Turbulent Air Motion Measurement System (TAMMS)

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TRACE P Data Products

10 Hz Data

- Winds
  - u, v, & w
- Atmospheric Variables
  - Temperature (Rosemount 102)
  - Humidity (Lyman Alpha, GE1011)
- Aircraft Parameters
  - Latitude
  - Longitude
  - Pitch
  - Roll
  - True Heading
  - Altitude

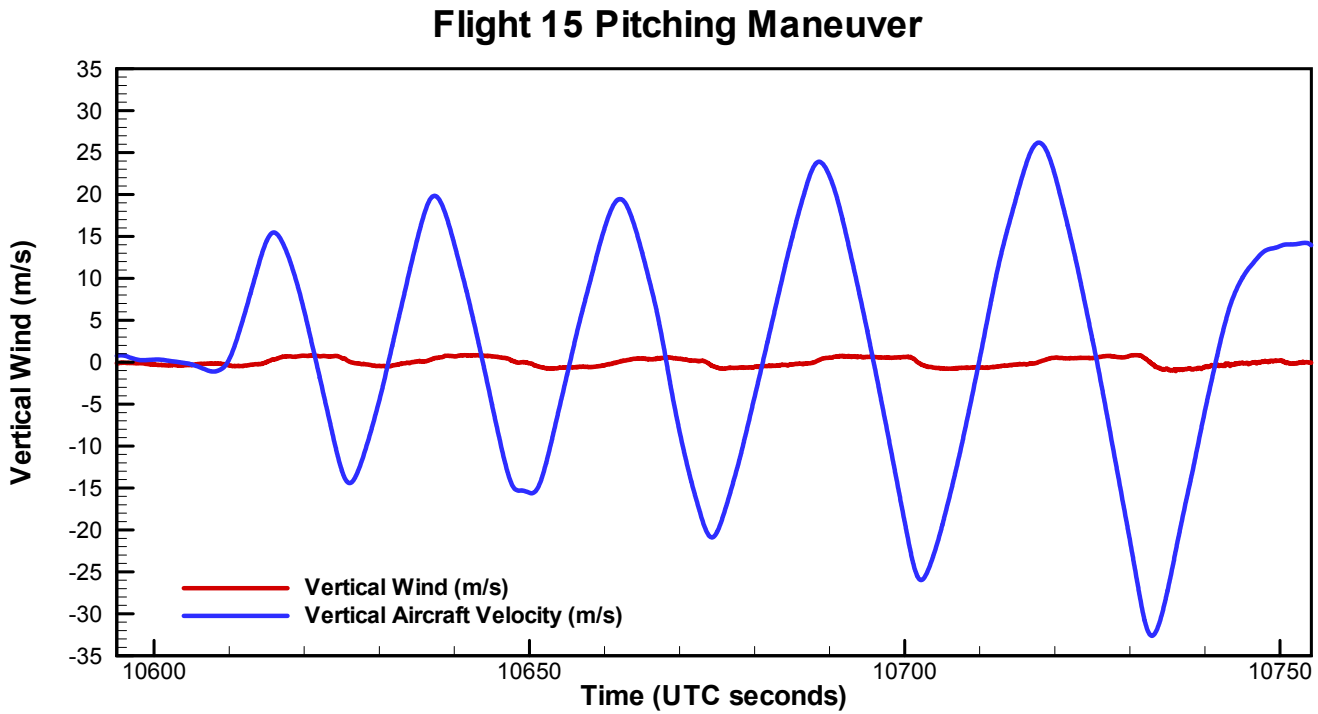
1 Hz Data

- Means and Variances
  - w
  - Tstat
  - Q (Lyman Alpha)

Additional Signals

- Chemical Species
  - CO_2 (LI-COR 6252 - NASA LaRC)
  - SO_2 (APIMS - Drexel U)
  - O3 (LaRC)

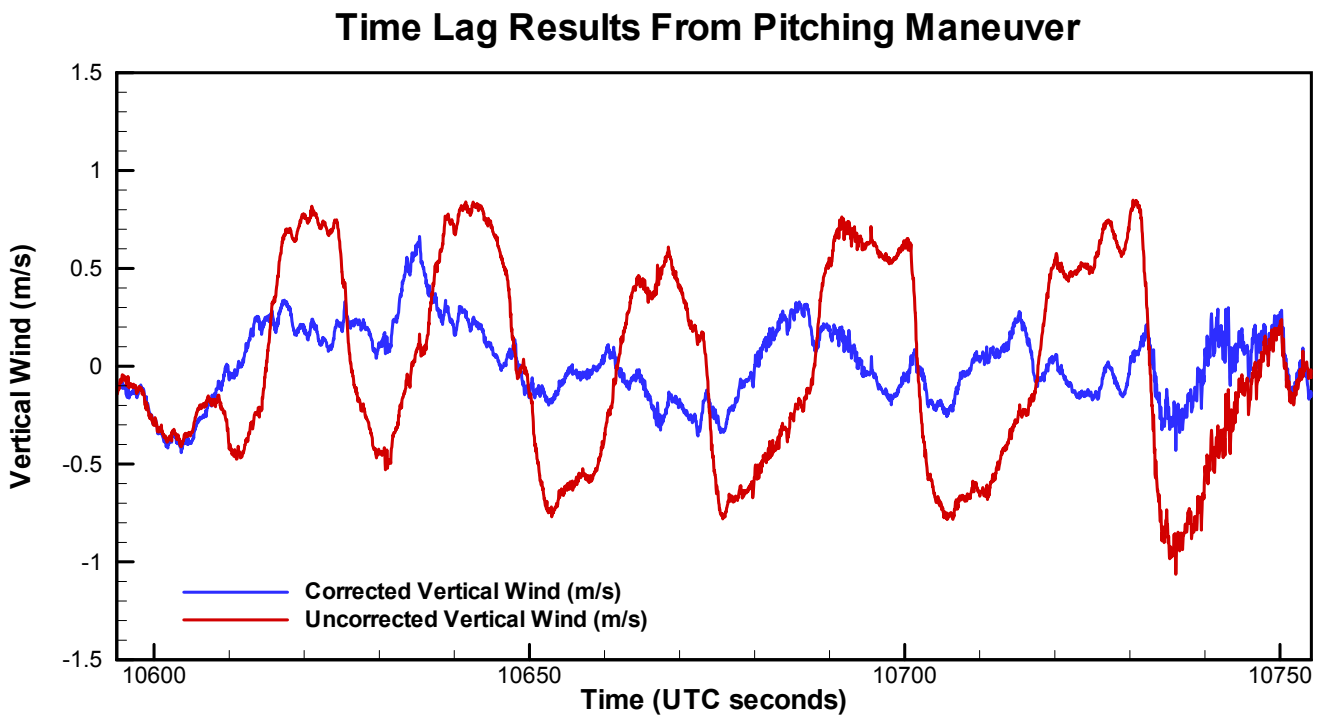
Pitching Maneuver



- The calculated vertical wind should not be affected by aircraft motion

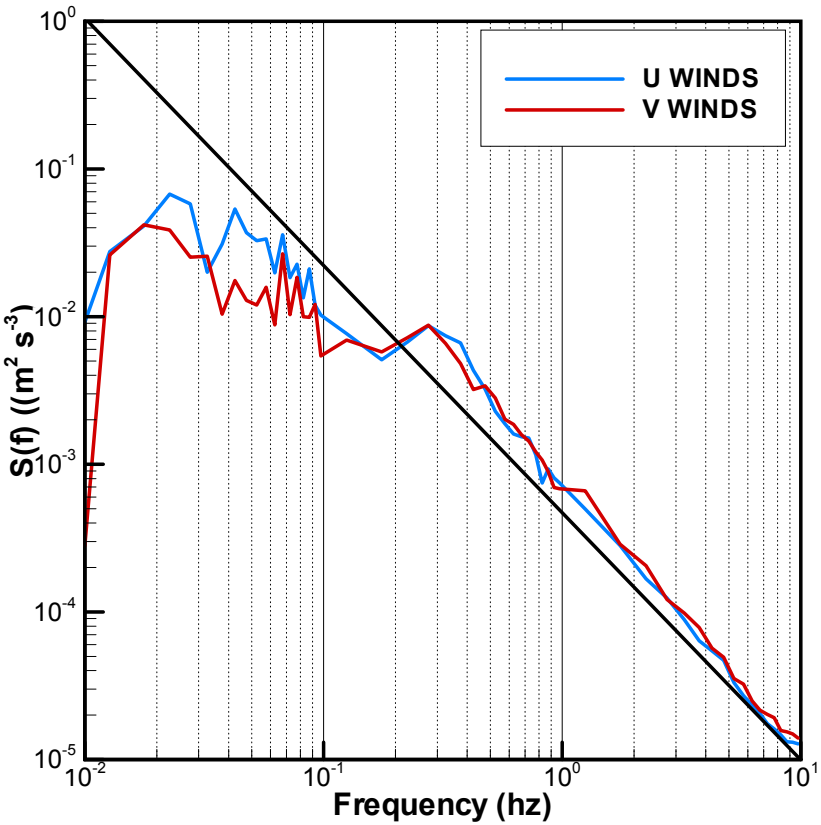
- The calculated vertical wind should be less than 10% of the aircraft vertical wind

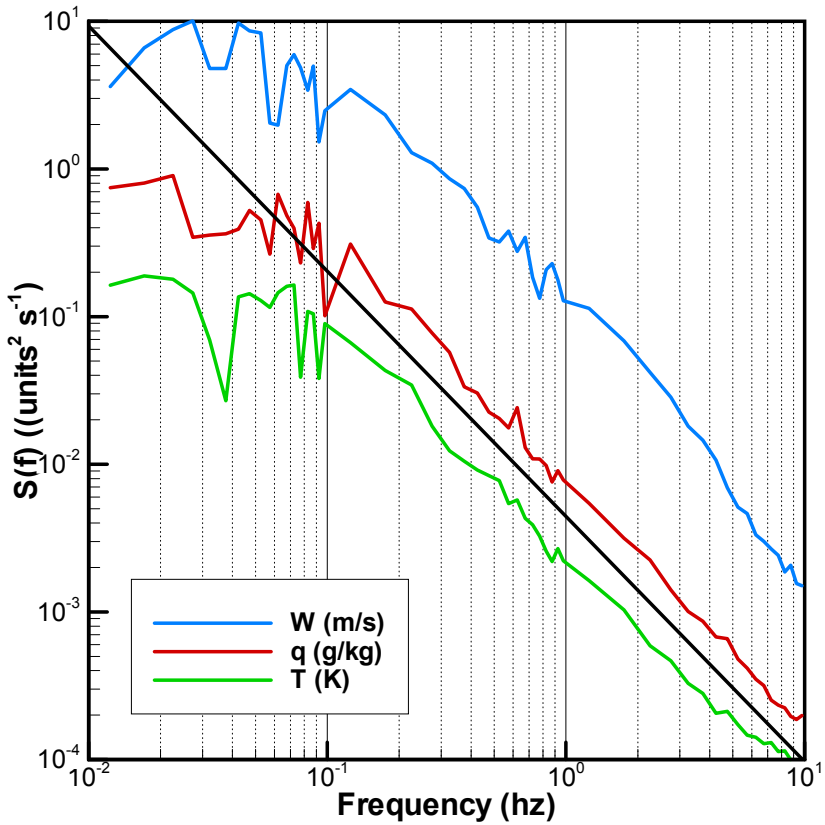
Time Lag Corrections



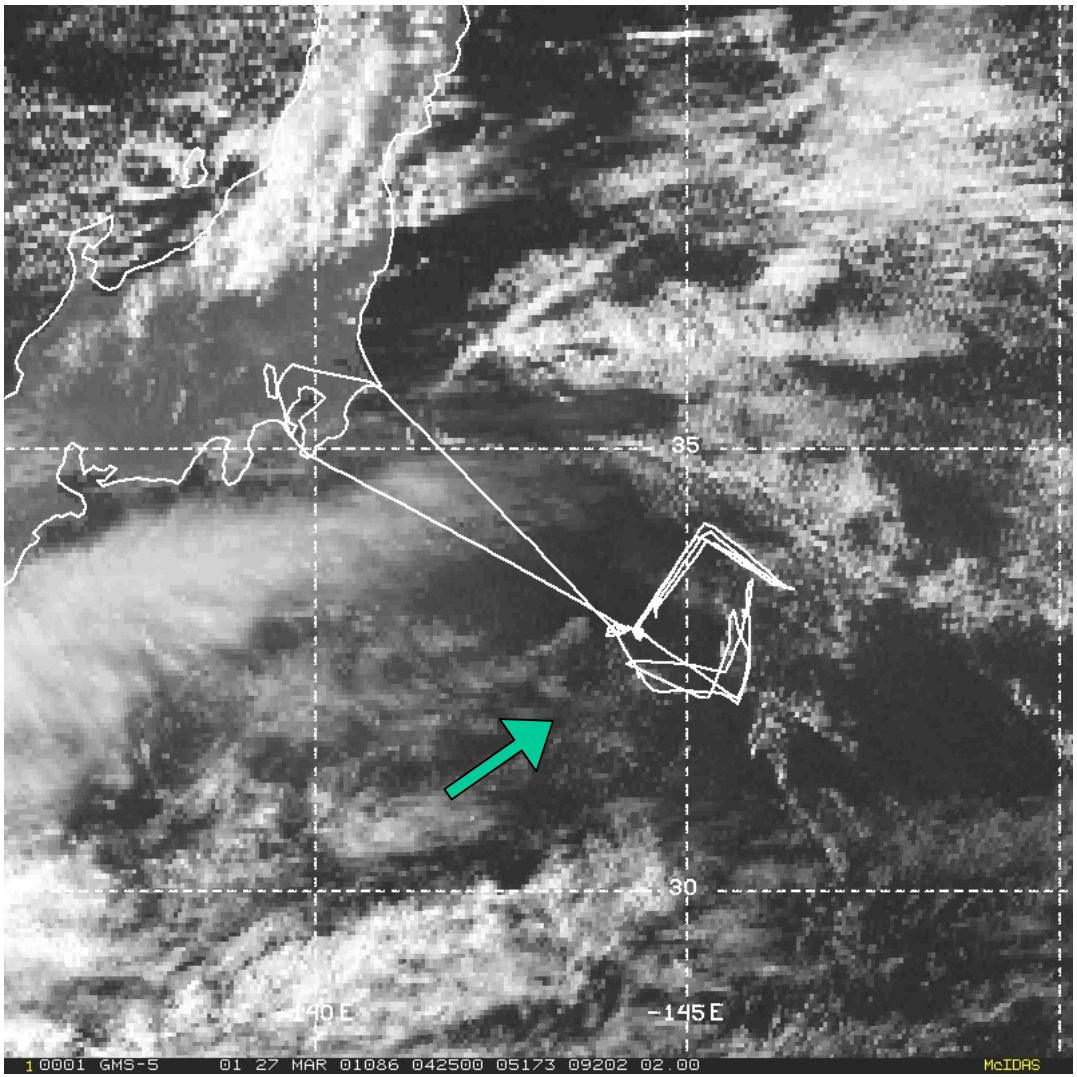
Tjernstrom and Samuelsson (1995) minimizes the variance in the vertical winds by lagging the Pitch and the Vertical Acceleration

TAMMS Power Spectra





Flight 17 - Initial Analysis

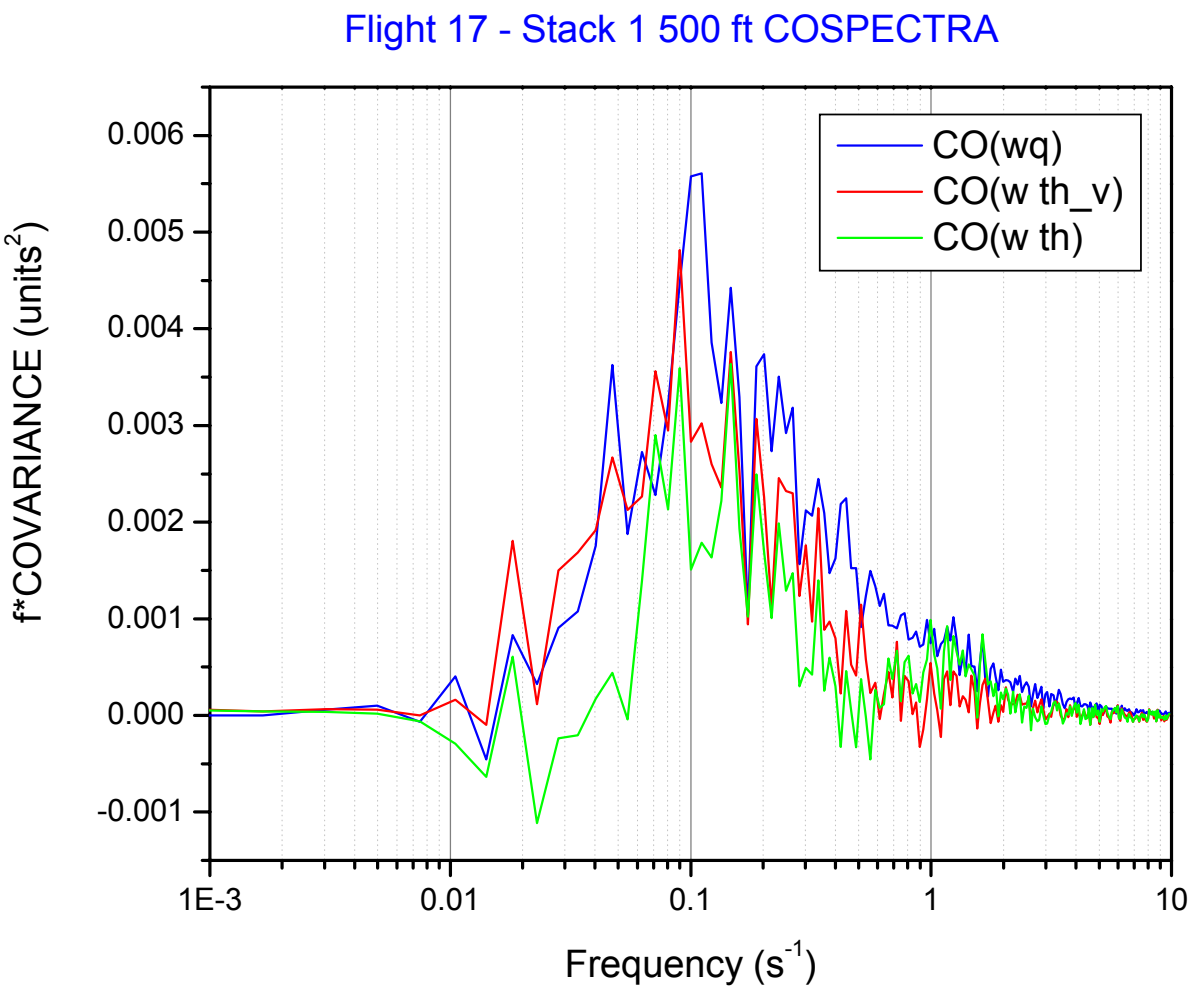


- Flight Path – Along wind and Crosswind Legs

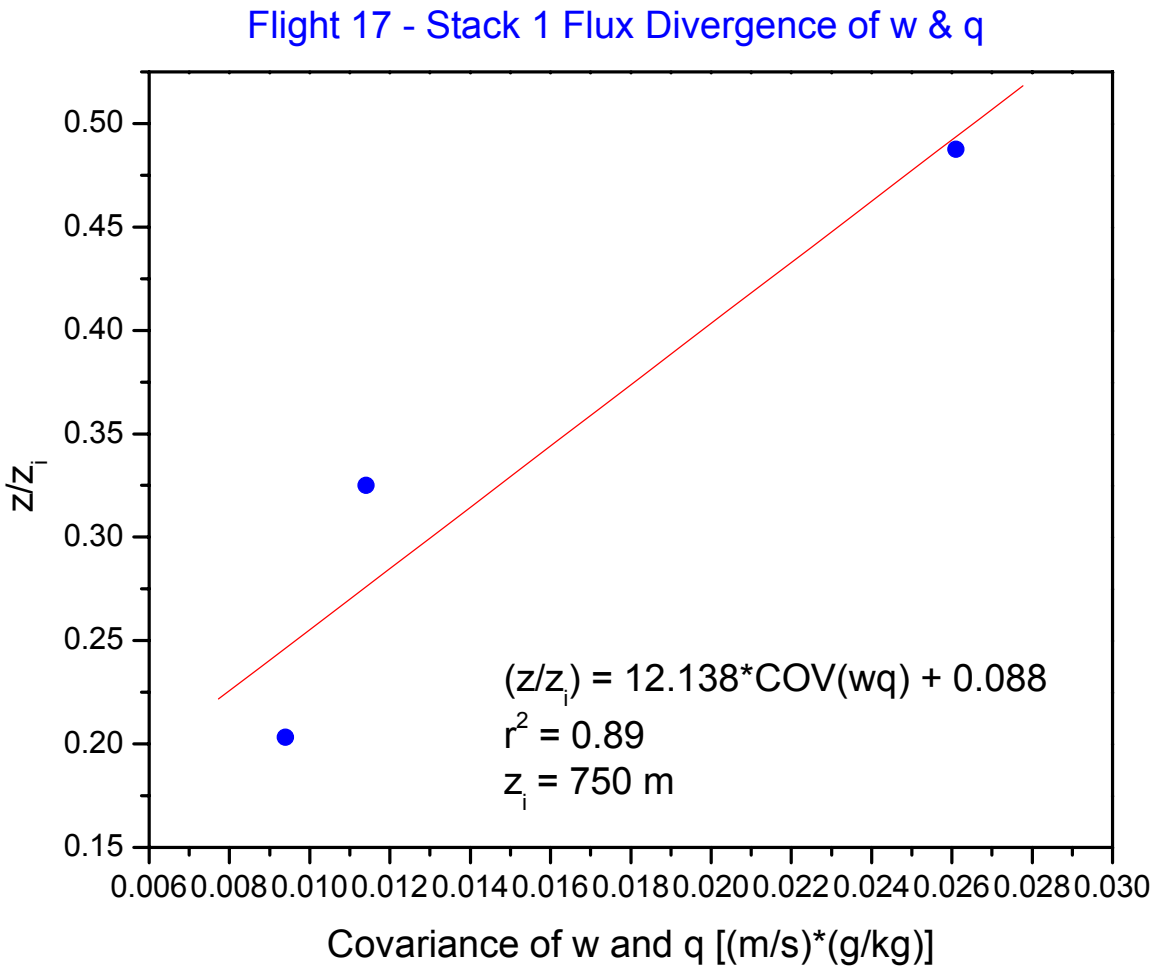
- Wind Direction = 235 deg

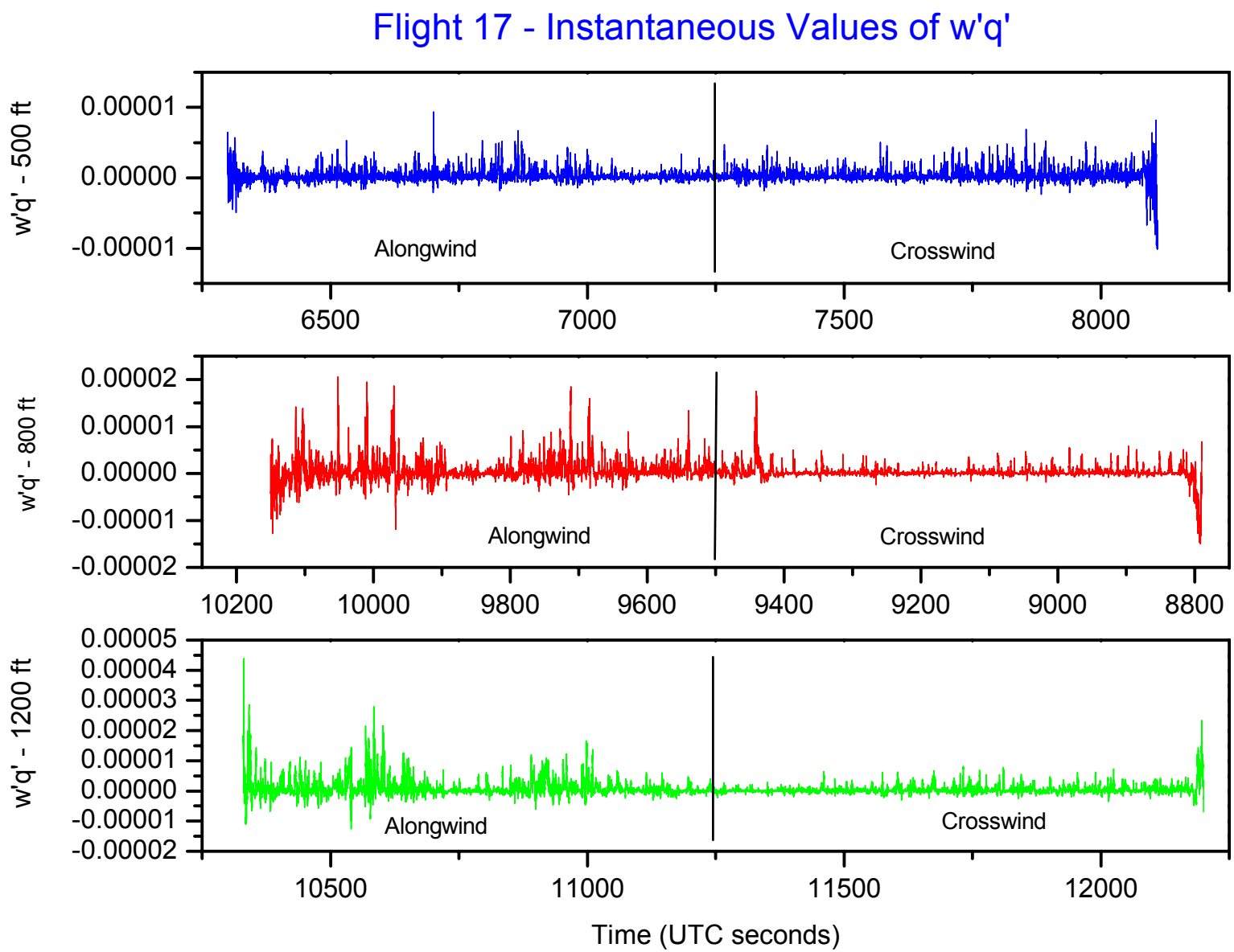
- 3 Legs in Mixed Layer

- 2 Stacked L-shape patterns


Flight 17 - Stack 1 500 ft COSPECTRA
CO(wq)
CO(w th_v)
CO(w th)
f*COVARIANCE (units^2)
0.006
0.005
0.004
0.003
0.002
0.001
0.000
-0.001
1E-3
0.01
0.1
1
10
Frequency (s^{-1})

Initial Flux Divergence of wq




Flight 17 - Instantaneous Values of w'q'
w'q' - 500 ft
0.00001
0.00000
-0.00001
Alongwind
Crosswind
6500
7000
7500
8000
w'q' - 800 ft
0.00002
0.00001
0.00000
-0.00001
-0.00002
Alongwind
Crosswind
10200
10000
9800
9600
9400
9200
9000
8800
w'q' - 1200 ft
0.00005
0.00004
0.00003
0.00002
0.00001
0.00000
-0.00001
-0.00002
Alongwind
Crosswind
10500
11000
11500
12000
Time (UTC seconds)

Planned TRACE P Analyses

- Split Flight 17 into crosswind and alongwind components and compare
- Compute Fluxes of w-q, w-theta_v, w-theta, and momentum
- Work with Drexel on SO2 fluxes
- Look into using the 48 BL runs for a survey analysis of BL parameters