The Effect of Sea Spray on Air-Sea Fluxes at Hurricane Wind Speeds
or
Would You Buy a Used Parameterization from this Guy?

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Present parameterizations of air-sea fluxes are reasonably valid up to wind speeds of about 25 m/s. Extrapolation of these parameterizations to higher wind speeds are inconsistent with theoretical analyses of the strength of tropical cyclones [*Emmanuel*, 1995]. The issue is the relative balance of momentum and scalar (heat/moisture) transfers. It is speculated that this balance is affected by evaporation of sea spray droplets at high wind speeds (u>25 m/s). At high wind speeds, the ocean is a major source of droplets produced by spume (i.e., the shearing off of wave tops) which may play a large role in latent heat transfer. Under extremely high winds, such as found in hurricanes, droplets may also have a large effect on the air-sea exchange of momentum. However, the relative importance of droplets in air-sea interaction at high wind speeds is largely unknown, due in large part to the difficulty in measuring droplet concentrations at high wind speeds. One fundamental parameter required for representing the effect of sea spray on air-sea exchange processes is the size dependent *source function* for droplets (the number of droplets of a given size produced at the sea surface per unit surface area per unit time as a function of wind speed). Once the source is characterized, the thermodynamic effects (i.e., how much evaporation and evaporative cooling occurs) must be determined, a problem greatly complicated by feedback (i.e., the evaporating droplets modify their own environment). This represents one of the nastiest two-stage parameterization problems in air-sea interaction physics. The question is not 'Can we develop a parameterization?' but 'How do we develop a parameterization that resembles a reality we don't know?'