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USING AIRCRAFT AND GROUND MEASUREMENTS OVER INDIA TO IMPROVE FORECASTS OF MONSOON RAINFALL

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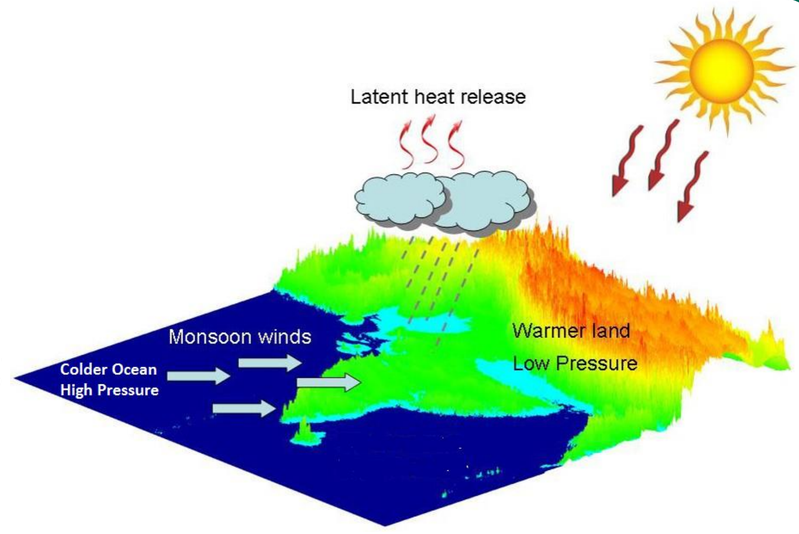
What is the Indian monsoon?

The Indian monsoon develops as a result of intense solar heating of the land in late spring as the solar maximum moves north from the equator. This results in increased temperature over the northern Indian Ocean and land, whereas the southern Indian Ocean will be relatively cooler. This sets up a cross-equatorial temperature and pressure gradient resulting in a reversal of the winds, blowing from the ocean towards India. These winds carry moisture and result in rainfall over the Indian land and surrounding regions.



Why do we need to improve monsoon forecasts?

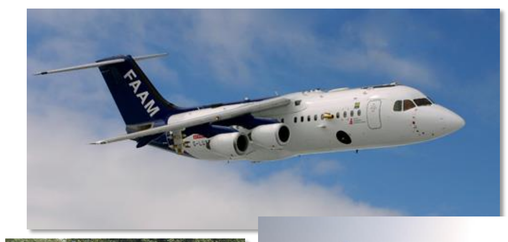
The monsoon provides water to more than a billion people in India for their survival, agriculture and industry. Any variability in timing, intensity and duration of the monsoon has a great impact on rain-fed agriculture affecting the Indian economy and thereby the world economy. Current computer models fail to provide accurate forecasts of the monsoon even a season in advance because we don't know enough about the physical processes involved.

The Indian monsoon is a large-scale system that also has impacts on European weather through atmospheric waves. A better understanding of the monsoon and improved forecasts could also help to improve seasonal forecasts in Europe.

What have we done so far?

During summer 2016, we took the UK's Atmospheric Research Aircraft on it's first mission to India. We set up bases at two airports: Lucknow in northern India where we flew from fertile agricultural land around the Ganges river to deserts in the northwest; and Bangalore in southern India, where we flew over the Western Ghats mountain range and the adjacent oceans. During the flights, we measured changes in the structure of the boundary layer (lower atmosphere) and in developing cloud structures as we flew over different types of land surface. We also made ground-based observations from towers measuring surface temperature, soil conditions and heat and moisture transfers and launched weather balloons.

How are we working to improve monsoon forecasts?



Improved forecasts

The 'INCOMPASS' project aims at improving the monsoon rainfall forecasting capability of the Indo-UK scientific community by gathering new observations over India and combining them with computer modelling at unprecedented detail.

An improved forecast will help in better agricultural and industrial planning, resulting in food and water security of more than a billion people.

Acknowledgements

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