

Estimating Daily Sea Surface Dimethyl Sulphide (DMS) Concentration over the Northern Atlantic Ocean by Machine Learning Approach

PhD Student: Meixuan Liu

1. Background

Project – Bird navigation study

- How do they forage and migrate over a featureless ocean?
- Biosphere Interactions, Bird Flu & Public Health

DMS – Volatile Organic Compound

- Distinct smell: Utilised by birds for their navigation
- Influenced by local marine productivity: Monitoring of biogeochemical factors
- Global Sulfur Cycle, Global Climate Patterns & Climatological Study

3. Method

Comparison:

- 5 Single Models
- Stacking Models (Meta: RF, XGB, Ridge)

Tuning (5- & 10-fold Cross-Validation):

- Grid Search vs Random Search

SHAP Analysis

Generalisation:

- Point to Grid, then to the Region
- 1km, Daily

2. Research Aim

Develop an automated tool to:

Generate an odour gradient map with a high spatio-temporal resolution by estimating sea surface DMS in the NA domain

- Can be integrated with avian movement data later

4. Preliminary Results

XGBoost outperforms other models!

($R^2 = 0.853$ for test set, train: test = 7:3)

