**A Statistical Analysis of Horizontal Visibility at Pegasus Field, Antarctica**

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**Introduction:**

Horizontal visibility and cloud ceiling height are two of the most pertinent forecasted parameters for aviation operations. This study focused on horizontal visibility by using a manual surface observations dataset from December of 2009 to April of 2015 for Pegasus Field, Antarctica (NZPG). Several methods of statistical analysis were applied to discover patterns in the visibility and determine which predictor variables have the largest influence. Patterns in the data might be used in aviation operational forecasting to develop more rigorous and statistically-supported visibility predictions.

**Methods:**

Linear statistic models were applied to temperature, wind speed, wind direction, in some cases the time since last snowfall, and to the dataset as whole, taking into account all the predictor variables at once to determine their relationships to horizontal visibility. Linear-circular correlations (Mardia, 1976) were also calculated for wind direction due to the cyclical nature of the data; however, other circular statistical methods are being investigated. These methods were applied to the dataset as a whole and also to groups of observations based on the present weather elements that were reducing the visibility.

**Preliminary Results:**

Out of the predictor variables that were analyzed, wind speed had the highest linear correlation with visibility (R = 0.297) over the whole dataset. P-values for temperature, wind speed, and direction were well below 0.05, which is considered the standard limit. When blowing snow was the only visibility-reducing present weather the wind speed linear correlation was again the strongest with R = -0.371 and a multiple R = 0.476 for wind speed, direction, temperature, and time since snow fall. The same for snow events yielded R = 0.158 for temperature, wind speed, and direction. The circular-linear correlations between wind direction and visibility were low, except for blowing snow events, which yielded a 0.287 coefficient.

**Future Directions:**

Continue investigating new statistical approaches to the data that might better highlight patterns. Such approaches include new circular-linear statistical approaches to be applied to wind direction, cluster analyses to better group the data into schemes where predictive formulas could be more accurate, and the inclusion of other predictor variables that are applicable under certain circumstances, such as relative humidity.