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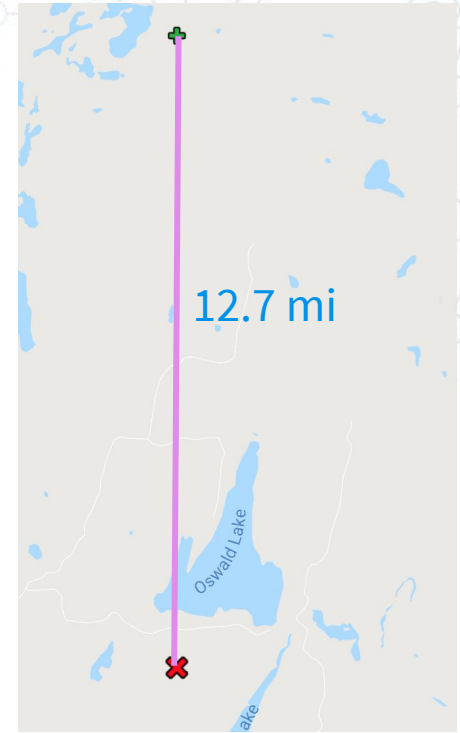
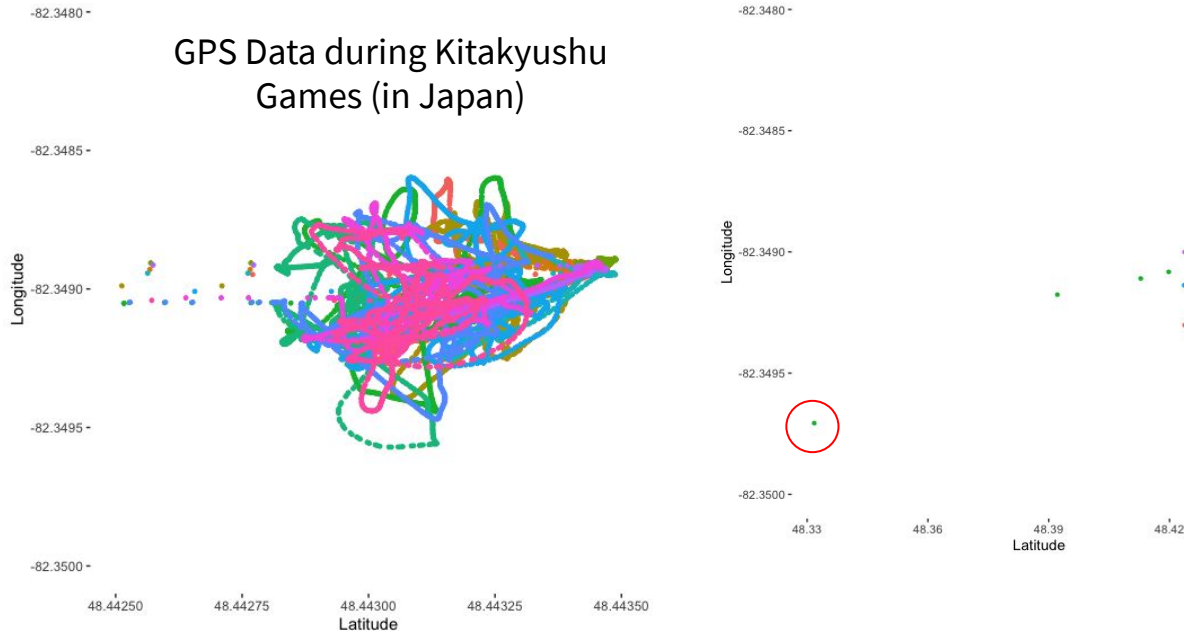
# Quantifying and Predicting Exhaustion

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TEAM LOAF

# Visualizations

## Interesting complications with GPS data

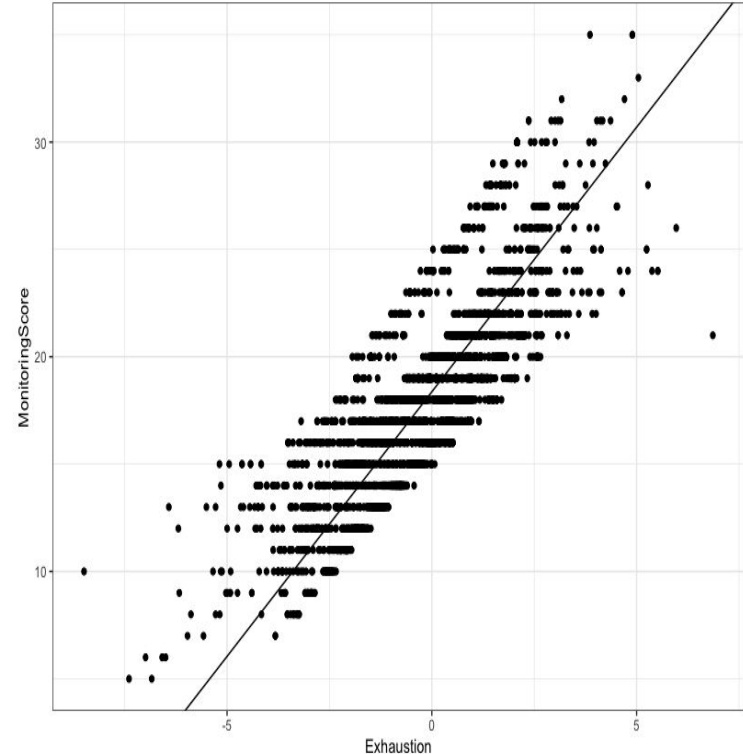
GPS Data during Kitakyushu Games (in Japan)



Other players go from Canada to Philadelphia and back within two minutes (~1800 miles).

# Summarizing Overall Fatigue

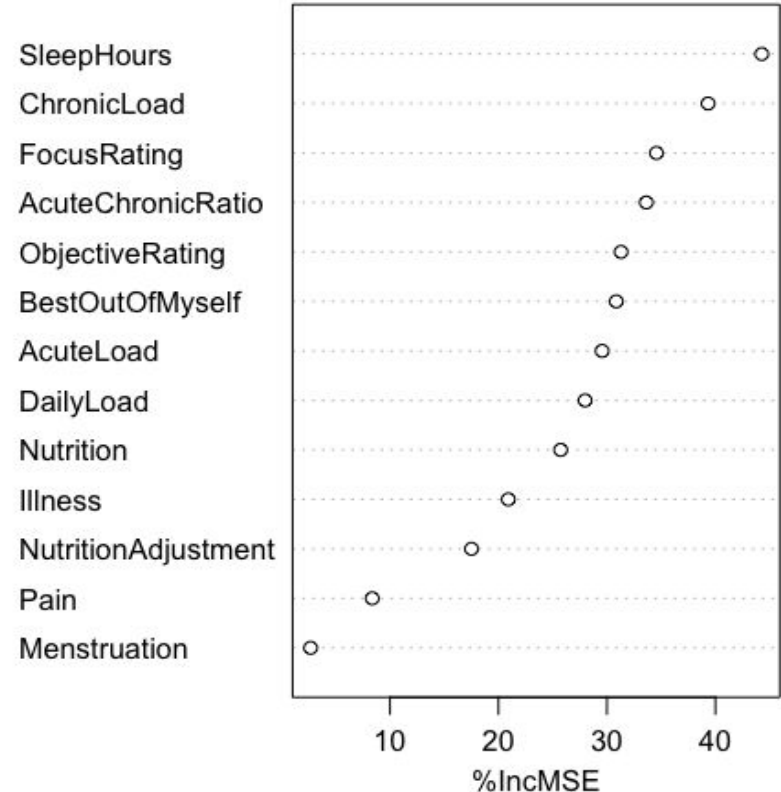
- Principal component analysis (PCA) to determine best summary of:
  - Fatigue, Soreness, Desire, Irritability, and SleepQuality*
  - Standardized within *PlayerID*
- Weighted average → ***ExhaustionMS***
  - Explained 45% of the variability
  - Theoretically better than *MonitoringScore*



# Training Analysis

- Standardized *RPE* and training loads by *PlayerID*
- Find important predictors for *ExhaustionMS*
- Prediction of *ExhaustionMS* is more accurate than *Fatigue*
  - ExhaustionMS* seems to be a more relevant metric

Random Forest Variable Importance Plot for Predicting Exhaustion



# Game Analysis

- ◎ Predicting exhaustion in games based on accelerometer readings
- ◎ Scraped and added weather conditions by game
- ◎ Ran **17** different models
  - Gradient Boosting Regressor
    - ◎ Training MSE: **0.48**
    - ◎ Test MSE: **2.72**
- ◎ Multiple Linear Regression (stepwise) includes only *WindSpeed* and *TeamPoints*
  - Higher *WindSpeed/TeamPoints* ↔ less *ExhaustionMS*