Hurricanes

Part III Hurricane Forecasting

by Professor Steven Businger

Evacuation for Hurricane Katrina

Hurricane Forecasting

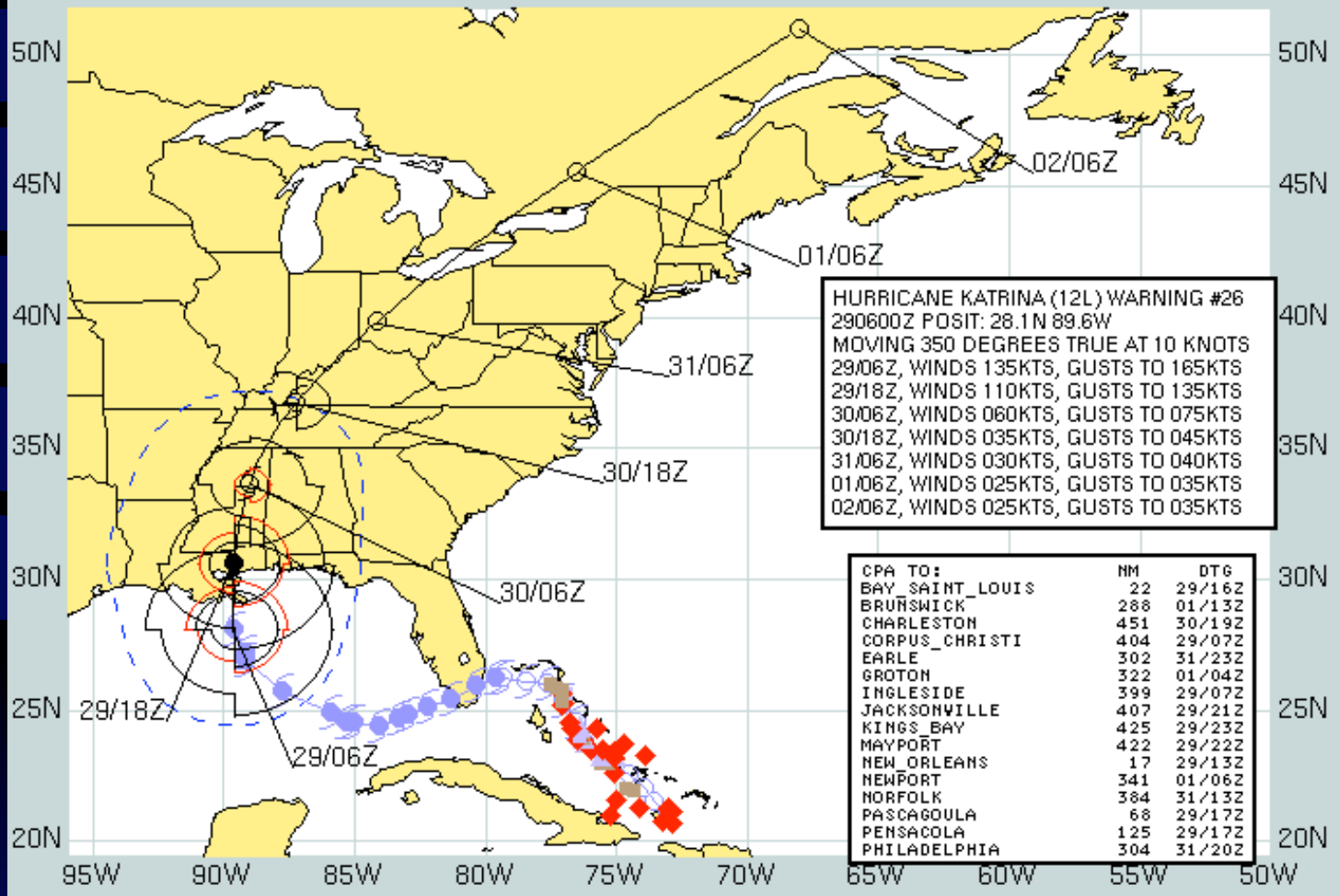
- Locating the storm Center
- Assessing Current Storm Strength
- Track Forecasting
- Intensity Forecasting

Hurricane Advisories

- Hurricane Watch - Hurricane may threaten the coast. Issued ~ 36 hours in advance

- Hurricane Warning - Hurricane conditions are expected within 24 hours. Issued ~12-24 hours in advance.

Official Track and Intensity Forecasts



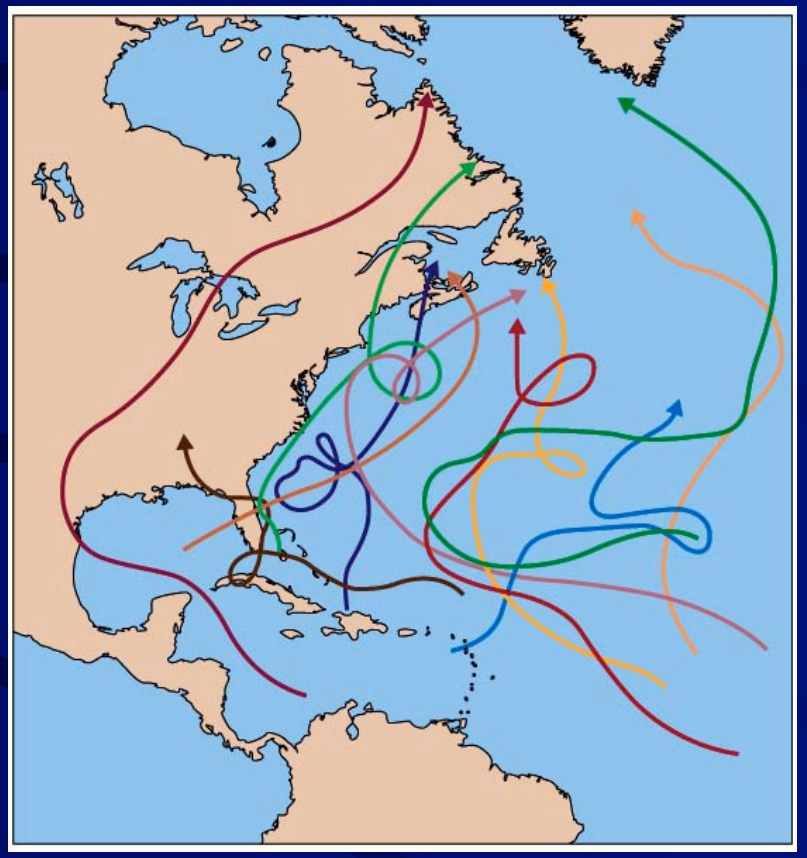
Allow emergency managers to order evacuations

Hurricane Forecasting

Hurricane forecasting involves locating the storm center assessing current strength predicting the track and intensity of a hurricane.

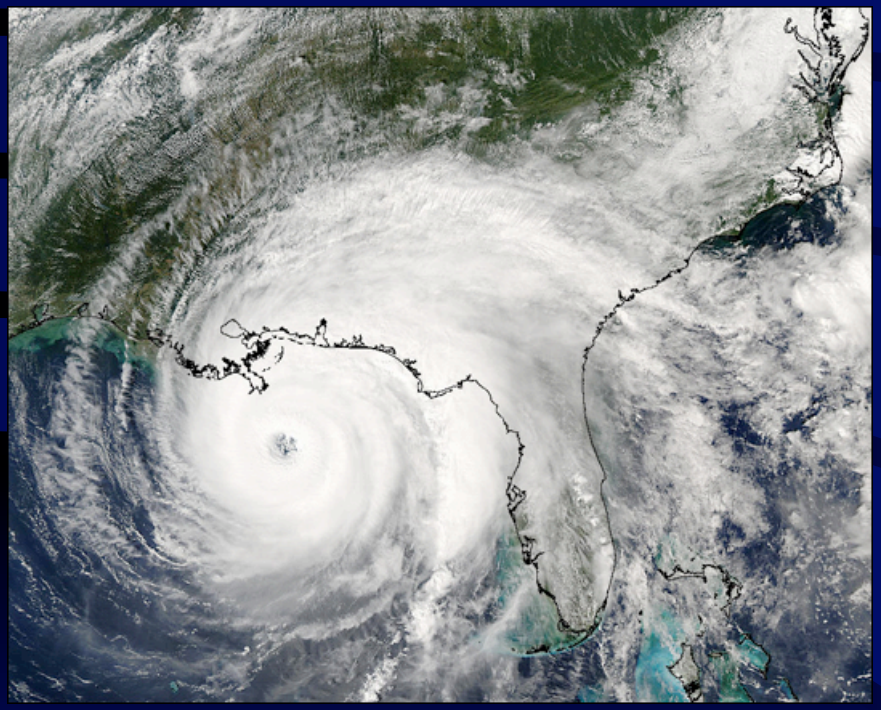
Hurricane tracks are erratic and difficult to predict.

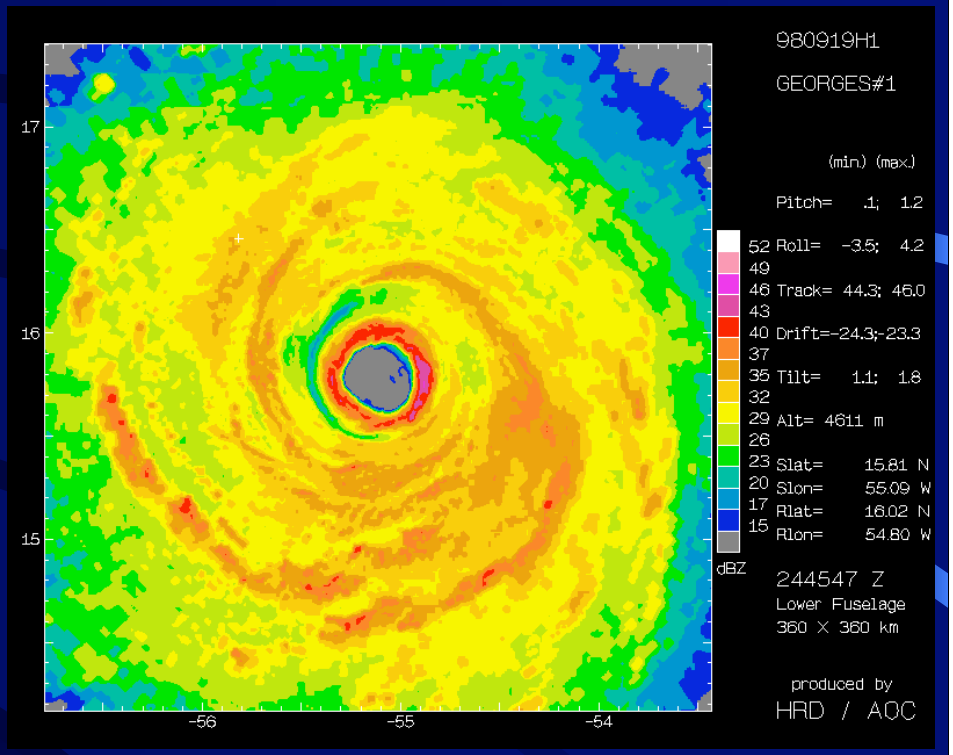
A combination of observations, numerical model output, and climate data are used to forecast hurricane tracks.



Storm Location and Strength

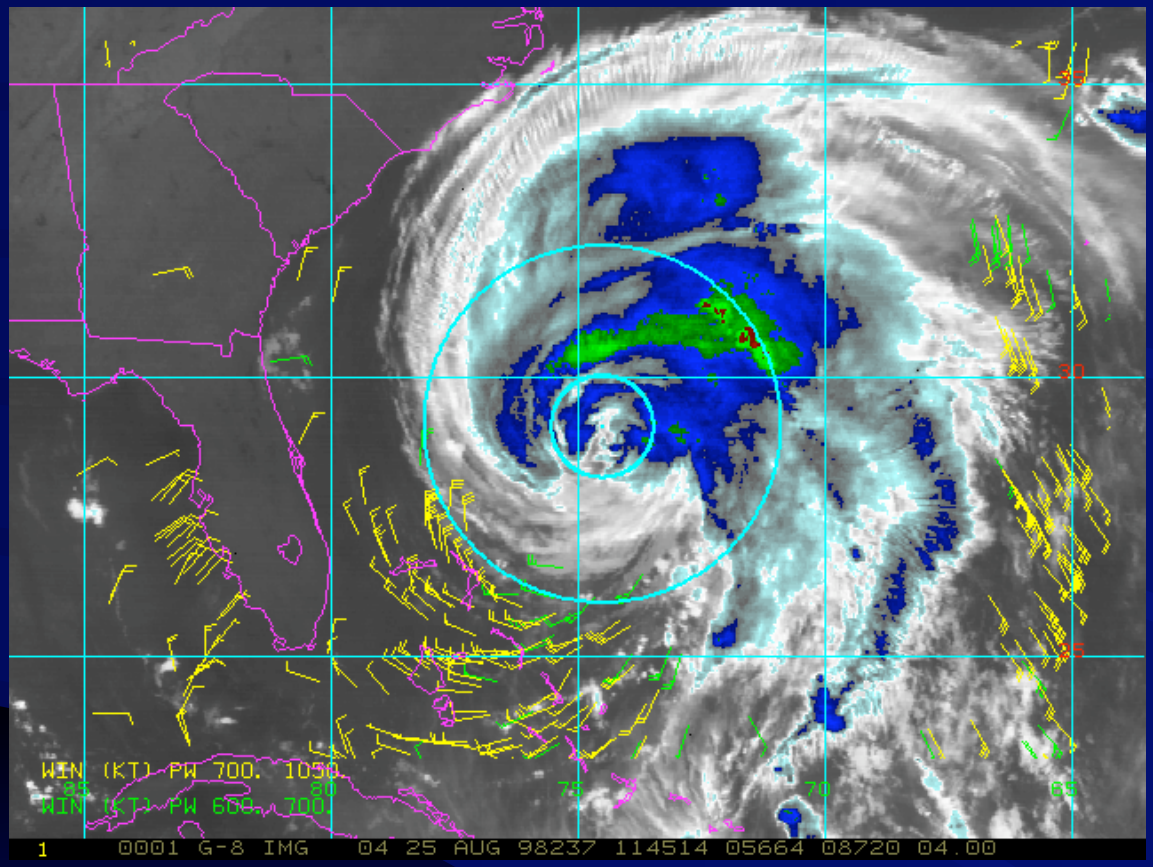
- Satellite data
- Aircraft reconnaissance data
- Coastal and aircraft radar data





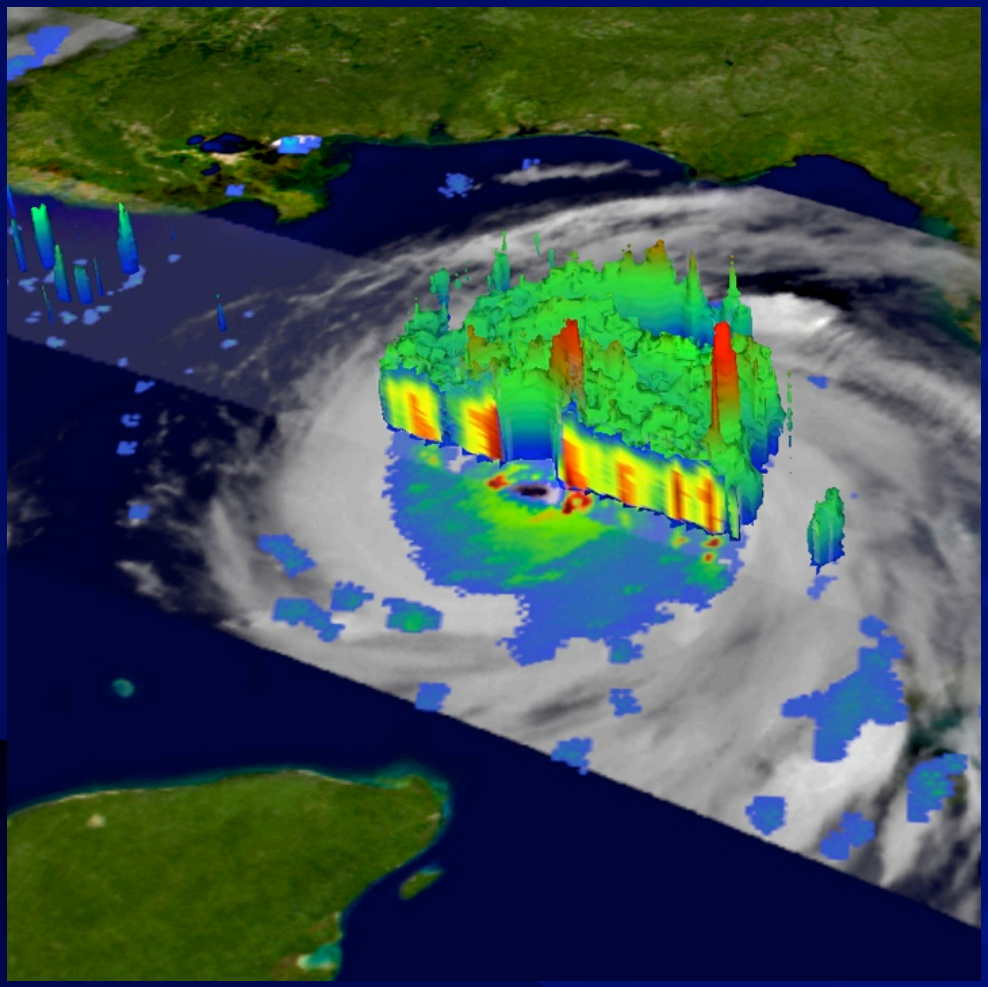
Eye seen in satellite or radar data marks center

Cloud Drift Winds



IR Imagery from Bonnie 8/25/98 1145 UTC
(Blue Rings at 100 and 350 km Radius)

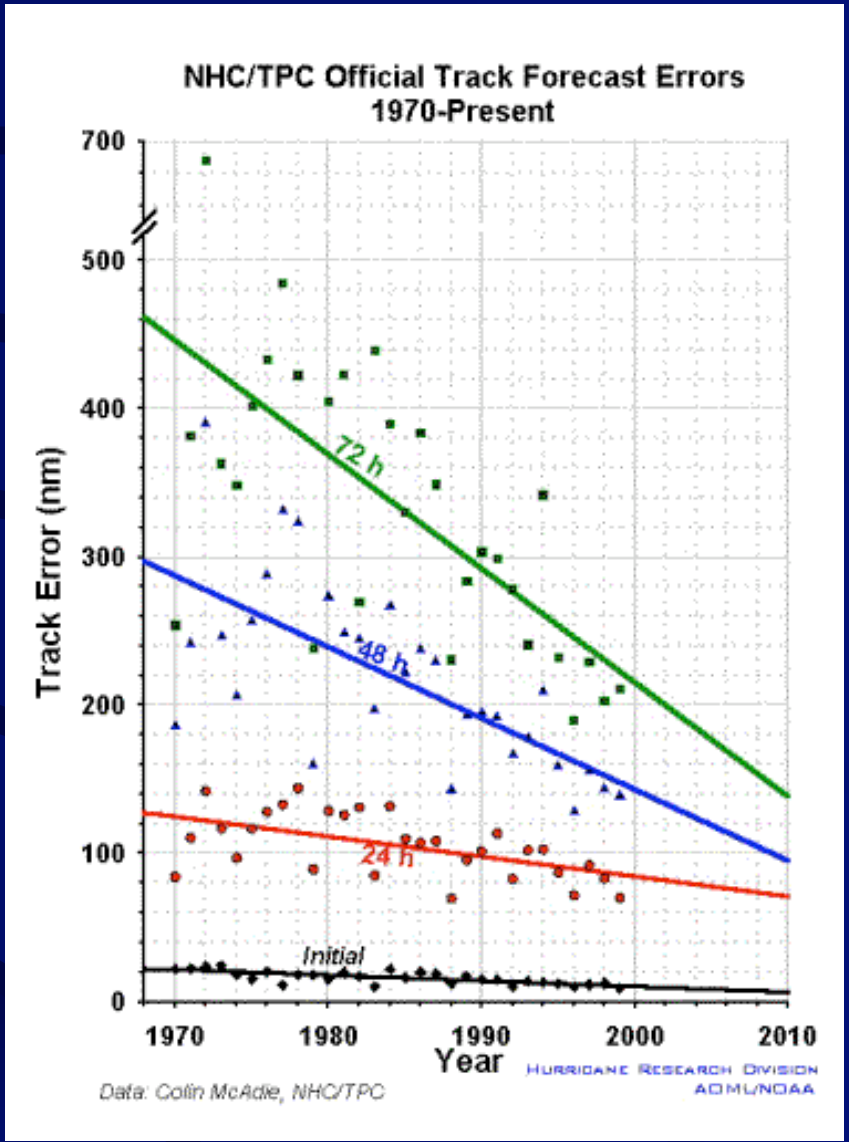
Satellite Rainfall Measurement



Rainfall in Hurricane Katrina helps mark eyewall

Hurricane Forecasting

More progress has been made in hurricane track forecasting than in forecasting hurricane intensity change.

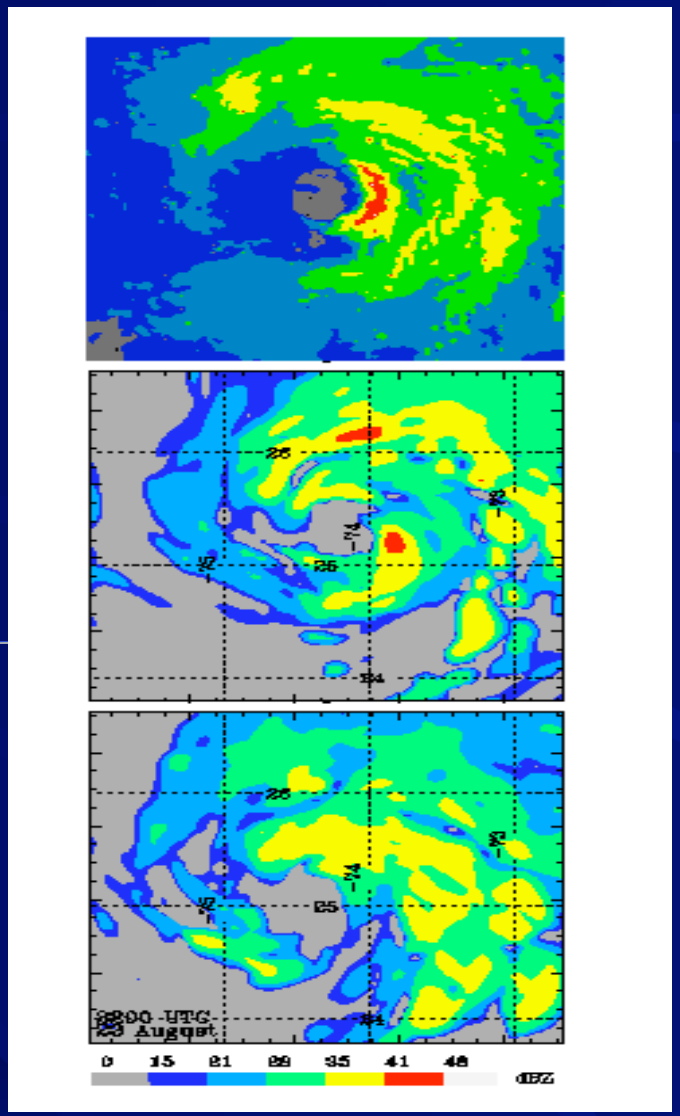


Hurricane Modeling

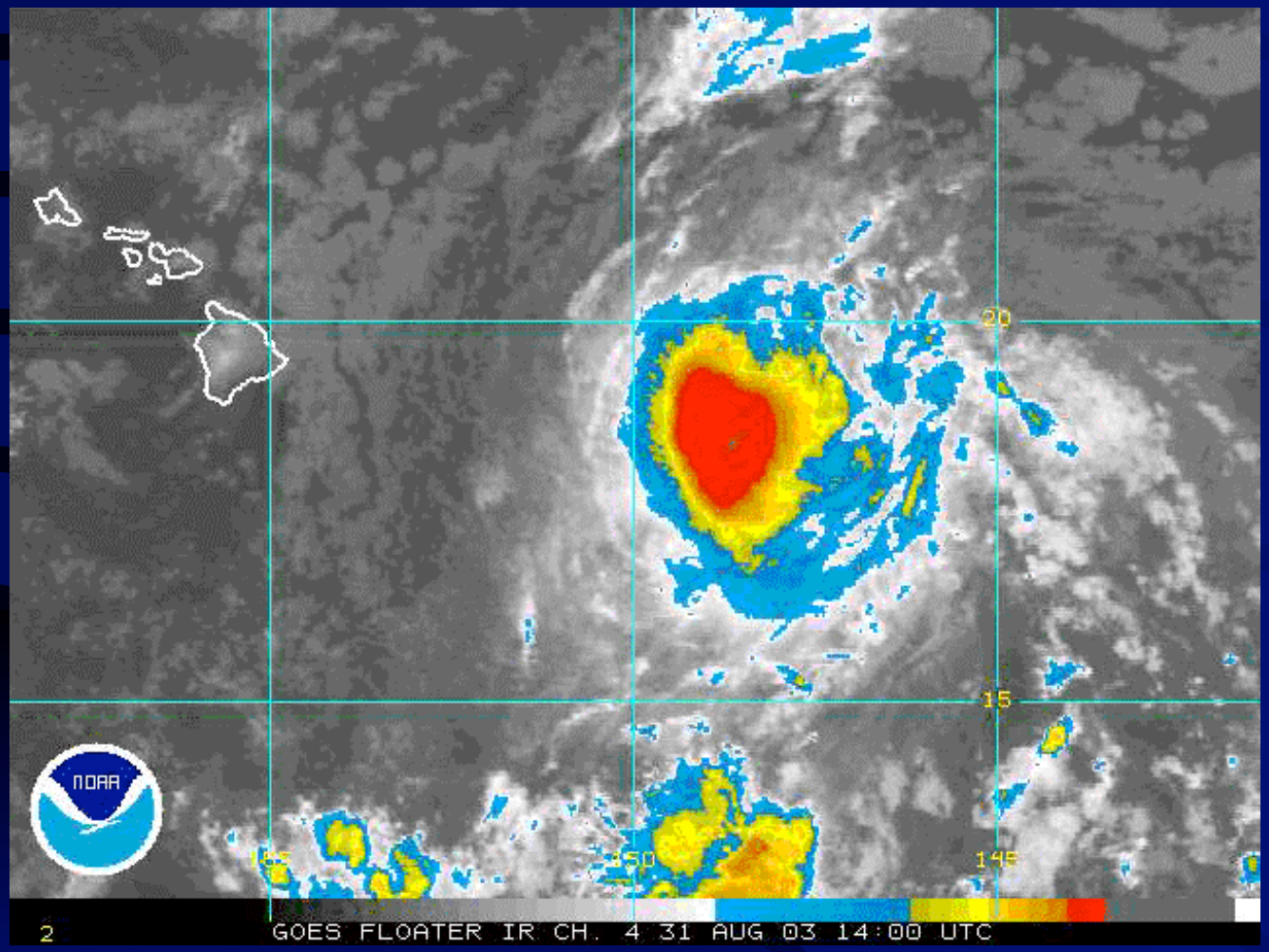
Radar Observed Rainfall

48-h model forecast with satellite observations

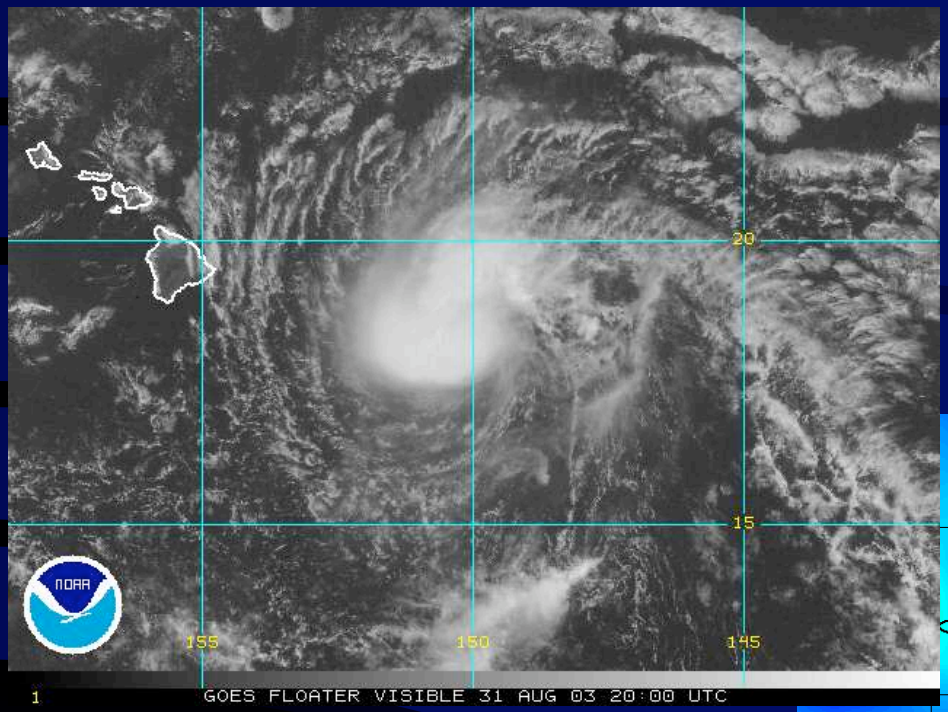
48-h model forecast without satellite observations



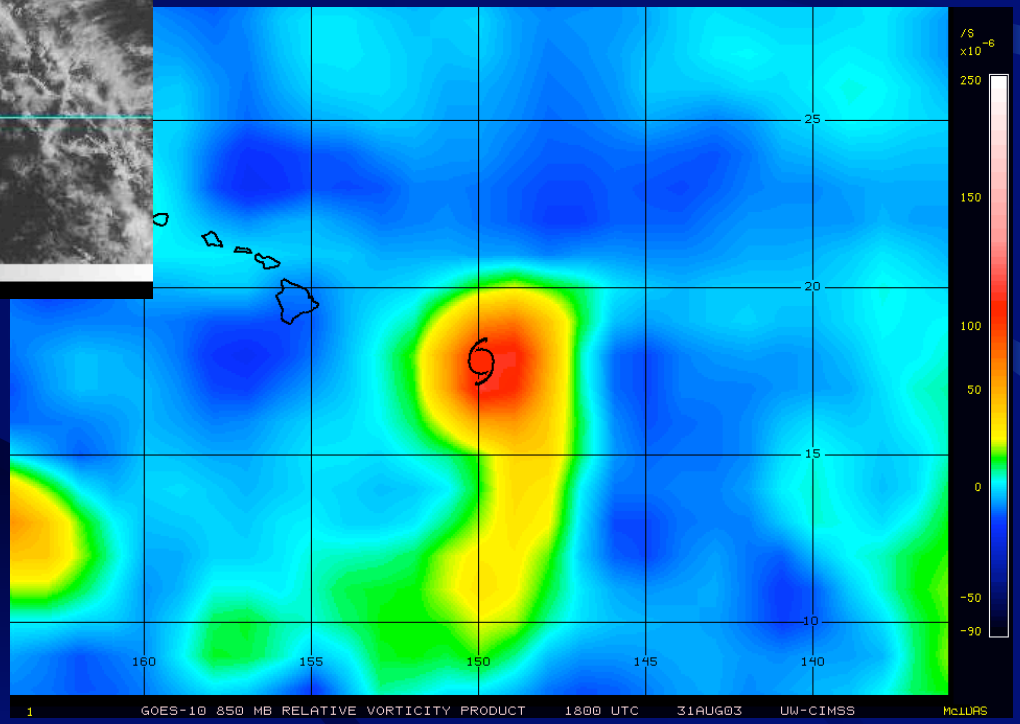
Forectasting Hurricane Jimena



Locating Hurricane Jimena

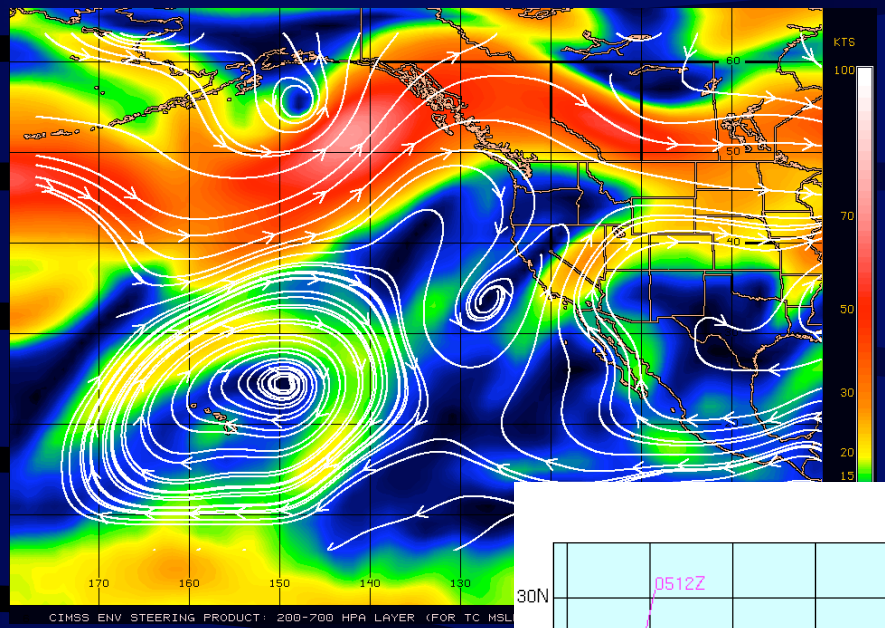


Locate center using vorticity or spin from satellite winds.

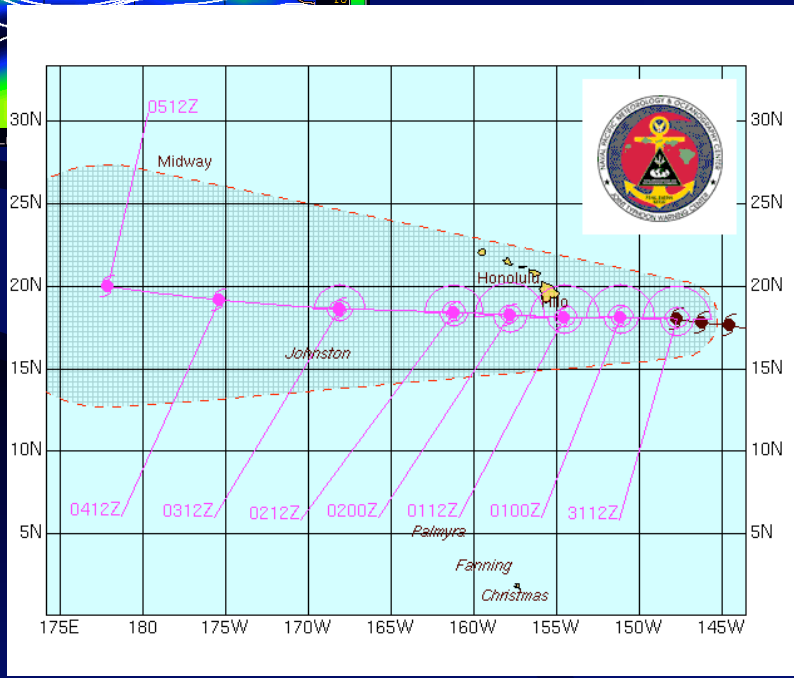


Eye missing in satellite image

Layer-Mean Winds Steer the Storm



200-700-mb layer mean winds from satellite



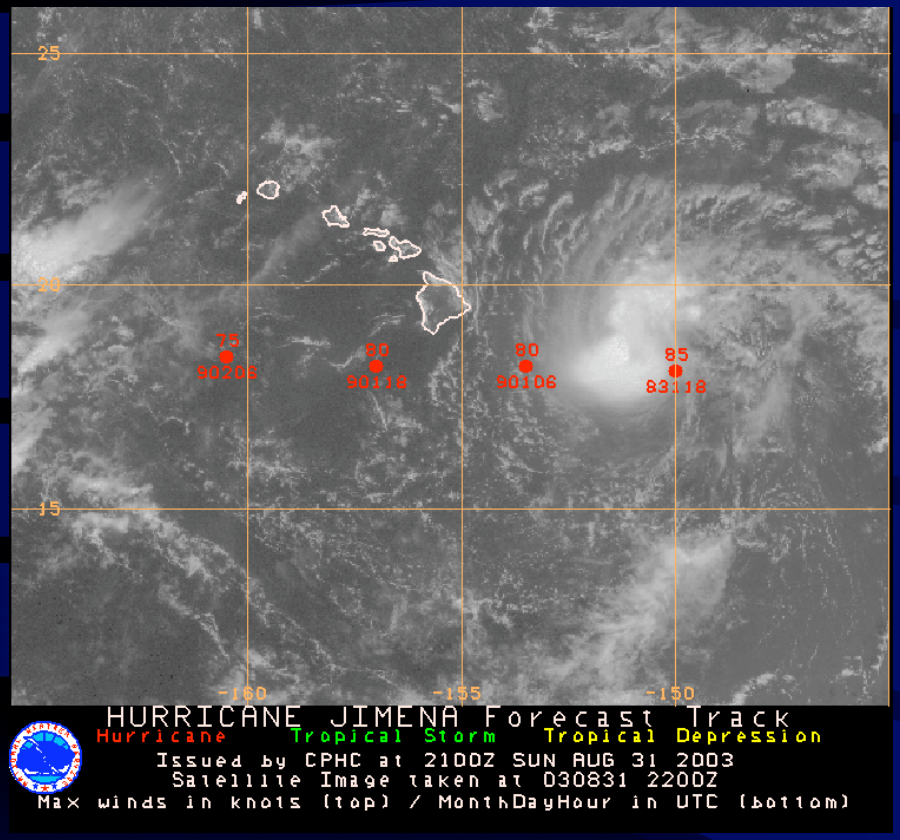
HURRICANE 10E (JIMENA) WARNING #15
311200Z POSIT: NEAR 18.0N 147.7W
MOVING 270 DEGREES TRUE AT 15 KNOTS
MAXIMUM SIGNIFICANT WAVE HEIGHT: 28 FEET
3112Z, WINDS 090KTS, GUSTS TO 110KTS
0100Z, WINDS 080KTS, GUSTS TO 100KTS
0112Z, WINDS 080KTS, GUSTS TO 100KTS
0200Z, WINDS 075KTS, GUSTS TO 090KTS
0212Z, WINDS 075KTS, GUSTS TO 090KTS
0312Z, WINDS 070KTS, GUSTS TO 085KTS
0412Z, WINDS 065KTS, GUSTS TO 080KTS
0512Z, WINDS 065KTS, GUSTS TO 080KTS

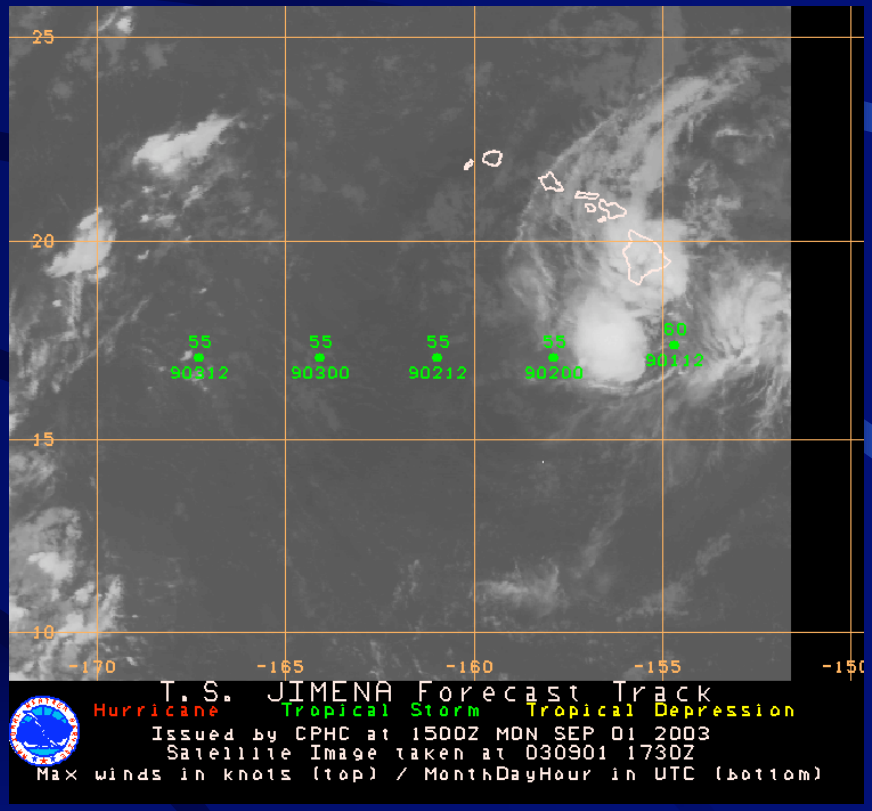
CPA TO:	NM	DTG
BARBERS_POINT	202	02/02Z
BARKING_SANDS	220	02/08Z
BRADSHAW_AAF	100	01/16Z
CAMP_H.M.SMITH	197	02/01Z
HICKAM_AFB	185	02/01Z
HILO	95	01/14Z
JOHNSTON_ISLAND	118	03/16Z
LIHUE	221	02/07Z
MCBH_KANEOHE	191	02/01Z
PEARL_HARBOR	191	02/01Z

BEARING AND DISTANCE	DIR	DIST (NM)	TAU
HILO	160	102	24
	258	355	48
	267	740	72
	272	1149	96
	275	1522	120

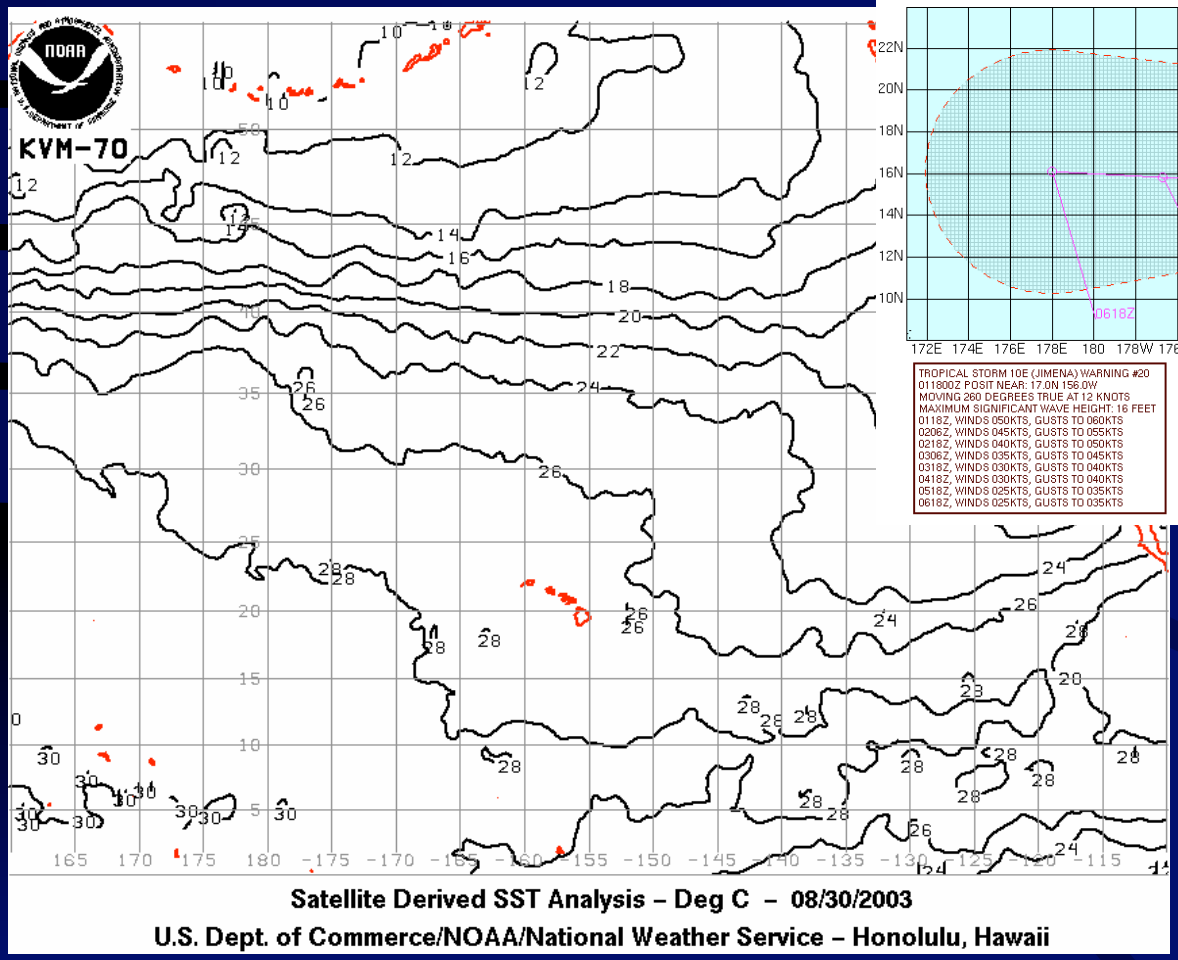
TROPICAL DEPRESSION
TROPICAL STORM
HURRICANE
PAST CYCLONE POSITS SHOWN EVERY SIX HOURS.
FORECAST CYCLONE POSITIONS AS LABELED.
HATCHED AREA SHOWS AVG TRACK ERROR.

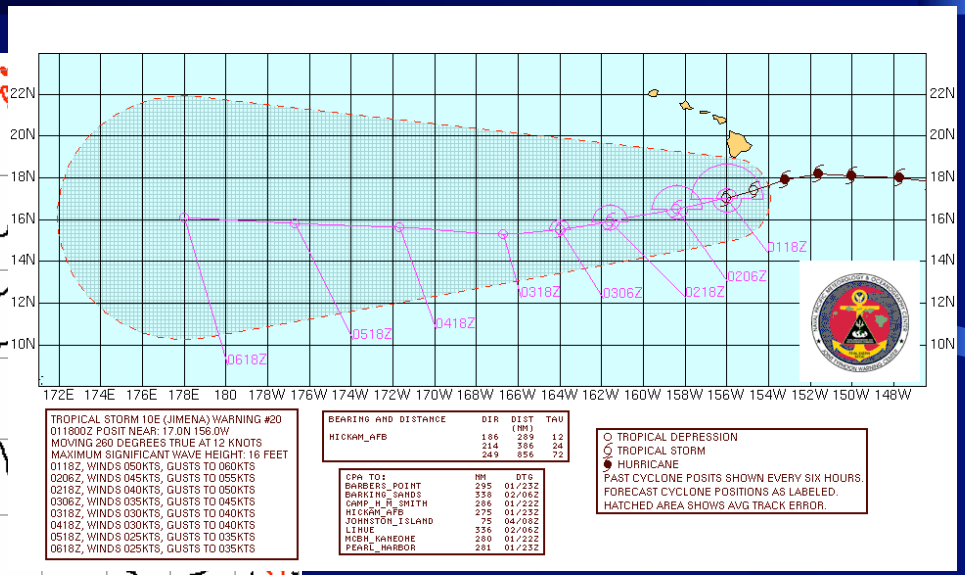
Track Forecast



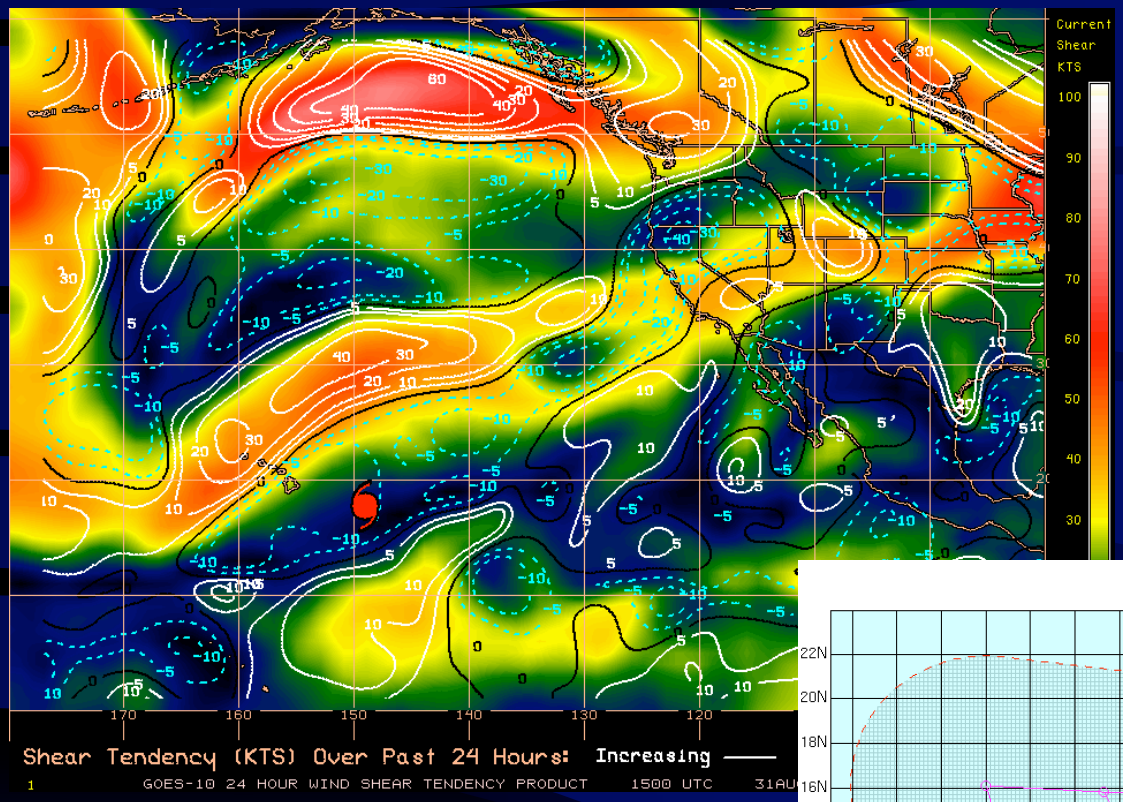


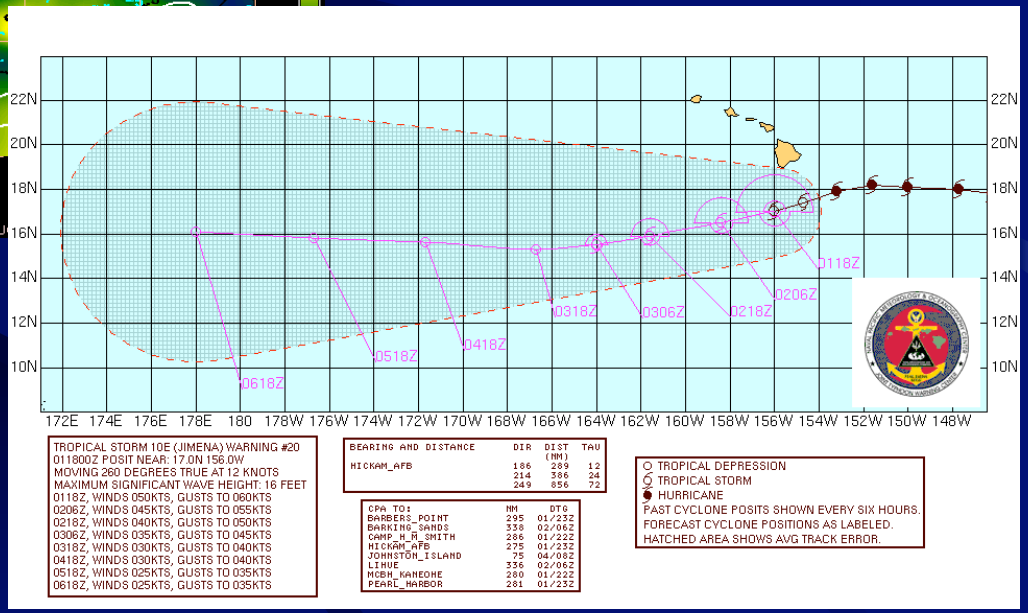
Sea Surface Temperature Important Factor for Hurricane Strength



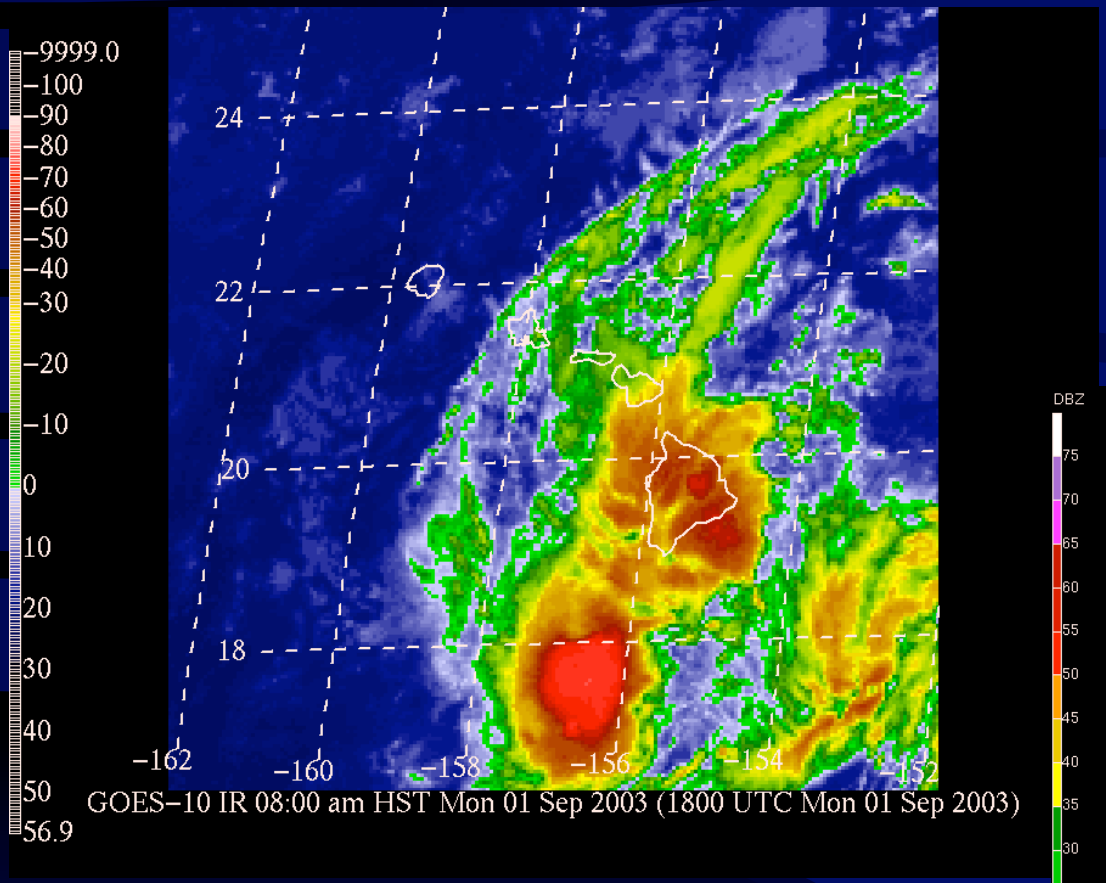


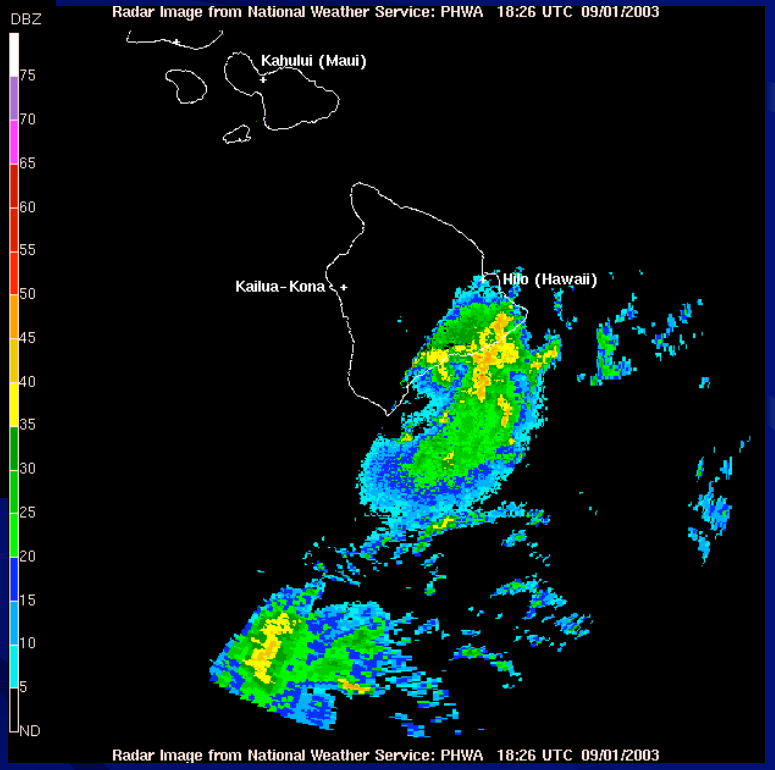
Wind Shear Weakens Storm





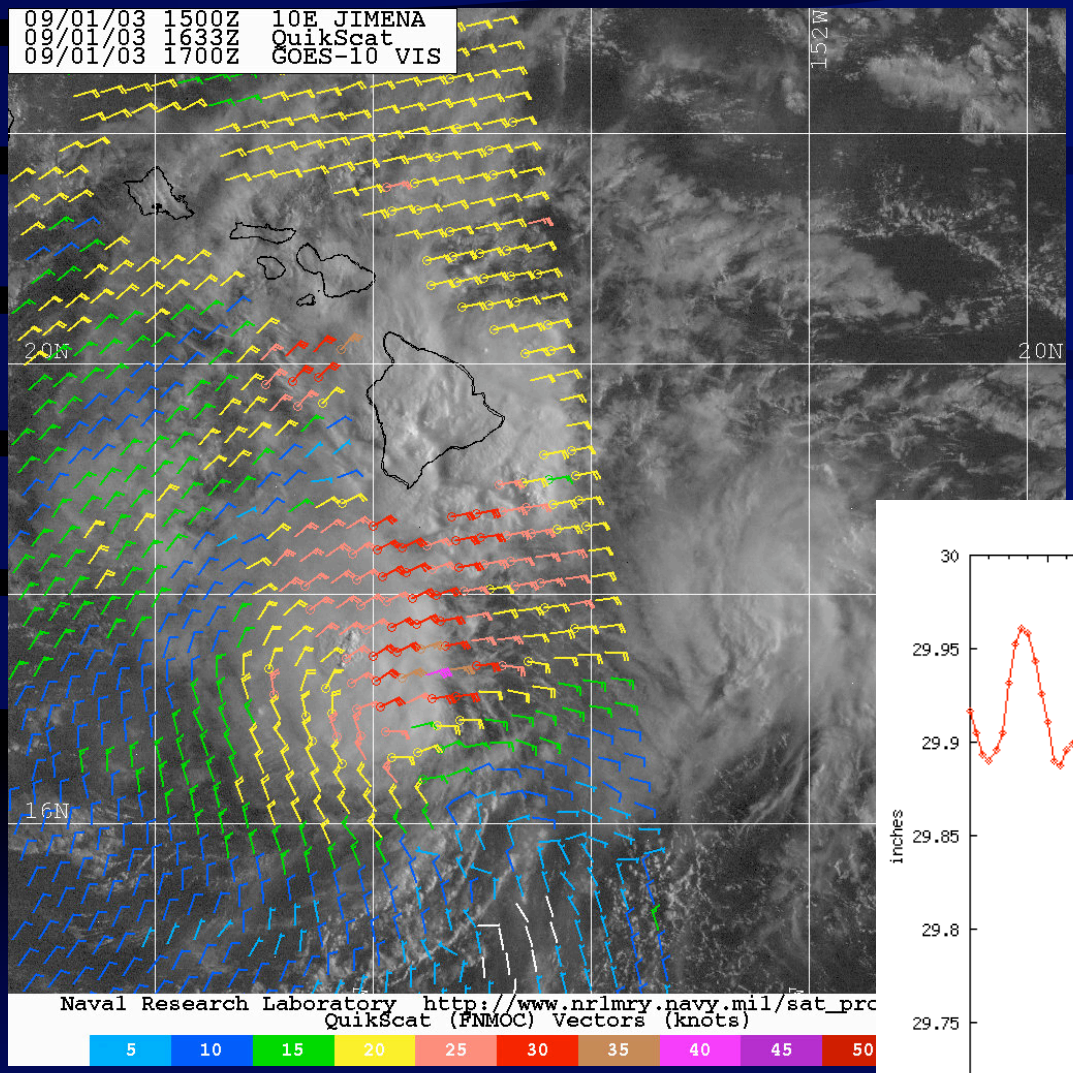
Thunderstorms and Flooding





Satellite and radar help locate areas of heavy rainfall

Winds in Hurricane Jimena



Strong winds can be seen in Quickscat data from satellite. High winds are associated with rapid changes in pressure over short distances (below).