# Atypicality Analysis Tool Applied to Flight Operations Quality Assurance (FOQA) Data

Bryan Matthews (SGT), Rodney Martin (NASA), and Ryan Nurnberger (Southwest Airlines)

- Southwest Airlines analyzes approximately 1600 flights per day from 305 aircraft (of a fleet of 544 aircraft).

- The data is analyzed using a 3rd party analysis tool to determine threshold exceedances based on Flight Operations Manual limits and other coordinated parameter limits.

- Most discovery analysis is done while performing daily exceedance review or through voluntary pilot reporting
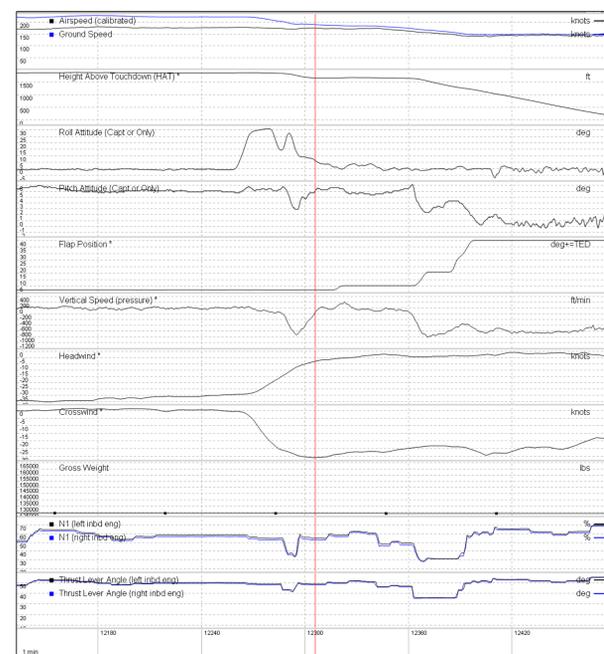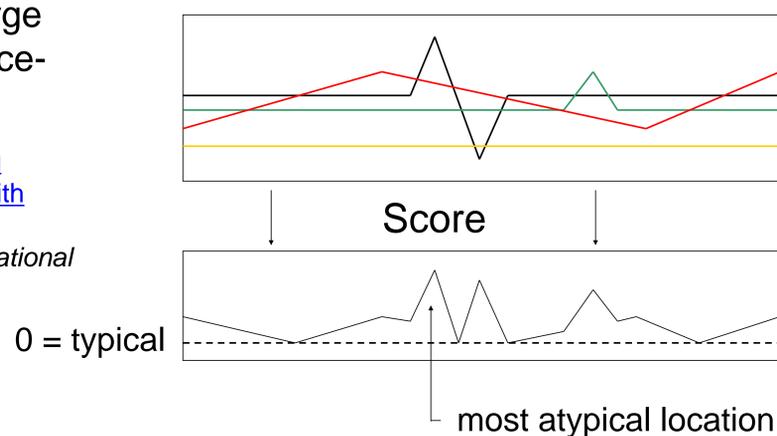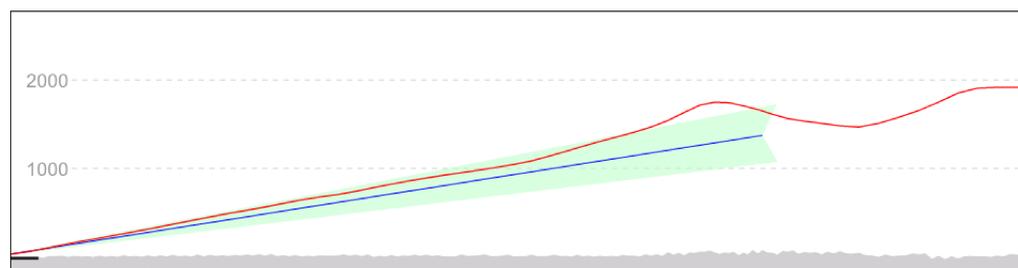

ORCA

- A program for mining outliers in large multivariate data sets using distance-based outliers

Bay, S. D. and Schwabacher, M. (2003). Mining Distance-Based Outliers in Near Linear Time with Randomization and a Simple Pruning Rule. *Proceedings of The Ninth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining.*

Score

0 = typical

most atypical location

Analysis

- ORCA was used to analyze 7200 flights from 10,000 ft MSL to touchdown to a single runway

- Data revealed interesting events:

  - Parameter spikes (data issues)

  - High roll and pitch events near final approach fix

  - Hard nose-over prior to landing

- Lead to new events added to daily exceedance review

| Airspeed (knots) | 123 | 134 | 146 | 157 | 168 | 180 |
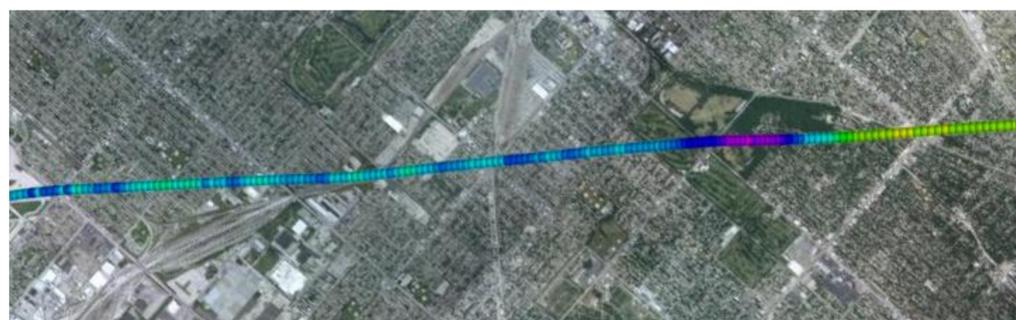
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For additional information, contact ryan.nurnberger@wnco.com