EUREC4A-OA ATALANTE **PICCOLO**

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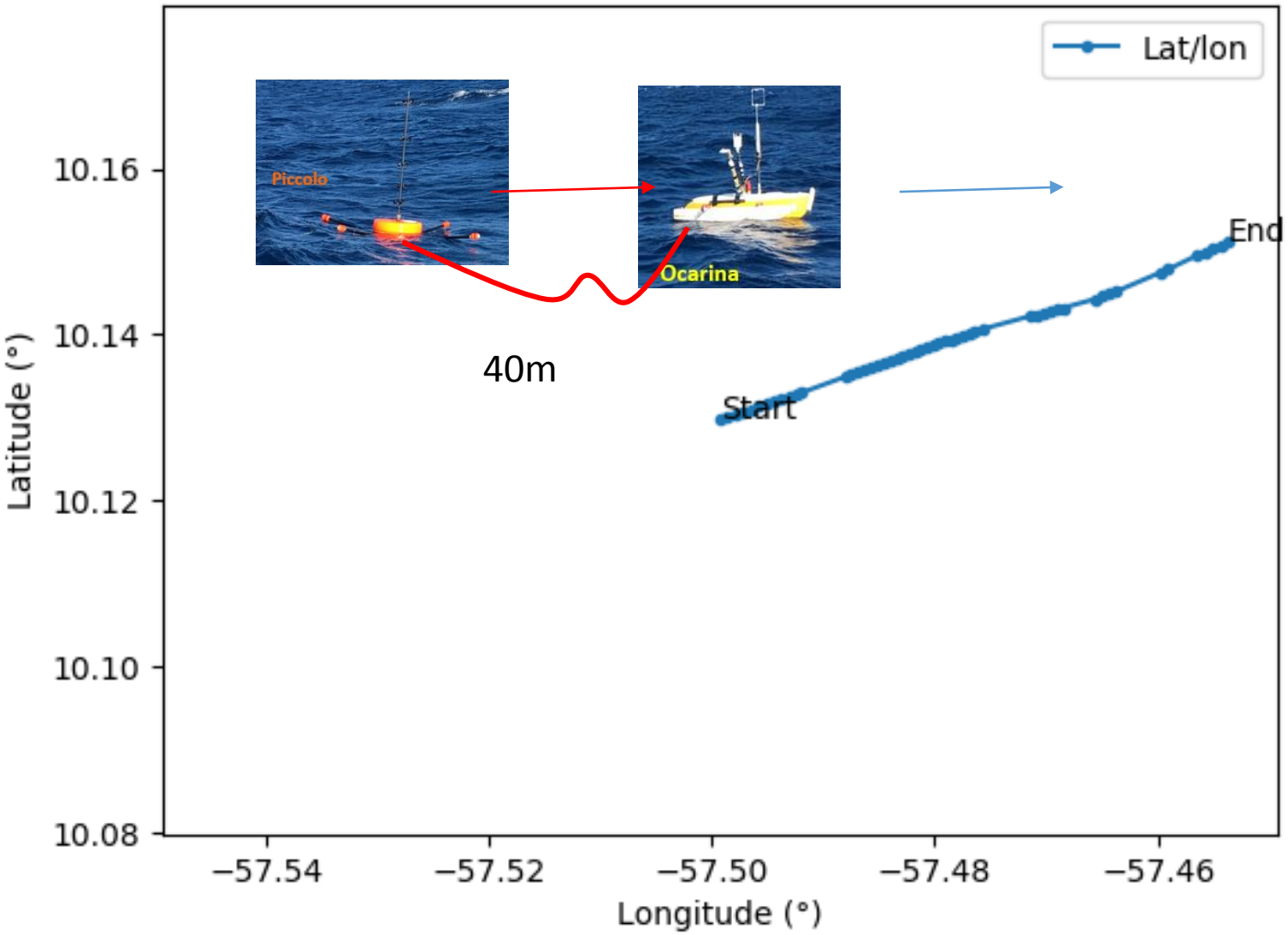
PICCOLO

January 25 2020

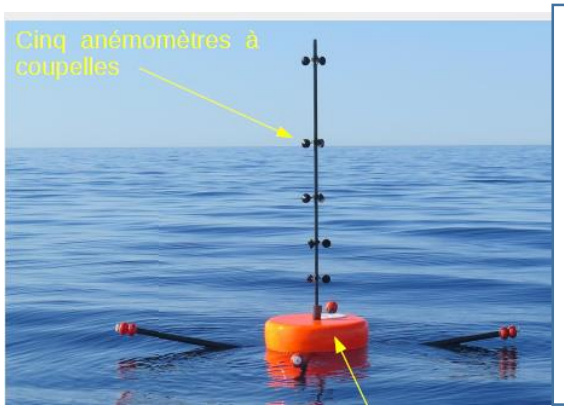
GPS Track

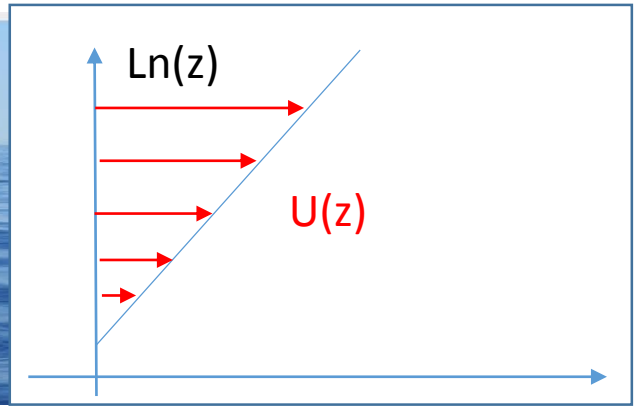
Piccolo was attached to Ocarina by a 40m long leash



Piccolo : main goal : wind shear and aerodynamic roughness zo

Five cup home made
cups anemometer





- All is home made …

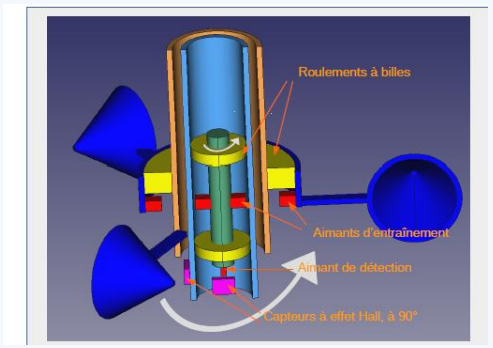
- Floater is symmetric: no wind direction influence
- Cup anemometer axis of rotation is inside the mast
  (cups turn around the mast : no wind direction influence)

- Weak mass (< 10 kg) + 4 arm directed slightly upwards
  → act as a wave follower, constant altitude above the sea surface
- Spot localization
- 25 Hz data acquisition rate on a SD Card
- Bluetooth connection to check the data

$$U(z) = \frac{u*}{\kappa}\left(\ln\left(\frac{z}{z_o}\right) - \Psi\left(\frac{z}{L}\right)\right)$$

$$\Psi\left(\frac{z}{L}\right) = \frac{3}{2} ln\left[\frac{1}{3}(X^2 + X + 1)\right] - \sqrt{3}\, arctan\left[\frac{2X+1}{\sqrt{3}} - \frac{\pi}{3}\right]$$

$$X = \left(1 - 16\frac{z}{L}\right)^{1/3}$$



Mast and cup design :
- There are several concentric nested masts
- There are several Bearings
- We used magnets:
  for each anemometer:
  - 4 training magnets : Two exterior
    Two interior
  - One detection magnet creating Magnetic field for the Hall-effect sensor located et 90°

→ Two analog signal + TTL signal in order to have rotational speed (and rps)

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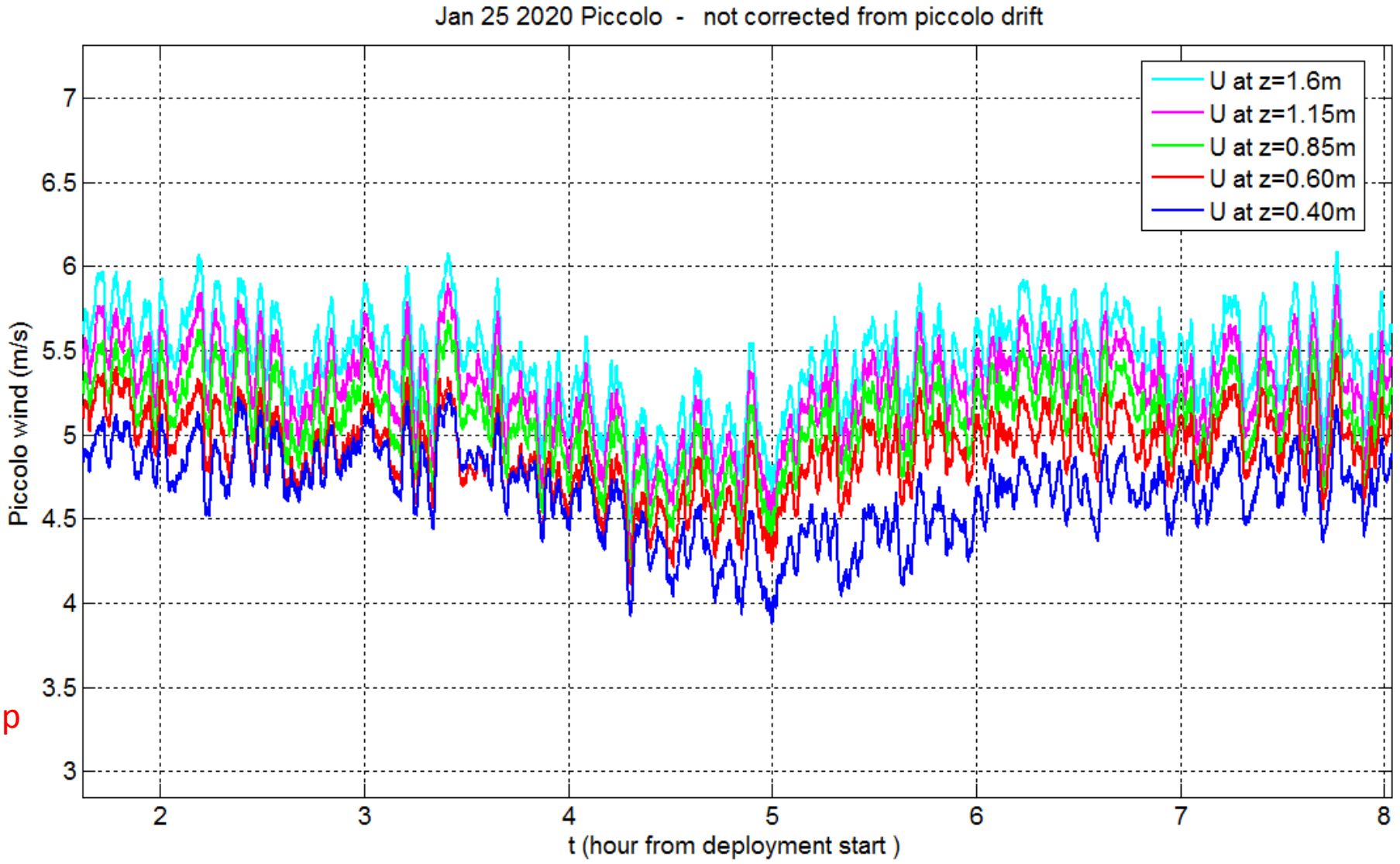

Measured

Wind from the five cup anemometers

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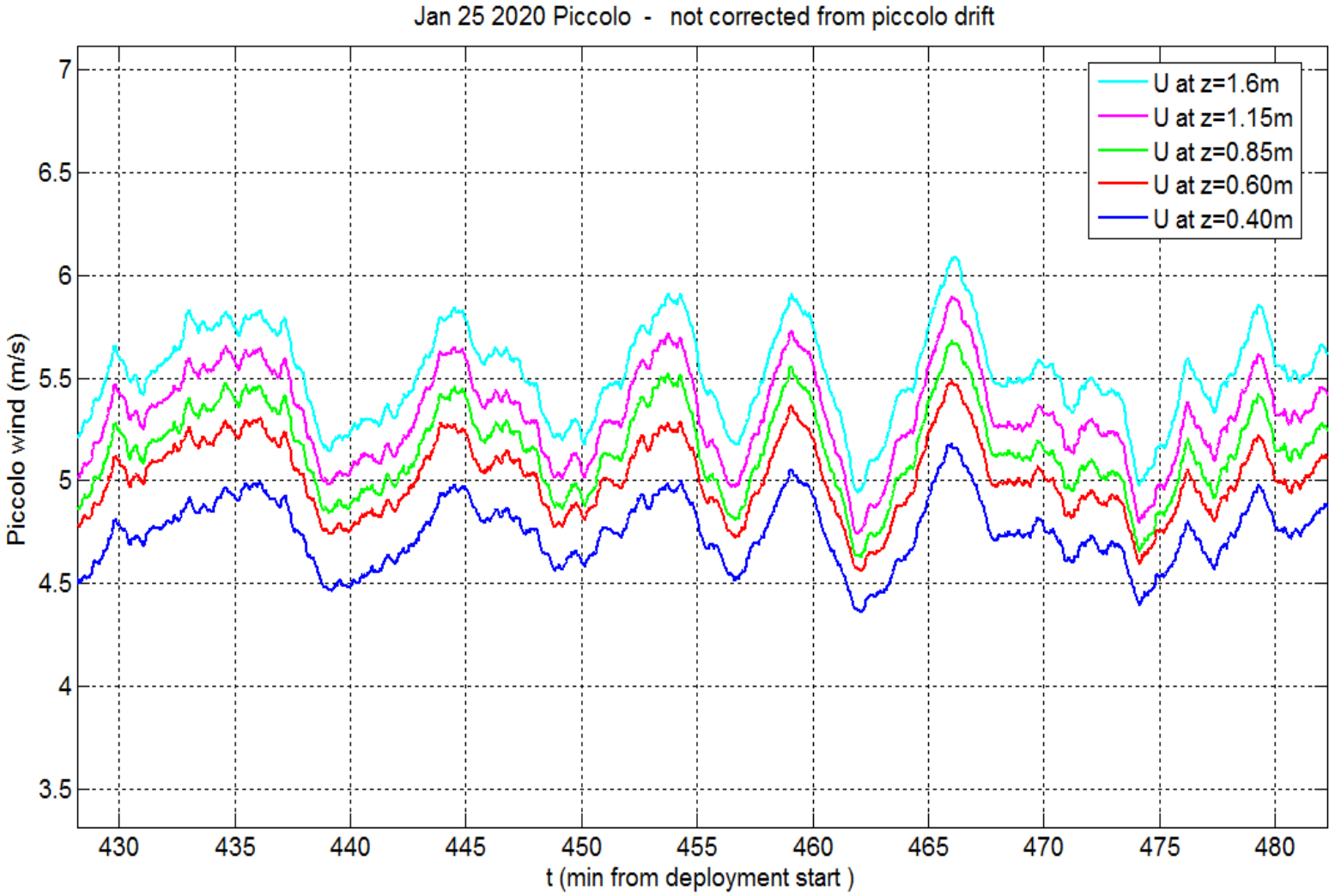
Wind from the five cup anemometers



From time to time we see clearly 5min to 10 min gusts oscillations → need further research

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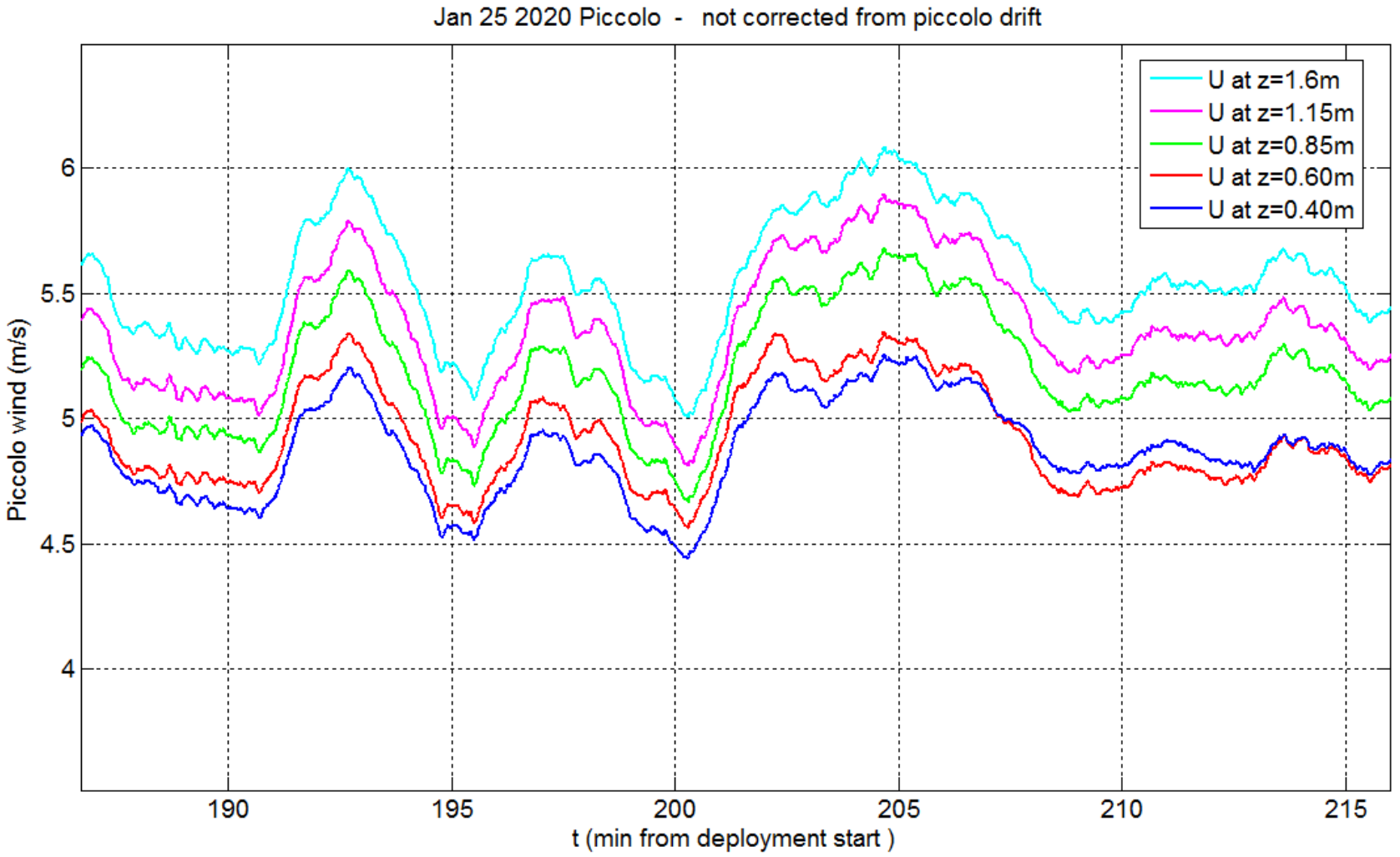
Wind from the five cup anemometers



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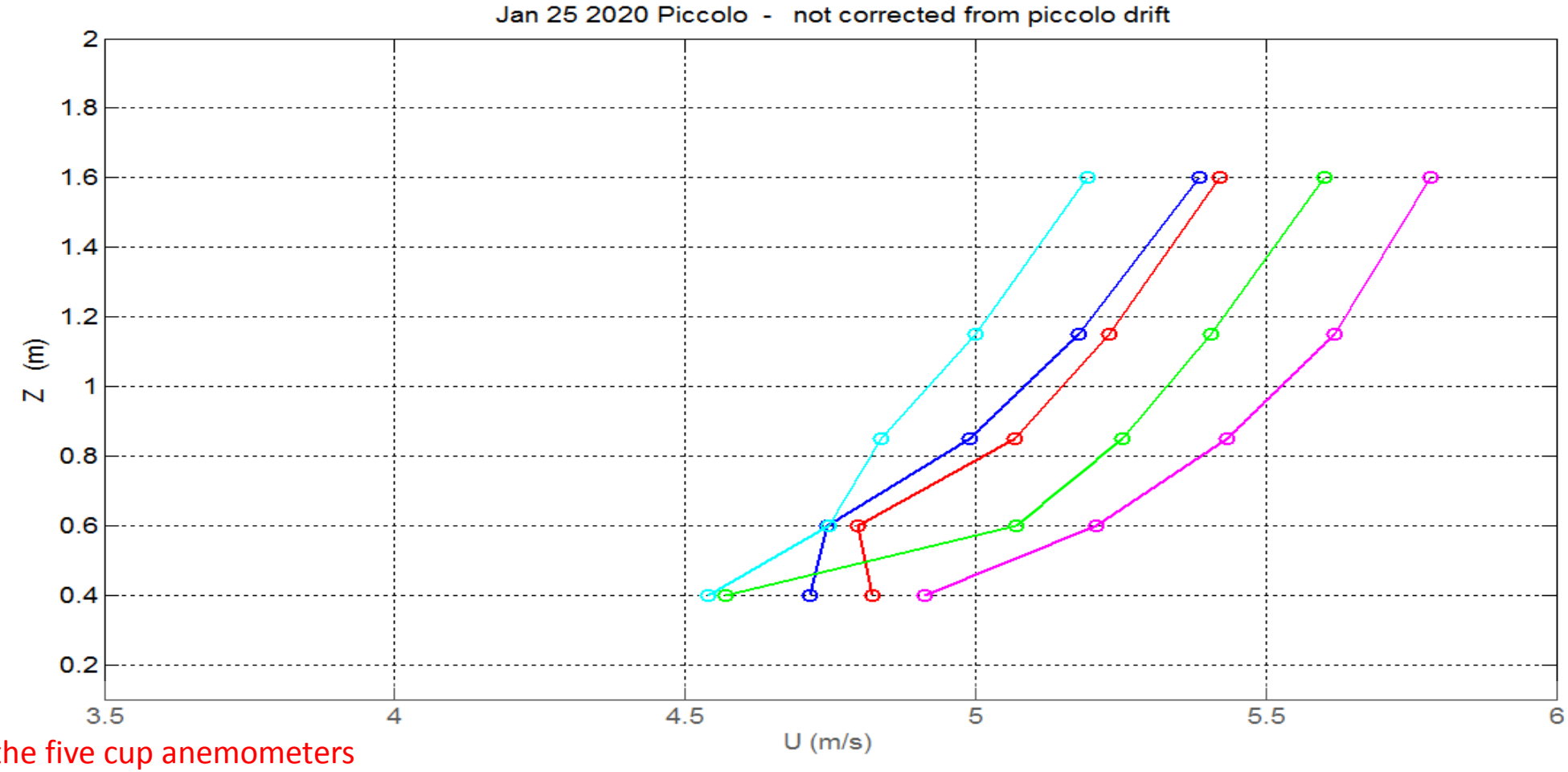

Measured

Wind from the five cup anemometers

Example of measured Wind profiles at a different time of the day (computed with 2 min average)

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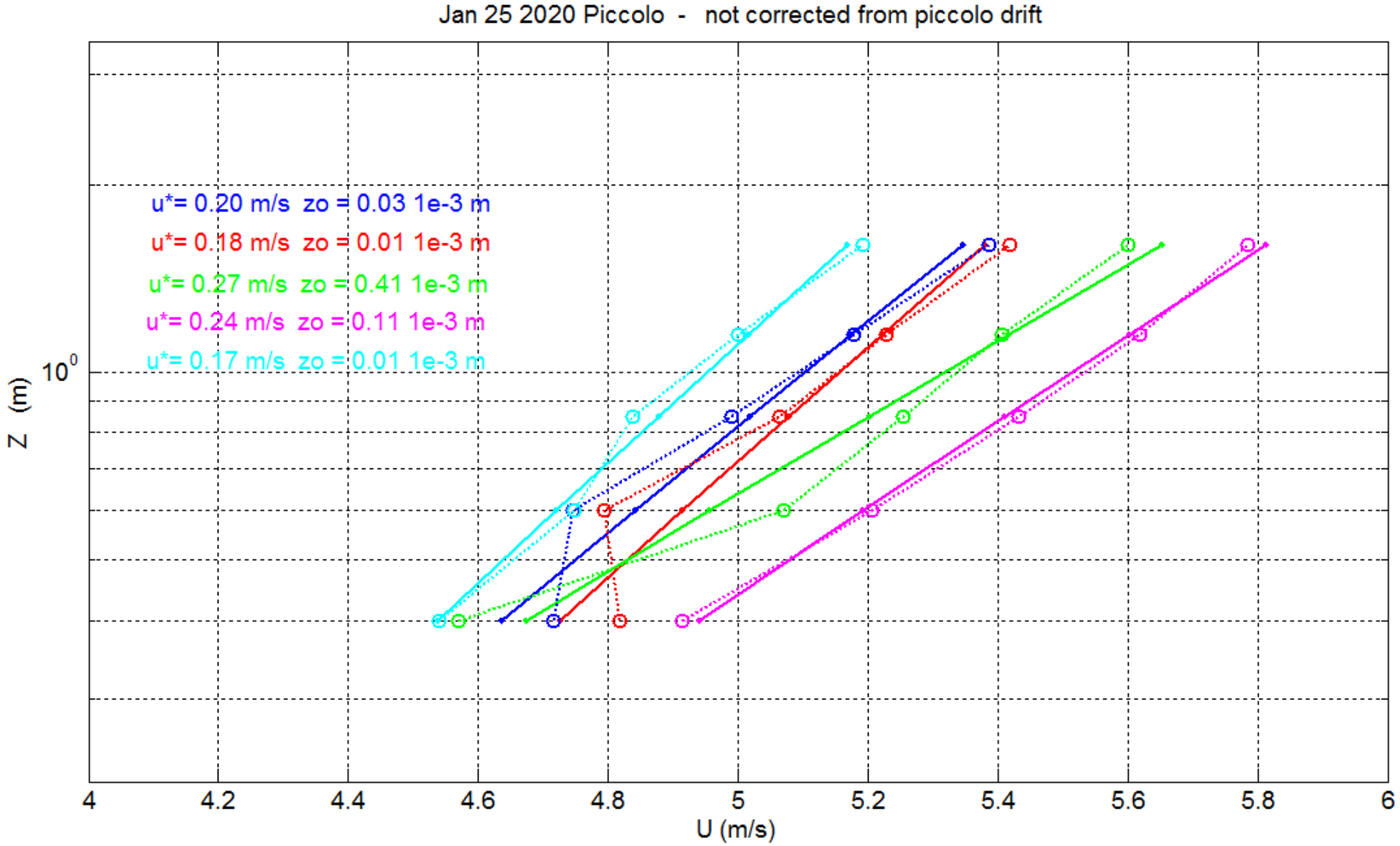
Same Graph

Z in Log Scale

Measured
Wind from the five
cup anemometers

U* and zo
Determination



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