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The use of a transportable X-band polarimetric radar to monitor rainfall parameters in flood-prone coastal areas

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Some areas of the California coast, that are prone to occasional seasonal flooding, lack an adequate coverage by the National Weather Service (NWS) operational radar network of Weather Surveillance Radar -1988 Doppler (WSR-88D, NEXRAD). Smaller and relatively inexpensive X-band radars strategically located in such areas can fill the gaps in NEXRAD coverage and provide warnings and valuable information on winter-time land-falling rain storms that cause local flooding.

Meteorological radars that operate at X-band (3 cm wavelength) have been traditionally limited in their applicability for precipitation measurements due to relatively high attenuation rate of radar signals in rain. However, the use of polarimetric approaches provides new tools for correcting attenuation effects, and for more accurate estimates of rainfall rates compared to traditional techniques based on radar reflectivity measurements. The polarimetric approaches can also be used to infer parameters of raindrop size distributions and to distinguish among different hydrometor types, i.e. to provide information that that has been unattainable with traditional radar approaches.

This presentation will show the results from the 3 month-long winter-time (2003-2004) deployment of the NOAA Environmental Technology Laboratory transportable polarimetric X-band radar near the mouth of the Russian River in Northern California - an area which is prone to frequent flooding. The data from this radar were used to provide information on instantaneous rainfall rates, total rainfall accumulation, characteristic raindrop sizes and other characteristics of rainstorms along the shoreline and in the open sea area at distances up to about 50 km. While the X-band radar retrievals

of rainfall parameters were in close agreement with available ground instrument data, the available NEXRAD data underestimated storms totals by as much as a factor of 5 (mostly due to storm overshooting).