On track of NH_3: cross-validation of satellite and ground-level measurements

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THE CHALLANGE

Ammonia (NH_3) is the most abundant alkaline gas in the atmosphere and has **major impacts on air, soil, and water quality**. It is responsible for the **formation ammonium (NH_4^+) particles** in the atmosphere which have a significant impact on human health. In the UK, **agriculture** represents **88% of atmospheric NH_3 emissions**. The UK government aims to reduce emissions by 16% in 2030 compared to 2005 levels.

WHAT WE DID

We **compared concentrations of NH_3** as measured at **ground-level by sites** belonging to the **UKEAP network** and **column-integrated satellite NH_3 concentrations from IASI and CrIS instruments at NUTS1 level. All data was monthly.**

We **compared** temporal and spatial trends.

A **sensitivity analysis** was done considering **satellite data** based on the **cloud cover fraction**, the **surface temperature contrast temperature at 1 km** and the **altitude**.

INVOLVEMENT OF STFC

The contribution of the **STFC Rutherford Appleton Laboratory (RAL)** was essential for the development of the project:

- STFC RAL provided the **Level 3 satellite NH_3** data for both **IASI** (Jul 2007 – Mar 2019) and **CrIS** (Nov 2015 - Dec 2019)
- STFC RAL provided the **knowledge about satellite** data products
- STFC RAL inputted on the **data analysis**

FUTURE AMBITIONS

- Publish the results in a **peer-reviewed publication**
- Apply daily **L2 data** and compare to **individual stations** ideally **with high-time resolved data** (i.e. hourly) for a better comparison.
- **Expand** the comparison approach in **other locations in Europe**
- Check the **proof-of-concept** project of ***Annalisa Sheehan et al***.