Abstracts and Biographies

Wednesday 19 February 2014

Over the hill and dale: the effects of mountains on the weather.

Four Years of Floods in the Himalayas: Meteorological Factors.
Prof. Robert A. Houze FRMetS, University of Washington, Seattle, USA

Abstract:
Pakistan and western India have experienced terrible flooding in each of the last four summer monsoon seasons in the normally arid region over and south of the Himalayas. The TRMM satellite, reanalysis data, and regional modeling have shown that both the nature of the convection and synoptic-scale conditions took on atypical characteristics during the periods of flooding. A midlevel cyclonic circulation centered over the west coast of India drove a deep layer of moisture into the region from the east and the convection became organized on the mesoscale. When the moist flow rose encountered the terrain, the mesoscale systems were enhanced. These conditions depart from the more normal precipitation events in the region, which are locally intense but not flood prone. Typically midlevel dry air arrives from Afghan Plateau to the west instead of the deep moist flow from the east seen during the flood periods. Under these more typical conditions, the convection can be locally very intense but does not organized upscale to form mesoscale systems.

Biography:

Mediterranean Precipitation Structure over Topography.
Dr Sandrine Anquetin, LTHE, Domaine University, Grenoble, France.

Abstract:
Extreme rainfall rates (up to 100-year return-values) over the French Mediterranean region present significant different patterns of rainfall statistics across accumulation time steps. For a daily time scale, the relief significantly influences the statistics, whereas for the hourly time step, no specific signature is observed. Moreover, rainfall intermittency is found lower in the mountainous area than in the piedmont and plain areas. These results invite to understand how convection mechanisms determine these space and time features of rain variability.

This presentation presents the state of the art of convection understanding in this region with a focus on banded orographic convective system.

During Mediterranean storms, convective orographic rain bands are persistently established over prevailing locations in mountainous areas and may lead to the generation of flash-flooding when the bands are associated with a stationary flow that depends on the synoptic-scale steadiness.

Numerical studies have already been carried out to bring to the fore spatial and temporal characteristics of such rain bands and to identify their necessary synoptic triggering ingredients.

This presentation points out the contribution of the precipitation associated to banded orographic convection to the rainfall regime of the Cévennes \u2013 Vivarais region (France) that can locally reach 40%. This result encourages the deployment of a specific observation device to better document this type of convection during the HyMeX campaign (fall 2012) illustrated here with first preliminary results.
Biography:

Sandrine Anquetin has a background in boundary layer meteorology, in particular in mountainous area. She studied the diurnal cycle of the atmospheric boundary layer within complex topography and the associated urban pollution exposure.

Now, her research deals with the understanding of the rainfall structure and the rainfall regime in Mediterranean region and the associated hydrological impacts within a seamless approach. Her work takes place in a general context of natural hazard mitigation for present and future climate and aims to be integrated within social science.

Sandrine Anquetin was the coordinator for her laboratory of several European projects and was Task leader of two FP6-IP European projects. These projects focused on the observation and modeling of the genesis and the propagation of flash-flood. She was also the French coordinator of the International SAFEwater project with South Africa targeted on the hydrometeorological risk and water resources management in Mediterranean and South-African regions (2006-2010).

In 2010, she took the co-responsibility with Gilles Molinié of the International Education bi-lateral Program HYDROHASARDS with the University of Thessaly (Greece).

At regional scale, S. Anquetin is responsible of the platform ‘Regional Climate’ of Envirhonalp that aims to link the research with stakeholders.

At LTHE, S. Anquetin was responsible of the team ‘Hydrometeorology, Climate and Impacts’ from 2007-2013 and is now deputy-director of the laboratory.

Climatology of banded convection in the UK.
Dr Jonathan Fairman, University of Manchester.

Abstract:

Stationary precipitation bands have the potential to cause large amounts of precipitation due to their persistent over a given location, especially when associated with high precipitation rates. However, due to subjectivity in defining what a stationary band is, climatologies of these events do not exist in either the United Kingdom. This study uses automated image processing techniques on radar composites over the United Kingdom, utilizing 8 years of the UK 1 km radar derived rain rate composite as the basis. This feature-driven climatology of rainfall over the UK highlights areas of the highest precipitation as well as preferential areas for banding such as the Irish Sea and English Channel. Results show that in the UK, 15-20% of precipitation can be considered banded.

Biography:

Jonathan Fairman is from Cleveland Heights, Ohio, United States, and began studying meteorology at The Ohio State University in Columbus, Ohio and continued on to his PhD at the University of Alabama in Huntsville. He is currently a postdoctoral researcher at the University of Manchester on the PRESTO project.
Cause and predictability of banded orographic convection.
Dr Andrew Barrett, University of Reading.

Abstract:
The Met Office is one of two World Area Forecast Centres (WAFC) producing forecasts of aviation hazards including turbulence for aircraft around the world. In order to demonstrate the skill of these forecasts an objective verification scheme using high-resolution automated aircraft observations was set up.

In this talk we demonstrate how this verification system has been used in the development of improved turbulence predictors from deterministic models and how the Met Office Global and Regional Ensemble Prediction System has been used to produce further improvements by creating probabilistic forecasts of turbulence. The probabilistic and deterministic turbulence forecasts are assessed globally over several months and results are shown for the skill, reliability and economic value of the forecasts.

Biography:
Stationary convective bands are associated with high rain rates and can cause significant damage if they form over a region prone to flash flooding. Mountainous regions can initiate such stationary bands and are also particularly prone to flash flooding due to the terrain (e.g. steep sided valleys). The interaction of atmosphere and terrain could make these events more predictable than non-orographically forced convection. To understand the mechanisms involved and the predictability of the bands, a convection-permitting ensemble of the Met Office Unified Model is used to study a number of cases.

The ensemble simulations are used to determine the required atmospheric ingredients for persistent banded convection and to establish the importance of both synoptic scale flow and mesoscale features in each case. The precise details of the large-scale pressure pattern can be important in controlling the wind upstream of and flow around the terrain. Furthermore, the local temperature and humidity are important in governing where the convection is and is not initiated. The location and stationarity of the band are critically dependent on the upstream flow conditions such that subtle changes in either the synoptic or mesoscale pattern disrupt the stationary band. Results from analysis of numerous cases over the UK will be presented, identifying the differing predictability of the cases.

Insights into thermally forced mountain convection.
Dr Daniel Kirshbaum FRMetS, McGill University, Montreal, Canada.

Abstract:
While the problem of mechanically forced orographic precipitation has been studied intensively for the better part of the past century, the problem of thermally (or diurnally) forced orographic convection has received comparatively less attention and remains inadequately understood. Herein an attempt is made to comprehensively advance the understanding of the latter problem, ranging from the boundary layer circulations that initiate cumulus convection, to the detailed processes controlling the transition to deep convection, to the evolution of deep convective storms after their initiation. The analysis is aided by analytic scalings of dry boundary-layer flow, numerical simulations of varying complexity, and an observational climatology of the Black Hills, an isolated mountain ridge in the north-central United States.

Biography:
Dr. Kirshbaum obtained his Ph.D. in Atmospheric Sciences from the University of Washington. Before arriving at McGill he worked as a postdoctoral fellow at NCAR, a postdoctoral associate at Yale, and a lecturer at the University of Reading. He studies mesoscale meteorology, namely the dynamics, microphysics, and numerical prediction of cumulus convection.
Fluvial flood risk forecasting for upland communities of England and Wales.
Keith Fenwick FRMetS CMet, Senior Hydrometeorologist, Flood Forecasting Centre.

Abstract:
The Flood Forecasting Centre (FFC) is a partnership between the UK Met Office and the Environment Agency, established in 2009, to give an overview of flood risk across England and Wales. It was set up following the summer 2007 floods in England and Wales, and the subsequent recommendations of the Pitt review, to provide longer lead time forecasts of flood risk to the emergency responder community.

This presentation focuses on how the FFC forecasts two very different upland flooding events; the November 2009 flooding of Cockermouth, Cumbria and the June 2012 flooding of Hebden Bridge, West Yorkshire. The operational methods, models and tools that the FFC uses in river flood risk forecasting will be presented, along with an explanation of flood risk and how forecast uncertainty is handled.

Biography:
Keith Fenwick is a senior hydrometeorologist at the Flood Forecasting Centre. After joining the Met Office as a weather observer he became an operational meteorologist in 1996. Before joining the FFC, Keith has worked in operational aviation (civil and military) and marine meteorology as well as working offshore in support of oil platform installation projects.