

# MUYE RU, PhD

1-919-808-8137 • [rumuye@hotmail.com](mailto:rumuye@hotmail.com) • Manhattan, NYC

Experienced commodity analyst leveraging weather data and advanced modeling to improve supply-demand forecasts.

## PROFESSIONAL EXPERIENCES

**Predicative Modeling Innovation Lead**, Morgan Stanley, NY, USA

**Mar 2022 – present**

Lead innovation, development, and enhancement of predictive modeling capabilities across commodities and equity markets. Drive application of advanced weather and fundamental modeling methodologies across Trading, Strats, and Research.

### ○ Weather & Climate Modeling Innovation:

#### ▪ Launching weather AI models:

- Build in-house capabilities for weather AI models (GraphCast, FourCastNet, etc.); Sent daily views on model comparisons.
- Conducted comprehensive model evaluation and backtest vs. ground truth and vendors across key ISOs/RTOs, with special focus on extreme-weather performance.
- Develop methodologies for customized model improvements, including ensembles, finetuning, and refreshed input data.

#### ▪ Exploring market edges in systematic weather shifts related to climate and teleconnections:

- Tested how variations in short-term weather, long-term climate, and ENSO phases are “priced in” using weather futures and regressions versus realized weather. Investigate links between polar vortex weakening, February cooling, and prices.

#### ▪ Expanding use of alternative weather datasets:

- Onboarded probabilistic storm-track forecasts for real-time hurricane monitoring; Designed backend infrastructure for flexible storage, processing, and visualization of spatial data.
- Assess value and limitations of Subseasonal-to-Seasonal forecasts across commodities and cross-asset applications.

### ○ Fundamental Supply/Demand Model Enhancements:

#### ▪ Developing advanced short-term load forecast model:

- Developed an hourly load forecast method using a flexible “like-days” sampling framework, improving transparency, reducing dependency on historical climate, and enhancing peak-load performance.
- Optimized model performance through a hybrid statistical-ML approach, capturing non-linearity, cross-hour dependencies, and improving accuracy under extreme-temperature conditions.
- Prototype a 2D spatial load-prediction framework incorporating high-resolution population distribution.

#### ▪ Improving crop yield predictions:

- Integrated nonlinear temperature-extreme effects into soybean and corn yield models, capturing yield losses from extreme temperatures and improving model accuracy by 15%.

### ○ Long-Term Power Market Scenario Analysis:

#### ▪ Integrating DOE Power System Models

- Onboarded DOE’s long-term supply-demand model for scenarios on capacity, data centers, and extreme weather stress.
- Built an automated pipeline connecting the model to internal fundamental analytics, enabling customized scenarios experiments by Research. Awarded a patent as the primary innovator for this workflow and integration architecture.

## ACADEMIC RESEARCH EXPERIENCES

**Postdoctoral Research Fellow - Modeling Energy Sector**, Earth Institute, Columbia University, USA

**Oct 2020 – Mar 2022**

- Studied behaviors of 600 oil and gas facilities in response to the methane policy lift using TROPOMI satellite retrievals.
- Simulated policy scenarios to evaluate the impacts on supply/demand, and climate. Attribution analysis of natural variability.

**PhD In Atmospheric Science - Linking Energy, Climate, and Economics**, Duke University, USA

**Sep 2016 – Oct 2020**

- Modeled relationships between atmospheric phenomena and energy demand, crop yield, and human health.
- Quantified wildfire amplification in the Pacific Northwest between 2002 to 2018 using satellite carbon monoxide retrievals.

## EDUCATION

**Duke University**, Durham, NC, USA

**PHD IN ATMOSPHERIC SCIENCE**, September 2020

**MASTER IN ENERGY SYSTEM**, May 2016

**Peking University**, Beijing, China

**BACHELOR OF SCIENCE IN EARTH SCIENCE/ BACHELOR OF ART IN ECONOMICS**, June 2013

## SKILLS

**Programming:** Python, R, Linux, Tableau. **Statistics and Econometrics:** regression, time-series analysis, causal inference, Monte Carlo, uncertainty quantification. **Commodity and Weather:** atmospheric and climate models, emission modeling, satellite data.

## SELECTED PUBLICATIONS

Du, X., **Ru, M.**, Almond, D., 2024. Rapid Increases in Methane Emissions from the Oil and Gas Industry. *AEA Conference Paper*.

- Derived O&G activities using satellite data. Compared O&G stock prices before and after a policy lift. Conducted causal inference.

Tao, S., **Ru, M.**, et al., 2018. Quantifying the residential energy transition in China through a national survey. *Nature Energy*, 3(7), 567.

- Reconstructed spatial-temporal patterns over 30 years from 30,000 samples. Derived residential energy demand model for China.