

## INTERNSHIP 6: IDENTIFYING DRIVERS OF INCREASED THUNDERSTORM FREQUENCY OVER INDIA

*Supervisors: Emma Barton (UKCEH), Jawairia Ahmad (UKCEH), Christopher Taylor (UKCEH)*

**Internship Location:** UKCEH Wallingford, Maclean Building, Crowmarsh Gifford, Wallingford, OX10 8BB

### **Project Description:**

Across India, large thunderstorm clusters called Mesoscale Convective Systems (MCSs) contribute up to 70% of the total rainfall during the Indian Summer Monsoon (ISM). MCSs are also associated with destructive hazards such as high winds, intense rainfall and lightning which can result in loss of life and infrastructure.

A 20-year global MCS dataset suggests a trend of increasing storm frequency during the ISM over a region where irrigation has been expanding over a similar timeframe. The role of the intern will be to identify and analyse significant trends in atmospheric and surface properties to characterise the processes driving the increase in storm frequency. In particular, the intern will evaluate whether human activity (i.e. irrigation expansion) is contributing to the observed trend.

### **Tasks:**

- Compute trends in surface and atmospheric properties (e.g. surface fluxes, temperature and humidity) using satellite and reanalysis products.
- Use statistical methods to isolate significant trends.
- Analyse temporal and spatial correlations between significant trends to identify the physical processes driving the storm trend.

### **Expected Outcomes:**

The project will determine whether the observed storm trend can be attributed to irrigation expansion. This could be crucial information for agricultural planning, particularly with the increasing demand for food with population growth. The findings could have implications for other regions of the world where MCSs are a threat to the population and irrigation has been expanding, including China and North America.

Results from the analysis will contribute to an academic paper, including figures produced by the intern, such as spatial maps of significant trends. The project tasks will provide the intern with experience in statistical and geospatial data analysis, producing publication quality outputs and working with a diverse team of scientists at UKCEH.

### **Required Skills and Background:**

Essential:

- Currently in undergraduate or postgraduate (**not** including PhD) education at university or have graduated within the six months prior to the start of the internship (30th June 2025)
- Interest in extreme weather and atmospheric dynamics
- Ability with a scientific programming language (preferably Python)
- Very good numeracy / statistical ability

Desirable:

- Experience with remote-sensing or reanalysis datasets
- Background in meteorology