A Statistical Analysis of Horizontal Visibility at Pegasus Field, Antarctica

Joey Snarski

Research Analyst

Scientific Research Corporation

Data

- Human observer at NZPG 12/09 – 04/15
  - Gaps in the data when no observer at airfield
- Total of 12,914 observations
- Time, Temperature, Wind speed & Direction, Present Weather, and Visibility

Whole Data Set

- 12421 Observations
- Multiple Linear Regression (Temp, Speed, Direction)
  - R = 0.305
  - Temp removed due to P-value = 0.262
    - R=0.305
- Mean = 8909m; STDEV = 2671m
  - ~86% of obs are within 1 STDEV (> 6000m)

Predictor Variables

- Linear correlations with visibility:
  - Temperature = 0.039
  - Wind Direction = 0.083
  - Wind Speed = 0.297
- Mardia Linear-Circular Correlation:
  - Wind Direction and Visibility = 0.209

Blowing Snow

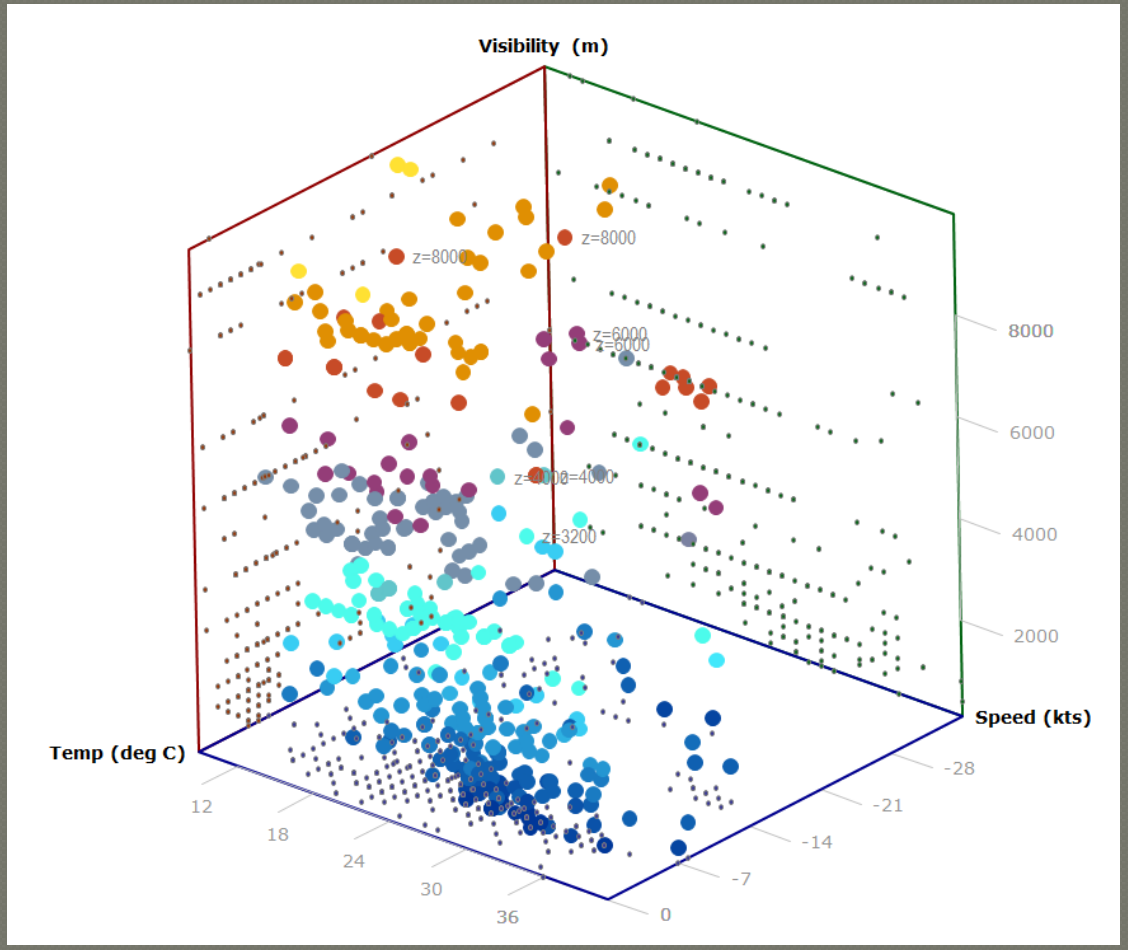
- 355 Observations
- Multiple Linear Regression (Temp, Speed & Dir, Time Since Snowfall)
  - R = 0.476
  - All p-values under 0.05
- Mardia Circular-Linear Correlation
  - Wind direction and visibility = 0.287
- Mean = 3715m; STDEV = 2849m
  - ~63% of obs are within 1 STDEV

Snow and Snow Grains

- 1332 Observations
- Multiple Linear Regression (Temp, Speed & Dir)
  - R = 0.158
  - All p-values under 0.05 (Speed = 0.041)
- Mean = 8086m; STDEV = 3038m
  - ~78% of obs are within 1 STDEV (>5000m)

Data Structure

BLSN events without other visibility obscurations



Produced with scripts by Gabor Doka

Future Directions

- Cluster Analysis
  - Categorize into regimes
  - Better prediction within regimes
  - Indicators for change of regime?
  - What causes certain regimes?
- Additional Circular-Linear Statistics
- Continue Data Mining to Find Patterns
- Use Additional Data
  - FMQ-19 Visibility Sensor

Acknowledgements and References

- SPAWAR Operations of Polar Programs
- Scientific Research Corporation
- Jeff Johnson and Art Cayette

- Mardia KV (1976) Linear-circular correlation and rhythmometry. Biometrika 63:403–405

Questions?