconditioned towards being dry. The other factor about precursors of the 2012 drought is the previous 'Texas drought' in 2011. The Drought Monitor data indicated that the 2011 drought remains stronger than the 2012 one in the 'exceptional' category. This feature might reflect the different scales in the atmospheric teleconnection pattern and the comparison of the two events might help determ ine the soil moisture (or lack of) impact of 2011's intensive drought on 2012's widespread drought.Our hypothesis is that even if one cannot predict the future atmospheric circulation patterns with much certainty for a given year, we may still be able to make some assessment of whether or not a drought may be likely to occur. We refer to this as anticipating drought. As precursors such as soil moisture and snowpack become important in potentially enhancing and prolonging the drought as it occurs, the actual drought (if any) that does subsequently occur will depend closely in magnitude and duration on the atmospheric circulation that unfolds.	simon.wang@usu.edu
25	Bahaga Titike Kassa	Bahaga Titike Kassa	Climate Variabilty, Predictabilty and Prediction	Assessment on the Predictability and Prediction of the Seasonal Mean Short Rain over Equatorial East Africa using APCC Multi-Model Ensemble	Interannual fluctuation of short rain during September-October-November (SON) over equatorial Eastern Africa often leads to severe disasters such as flooding or drought, which makes the extended range forecast of short rain from month to season is vital for policy planning, agricultural productivity, management of water resources and early warning for agro-economic countries over the region. Moreover, the links between East African short rain variability and tropical Ocean–Atmosphere coupling have been widely documented. During the period of warming (cooling) in the western part of equatorial Indian Ocean, anomalous Ocean–Atmosphere conditions over Indian Ocean basin are triggered, leading to enhanced (reduced) East Africa short rain. In this study the performance of dynamical seasonal forecast systems evaluated for the prediction of SON rain anomalies over equatorial East Africa (usually referred to as short rains). The evaluation is based on observational data a nd the Asia-Pacific Economic Cooperation (APEC) Climate Center (APCC) Ocean-Atmosphere coupled Multi-Model ensemble hindcasts. The different models are evaluated separately, but also their Multi-Model ensembles mean (MME) is considered. Only hindcasts initialized on August 1 of each year were considered, as these were the most relevant to short rain prediction. The coupled climate model ensemble reproduced the spatial distribution mean autumn rainfall and seasonal climate variation over equatorial East Africa and the performance is enhanced in MME. Individual coupled model ensemble and MME also shows statistically significant skill in forecasting Sea Surface Temperatures Anomalies (SSTAs) over the western and eastern pole of equatorial Indian Ocean, giving 99% significant level for Dipole Mode Index (DMI). Moreover, four out of ten coupled models ensembles and MME have statistically significant skill with 95% level and above in predicting equatorial East Africa short rain. The spatial pattern of simulated SON rainfall over the Indian Ocean and surrounding regions is also reproduced with significant skill, as measured by the spatial Anomaly Correlation Coefficient (ACC) between forecast rainfall anomaly and the observed rainfall anomaly, and four models and MME show significant correlations over East Africa. The skill of Cou pled models and MME over East Africa is also confirmed by regression of observed rainfall on to coupled models hindcasts and MME DMI, showing dipole mode pattern over Indian Ocean basin and clearly demonstrates the control of IOD on the variation of Equatorial East Africa short rain. On the other hand, the regression of coupled models and MME hindcasts precipitation over Indian Ocean basin and Africa on to the corresponding DMI noticeably changed, implying that the relation of coupled models IOD and precipitation is relatively weak over land points. The skill of dynamical models is attributed to the fact that slowly evolving SSTs are the primary source of predictability, and to the fact that APCC coupled climate models and MME produce skillful predictions of SON SST anomalies over the tropical Indian Ocean. This information opens the possibility of using readily available seasonal predictions of SSTs to make real-time skillful predictions of equatorial East Africa short rain.	tkkassa@gmail.com
26	Bhaskar Jha	Bhaskar Jha	Climate Prediction Center	Climate Mean, Varibility and Predictability during wintertime in the NCEP CFSv2 AMIP simulation	In this work, climate mean, variability, and potential source of predictability during wintertime in 200-mb height is analyzed using a set of 18 members AMIP simulation from the NCEP CFSv2 and compared with NCEP/NCAR reanalysis. The AMIP simulation started with different initial conditions from 1st January 1957 and proceeded to the April 2013, and all the 18 members were forced with the observed varying SSTs, sea-ice concentration and CO2 concentration. The runs are updated on monthly basis (near real-time) to provide seasonal attribution activity at CPC. The model has a cold bias almost over most of the globe, and only warm bias is seen concentrated in small area West of Date line between 30S-60S latitudinal belt. The bias in stationary waves is characterized with wave trains emanating from the tropical region into both the hemispheres, which could be related to bias in the precipitation over the tropical Maritime continent and over the southern Indian Ocean.The model successfully simulated the seasonal mean variability in terms of geographical locations of the major centers of action, but the simulated intensity was generally weaker than that in observation, particularly over the Greenland area. The simulated ENSO teleconnection pattern from model resembles well that from the observation, except for a small eastward shift. Overall, the NCEP CFSv2gaea is capable of simulating major features of global winter seasonal mean circulation with good fidelity.The model dependence of the signal (variance of ensemble mean) and noise (variance about the ensemble mean) is large. The signal-to-noise ratio is significantly greater than unity in the Tropics, the northern Pacific and continental North America subtropics and the southern Pacific subtropics.	bhaskar.jha@noaa.gov
27	Laifang Li	Laifang Li	Duke University	Dynamic origins of WRF bias in simulating Southeastern United States summer precipitation	The Weather Research and Forecasting (WRF) model tends to simulate a dry bias in summer precipitation over the Southeastern (SE) United States (US), which hampers its application in atmospheric research and operational forecast over this region. This study addresses the causes of this dry bias by performing WRF experiment and climate diagnosis. The analysis suggests that the large-scale circulation system, specifically the North Atlantic Subtropical High (NASH), is distorted in the WRF simulation with a biased western ridge location, i.e. northwestward relative to observation. Since the NW-type ridge corresponds to abnormally dry summers over the SE US, this distortion leads to the dry bias in the WRF simulation. The distortion of the NASH western ridge and associated circulation mainly come from the circulation biases in the tropical areas between 15˚N and 20˚N, where WRF simulates an anomalously strong upper tropospheric divergence due to the e rrors in the spatial distribution of zonal wind. Such an erroneous circulation induces an artificial meridional circulation with its down branch located over the Gulf of Mexico. An erroneous anticyclone is thus generated over the Texas coast following a Gill-type response. Correspondingly, the WRF simulated NASH western ridge extends northwestward compared to observations. These results suggest that the simulated SE US dry bias probably originates from atmospheric dynamic processes. To verify the results, three sets of Four-Dimensional Data Assimilation (FDDA) experiment were performed: Full FDDA, Thermodynamic FDDA, and Dynamic FDDA. In the Full FDDA both thermodynamic and dynamic fields are nudged, while in the Thermodynamic (Dynamic) FDDA, only temperature and specific humidity (wind) are nudged towards reanalysis during the simulation. It is shown that the Full FDDA successfully corrected the SE US dry bias, with such an improvement largely coming from the Dynamic FDDA. Our analysis indicates that WRF simulated dry bias might originate from its misrepresentation of large-scale dynamics (i.e. NASH western ridge and tropical circulation). Thus, accurately simulating these system and processes could potentially advance the WRF prediction skills in SE US summer precipitation.	laifang.li@duke.edu
28	José Antonio Aravéquia	José Antonio Aravéquia	Center for Weather Forecast and Climate Studies / National Institute for Space Research (CPTEC / INPE)	Analysis study of rainy season onset in the Southeast and Midwest of Brazil	The rainy season in the Midwest and Southeast regions of Brazil is the object of study of this research focused on the characterization of atmospheric conditions in the moments preceding, accompanying and following the onset of the rains in these regions. Several methodologies have been used to identify the date of the rainy season onset, based on variables such as total precipitation, wind, outgoing longwave radiation, which are used to generate monsoon indices. The monsoon constituted one of the main components of the rainy season in South America. Moisture data from CFSR reanalysis, characterized by the precipitable water content and moisture flux, will be used to identify the start of the rainy season using different methodologies. The atmospheric instability will be analyzed using the K, CAPE and CINE indexes in order to identify how the atmosphere behaves in the period preceding the onset of the rains. In this study the focus is given to the variables of moi
29	Charles Jones	Charles Jones	University of California Santa Barbara	The Madden-Julian Oscillation and extratropical cyclogenesis	The Madden–Julian Oscillation (MJO) has a significant role in weather and climate variability. The MJO significantly influences the occurrence of heavy precipitation around the globe. Since the MJO involves intense tropical convective heating anomalies, tropical–extratropical interactions are significant during its life cycle. Consequently, the MJO interacts with the large-scale circulation in the extratropics of both hemispheres. This study uses NCEP CFSR reanalysis from 1979-2010 and a tracking algorithm to detect the formation of extratropical cyclones. Events of MJO are identified with filtered outgoing longwave radiation (OLR) and zonal winds at 850-hPa and 200-hPa anomalies. The presentation will discuss the climatology of extratropical cyclones and the life cycle of the MJO.	hyemi.kim@stonybrook.edu
30	Ehsan Erfani	Ehsan Erfani	Desert Research Institute/ University of Nevada, Reno	Mechanisms for the Onset and Evolution of North American Monsoon	The North American Monsoon (NAM) is a large-scale feature having a strong impact on summer rainfall patterns and amounts over North America. Although regional climate models have succeeded in reproducing some features of the NAM, its onset, strength and evolution are not well predicted, and a physical understanding of key processes governing its life-cycle remains elusive. In this study, we propose a partial mechanistic understanding of the NAM incorporating local- and large-scale processes. The proposed hypothesis is supported with satellite observations of sea surface temperature (SST), sea surface height (SSH) and rainfall amount; temperature and humidity profiles from ship soundings launched over the Gulf of California (GC); climatologies of SST, outgoing longwave radiation (OLR) and 500 hPa geopotential height from NCEP/NCAR reanalysis; regional scale modeling of the NAM region (WRF). The local scale mechanism is related to the marine boundary layer (MBL) over the northern GC. The strong low-level inversion capping the top of shallow MBL weakens with increasing SSTs and generally disappears once SSTs exceed 29°C, allowing the trapped MBL moisture to mix with free tropospheric air. This leads to a deep, moist, well-mixed layer that can be transported inland by low-level winds to form thunderstorms in Arizona and elsewhere. The large-scale mechanism demonstrates the association between a northward shift of tropical surface water, OLR and the NAM anticyclone by means of climatologies of NAM region SST, OLR and NCEP/NCAR 500 hPa geopotential height reanalysis from 1983 to 2010. As warm Pacific SSTs propagate northwards up the Mexican coastline, deep convection follows this northward advance, with associated descending air north/northeast of the convection region possibly advancing the position of the anticyclone. This evolution brings mid-level tropical moisture into the NAM region. A set of carefully designed simulations is used to investigate the dependence of NAM convection and the 500 hPa anticyclone on SSTs along the Mexican coastline and in the GC.A physical understanding of the NAM is needed to guide improvements in regional and global scale modeling of the NAM and its remote impacts on the summer circulation and precipitation patterns over North America. This understanding is also needed to predict the NAM's response to global warming.	ehsan.erfani@dri.edu

Number		Presenter	Presenter Affiliation	Title	Abstract	Email
31	Ruping Mo	Ruping Mo	National Lab for Coastal and Mountain Meteorology, Environment Canada, Vancouver, BC, Canada	Some similarity indices with possible meteorological applications	Beyond the common and traditional measures of pattern differences and association, four modern similarity indices that have been widely used in other disciplines are examined and promoted for meteorological applications. The Carbó index, which was originally proposed to measure the similarity between molecules in terms of their electron densities, has a meteorological equivalent known as the uncentered anomaly correlation. Like the traditional correlation coefficient, this similarity index is sensitive to the shape difference in the compared measurements, but not to the proportional difference in their magnitudes. An alternative to the Carbó index is the Hodgkin-Richards index, which is less sensitive to the difference in shape but more sensitive to the difference in magnitude, and can be defined as a normalized mean-squared distance subtracted from unity. A modified version of the Hodgkin-Richards index, the Petke index, has the advantage of being e ven more sensitive to the difference in amplitude. In addition, the structural similarity index has gained widespread popularity in the field of signal processing. It can be considered as a modified correlation coefficient, with the advantage of being sensitive to differences in sample means and variances. A summary of the strengths and sensitivities of these indices is provided. A modified version of the structural similarity index is proposed which accommodates meteorological data that would be unsuitable in the original definition. Using an example, we demonstrated how this index may have advantages over the other similarity measures (including the Pearson correlation and the root-mean-squared distance) for analogue analysis in meteorology.	ruping.mo@ec.gc.ca
32	Martina Ricko	Martina Ricko	University of Maryland/ESSIC, College Park, MD	Assessment of precipitation extremes observed in satellite data	Characteristics of recent climatological precipitation extremes on annual and seasonal time scale with their interannual variations over the tropical and subtropical regions both land and ocean areas will be presented. Precipitation extremes are analyzed with mean and total heavy rain (defined as precipitation above assigned thresholds and 95th percentile) and mean number of days with precipitation above assigned thresholds to identify characteristics of extremes and spatial areas that are prone to wet precipitation extremes. Relationship between variations in wet precipitation extremes and potential flood events on a global to regional scale will also be presented. Recent high-resolution TRMM Multi-satellite Precipitation Analysis (TMPA) 3B42 Version 7 near-global (50°N to 50°S) data with 0.25° spatial resolution during 1998-2011 is used to derive daily precipitation data set to examine the effects of spatial and temporal coverage of precipitation ex tremes. Flood event data from a global hydrological model is used to quantify the global distribution of potential flood events. The spatial and temporal variation of precipitation extremes is of great importance to water resource managers and decision makers. Improved understanding of precipitation extremes-floods relationship can allow better cost-benefit analysis of future flood risk.	mricko@umd.edu
33	Joong-Bae Ahn	Joong-Bae Ahn	Division of Earth Environmental System, Pusan National University, Busan, South Korea	Improvement of multi-model ensemble seasonal prediction skills over East Asian summer monsoon region using a climate filter concept.	The authors propose the use of a "climate filter" concept to enhance prediction skill of a multimodel ensemble(MME) suite for the East Asian summer monsoon (EASM) precipitation and temperature at 850 hPa. The method envisages grading models based on the degree of reproducibility of the association of EASM variability with a few relevant climate drivers with the respective model hindcasts for the period 1981—2003. The analysis identifies the previous winter Ni~no-3.4 and spring North Atlantic Oscillation (NAO) indices as the most suitable climate drivers in designing a climate filter for evaluating models that replicate the observed teleconnections to EASM well. The results show that the hindcast skills of a new MME with the betterperforming models are significantly higher than those from the nonperforming models or from an all-inclusive operational MME.Acknowledgements : This work was carried out with the support of Rural Development Administration Cooperative Research Program for Agriculture Science & Technology Development under Grant Project No. PJ009353 and the Korea Meteorological Administration Research and Development Program under Grant CATER 2012-3100, Republic of Korea.	jbahn@pusan.ac.kr
34	Sudhir Raj Shrestha	Sudhir Raj Shrestha	NOAA Climate Prediction Center	Improving Data Discovery and Access through Interoperable System in Climate.gov	The National Oceanic and Atmospheric Administration's (NOAA) Climate.gov team is enhancing users' ability to locate, preview, interact and access/acquire climate data and products in most commonly used data formats through a seamless and elegantly simple Climate.gov Maps and Data Section interface. The Climate.gov "Data" team faces multiple challenges from the diversity within the nation's climate data management such as various kinds of data, digital formats, inconsistency of metadata records, variety of data service implementations, very large volumes of data and geographically distributed locations. The Climate.gov team has created the Data Access and Interoperability project to design a web-based platform where interoperability between systems can be leveraged to allow greater data discovery, access, visualization and delivery. There are varieties of definitions on Interoperability based on the use case. For the climate.gov Interoperability is the ability of d iverse systems to work together or inter-operate. The interoperable system interface will allow users to find, display, manipulate, and (where applicable) download NOAA's and its partners' climate data products that are stored in and served from different data centers.Based on the definition of the Interoperability, the team proposed developing an Interoperable Data Platform in Climate.gov Maps and Data Section tab wherein systems can integrate with each other to support the synthesis of Climate data and products. This simple web based interoperable system platform will provide users the ability to discover the available climate data, preview and interact with them, and acquire the data in common digital formats. The Climate.gov Interoperable Data Platform is designed around the concepts of Representational State Transfer (REST) and implements design patterns and use cases which conform to best common practices for Web Services. Emerging standards for automation of machine-to-machine services discovery, such as OpenSearch autodiscovery, are being implemented throughout the Data Platform to ensure harmonization between data service providers, integrators and consumers. Implementation of these common specifications will not only ensure compatibility between systems within NOAA, but also with non-NOAA systems and innovators in the public. The proposed Data Interoperable System platform will have improved and smooth experience to the users in Data discovery, Access, preview and data export due to scalable interoperability. As the team works across the organization, it will evaluate the capabilities of the participating systems to capture and assess the relative maturity of each system acc ording to the Technology Infusion Working Group (TIWG) Interoperability Readiness Levels (IRL) as the reference for the interoperability mapping within NOAA. This will help establish the gaps and opportunities for integrating systems across a common set of discrete aspects of interoperability. Applying the principles of IRL will give NOAA reasonable and consistent snapshots of current readiness of systems to be interoperable, but also provide consistent targets for evolving a more integratable ecosystem for Earth Sciences data throughout NOAA.In this presentation, we will provide an overview of the Climate.gov Data Interoperability concept, explore the TIWG IRL within the process, examine the technologies and standards being used, demo the prototype the team has developed for the proof of concept and discuss the challenges and ongoing activities within the Interoperable Data Platform team.	sudhir.shrestha@noaa.gov
35	Ni Dai	Ni Dai	AOSC-UMD, CICS	ENSO Representation in CMIP5 Models	The El Nino Southern Oscillation (ENSO) is the most significant interannual climate phenomenon, and is associated with large-scale changes in sea surface temperature (SST), surface pressure and atmospheric circulation. Understanding and predicting ENSO is important to help address the environmental and societal issues it brings. However, since ENSO itself is associated with complex atmosphere-ocean coupling, it is still difficult for models to accurately represent it. We will examine the ability of CMIP5 (Coupled Model Intercomparison Project phase 5) models to simulate ENSO. Currently we are using Empirical Orthogonal Functions (EOF) and power spectrum analysis to extract ENSO signals from annual averaged precipitation and SST in each CMIP5 model, and comparing them to observational datasets (20th Century Reanalysis and Reconstructed Precipitation by CICS). Our preliminary conclusion is that most of CMIP5 models exhibit phenomena with that resemble ENSO in their spatial and spectral signatures, with impressive consistency across ensemble members. The detailed spatial patterns, however, differ quite substantially from the observed ENSO precipitation anomalies. We will describe further analyses of model seasonal to interannual variability using monthly and seasonally resolved observation datasets.	ndai@atmos.umd.edu
36	Laifang Li	Laifang Li	Duke University	Improvements in WRF Climate Prediction of Southeastern United States Summer Rainfall: Physical Parameterization and Horizontal Resolution	Realistic regional climate simulations are important in understanding the mechanisms of summer rainfall in the southeastern United States (SE US) and in making seasonal predictions. In this study, skills of SE US summer rainfall simulation at a 15-km resolution are evaluated using the Weather Research and Forecasting (WRF) model driven by Climate Forecast System Reanalysis (CFSR) data. The influences of parameterization schemes and model resolution on the rainfall are investigated. It is shown that the WRF simulations for SE US summer rainfall are the most sensitive to cumulus schemes, moderately sensitive to planetary boundary layer schemes, and less sensitive to microphysics schemes. Among five WRF cumulus schemes analyzed in this study, the Zhang-McFarlane scheme outperforms the other four. Further analysis suggests that the superior performance of the Zhang-McFarlane scheme can be attributed primarily to its capability of representing rainfall-triggering proce sses over the SE US, especially the positive relationship between Convective Available Potential Energy (CAPE) and rainfall. In addition, simulated rainfall using the Zhang-McFarlane scheme at the 15-km resolution is compared with that at a 3-km convection-permitting resolution without a cumulus scheme to test whether the increased horizontal resolution can further improve the SE US rainfall simulation. Results indicate that the simulations at the 3-km resolution do not show obvious advantages over those at the 15-km resolution with the Zhang-McFarlane scheme. In conclusion, our study suggests that in order to obtain a satisfactory simulation of SE US summer rainfall, choosing a cumulus scheme that can realistically represent the convective rainfall triggering mechanism may be more effective than solely increasing model resolution.	laifang.li@duke.edu
37	Kyong-Hwan Seo	Kyong-Hwan Seo	Pusan National Univ.	Physical processes for the Northern Hemisphere wintertime temperature anomalies induced by the Madden-Julian oscillation	The impact of the Madden-Julian oscillation on the wintertime low-level temperature over the Northern Hemisphere has been examined by a themodynamic energy equation analysis for the period 1979-2010. The major thermodynamic and dynamic processes are elucidated through interaction between the MJO perturbation and time-mean component. The statistically significant extratropical temperature anomalies develop over the continent of Asia and western Pacific and North American continent after one or two weeks after the MJO is situated over the Indian Ocean or western Pacific (MJO phases 2, 3, 6, and 7). Results show that the dynamic processes associated with MJO-driven adiabatic warming/cooling and mean-perturbation interaction play a critical role in producing the temperature anomalies. For example, adiabatic warming is the most important mechanism for the warming over the Asian continent developed 10 days after the initial MJO is located at phase 2. In contrast, the wa rming anomalies over the North American continent results mainly from the warm advection by the MJO wind component acting on the mean spatial temperature gradient at the phases 2 and 3. Schematic plots that summarize main processes will be presented.	khseo@pusan.ac.kr
38	Woo-Sung Lee	Woo-Sung Lee	Canadian Centre for Climate Modelling and Analysis	CanSIPS Prediction of NAO and PNA for the NH Winter	The Pacific/North American pattern (PNA) and the North Atlantic Oscillation (NAO) are the two most recognized, influential teleconnection patterns in the Northern Hemisphere extratropics. Thus, the overall seasonal prediction skill for the NH extratropics is intimately related to the prediction skill for these patterns. Especially, the variability of PNA has been found to be strongly influenced by the ENSO related tropical SST anomalies. The ability of model to replicate the link between model ENSO and teleconnection patterns is significant for model evaluation.In this presentation, we use retrospective predictions from CanSIPS (Canadian Seasonal to Interannual Prediction System) and NCEP CFSv2 to investigate performance in predicting the wintertime PNA and NAO. The winters for 28 years from 1982 to 2010 are considered. Teleconnection pattern spatial distributions and monthly and seasonal forecast skills of PNA index and NAO index are compared, and the relationship between ENSO indices and teleconnection indices is discussed. These results will be also compared with multi-model forecasts (CanSIPS+CFSv2).	woosung.lee@ec.gc.ca
39	Stephen Baxter	Stephen Baxter	Climate Prediction Center	Forecast Circulation and Teleconnection Skill in the CFSv2 Beyond Week-2	A leading goal of ongoing climate research is skillful subseasonal prediction beyond the Week-2 period. To this end, the latest Climate Forecast System (CFSv2) is evaluated to assess any potential skill in the weeks three and four time period in the Northern Hemisphere. The forecast skill of both the large scale circulation field and major teleconnection indices are evaluated in the 12-year hindcast period (1999-2010), with some positive results. The model is found to have some reasonable skill in weeks three and four in the well-teleconnected areas of the Northern Hemisphere during boreal winter. Furthermore, daily forecasts of the Arctic Oscillation (AO) index are found to be skillful out to 24 days in DJF, while forecasts of NAO and PNA indices in the same season are skillful to 19 and 21 days, respectively. For comparison, a simple statistical forecast is computed utilizing modes of variability from a time-extended EOF analysis; it is found that the CFSv2 impr oves upon such a statistical forecast.	Stephen.Baxter@noaa.gov
40	Youlong Xia	Youlong Xia	IMSG at NCEP/EMC	Objective Blends of Multiple NLDAS Drought Indices over the Continental United States (CONUS): Development and Application	An objective blending approach of multiple drought indices is developed through collaboration between NOAA National Centers for Environmental Prediction (NCEP), NASA Hydrological Sciences Laboratory, and Princeton University. This study is jointly sponsored by CPO's Modeling Analyses, Prediction and Projection (MAPP) and Climate Testbed Program. The drought indices used in this study include monthly top 1-meter soil moisture and total column soil moisture (SM) percentile, total runoff percentile (Q), Evapotranspiration (ET) percentile, snow water equivalent (SWE) percentile, and 3-month and 6-month standard precipitation index percentile (spi3 and spi6). The blending equations are assumed to be a linear combination of multiple drought indices, and the weights of the equations are estimated by an optimization approach (called very fast simulated annealing) through minimizing root-mean-square error between drought extent derived from the US drought Monitor (USDM) and the blend s. The calibrated spatial scales are CONUS, six USDM regions, and 48 states. The results show that for most cases, SM plays a dominant role for most regions and states, followed by Q, spi6, ET, and spi3 over the continental United States. Over the western regions, the SWE plays a dominant role, followed by SM and ET. This work will be expanded by adding operational drought indices used in the Climate Prediction Center and remotely-sensed drought indices through a collaboration with CPC scientists. Spatial scales will be expanded from states to 345 climate divisions, and temporal scales will be expanded from monthly to weekly. The purpose of this study is to enhance the objectivity of the USDM and efficiency of generating the USDM draft map from the NLDAS products and other drought indices.	youlong.xia@noaa.gov
41	Ahmed Tawfik	Ahmed Tawfik	Center for Ocean-Land-Atmosphere Studies	A process-based framework for isolating large-scale and surface forcing during convection	Convection triggered by surface heating is tightly coupled to the diurnal cycle of surface temperatures and boundary layer growth. This land-atmosphere connection is typically divided into two segments, a terrestrial and an atmospheric component; however, isolating the large-scale forcing from the local land surface forcing has been particularly difficult. A process-based diagnostic framework, the mixed condensation level (MCL), is presented that attempts to quantify the atmospheric background state within the context of convective triggering. Physically, the MCL is retrieved by constructing a hypothetical boundary layer thereby avoiding common umixed parcel convection metrics, such as the LCL and CIN. The MCL is calculated using standard meteorological profiles of temperature and humidity and can be calculated for any time of day or year making it suitable for broader application. Certain regions over the continental United States are highlighted where conv ection is particular sensitive to soil moisture and surface energy partitioning.	abtawfik@iges.org

Number		Presenter	Presenter Affiliation	Title	Abstract	Email
42	Emily Riddle	Emily Riddle	NOAA CPC	A generalized framework for estimating the effect of ensemble size on forecast skill	Increasing ensemble size generally improves model skill by eliminating the contribution from the noise component, thus enhancing the relative contribution of the signal. The improvement due to adding additional ensemble members is largest for smaller ensemble sizes (i.e., a larger improvement is seen when increasing from 1 – 3 members than when increasing from 50 to 100). While there are many considerations that go into designing a forecast system, one important factor is the degree to which increasing or decreasing the ensemble size will affect the forecast skill. The result will depend on the forecast variable, averaging period, season, lead-time, and model. Both theoretical and actual results have demonstrated that the sensitivity of a forecast to ensemble size depends to a large degree on the difficulty of the forecast problem at hand. More predictable forecast variables (i.e. those with a larger signal to noise ratio) will require fewer ensemble members to approach the optimal forecast skill than forecast variables that are difficult to predict (i.e., those with a smaller signal to noise ratio). We expand on previous work to establish a generalized framework estimating the effect of ensemble size on forecast skill, applicable to forecast problems of varying timescales and predictability. We compare analytical results with results from a real forecast setting.	emily.riddle@noaa.gov
43	Ricardo Fonseca	Ricardo Fonseca	Earth Observatory of Singapore, Nanyang Technological University, Singapore	Tropical Vorticity Budget in ECMWF (Re)analyses	An analysis of the large-scale upper-level tropical vorticity budget using ERA-Interim data for JJA showed the vorticity forcing to be associated with the vertical mixing of horizontal momentum in towering cumulus, a process known as cumulus momentum transport, as well as with the transient nature of tropical convection. It was also found that the vertical advection and twisting terms play an important role in the vorticity balance. A simple parameterisation of the momentum source associated with convection was developed and the wind tendencies given by this scheme were compared to the forecast tendencies from the more complex scheme in the ECMWF model used for the Year of Tropical Convection (YOTC) analyses and forecasts. It was found that the simple scheme gives wind tendencies that are similar in both phase and amplitude to the forecast tendencies.	RMFonseca@ntu.edu.sg
44	Joong-Bae Ahn	Joong-Bae Ahn	Division of Earth Environmental System, Pusan National University, Busan, South Korea	Possible impact of the autumnal North Pacific SST and November AO on the East Asian winter temperature.	This study investigates the effects of the North Pacific sea surface temperature (NP SST) anomalies on the East Asian winter temperature (TEA), and the relationship between the Arctic Oscillation (AO) and NP SST anomalies in association with TEA. Time-lagged correlation analysis revealed that the third mode of the September—October—November (SON) mean NP SST (""SON SST 3rd mode"") and the AO index for November (""Nov AO"") are closely related to TEA, and further that the first and second modes of NP SST are associated with the Pacific Decadal Oscillation (PDO) and Pacific North America (PNA) patterns, respectively. This study reveals that when the SON SST 3rd mode and Nov AO have a positive (negative) phase, the intensity of the Siberian High weakens (strengthens), which in turn weakens (strengthens) the East Asian winter monsoon (EAWM), resulting in a warm (cold) winter in East Asia. Our results suggest that the North Pacific Ocean signals i nfluence the AO, which is one of the most pronounced Northern Hemispheric atmospheric global patterns. Such an influence in turn governs the continental-scale circulation over Siberia and affects the subsequent local climate variation over the East Asia regions.Acknowledgements : This work was carried out with the support of Rural Development Administration Cooperative Research Program for Agriculture Science & Technology Development under Grant Project No. PJ009353 and the Korea Meteorological Administration Research and Development Program under Grant CATER 2012-3100, Republic of Korea.	jbahn@pusan.ac.kr
45	Scott Weaver	Scott Weaver	NOAA CPC	Factors Associated with Decadal Variability in Great Plains Summertime Surface Temperatures	Decadal variability of summertime Great Plains surface temperature is probed from the perspective of the Great Plains low-level jet (GPLLJ). GPLLJ variability Modes 2 and 5 are shown to be most influential on the evolution and magnitude of Great Plains surface temperature anomalies over the latter half of the twentieth century, including the development of the summertime warming hole, and are further linked to the Pacific Decadal Oscillation (PDO) and Atlantic Multi Decadal Oscillation (AMO), respectively. The connection between GPLLJ variability and Great Plains surface temperature is strongest when the PDO and AMO are oppositely phased, and in the case of the warming hole, a preference for a positive (negative) PDO (AMO).The influence of remote SST variability on the central U.S. warming hole is broadly consistent with previous modeling studies. However, the pivotal role that GPLLJ variability plays in linking the hemispheric-wide SST variability (through the AMO and PDO) to the regional warming hole is an expanded and clarified perspective. These findings unify the results of recent studies from the U.S. CLIVAR Drought Working Group and have implications for decadal climate prediction efforts.	scott.weaver@noaa.gov
46	Mónica Rodrigues	Mónica Rodrigues	Department of Geography, University of Coimbra, Coimbra, Portugal	Modeling of Monthly Air Temperature in Portuguese Metropolitan Areas with ARIMA Models in time Series Analysis3	Air temperature, a temporal series, can be modeled using various techniques; including autoregressive integrated moving average (ARIMA) models [1]. The aim of this approach is to express current time series values as a linear function of past time series values (the autoregressive component) and current and lagged values of a white noise process (moving average component) [2].This research will analyse the characteristics of temperature series in the Lisbon Metropolitan Area (LMA), and a statistical model will be proposed using Box & Jenkins methodology. The data used in the temperature series were the monthly averages from January 1950 to December 2010. For the ACF and PACF modelling, the auto regression and moving average values were examined, and an appropriate model was found to estimate temperature values for the LMA. The analysis of selected ARIMA output values (2,1,1)(0,0,0)12 produced a highly accurate forecast. The model proposed will be useful for future decisions.References[1] FC McMichael, JS Hunter. Stochastic modeling of temperature and flow in rivers,Water Resources Research 8 (1), 87-98.[2] G. E. Box, G. M. Jenkins. Time series analysis: forecasting and control, San Francisco, Holden-Day, 1976.	monica.a.rodrigues@hotmail.com
47	Aston Chipanshi (1) , Hai Lin (2)	Aston Chipanshi (1) , Hai Lin (2)	1. Agriculture and Agri-Food Canada, Science and Technology Branch, Regina, Saskatchewan. 2. Atmospheric Numerical Weather Prediction Research, Environment Canada, Dorval, Quebec.	The prediction of extreme agrometeorological indices using the Canadian Meteorological Centres's medium range forecasts	Twelve agrometeorological indices were selected to monitor extremes of water, heat and wind impacts on agricultural resources. The indices were designed for use in the monitoring and forecasting of warm or cool season crop conditions. The twelve indices were first analyzed using climate data from which trends, variability and change over the 60 to 100 year periods were studied. Computer code was then written to forecast the extreme agrometeorological indices at 7, 16 and 30 day outlooks using outputs from the Canadian Meteorological Centre's medium-range and seasonal ensemble forecasting systems. The weekly and bi-weekly forecast outputs from CMC have a spatial resolution of 60km while the monthly products have a resolution of about 200 km. Before the extreme indices were run in an operational mode, forecast skill verification from hindcast data confirmed that these indices are predictable with sufficient confidence at the key agricultural centres. The heat based indices such as the Effective Growing Degree Days and the short term moisture based indices such as the precipitation accumulation in the first 10 days were the most skillful. The wind and long-term extreme indices were not as skillful as the heat and short-term based indices. For operational purposes, the predicted agrometeorological indices are currently posted to a research website for use by Agriculture and Agri-Food Canada and other clients. The predicted extreme indices provide users with additional information in their decision making on whether the observed conditions at a given time during the growing season will improve or deteriorate at the weekly, biweekly and monthly timescales in the near future. As better resolved outputs from the Canadian Meteorological Centre become available, it is expected that the skill level in the agrometeorological indices will also improve.	Aston.Chipanshi@agr.gc.ca
48	Barrie Bonsal	Barrie Bonsal	Environment Canada	An Assessment of Canadian Prairie Drought: Past, Present, and Future	Droughts are one of the most dramatic manifestations of extremes in the water cycle. Prolonged, large-area droughts are among the world's costliest natural disasters having major impacts on agriculture, forestry, industry, municipalities, recreation, human health and society, and aquatic ecosystems. Within Canada, the Canadian Prairies are particularly drought-prone mainly due to their location in the lee of the western cordillera. Although previous studies examined the occurrence of Canadian Prairie droughts during instrumental, pre-instrumental and to a lesser extent, future periods, none have specifically focused on their trends and variability over all three scales. Using the Palmer Drought Severity Index (PDSI) and Standardized Precipitation Index (SPI) as drought indicators, this investigation assesses the variability of summer drought occurrence over a core region of the Canadian Prairies during a) the pre-instrumental record extending back several centurie s (as inferred from tree rings), b) the instrumental record (1901-2005), and c) the 21st century as projected by several Global Climate Models with multiple emission scenarios. Results show that pre-instrumental droughts were generally more prolonged and severe than those during the 20th century. Projected changes to future droughts differ between the two drought indicators. The PDSI suggests increases in drought frequency and in some cases, severity particularly, after 2050. Conversely, SPI generally shows no significant changes to future drought frequency over the region. All future scenarios for PDSI and SPI do, however, suggest increased variability in drought-related extremes. This study can be considered an initial step toward quantifying and understanding Canadian Prairie drought occurrence over several centuries as determined from paleo, instrumental, and climate model data sources.	Barrie.Bonsal@ec.gc.ca
49	Chaihong Wen (1), Arun Kumar (1), Yan Xue, (1), M.J. McPhaden (2)	Chaihong Wen (1), Arun Kumar (1), Yan Xue, (1), M.J. McPhaden (2)	1. NCEP/CPC, 2. NOAA/Pacific Marine Environmental Laboratory (PMEL)	Understanding Causes for Changes in ENSO Characteristics after 1999: an Oceanic Perspective	The characteristics of El Niño/Southern Oscillation (ENSO) variability have experienced notable changes since the late 1990s, concurrent with a breakdown of the zonal mean upper ocean heat content as a precursor for ENSO. This provokes the debates on the role of thermocline variations on the development of ENSO events since the 21th century. In this study, the observed spatial connection between the thermocline variations and El Niño and La Niña events was examined separately for the 1980-1998 and 1999-2012 periods. The analysis highlights the important role of thermocline variations in modulating ENSO evolutions in both periods. It is shown that the state of thermocline variations in the central tropical Pacific is a good precursor for ENSO evolutions before and after 1999, while the zonal-mean equatorial thermocline variation is a good precursor only before 1999. Further, it is found that the strength of the Subtropical Cells (STCs) interior mass transport in both hemispheres enhanced rapidly around the late 1990s. We proposed that the strengthened STC interior transport provides a pathway for enhanced influence of off-equatorial thermocline variations on the development of ENSO events after 1999.	caihong.wen@noaa.gov