



The Use of Lightning Data to Improve Storm Simulations over the Pacific Ocean

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The distribution of moisture and latent heating in deep convective systems is critical for accurate initialization of numerical forecast models. A lack of in situ data over the oceans often results in inadequate specification of humidity profiles, leading to forecast errors in precipitation and storm central pressure. A promising application of Pacific Lightning Detection Network (PacNet) is to derive estimates of the convective rainfall rate from the lightning observations. PacNet currently includes four VLF lightning detectors in the Pacific, with contributing sensors in North America and Japan. The network monitors lightning activity over a large part of the north central Pacific Ocean, providing valuable information on the distribution of convective storm activity in the area. The data from PacNet shows that certain storms in the Pacific are electrically very active, whereas other storms show little activity. The distribution of hydrometeors over various storm systems has been studied using data from TRMM's Microwave Imager and precipitation radar. The ratio of lightning to convective rainfall has been investigated by comparing the number of lightning strokes measured by PacNet with convective rainfall obtained from Aqua's and TRMM's microwave sensors. Research using PacNet data has confirmed that lightning frequency and convective rainfall rates are relatively well correlated, suggesting that lightning data over the Pacific can be assimilated into numerical models as a proxy for moisture flux and latent heat release in deep convective clouds. Some promising results of sensitivity studies using MM5 to assimilate PacNet lightning data will be presented.