Online material for: Highly Resolved Observations and Simulations of the Ocean Response to a Hurricane

A test case for numerical models of the ocean response to a moving hurricane, Version 4

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with special thanks to
Tom Sanford, APL/UW

to CBLAST colleagues
and to NOAA/HRD

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the US Office of Naval Research

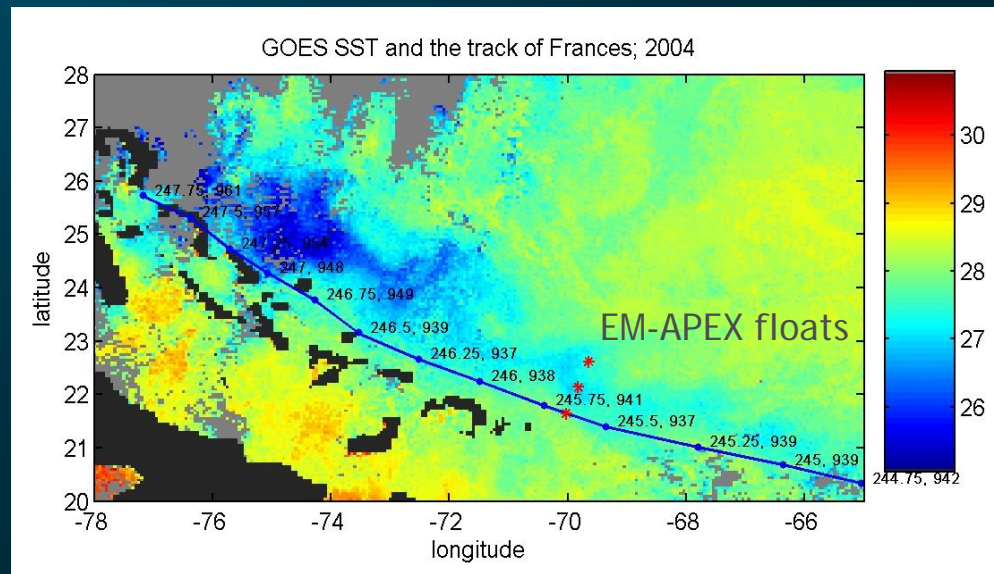29 January, 2007

Frances, 2 September 2004, by NASA/GSFC SeaWiFS
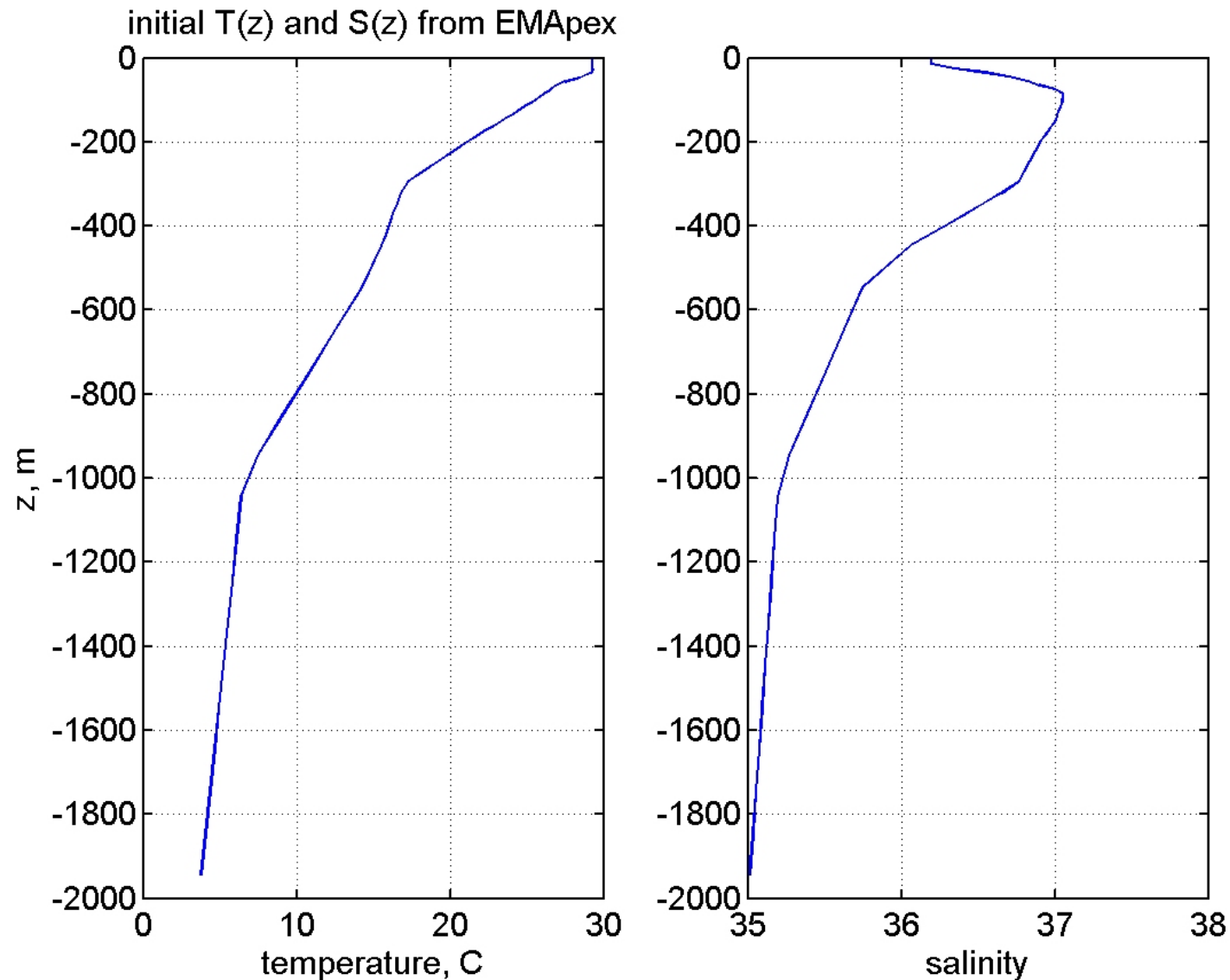
scales of CBLAST hurricane Frances and of the ocean

hspd = 5.5 m/s
R = hsize = 40 km
wmax = 62 m/s
τ = 7 Pa
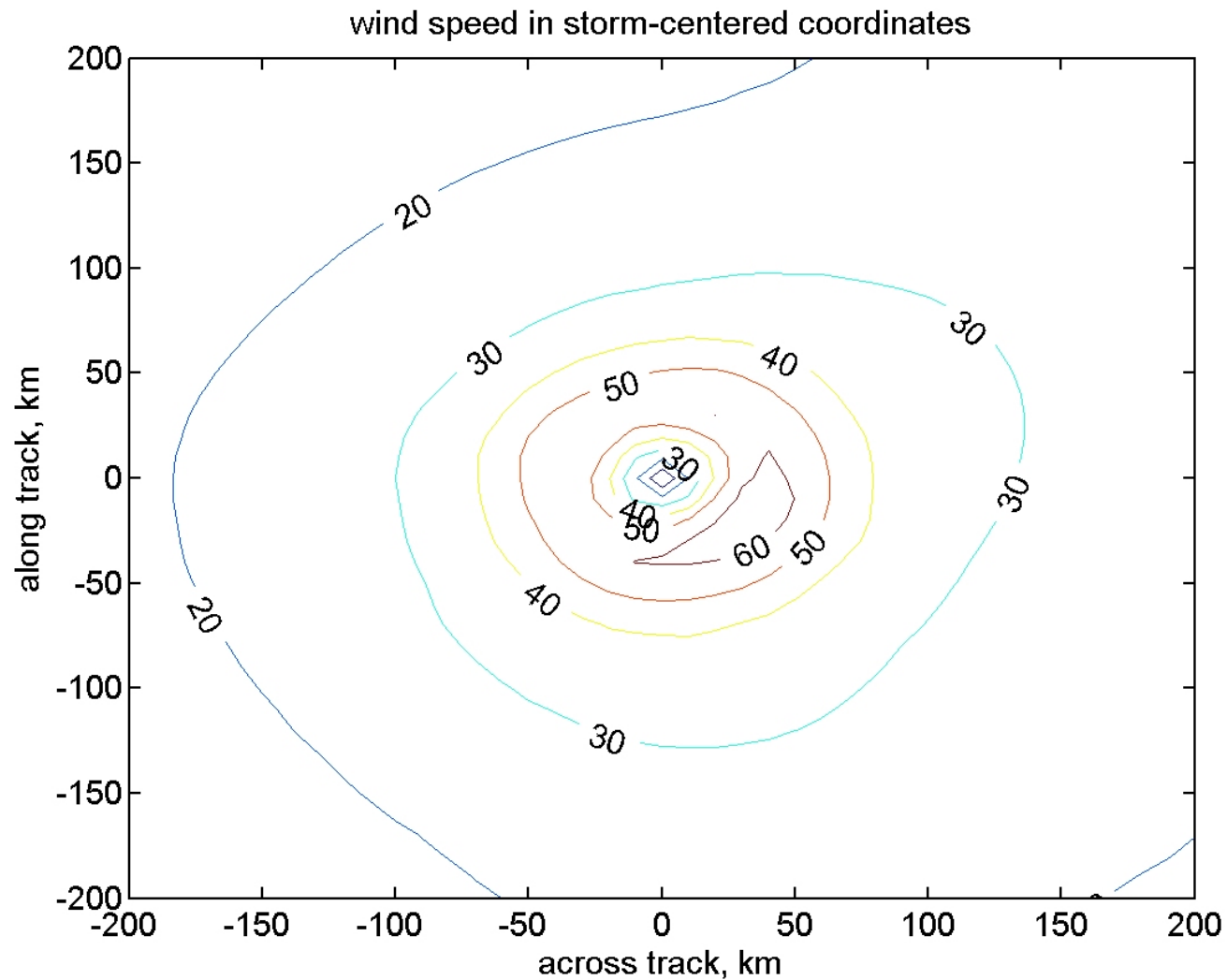
$\delta\rho$ = 5 kg/m^3
h = 50 m
b = 400 m
$2\pi/f$ = 1.33 day

non-d storm speed
$S = U_h/2\,R\,f = 1.2$

Burger number
$B = g'h/4R^2\,f^2 = 0.2$

Frances, 1 Sep 2004

from NASA SeaWIFS

GOES SST and the track of Frances; 2004

EM-APEX floats

latitude

longitude

247.75, 961
247.75, 957
247.?, 954
247, 948
246.75, 949
246.5, 939
246.25, 937
246, 938
245.75, 941
245.5, 937
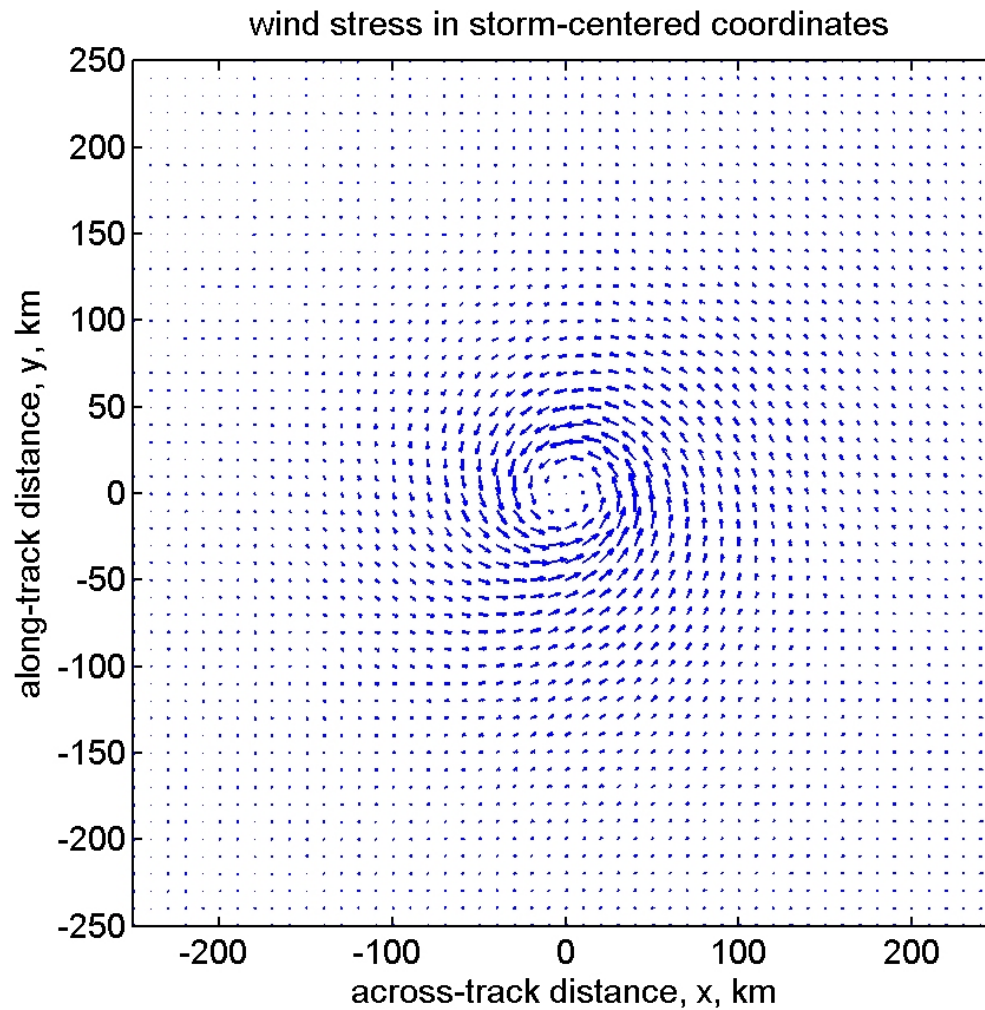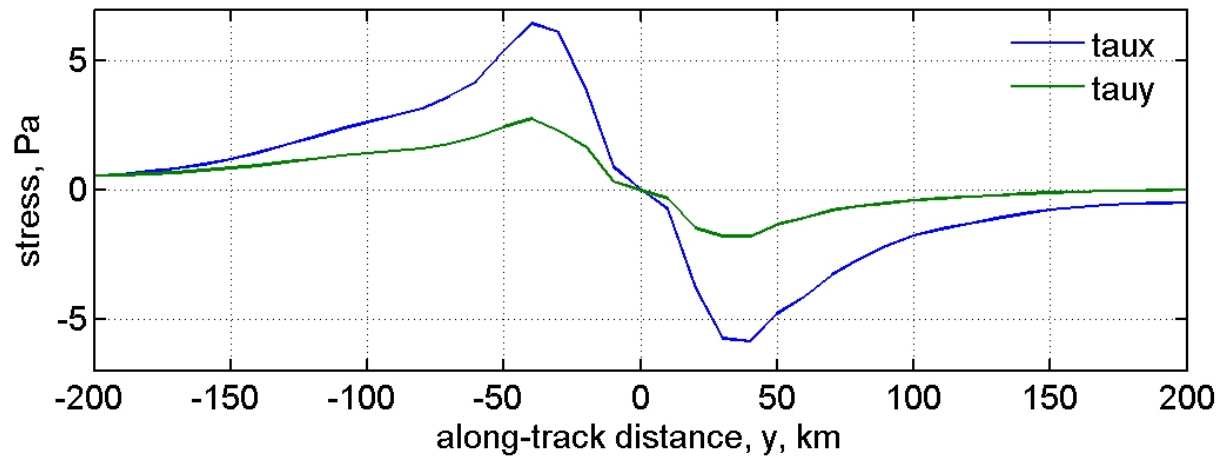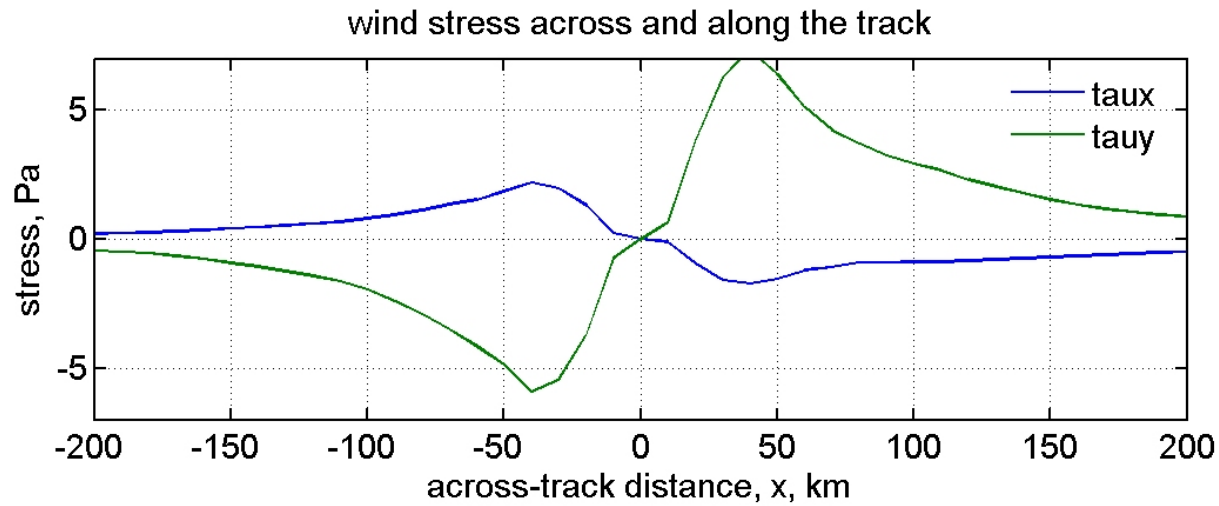245.25, 939
245, 939
244.75, 942

initial T(z) and S(z) from EM-APEX float 1633 during the day preceding the passage of Frances

Wind speed from HWINDS analysis of 18 Z, 1 Sep 2004
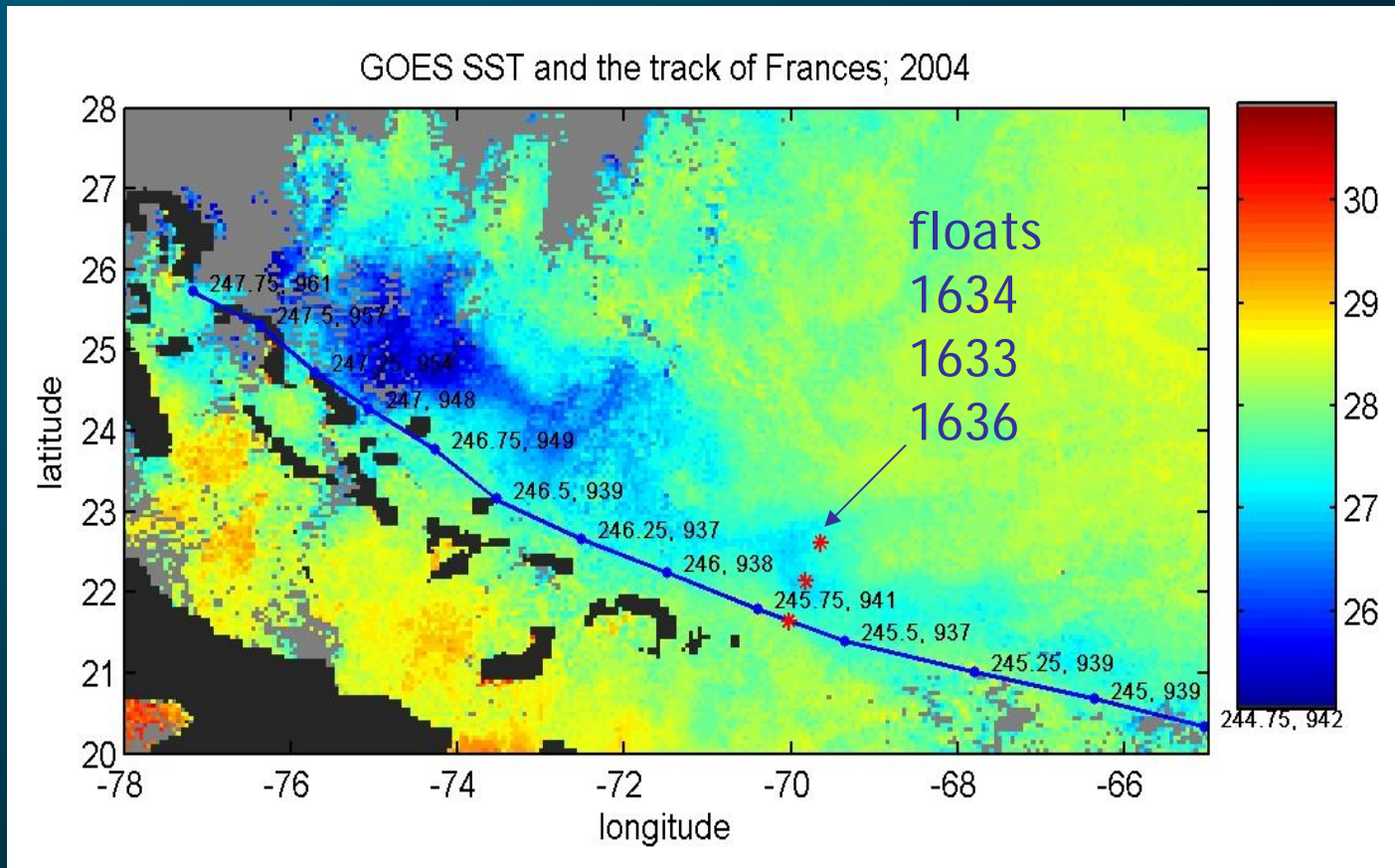shown in storm centered coordinates.

Wind stress estimated from the HWINDS wind speed and the Powell et al (2003) Cd.

wind stress across and along the track

slices across and along the track to show the stress amplitude

EM-APEX floats

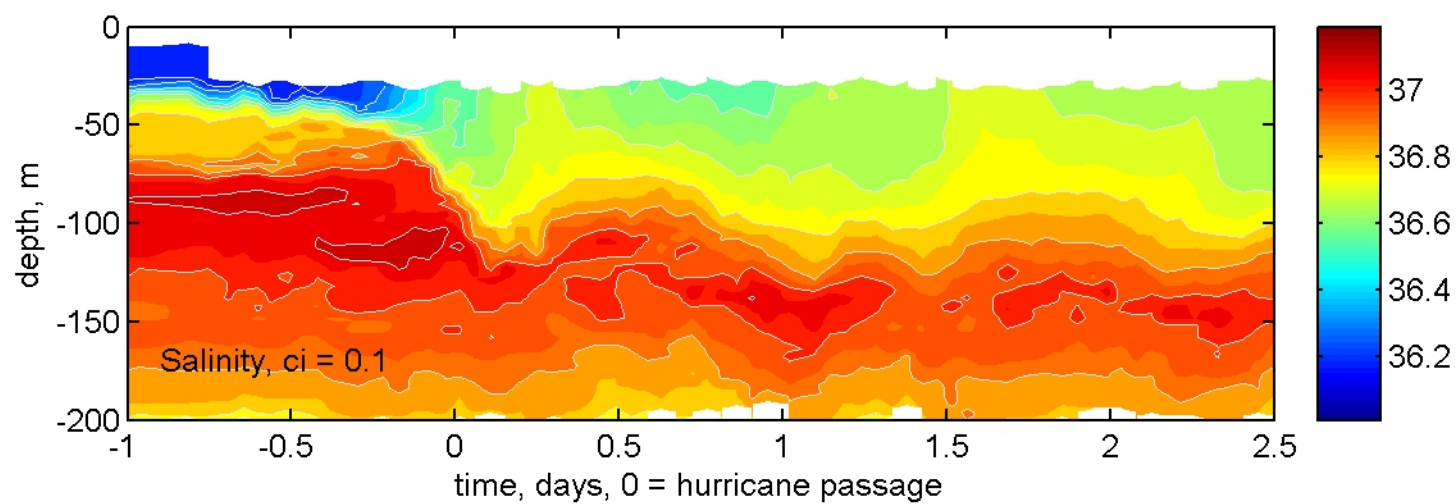GOES SST and the track of Frances; 2004
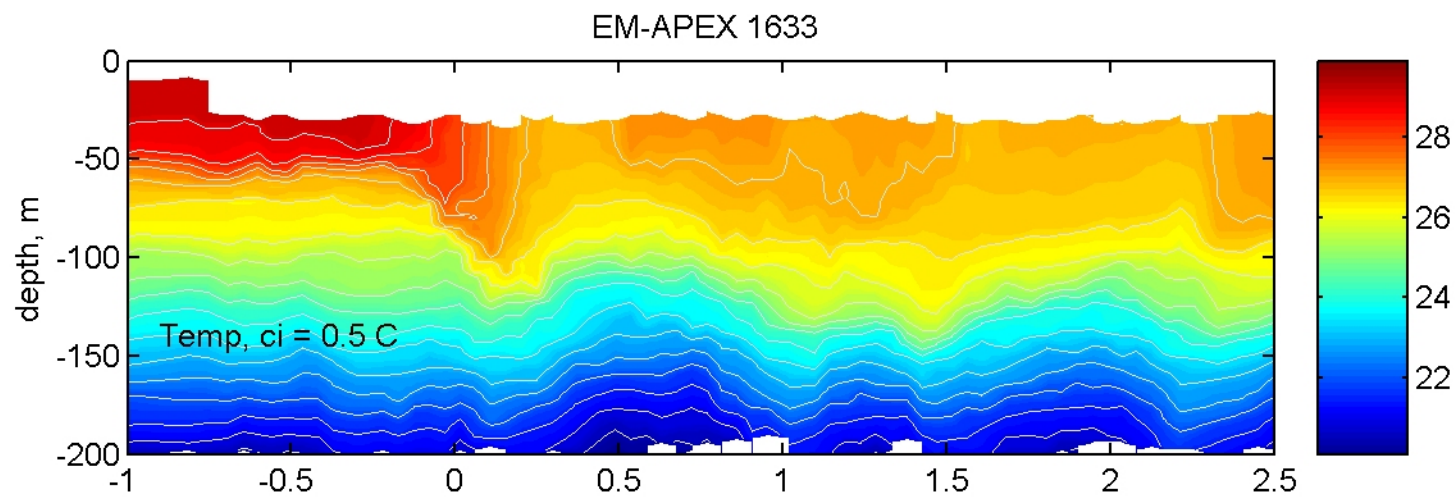
floats
1634
1633
1636

EM-APEX autonomous floats measure T, S, U, V via EM methods.
By Tom Sanford and Doug Webb. Air-launched approx 1 day ahead of
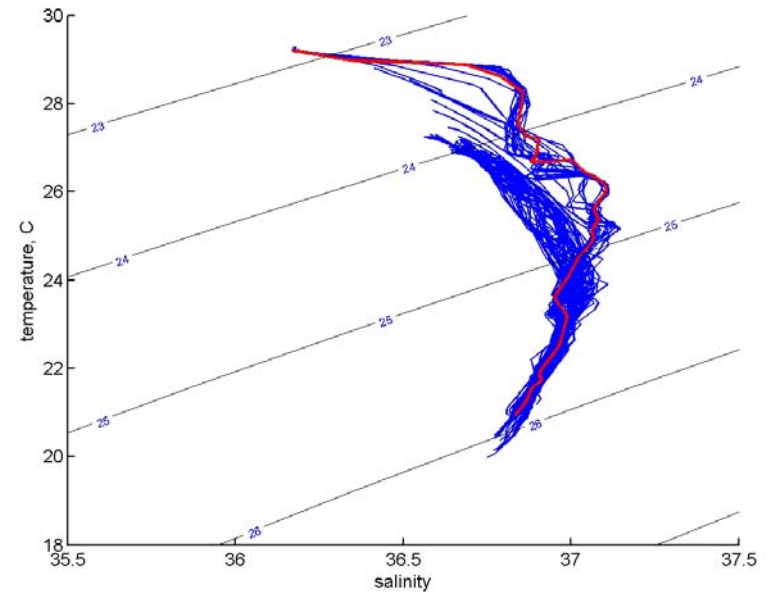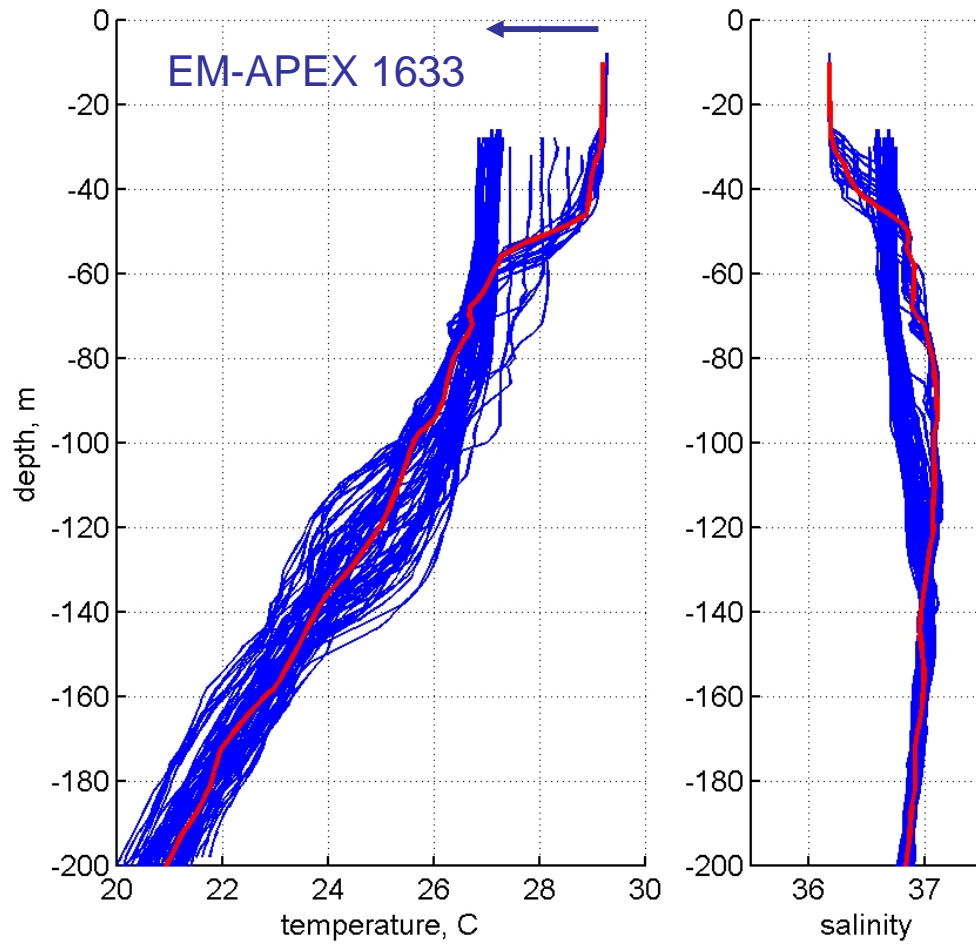Frances.

EM-APEX 1633

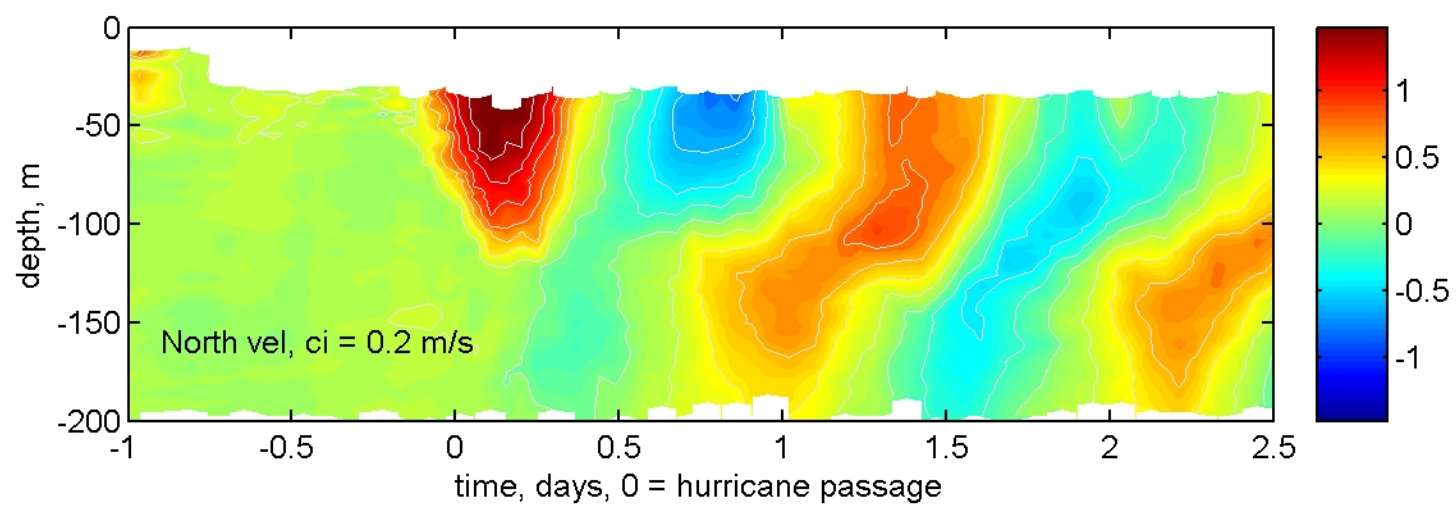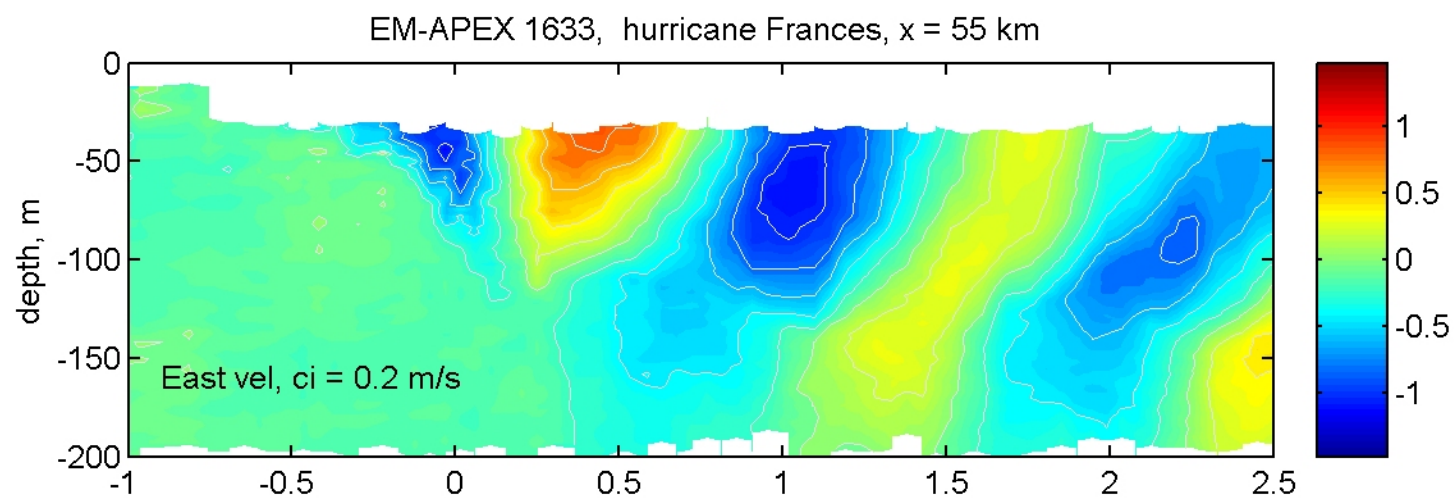launched at X = 55 km to the right
of the track

near the radius of maximum winds

near the maximum SST cooling

EM-APEX 1633

Temp, ci = 0.5 C

Salinity, ci = 0.1

time, days, 0 = hurricane passage

SST cooling = 2.3 +-0.2 C

EM-APEX 1633

EM-APEX 1633, hurricane Frances, x = 55 km

3DPWP model

sampled at Xo = 55 km to the
right of the track

3DPWP model sampled as if EM-APEX 1633

3DPWP at 55 km, T and S

T/S for x = 55 km

East vel, ci = 0.2 m s^{-1}

North vel, ci = 0.2 m s^{-1}

depth, m

time, days, 0 = hurricane passage