

Wind Effects on ACC's



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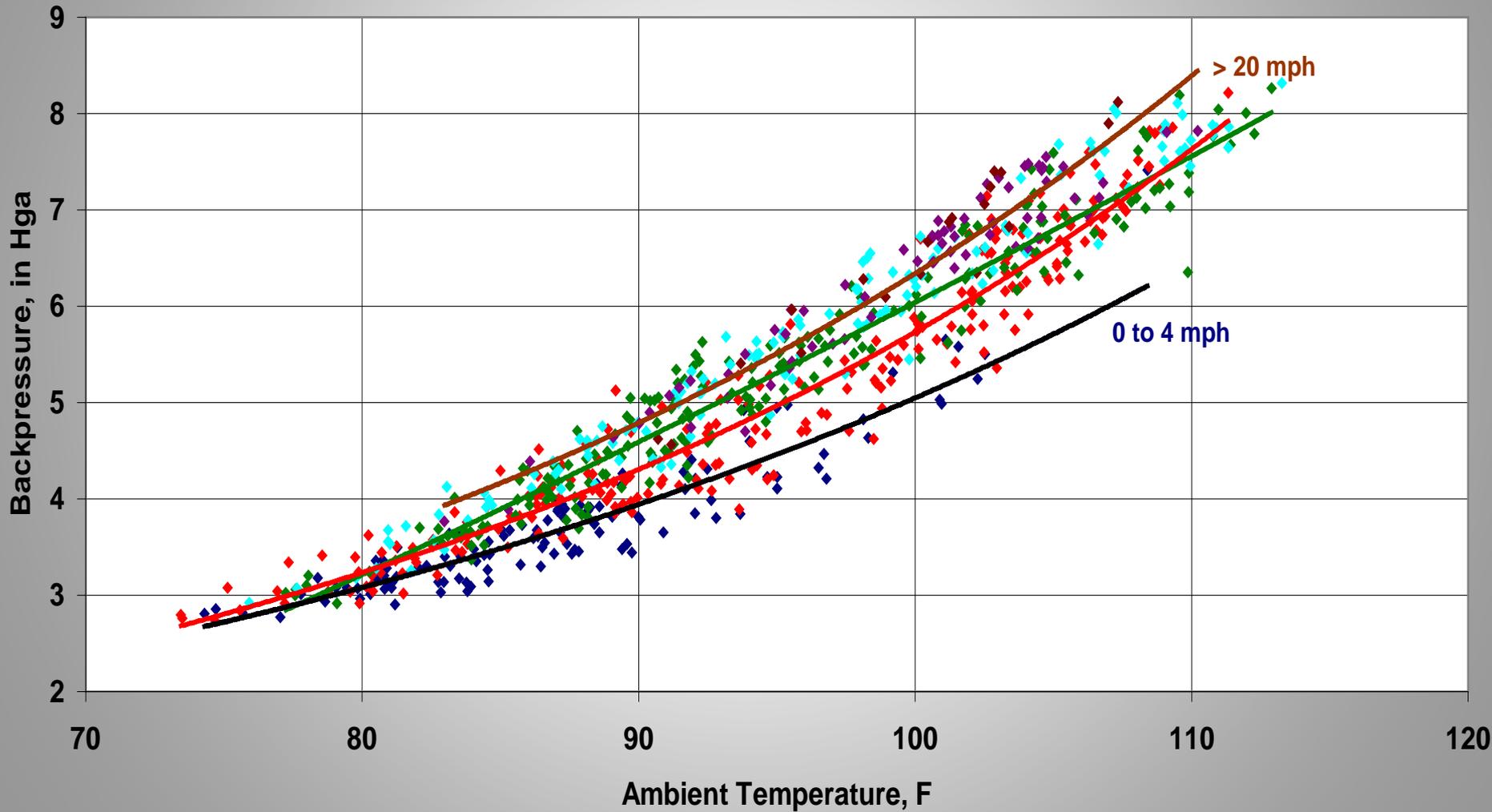
Thoughts for today

Quick review of last year

Does recirculation behave the way I said it did?

Why it matters

Wind Effect

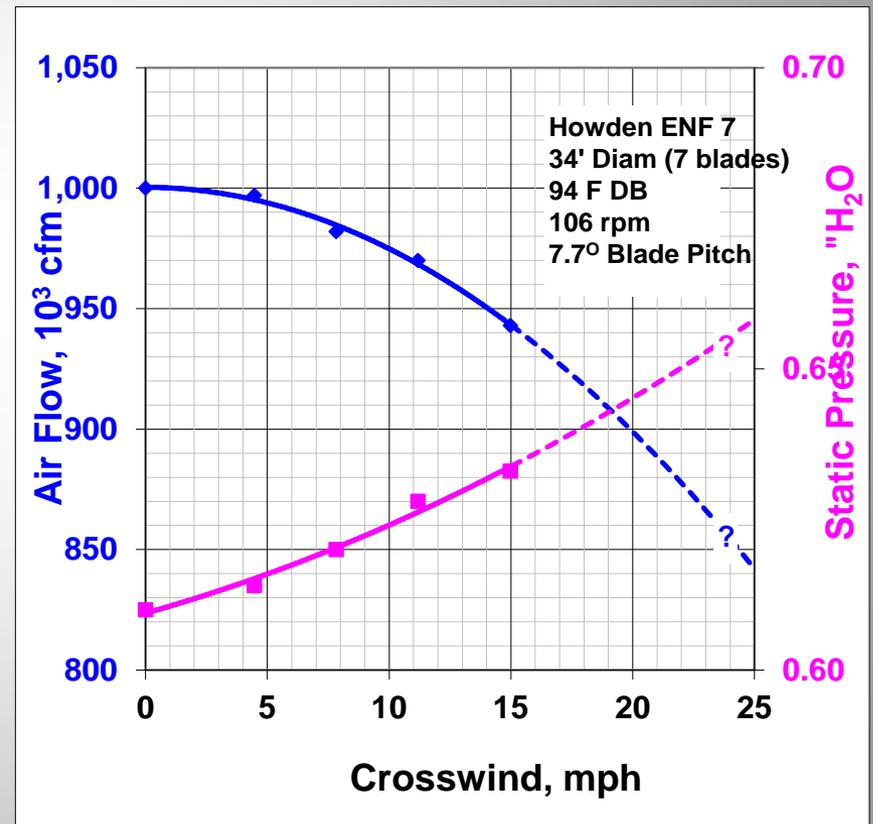


Two causes of wind effects

Recirculation



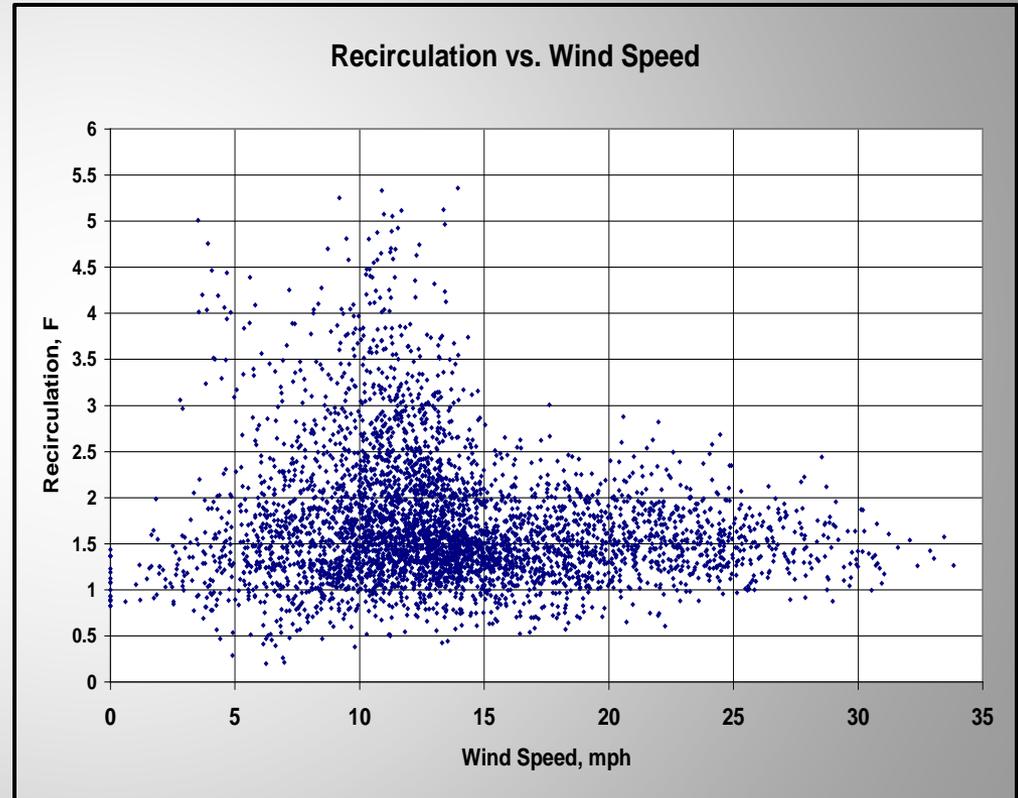
Reduced air flow



Field measurements

Recirculation

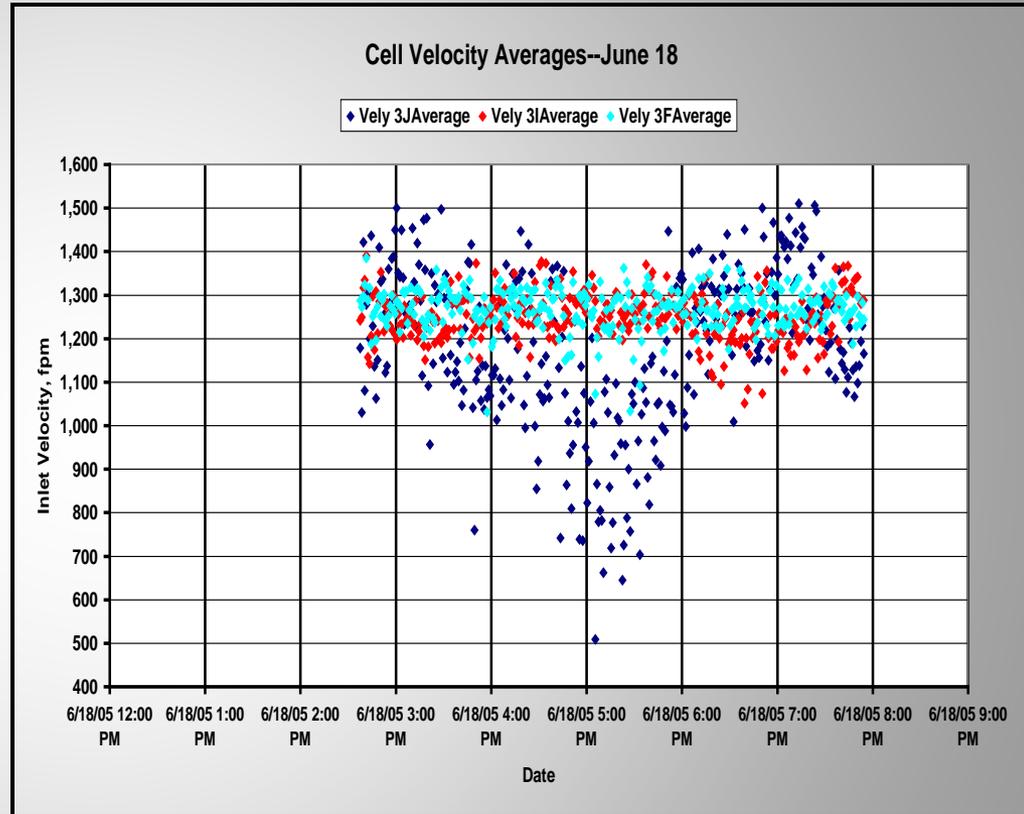
- **Recirculation = Inlet - Ambient**
- **Inlet temperature at all cells**
- **“ACC inlet” = All cell average**
- **“Ambient” is problematic**
 - Varies with height
 - Solar effects
- **Use “All cell minimum”**
 - No cooling mechanism
 - Shielded from sun
 - At right height



Field measurements

Fan performance degradation

- Can't measure it all
- Select a few fans
- Detect big reductions
 - At high wind speeds
 - From certain directions



A way to compare effects

- **Measure**
 - Ambient temperature
 - ACC inlet temperature
- **Get from plant**
 - Steam flow
 - Turbine exhaust pressure
- **Use ACC performance curves**

Relative Effects on ACC Performance

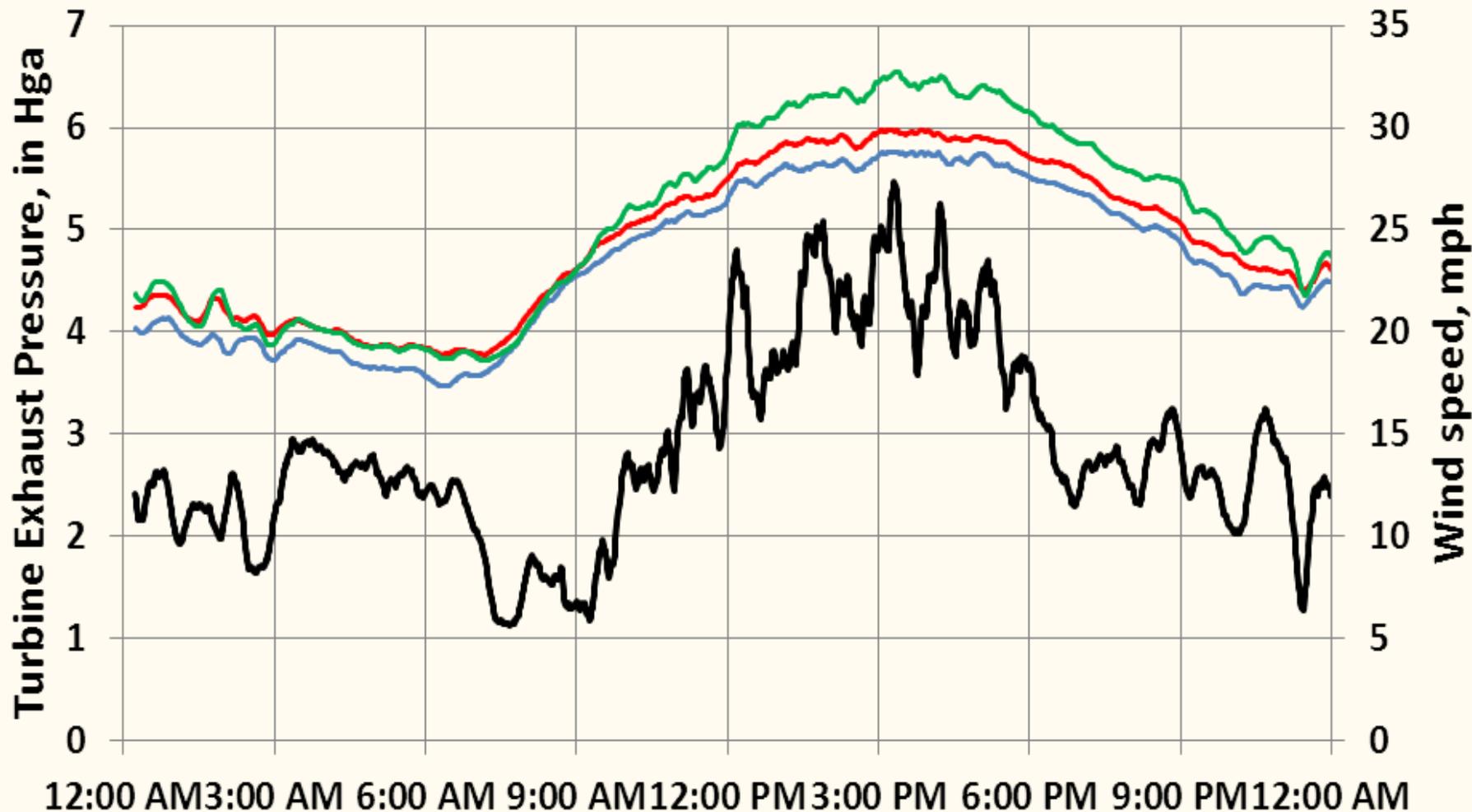
September 13, 2007

Design Backpressure

Expected BP

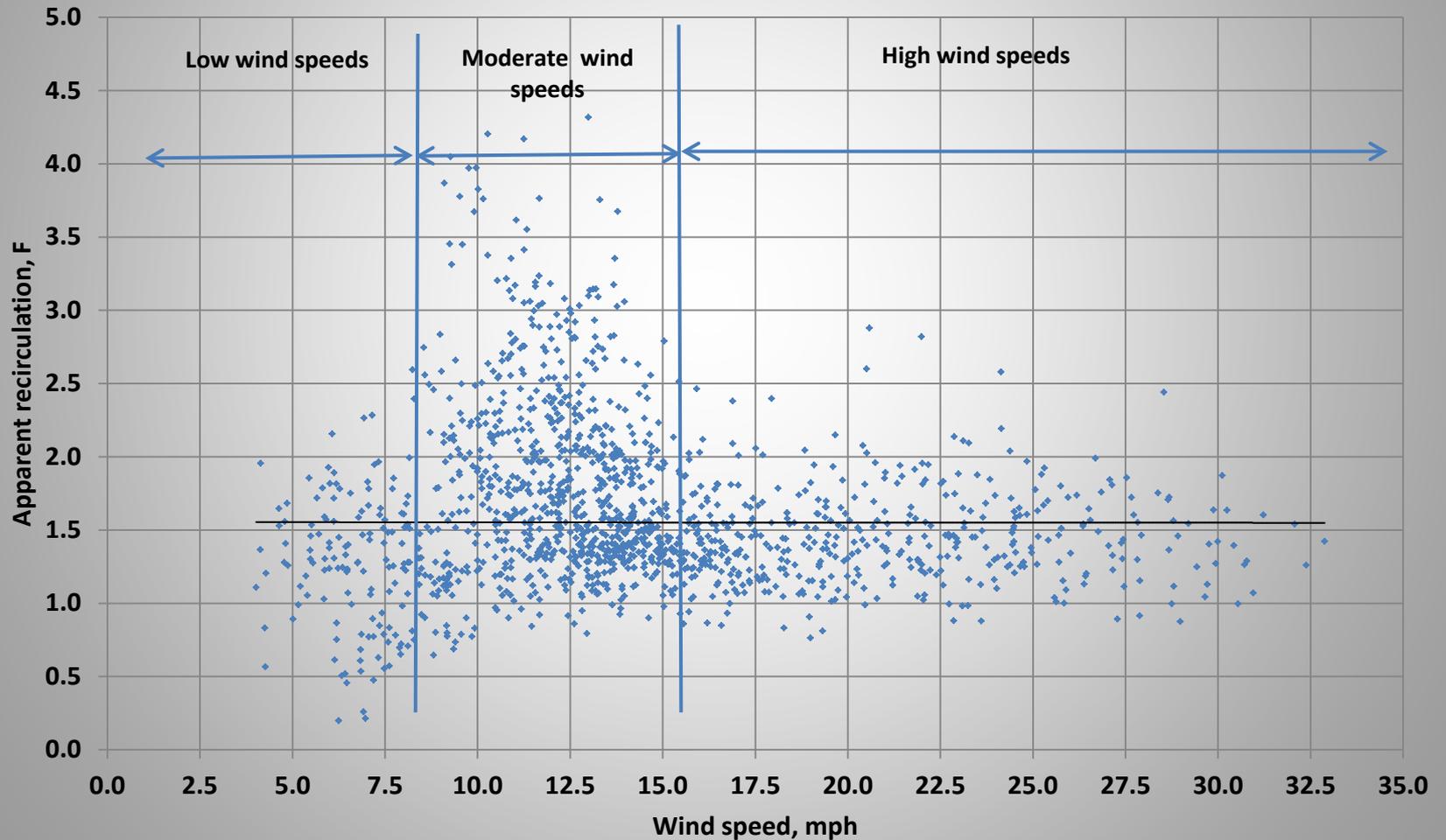
Plant data

Wind speed



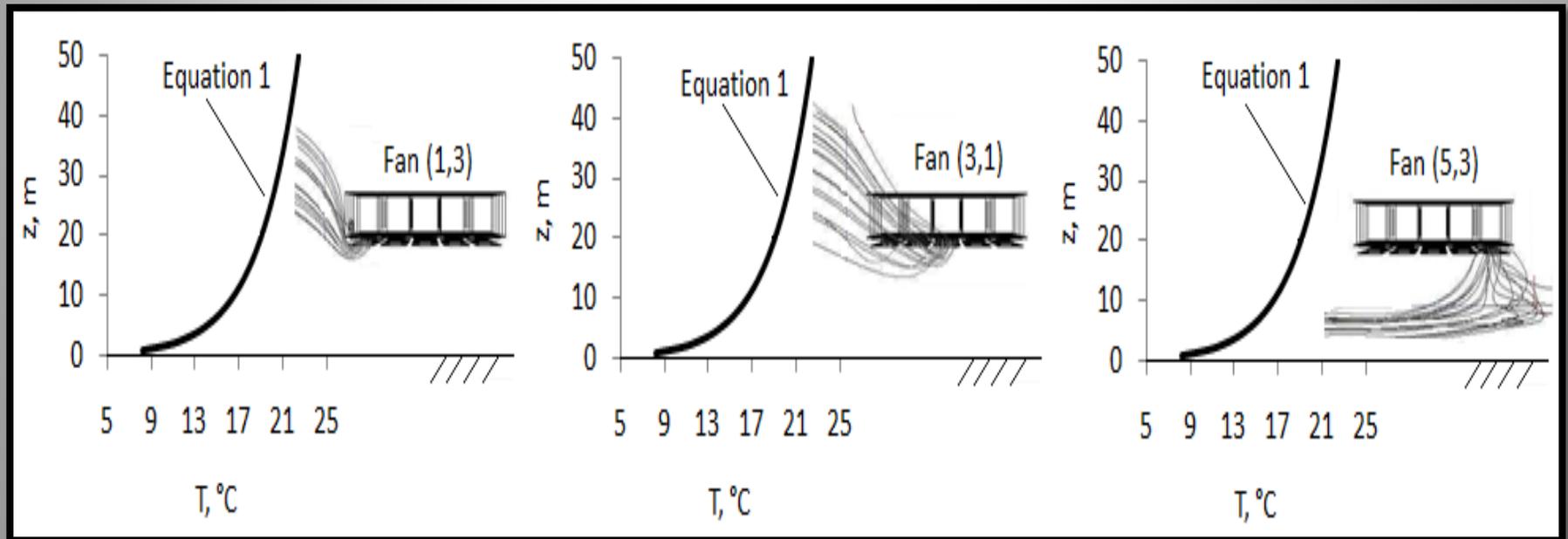
Back to recirculation

Apparent recirculation vs. wind speed September 13, 2007

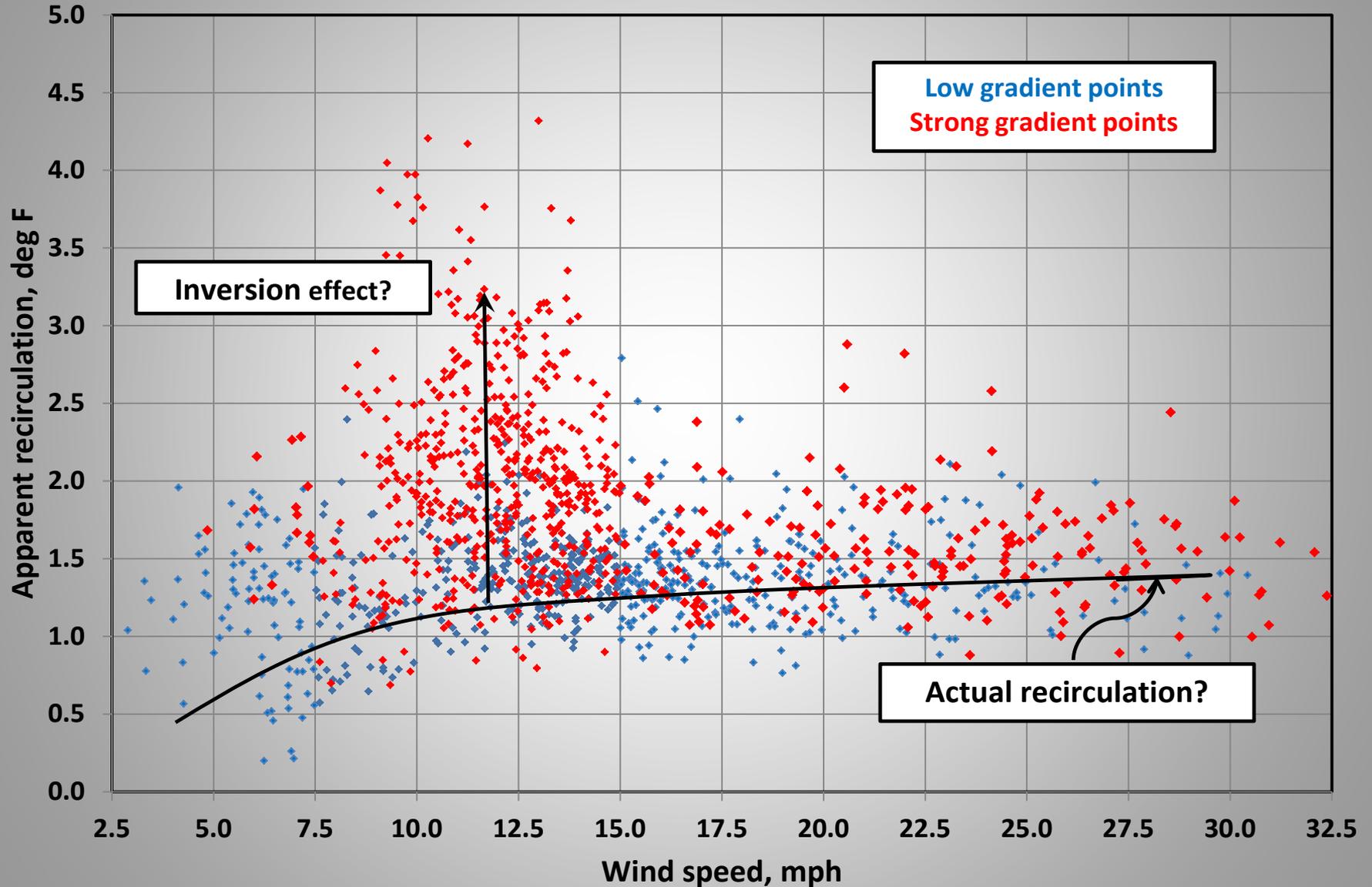


CFD Model Results

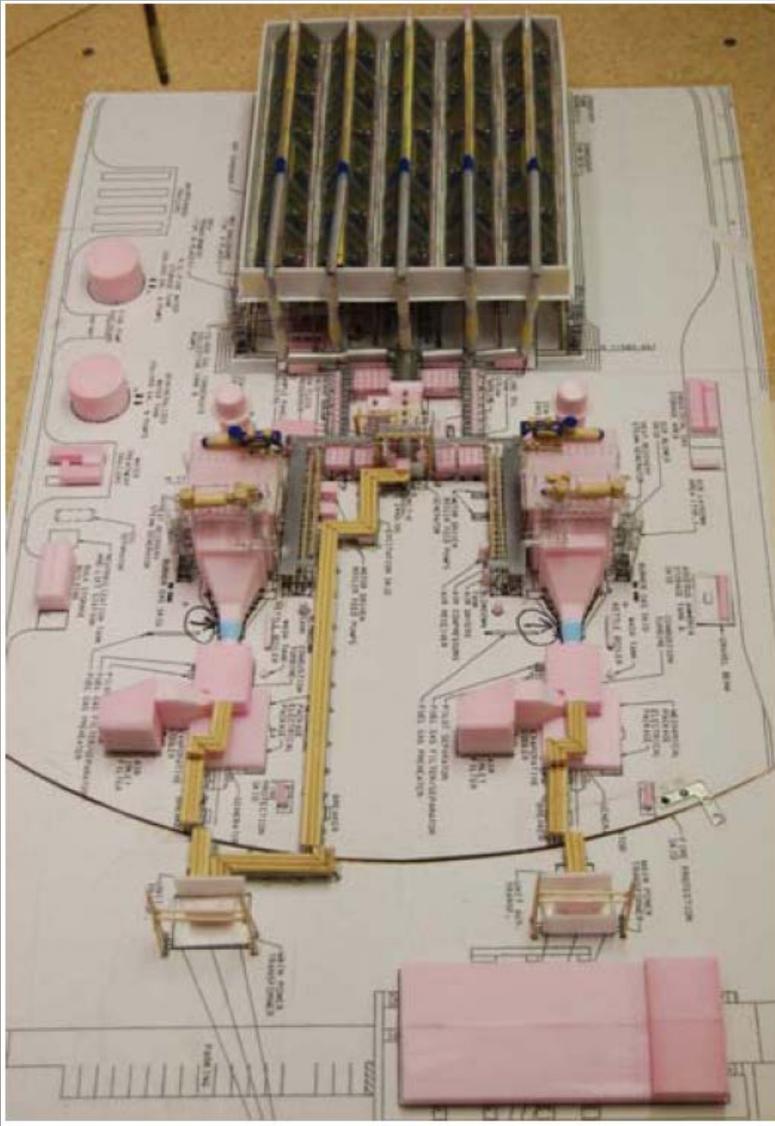
- Fans pull air from different levels
 - At low speeds; not high speeds
- Temperature gradients exist
- Cell inlet temperatures differ
- “Artificial recirculation”



Effect of atmospheric temperature gradient

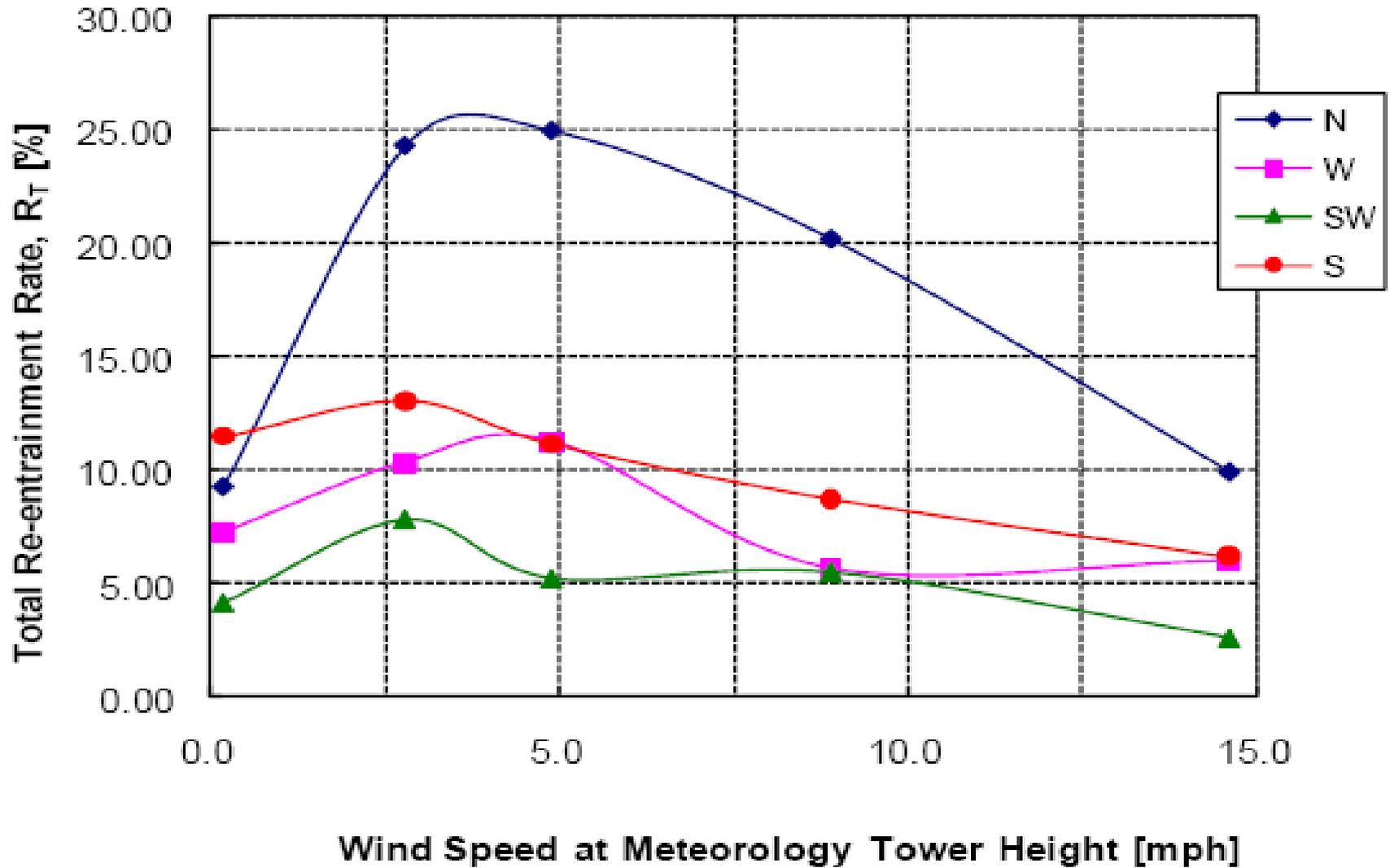


UC Davis wind tunnel model

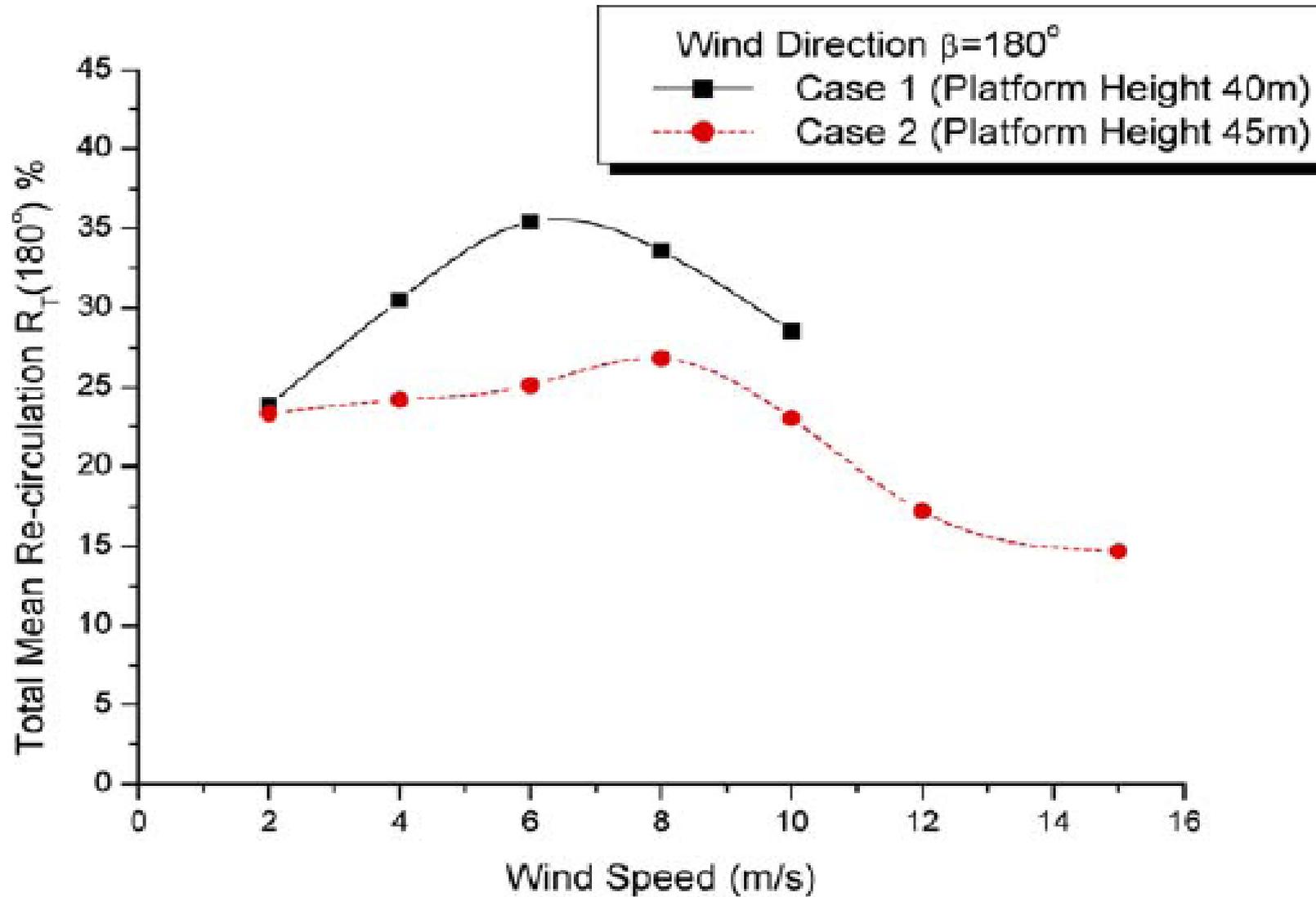


- Model of El Dorado ACC and site
- Get effects of surroundings
- Agreement with field test recirculation patterns was good
- No fan effects measured

UC Davis results



Work of Gu *et al.* in China



Who's right?

1. I don't know
2. Inclined to believe bulge exists
3. Why?
 - a. Measured at all 5 field test sites
 - b. Physical models usually good qualitatively
 - c. CFD models depend on sophisticated turbulence models
 - d. Often require tuning or tweaking

Why does it matter?

- **May be places where highest temperatures coincide with moderate winds**
- **Mitigation approach depends on mechanism**