

scour. Emphasis is placed on the special class of self-similar flows which, for wall jets, requires the ratio of the maximum-to-free stream velocities to be constant with streamwise distance. In this study, we consider values of this ratio from 0 to 0.8: the zero case corresponding to the challenging case of a wall jet developing in stagnant surroundings, a common occurrence in natural systems. The primary interest is the accurate prediction of the rate at which the jet expands into the surrounding environment, and the wall shear stresses that are the cause of severe scour associated with turbulent wall jets. We present comparisons with experimental data and with empirical correlations. These show that the second-order closure model succeeds in capturing many of the important features of this complex flow, including the separation of the points where the turbulent shear stress and the mean velocity gradients are zero. The wall shear stresses are also well predicted with this model but less so with the two-equation model. The implications of these results on the prediction of bed-load sediment transport will be discussed.

## H12C MCC: Level 2 Monday 1330h

### Coordinated Enhanced Observing Period (CEOP) I Posters (*joint with A, OS, GC*)

**Presiding: J O Roads, Scripps Institution of Oceanography; R Lawford, NOAA**

## H12C-1006 1330h POSTER

### A Simplified Land Data Assimilation Scheme (LDAS) for Assimilation of AMSR-E Data and Its Application to CEOP Reference Site: Mongolia

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Soil moisture controls the partitioning of land surface heat fluxes into the atmosphere and influences the global and/or regional water cycle. However, improvement in the forecast skill of quantitative/qualitative soil moisture forecasts has been slow. This could be attributed to uncertainties in model physics, parameterization, and initial conditions. With the rapid increase of satellite data, the skill of quantitative/qualitative soil moisture forecasts is expected to be improved by using these data. This paper investigates the method of retrieving spatial distributions and temporal variations of key land surface variables such as soil moisture and soil and canopy temperatures from passive microwave radiance measurements by using the novel application of data assimilation. The Land Surface Scheme (LSS), which forms the heart of the data assimilation algorithm, is a bio-physically based Model (Simplified Biosphere Model2: SiB2) of soil, vegetation, and atmosphere interaction. Our Land Data Assimilation Scheme (LDAS) takes into account both model and observation uncertainties and provides dynamically consistent data product of land surface parameters. The satellite sensor Aqua/AMSR-E measurements, gathered over one of the CEOP reference site: Mongolia, are assimilated into the LSS using our LDAS. However, satellite observations of brightness temperatures are likely to be available only over relatively larger spatial scales. In order to integrate spatial heterogeneity effects and pursue the optimal usage of large spatial scale satellite observations, we have introduced a simplified downscaling approach inside the LDAS. An assessment of the experiment results and the impacts of AMSR-E data and the data assimilation concepts in the modelling of land surface processes will be discussed.

## H12C-1007 1330h POSTER

### Model-Based Analysis on the Mountain-Valley Circulation in the CEOP Reference Site

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The mountain-valley circulation system in the Tibetan Plateau, one of the Coordinated Enhanced Observing Period (CEOP) reference sites, has been investigated. We set the target area around Naqu, which is located between the two mountain ranges running east to west in the north and the south. GEWEX Asian Monsoon Experiment-Tibet Intensive Observation Period of 1998 (GAME-Tibet IOP) data showed the diurnal variation of the convective activities and mountain-valley circulations. Wind from mountain to valley, accompanied by convection over the mountain range was observed during the afternoon while the wind direction changed at night with the mountain convection disappearing. At the same time, the convective precipitation areas moving from mountain to valley were observed by Doppler radar. Sometimes this convective precipitation system induced the vorticity. By using the atmosphere-land coupled regional model to investigate this phenomenon, we successfully clarified the mechanism of diurnal circulation going through the following steps. The convective clouds develop over the mountains encouraged by latent energy release. It leads to deep convective clouds with a high cloud bottom, while it also makes a huge amount of precipitation because of the relatively small saturation pressure. At the same time, these convections can bring down the westerly momentum in the upper troposphere with their downward stream. Then, this precipitation cools the surrounding air mass (by 2 to 4 K) by strong evaporation due to the relatively dry surrounding atmosphere. This significant amount of cold air mass under the cloud bottom induces a pressure gradient (meso-high) in the direction of the valley. As the wind blows from mountain to valley, lined convections are formed with cold air mass, with pushing up comparatively warm air mass in the valley. On the other hand, the contrast in the strength of westerly between inside and outside of the meso-high makes vorticity. For this validation, we made a comparison between the observation data and the simulation data. And these simulation data indicated pretty good correspondence with the observation data.

## H12C-1008 1330h POSTER

### US CONTRIBUTIONS TO THE COORDINATED ENHANCED OBSERVING PERIOD (CEOP) AND THEIR BENEFITS TO US WATER CYCLE RESEARCH

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The USA is a major contributor to the World Climate Research Programme's Coordinated Enhanced Observing Period (CEOP). Many US scientists are engaged in the project because they are convinced of the project's value for longer-term climate studies. The facilities of DOE, NASA and NOAA feature in US contributions to CEOP data set development. Through support from NOAA and NASA, UCAR is playing a major role in data processing and data set development. In return for these contributions, US scientists now have access to large international data sets that did not previously exist or were difficult to access. The use of these data sets for Water and Energy Simulations and Predictions and Monsoon system studies are already underway. These efforts will contribute to the Climate Change Science Program's (CCSP) Water Cycle theme, GEWEX Americas Prediction Project and NOAA's emerging Intraseasonal to Interannual Prediction (ISIP) program. The systems being developed through this process will advance some of the goals of the Water Cycle theme within the Integrated Global Observing Strategy (IGOS) Partnership. However, there will be many more opportunities for creative use of these data sets. The purpose of this presentation is to increase awareness of the US contributions to CEOP; to provide interested scientists with information on how to access these data sets and to obtain feedback on additional uses of these unique global data sets.

## H12D MCC: Level 2 Monday 1330h

### Hydrologic Predictions in Ungauged Basins: PUB I Posters (*joint with NG*)

**Presiding: T Wagener, University of Arizona; D Schertzer, Laboratoire de Modélisation en Mécanique, Université Pierre et Marie Curie**

## H12D-1009 1330h POSTER

### Regional Flood Frequency Equations: What Level of Complexity is Rational?

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The "single-return-period" prediction equation of the log-log multivariate regression form in which a peak discharge of a specific return period is related to one or more watershed and meteorologic characteristics is the most frequently used regional flood frequency procedure in the US for ungauged, unregulated rural streams. Equations are developed for a region that is identified as homogeneous based on underlying hydrologic/meteorologic and geologic/soil properties. The number and type of explanatory variables used in regression equations vary. For example, most regional regression equations developed by the US Geological Survey and compiled into "The National Flood Frequency Program," are based on watershed characteristics such as: drainage area, mean basin elevation, and channel slope. Other explanatory watershed variables used include parameters such as: storage area of lakes/ponds, forest cover, channel length, basin shape, high elevation index. Climatic characteristics present in some of the equations consist of mean annual rainfall, rainfall amount for a specified duration, mean annual snowfall and/or minimum mean January temperature. The development of GIS based models, such as ArcHydro or Watershed Modeling System, has created an opportunity to easily produce extensive sets of hydrologic parameters that could be investigated as possible predictors of T-year discharges. As a result, prediction equations tend to be even more complex than they used to be. However, based on our results, it appears that such equations may actually generate less accurate flood estimates than very simple equations that include only one or two predictors. Equations are highly sensitive to uncertainties (errors) in explanatory variables, both in calibration and in prediction mode. Based on our study for several watersheds in Utah we'll try to answer the question on how much complexity in prediction equations is really rational.

## H12D-1010 1330h POSTER

### A new GIS-based routing scheme for hydrological models

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The development and application of a new GIS-based routing scheme for hydrological models are presented in this paper. The new approach differs from previous methods in four aspects: (1) it computes the flow direction continuously from 0° to 360° and allows runoff to leave each grid from any angle between 0° to 360° rather than from only one of the eight directions (i.e., 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315°) which allows the new GIS-based routing scheme to be able to represent efficiently effects of different spatial and temporal resolutions of the digital elevation model (DEM) data on river network routing; (2) it considers impacts of land cover/use change on overland and river routing dynamically; (3) it advances the early routing methods by fully coupling it with a hydrological distributed model to consider runoff re-infiltration; and (4) it corrects the flow directions at the boundary grids of a watershed by taking the advantage of DEM data at a finer spatial resolution. The new routing scheme