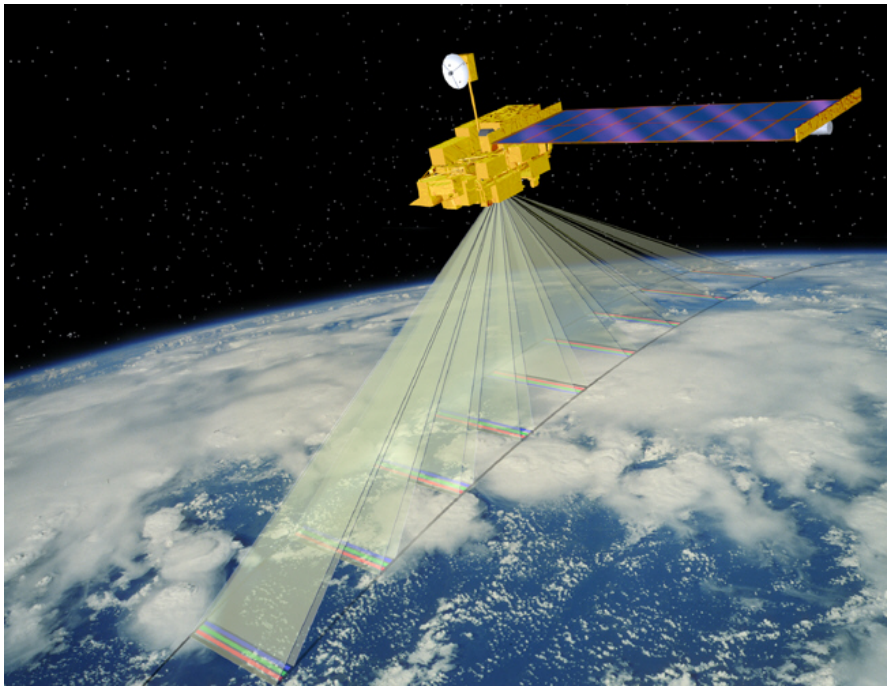
MISR Sciences

- Aerosol and air quality
- Clouds, climate, and weather
- Surfaces
- Advanced concepts for future remote sensing



PI: Dr. David Diner

9 view angles at Earth surface:
Nadir, ±26º, ±46º,±60º, ±70º

4 bands: 446, 558, 672, 866 nm

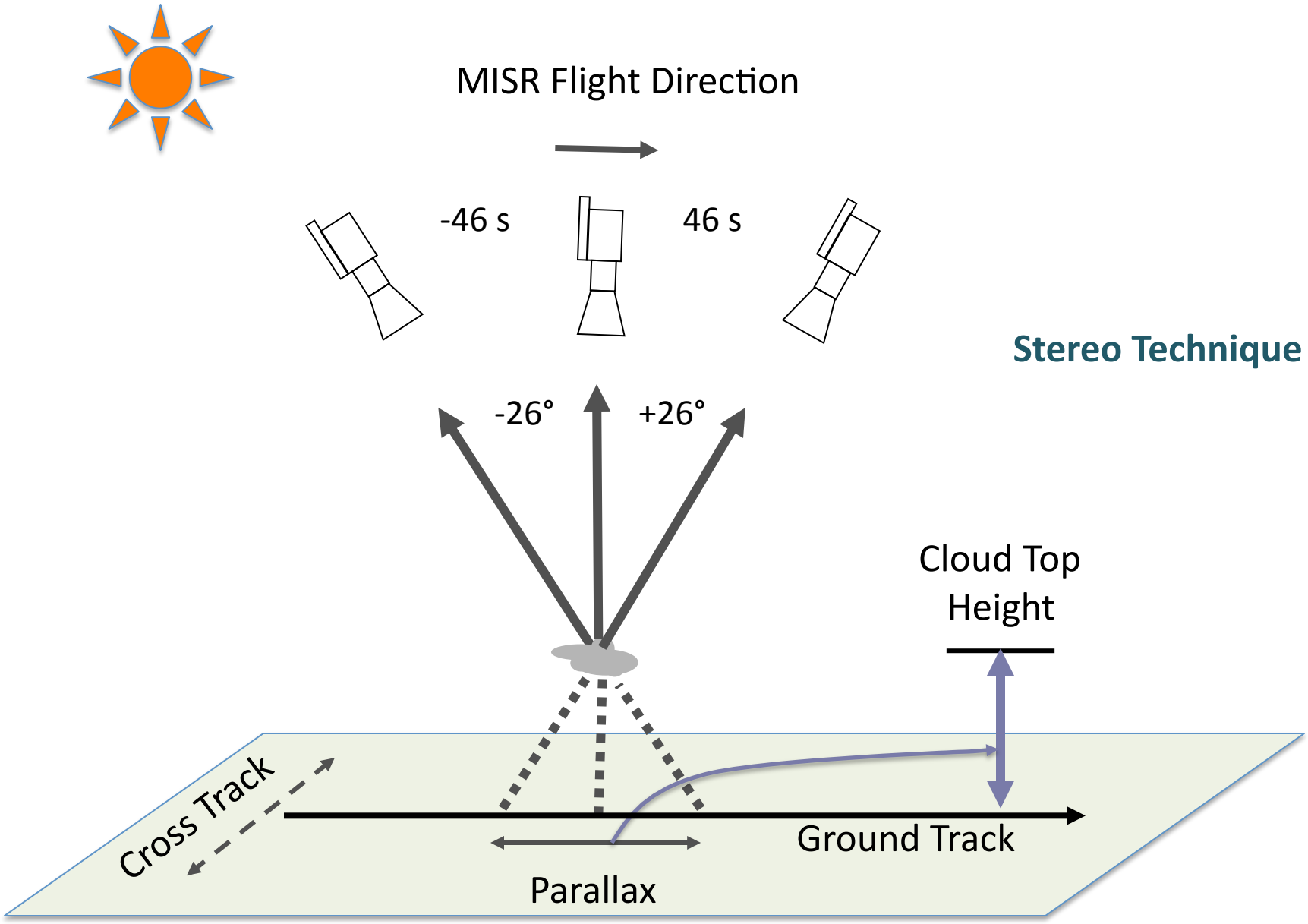
Daylight global coverage: 400-km swath

275 m - 1.1 km resolution

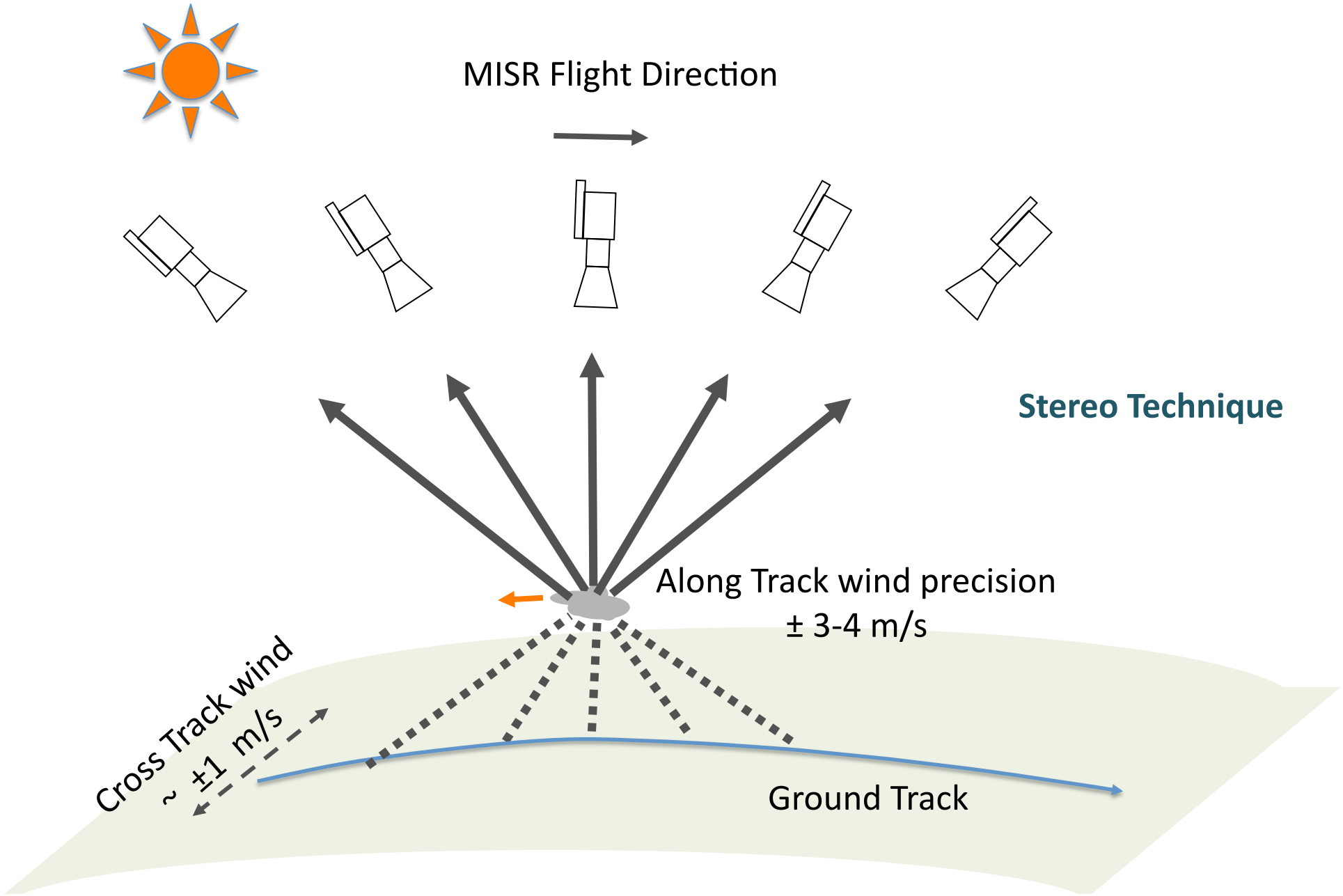
7 minutes for scenes at all 9 angles

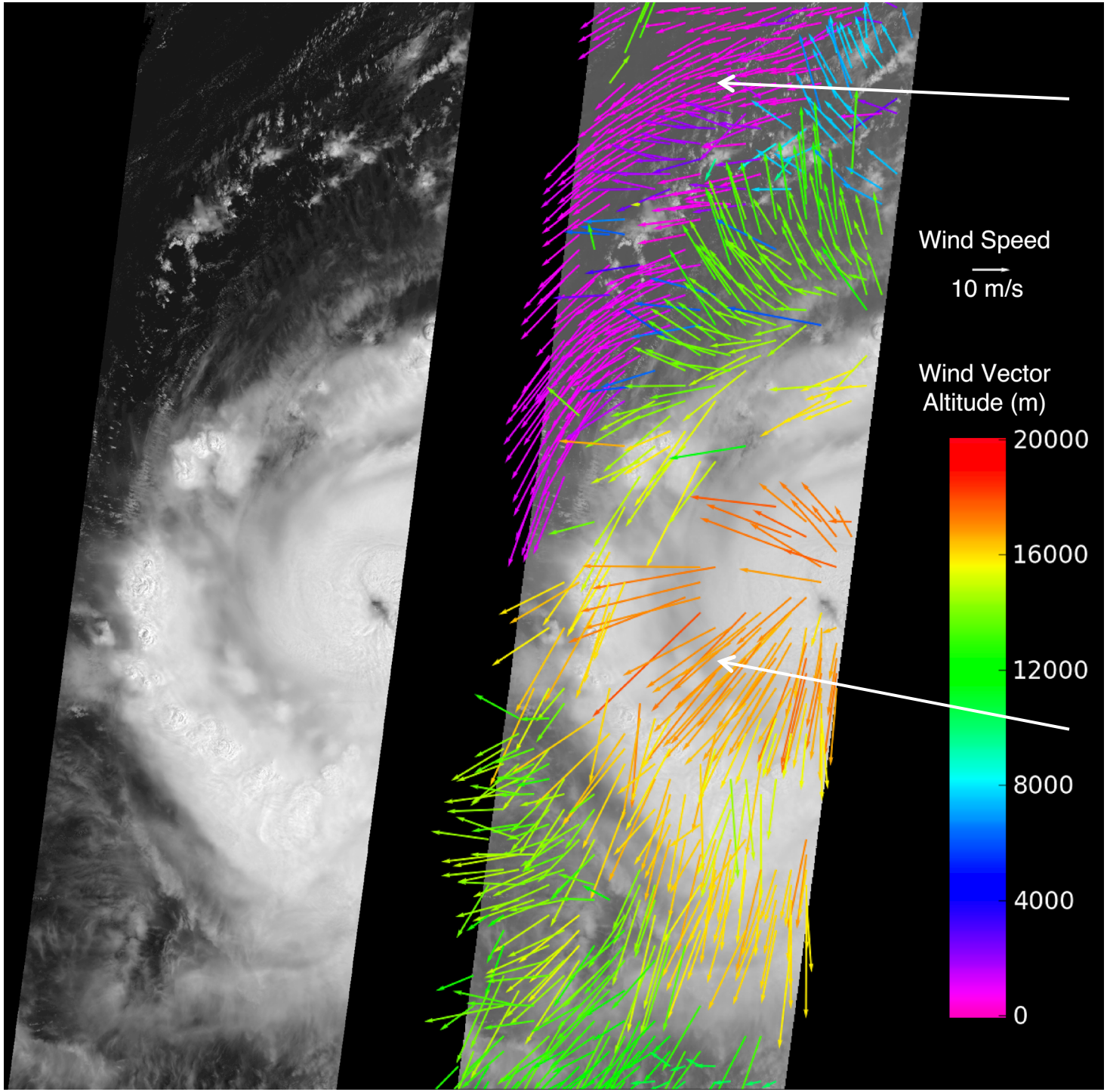
Data since 2000, lifetime projection >2017

Dong, JPL



Stereo Technique


MISR Flight Direction
Stereo Technique
Along Track wind precision
± 3-4 m/s
Cross Track wind
~ ±1 m/s
Ground Track



Boundary layer wind field

Hurricane Earl
8/30/2010

(orbit 37285)

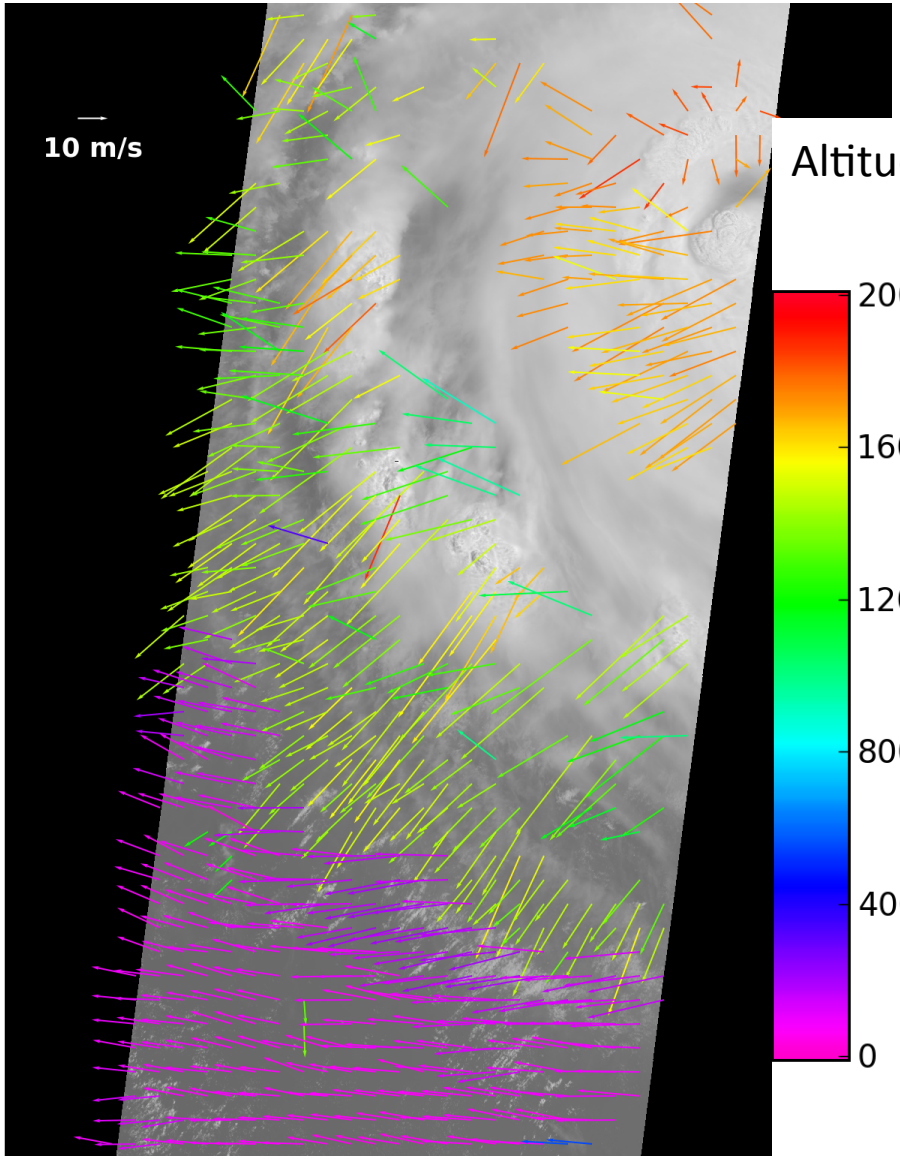
High-level outflow

Courtesy of
Kevin Mueller

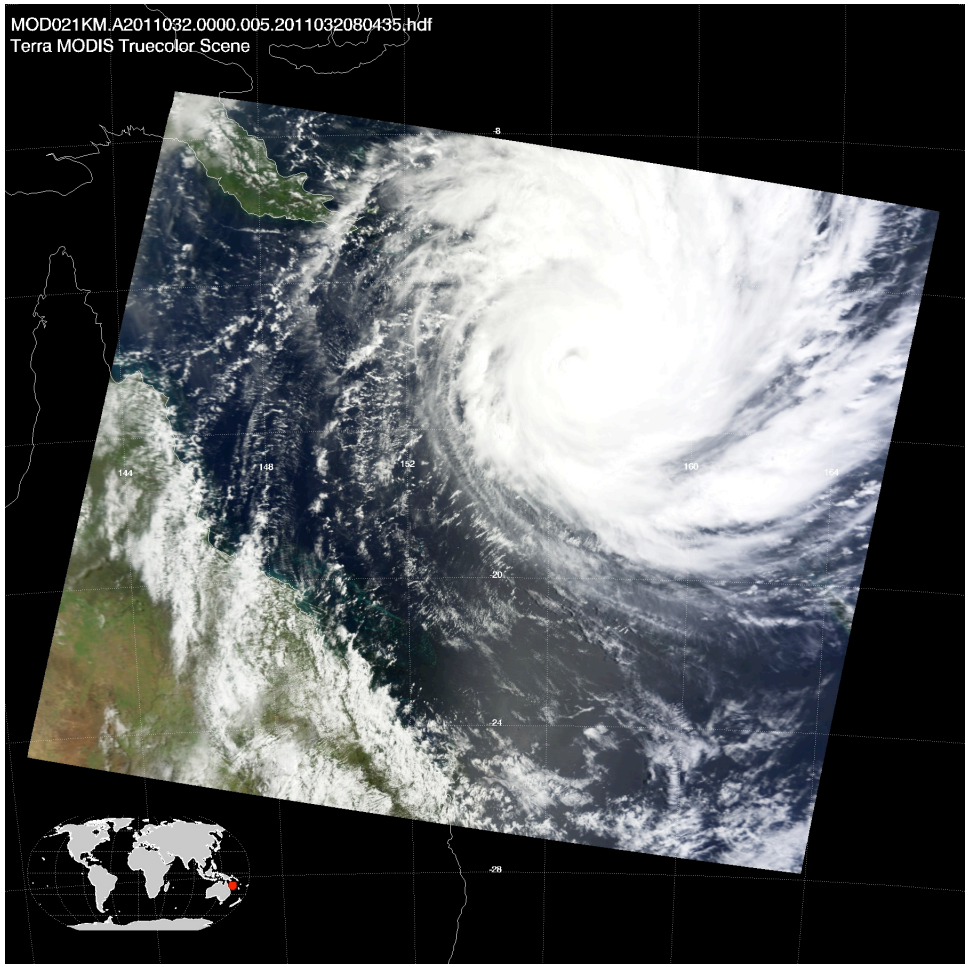
TC Yasi

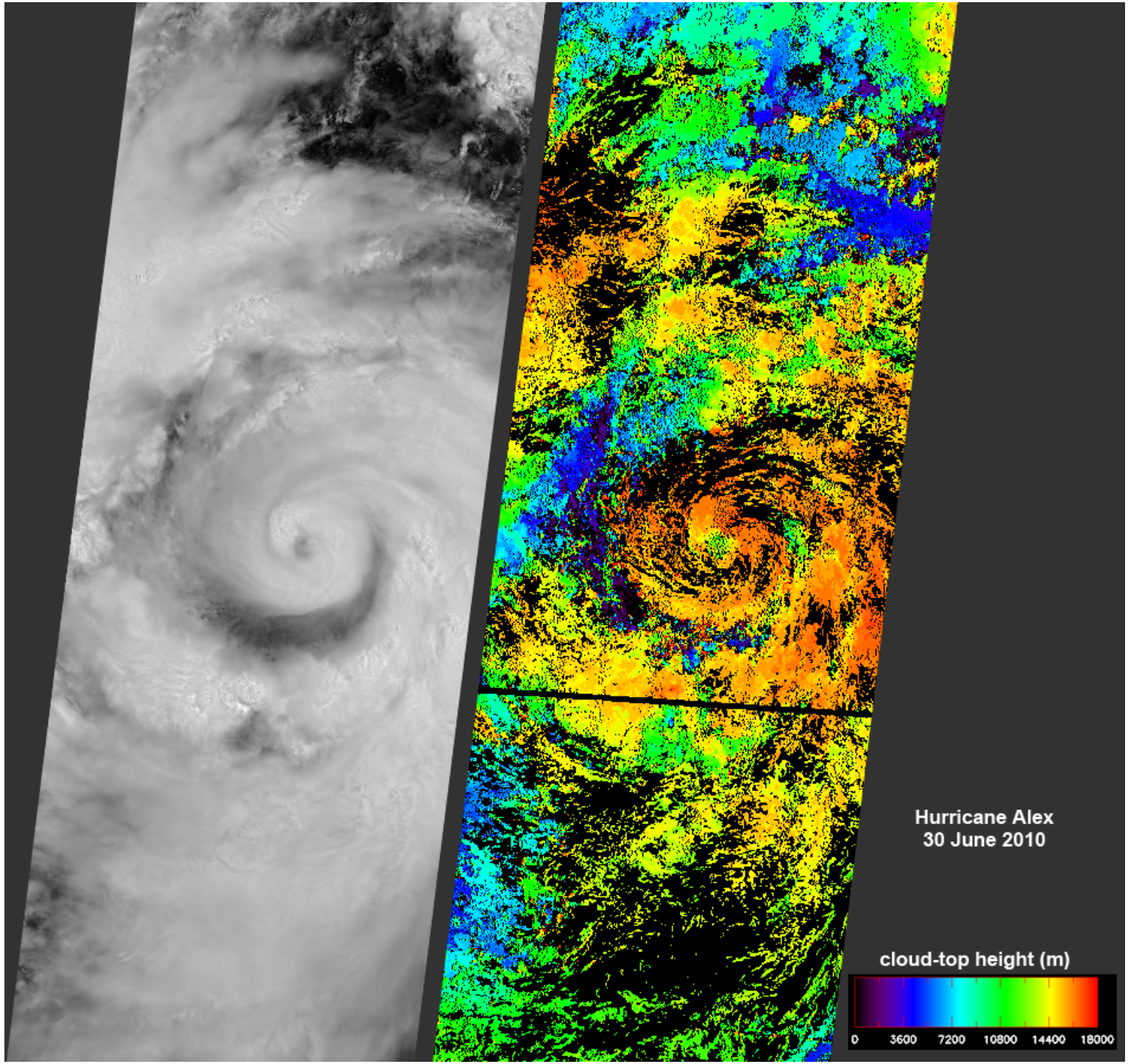
Courtesy of
Kevin Mueller

Orbit 59162, block 101-106, Feb 1



Altitude (m)




Hurricane Alex
30 June 2010
cloud-top height (m)
0
3600
7200
10800
14400
18000

Hurricane Alberto Observed by MISR

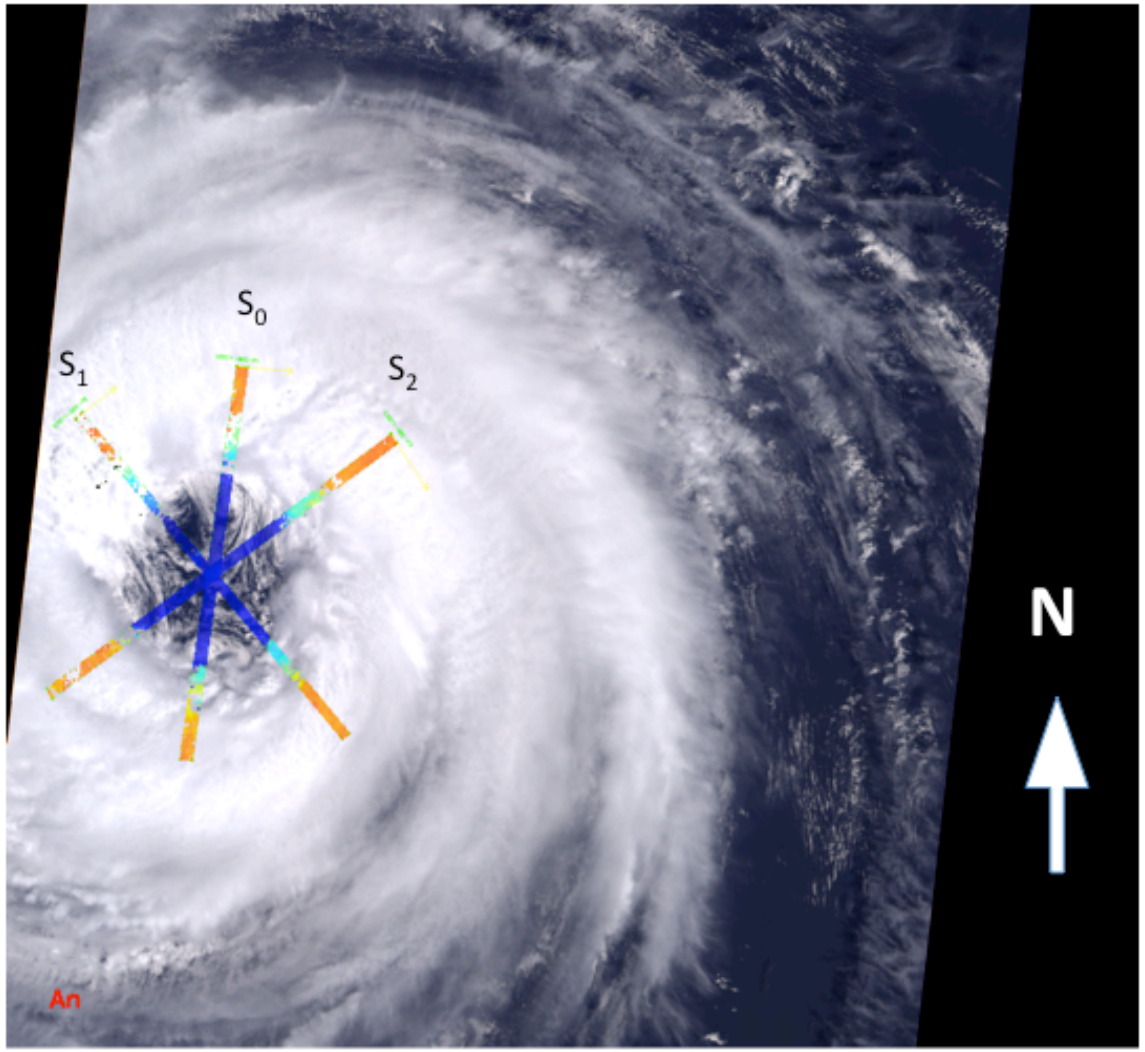
The MISR INteractive eXplorer (MINX)

(1) Simultaneous retrieving cloud-track wind and cloud top height;
(2) Using nadir-26°, 26°-46°, 46°-60° in both fore and aft views;
(3) Pattern matching in a domain of 5×5, 7×7, 9×9 pixels (MISR red images: 275m pixel size and ~400 km swath);
(4) Requiring *a priori* wind direction;
(5) Producing results if two of six pairs of pattern matching are consistent.

Alberto on 19 Aug. 2000

(1) Moving very slowly (< 2m/s);
(2) Winds inside the eyewall dominated by the tangential component;
(3) Three slices digitized (S0, S1, S2) with a mesovortex under S0;

19 August 2000

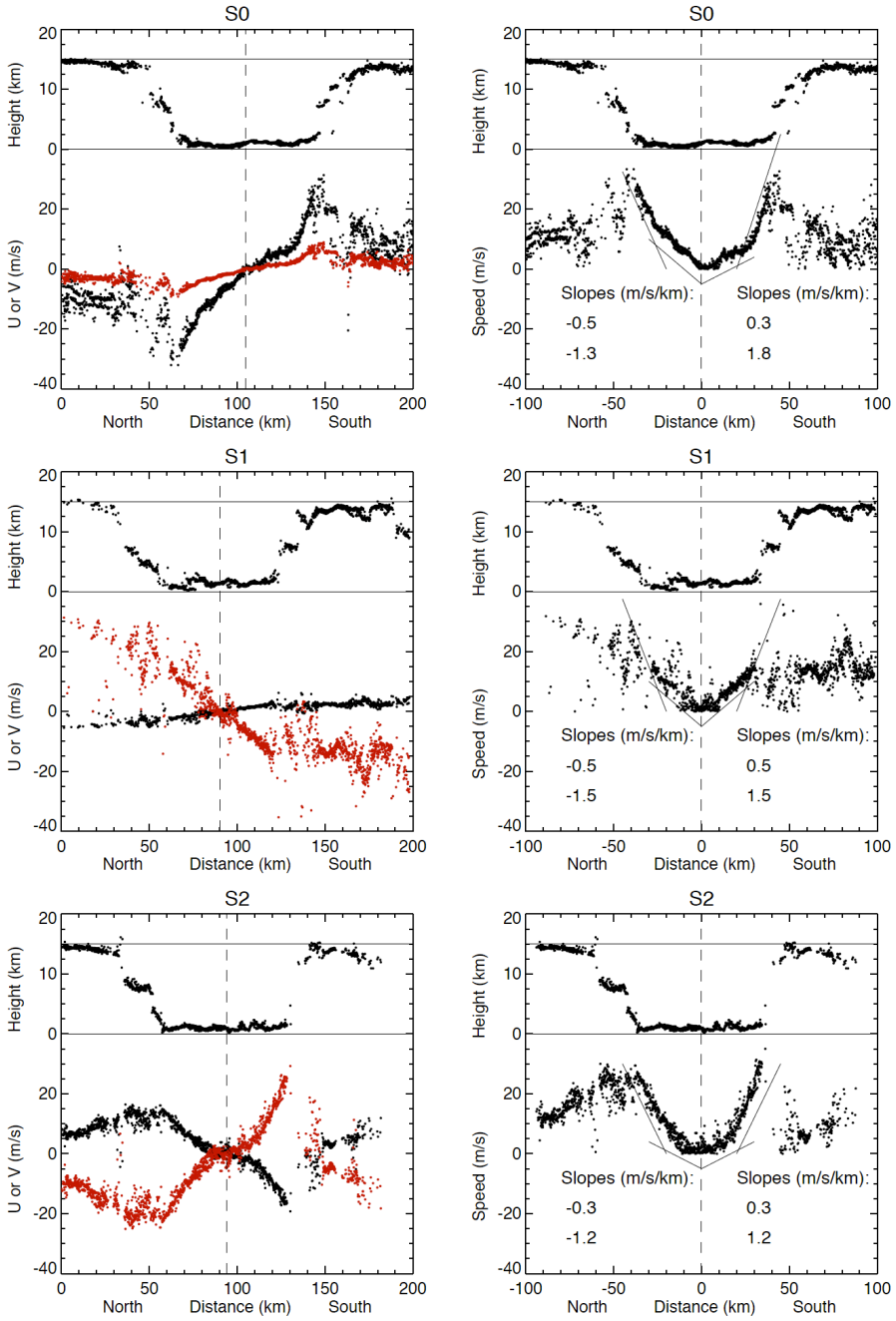


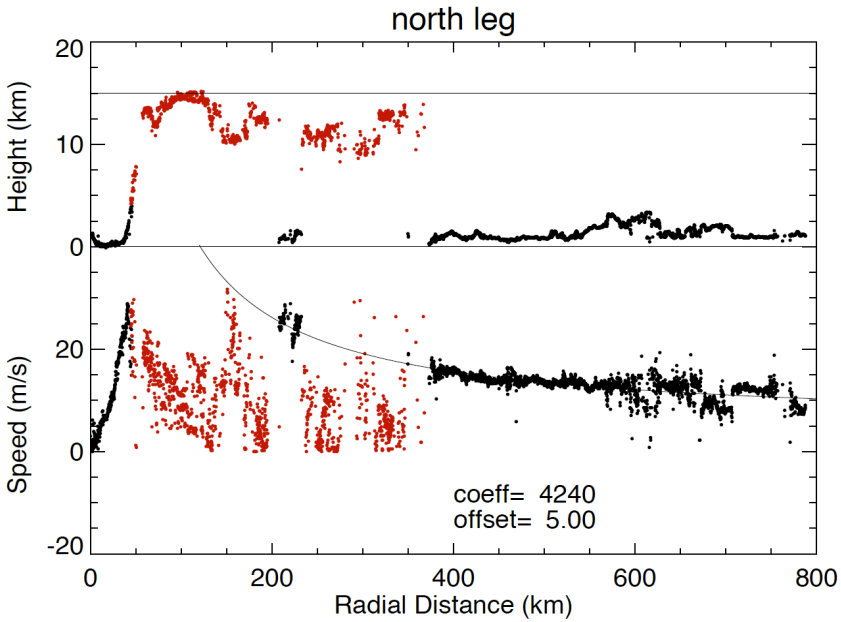
(1)Most of the low clouds inside the eyewall with an altitude <2 km;, including the mesovortex in the south end;

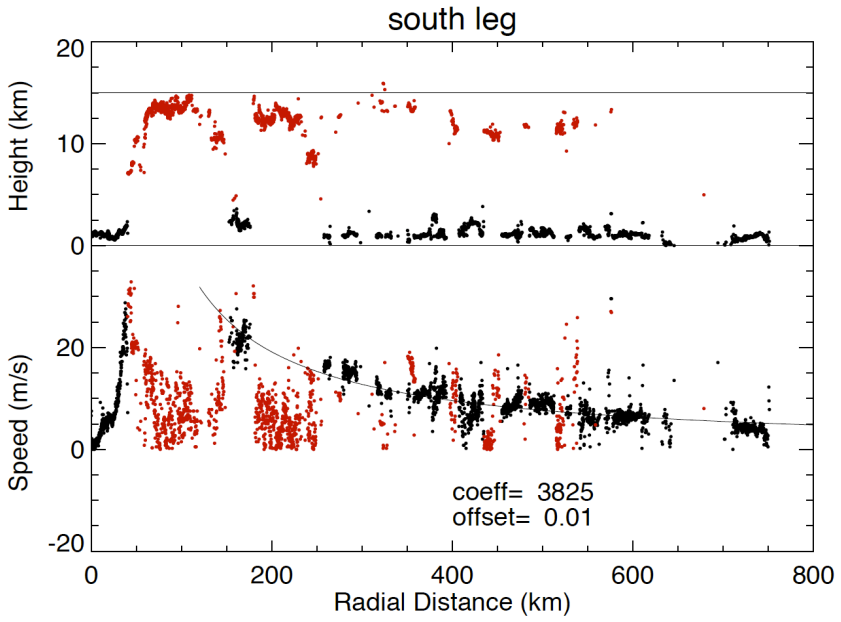
(2)Generally slow or near-zero rotation near the center of the eye;

(3)Two distinct rotational velocities in the southern S0 section (where the mesovortex is developed), showing the rotation near the eyewall is ~6x faster than one in the center;

(4)Lower cloud top deck in the south of the cyclone than in the north (although further investigations needed to verify the wind wind direction for these high clouds).





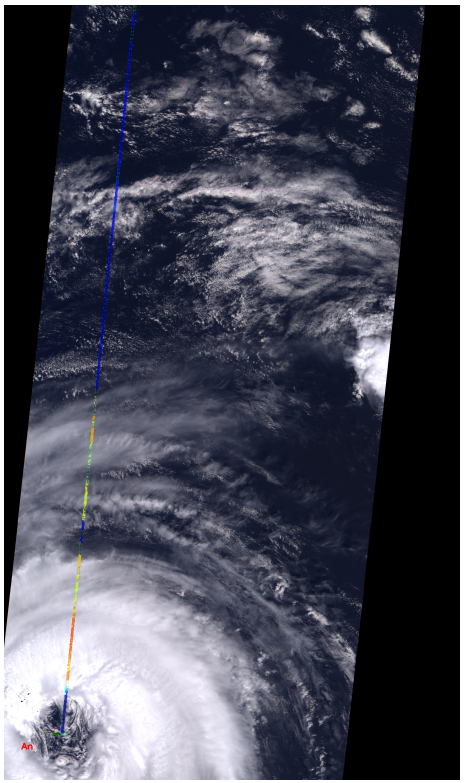


M ≈ 4000 m/s*km

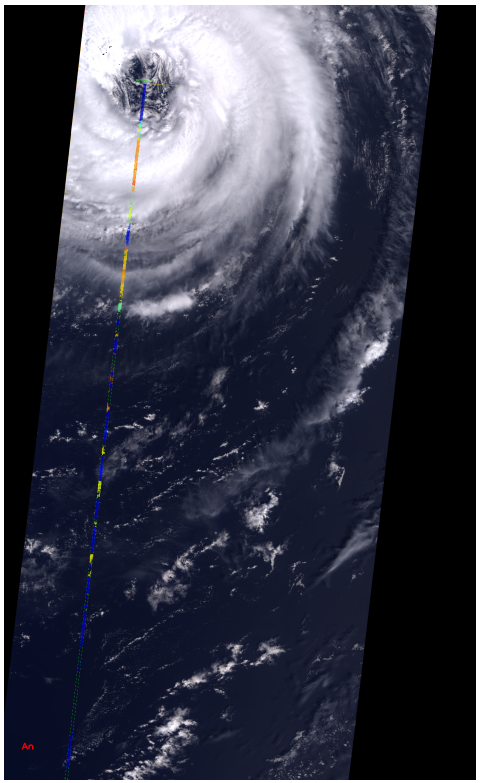
$$v_{north} = \frac{4240}{r} + 5.0 \quad \text{m/s}$$

$$v_{south} = \frac{3825}{r} + 0.0 \quad \text{m/s}$$

North leg

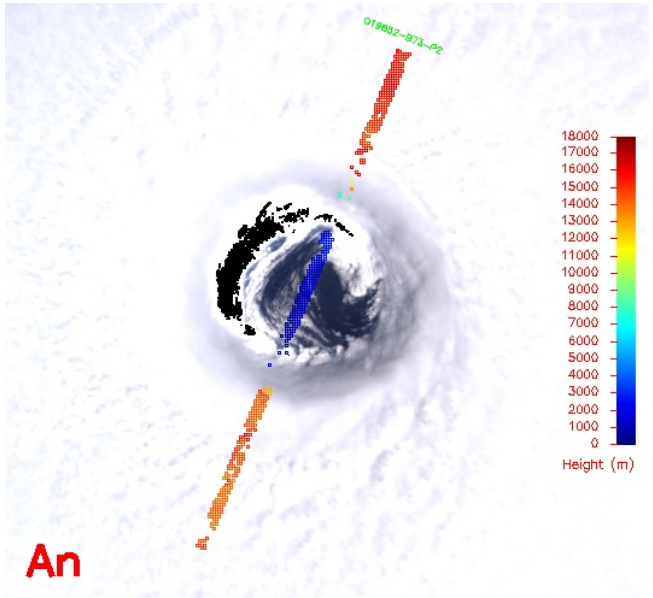


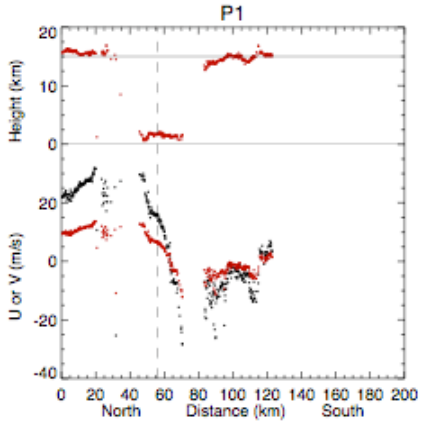
South leg

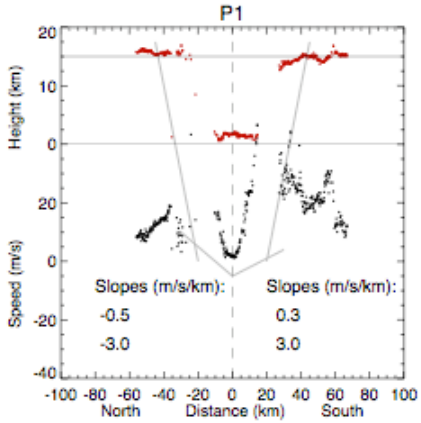


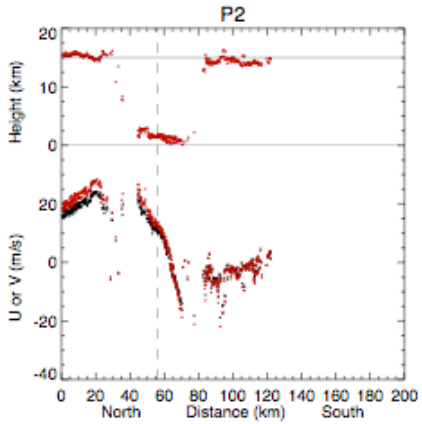
Inner-Core Rotation
and
Cyclone Intensity

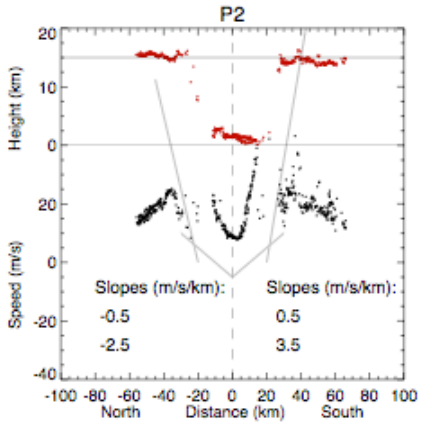
Isabel (2003)

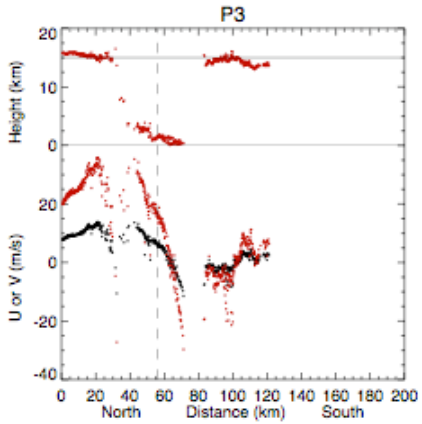

18000
17000
16000
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Height (m)
An

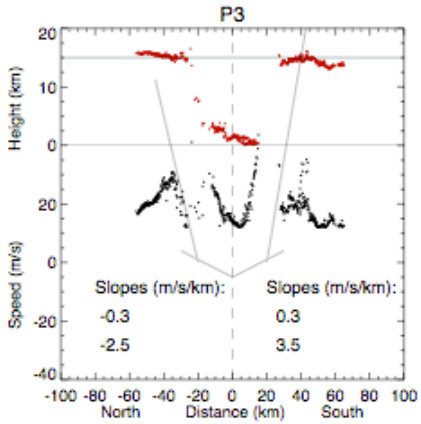

P1
Height (km)
U or V (m/s)
North
Distance (km)
South


P1
Height (km)
Speed (m/s)
Slopes (m/s/km):
-0.5
-3.0
Slopes (m/s/km):
0.3
3.0
North
Distance (km)
South

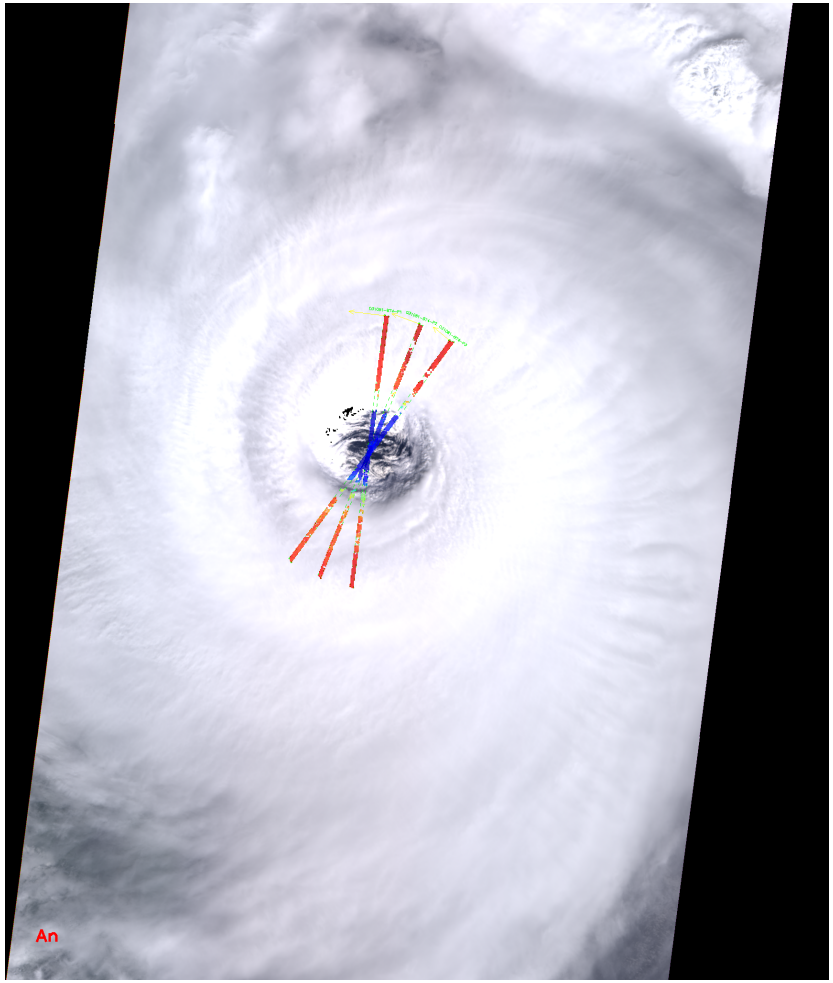

P2
Height (km)
U or V (m/s)
North
Distance (km)
South

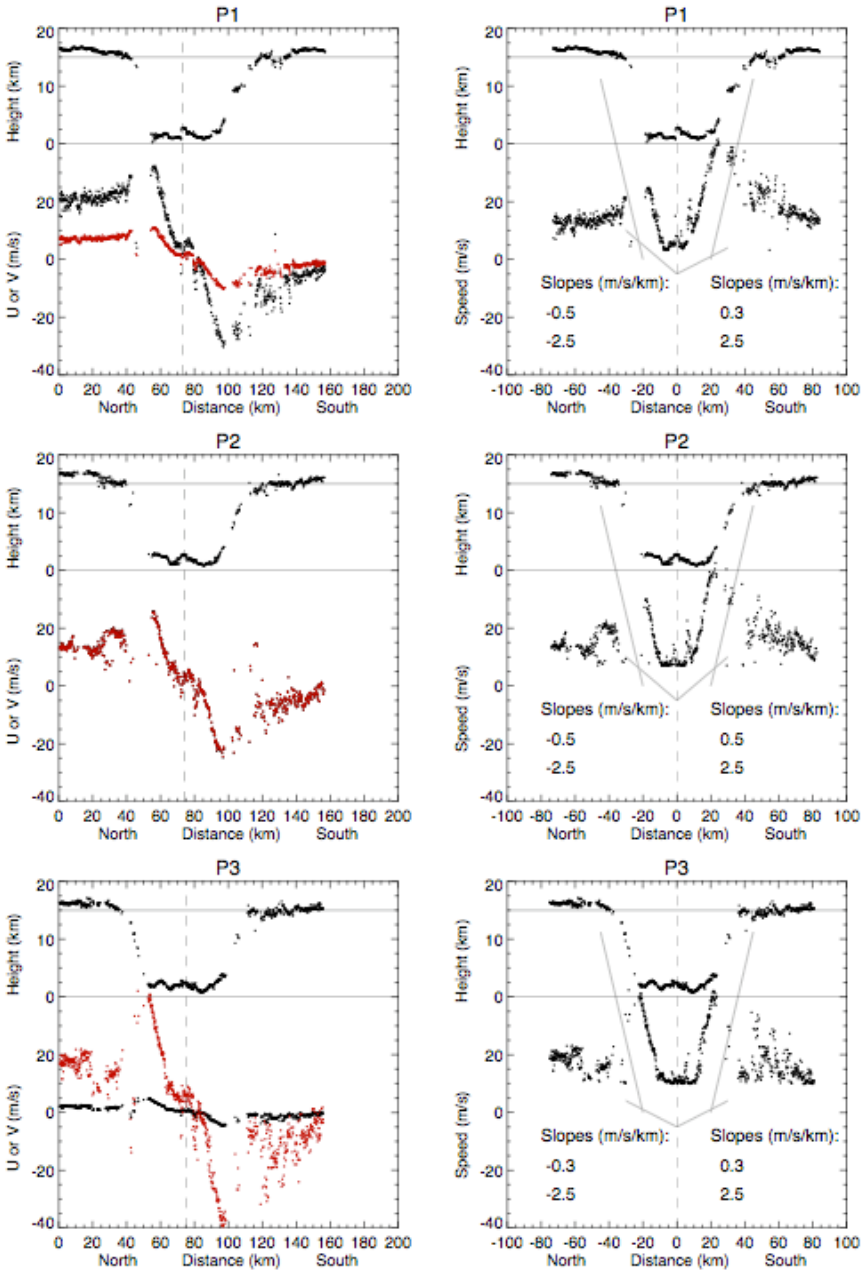

P2
Height (km)
Speed (m/s)
Slopes (m/s/km):
-0.5
-2.5
Slopes (m/s/km):
0.5
3.5
North
Distance (km)
South

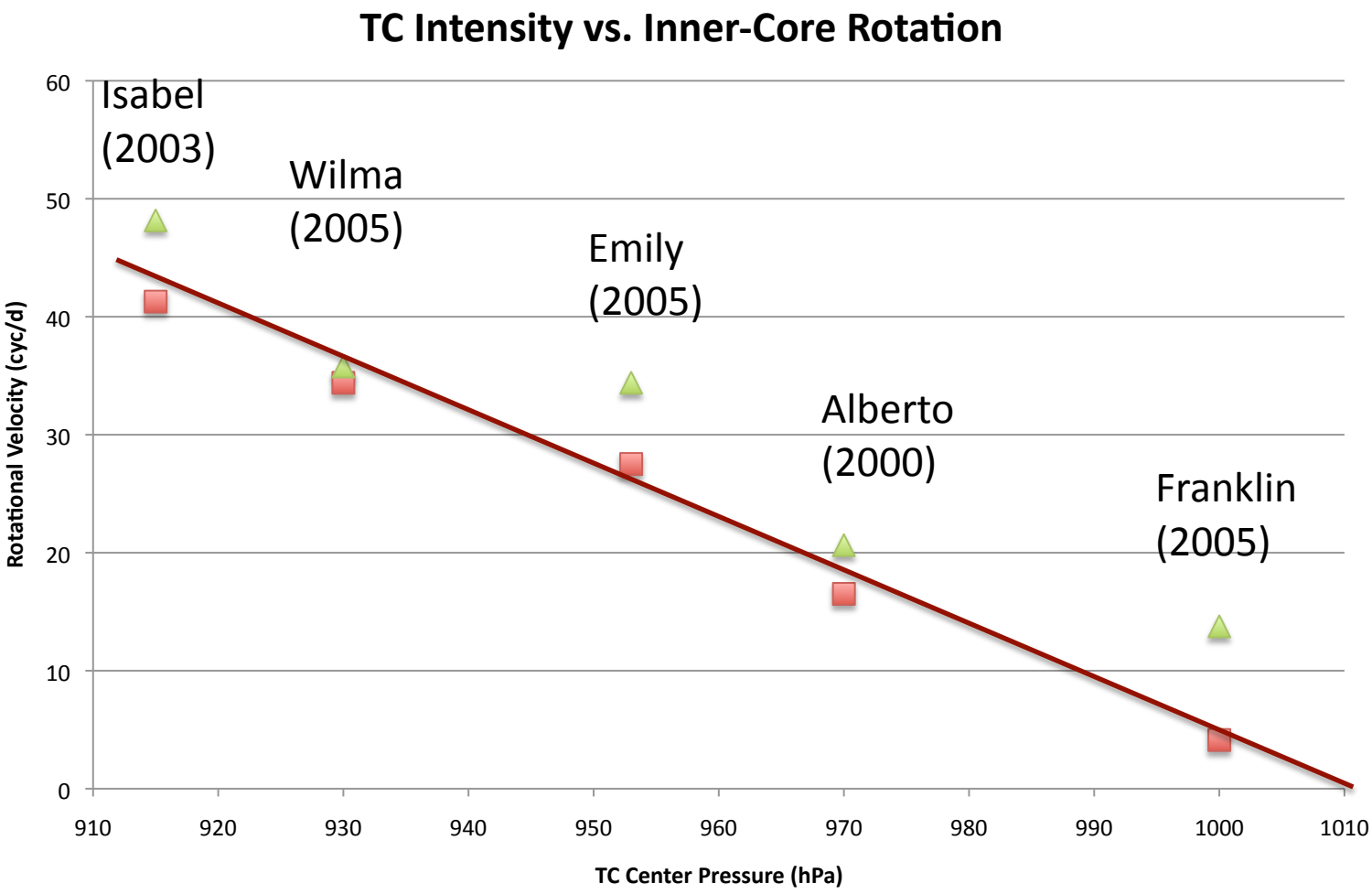

P3
Height (km)
U or V (m/s)
North
Distance (km)
South


P3
Height (km)
Speed (m/s)
Slopes (m/s/km):
-0.3
-2.5
Slopes (m/s/km):
0.3
3.5
North
Distance (km)
South

Wilma (2005)


An


P1
P1
P2
P2
P3
P3
Height (km)
U or V (m/s)
Speed (m/s)
Distance (km)
North
South
Slopes (m/s/km):
-0.5
-2.5
0.3
2.5
0.5
-0.3


TC Intensity vs. Inner-Core Rotation
Isabel (2003)
Wilma (2005)
Emily (2005)
Alberto (2000)
Franklin (2005)
Rotational Velocity (cyc/d)
TC Center Pressure (hPa)
60
50
40
30
20
10
0
910
920
930
940
950
960
970
980
990
1000
1010