

Global Energy and Water Cycle Experiment

**GEWEX**  
WCRP



## **WORKING GROUP ON PRECIPITATION RADAR NETWORKS**



- One of the most important potential effects of climate change is a change in the extremes of the hydrological cycle manifest in changing extremes of precipitation.
- Precipitation rate is so highly variable in time and space that it is one of the most difficult of the essential climate variables to measure and monitor precisely, particularly the more extreme (rarer) events.
- Current-day surface precipitation gauge arrays are much too sparse in spatial coverage and (usually) report too infrequently to resolve precipitation variations and can easily miss extreme events.
- Although indirect satellite precipitation products do exist at relatively high space and time resolution, the indirect nature of these methods may not be able to properly capture the extreme events that represent non-average conditions by their very nature.
- Spaceborne radars such as the TRMM PR, and GPM DPR in the future, have good spatial resolution and very good calibration stability but have very low time sampling frequencies compared with the variations of precipitation.



- **Weather radars, specifically designed to observe precipitation at high temporal and spatial resolutions, are becoming ubiquitous in many nations around the world and are currently the only precipitation-measuring system with the requisite space-time sampling.**
- **They are generally sparsely distributed and operated and analyzed separately in a case-study approach.**
- **The recent significant growth in the number of radars being operated, now makes possible high-resolution determinations of precipitation over extensive land areas and over long time periods.**
- **Such datasets, when merged with very stable spaceborne radar reflectivities would provide the observational basis for learning how the small-scale extreme events are connected with the large-scale atmospheric circulation and how this may be changing in time.**
- **To provide this type of data requires systematic collection and analysis of data from these radar networks in as many different climate regimes as possible, but efforts to coordinate the exchange of precipitation radar data are only just beginning.**



- Most of the precipitation radar applications are directed at real-time monitoring of rainfall for detection and warning of flood events and not the retrospective analysis needed for appropriate “climate-scale” statistics.
- The potential of these radar networks for climate studies is high but has not been realized.
- **The GEWEX Radiation Panel is organizing an international Working Group to foster systematic and collective use of comprehensive precipitation radar products, especially from extensive networks that provide large-area coverage for long time periods with very high space-time resolutions, to allow for the study of the coupling of small-scale and large-scale variability and the examination of the statistics of extreme events.**
- **Such studies are needed to advance understanding of the precipitation process.**



## Working group's tasks:

1. solicit expressions of interest to participate from operators of the major precipitation radar networks and from research scientists using these products,
2. collect descriptions of the attributes of the available weather radar networks [including the number of stations, average separation distance, area covered, type of radar (frequencies, polarization, Doppler), space-time sampling interval of standard products],
3. find out what data are currently archived [radiances, precipitation and other products] and discuss what products could/should be archived and disseminated,
4. find out whether radiances and products can be shared, and
5. make plans for producing common products (using common analysis methods) for common periods of time so that a comprehensive collection of precipitation products could be produced for global-scale studies.



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## Consortium for Quantitative Precipitation Estimation

Workshop Discussion at ERAD 2006  
Barcelona, 21 September, 2006

White paper by Tom Keenan.

Under the auspices of  
WMO Commission for Instruments and Methods of Observation (CIMO)

### Objectives of a QPE/QC strategy:

- Undertake systematic intercomparison and validation of radar QPE/QC algorithms evaluated under a variety of environmental conditions
- Assess the impact and provide guidance on QC processes employed in radar-based QPE
- Characterize errors involved in radar-based QPE
- Report and provide a source of applications employed in QPE/QC





## Consortium for Quantitative Precipitation Estimation

### Issues:

- **Physical Effects and Scientific Limitations**
- **Limitations and Opportunities Imposed by Radar Observational Techniques**
- **System Quality Assurance and Calibration**
- **Validation Approaches**





## Consortium for Quantitative Precipitation Estimation

Identified precipitation regimes to be monitored:

- High Latitude Regime Including Mixed Phase Precipitation (Winter rain)
- Tropical Maritime (Tropical convection)
- Sub Tropical Regime (Moist severe weather regime)
- Continental Regime (Dry arid regimes with severe weather)
- Mountainous (Orographic enhancement process and blocking)
- Signal processing QC activity



GEWEX - Working Group on Precipitation Radar Networks (WGPRN) - Mozilla Firefox

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<http://wgprn.isac.cnr.it/>

Pan GEWEX Meeting, Frascati, 9-13 October, 2006

**1st Meeting**

**March 2007**

**CNR-ISAC Bologna**

**iTALY**

