Modeling Power Loss Due to Wind Turbine Icing

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Motivation

• Site location
• Wind park planning
• Energy market pricing

Production Forecast Model

Mesoscale Model
Wind, Temperature, Clouds, Mixing Ratio

Microscale Model
Wind, Temperature, Clouds, Mixing Ratio

Icing Model
Ice Amount
Ice Type
Ice Shape

Wind Farm Management
Power Production Forecast
Icing Model

- Accretion
  - Makkonen Model
  - Collision efficiency
  - Freezing Fraction
- Ablation
  - Sublimation
  - Total Shedding
  - Wind Erosion

Sensitvity to Mesoscale Model

- Large impact on clouds from physics options
- Feeds to a large difference in projected ice mass
Power Loss Model

- Fit on ice model results reduces estimated power bias and error
- Park_pc is unadjusted power curve
- all_gam is the statistical model fit
- Better results are near 0.0