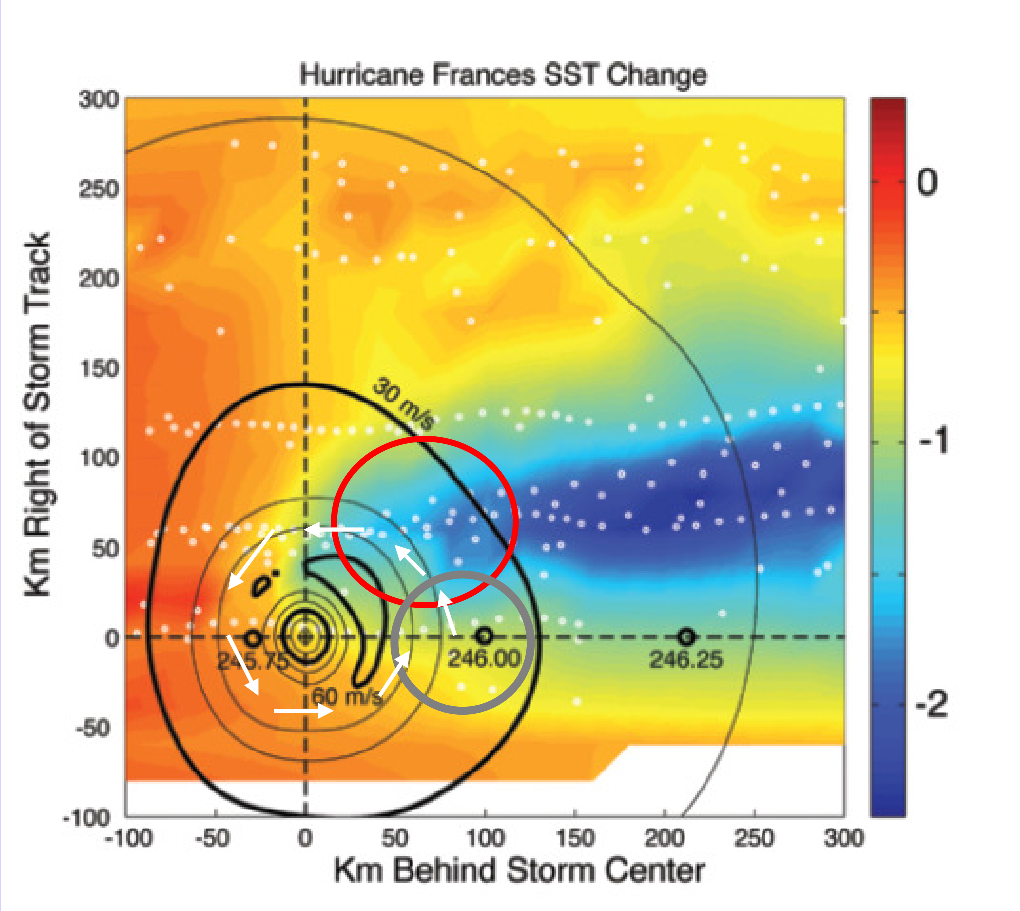
Heat flux from rain and sea cooling



From rain

$Q_v = L_v \, m \, d^2 \, (\pi/4)$

for: m = 10 mm/hr (0.0028 kg/s m^2)

d = 300 km

Q_v = 491 TW

From sea cooling

$Q_t = C_w \, \Delta T \, w \, d \, v$

for: ΔT = 2.5℃, d = 100 m

w = 100 km, v = 5 m/s

Q_t = 524 TW

Per unit spray production area

$Q_e = Q / A$

for: Q = 500 TW, A = 2500 km^2,

L = 50 km, w = 50 km

Q_e = 200,000 W/m^2

Per unit spray deposition area

Q_a = 40,000 W/m^2

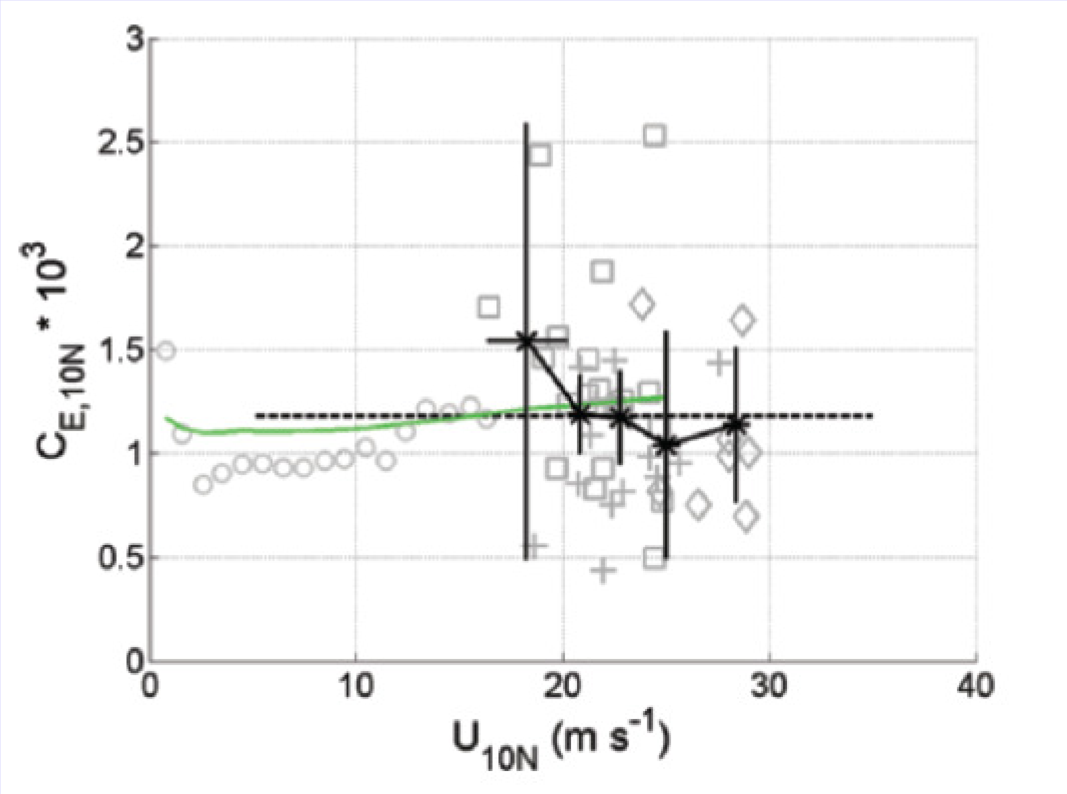
- 2500 km^2 green circle – Spray production area.
- 12,500 km^2 red circle – Spray deposition area.

Figure: Black et al. BAMS March 2007

Heat flux calculated from heat transfer equation

Dalton Coefficient

$C_E = 0.00118$



Note figure from: Black et al. BAMS March 2007

Heat Transfer Equation

$$Q_a = \rho \, C_E \, (h_s - h_a) \, u$$

Tropical sea light wind

for SST=25.5℃, P=100 kPa
T_a = 24.5, RH_a = 80%,
h_s=79000, h_a=64800 J/kg
u = 5 m/s
Q_a = 100 W/m^2

Hurricane eyewall

for: SST = 26℃, P = 95 kPa
T_a = 24.5, RH_a = 95%,
h_s=84200, h_a=74800 J/kg
u = 50 m/s
Q_a = 600 W/m^2