<table>
<thead>
<tr>
<th>Category</th>
<th>Challenges</th>
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<tbody>
<tr>
<td><strong>WINDS</strong></td>
<td>Ground level and above ground level (invisible threat)</td>
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<td>- Turbulent eddies, building induced wake turbulence</td>
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<td>- Venturi effect—extreme rapid changes in wind speed/direction</td>
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<td>- Micro-burst translation</td>
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<td><strong>CEILINGS AND VISIBILITY</strong></td>
<td>Sub-grid microclimates (difficult to detect for BVLOS routes)</td>
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<td>- Think SFO or NYC, coastal cities</td>
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<td></td>
<td>- Icing in northern climates in cloud</td>
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<tr>
<td><strong>TEMPERATURE</strong></td>
<td>Temperature (non-ambient measurements difficult)</td>
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<td>- Heat island effect (major urban cities and desert locations)</td>
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<td>- Take-off/Landing largest risk--affects density altitude</td>
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CONSIDERATIONS

Client Experience
- Go/No Decision Leadtime—5 Hours or More
- Client “Weather” Tolerance Versus Airframe Tolerance
- City versus Airport METAR Temperatures and Weight Planning

No Human Pilot
- Replicating human inferences requires better micro-climate measurements

Time of Year and Hazard ID Lead-times
- Pop-up showers/thunderstorms or snow squalls
- Outflow boundaries entering city canyons
- Localized ceiling and fog creation/dissipation
RESEARCH TOPICS

SENSORS
- Ground level and above ground level (invisible wind threats, ceiling and visibility)
  - Point Versus Area Coverage—Density of Measurements
  - Routes Versus Vertiport Locations—What Parameters Are Key?
  - What is Good Enough? Mix of IoT and Legacy Weather Sensors?
  - Building obstructions to remote sensing systems
  - UAS as a sensor? How and what…in-situ, derived or both? Policy?
  - Business Models (P3) – Innovation and Greater Measurement Density

PREDICTIONS
- Safety Versus Client Experience
  - Validation and Calibration for performance-based standards vice instrument certification
  - How validate performance standards are being met by PSUs? Who?

LATENCY
- Best Approaches and Resolutions to Generate Useful Outputs
  - Physical and Dynamical Models, Coupled CFD, Machine Learning
  - Same Basic Questions as Sensors

Sensor—Fusion—Analytics—Decision Insight: Processed Where? Delivered How and to Whom?