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*Editorial*

## Revisiting Agrometeorological Research in Context of Climate Change


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Agrometeorology is the branch of meteorology that studies the effect of weather and climate on agriculture and various components of farming system. With the progress of industrialisation, technology development and rapid urbanisation in recent decades, exponential increases in greenhouse gas emissions have caused instability in atmospheric conditions such as rapid change in temperature, rainfall, other weather parameters and their distribution in space-time scales. It is becoming very challenging for agriculturalists to feed the ever increasing population with decreasing cultivable land area and pressure on natural resources like water. These challenges are substantially intensified when the actions required to address shifts in climate variability under future climate change projections are considered.

The potential impacts of climate change on food (food grain production with proper nutrition)-fodder, water (water use efficiency and environmental security including pollution) are extensive. It demands revisiting and strengthening of agrometeorological research into mitigation and adaptation actions that can assist in addressing those issues. This includes assessments of climate change impacts on agricultural production, quality of produce, water use and agricultural productivity, both in aggregate and also down to farm scale. The application of downscaled climate projections to estimating future yields and losses including measures of uncertainty deserves further attention. To facilitate progress, and to improve baseline observational data to support services and modelling, optimal combinations of remotely sensed, modelled and in-situ measured agrometeorological parameters will need to be developed at high spatial and temporal resolution universally. Placing such data on a common spatial and temporal grids would vastly improve its utility. Recent developments in satellite meteorology are enabling the frequent measurement of a number of basic agrometeorological parameters (e.g. surface albedo, surface temperature, evapotranspiration, solar radiation, rainfall, crop vegetative indices etc.) at higher accuracy than previously available. Research efforts to ensure this data which is fit for purpose and widely available for use, will be extremely important to developing such finer resolution baseline data.

Notably, research and development of the Internet of Things (IoT)-based automation with in agricultural technology will also be important in augmenting baseline data. The automation itself will help drive further productivity gains, releasing human capital for other productive activities within the agriculture sector, or elsewhere. IoT combined with use of Wireless Sensor Networks (WSN) and Precision Agriculture (PA) are amongst the cutting edge of current practices to increase farm income through optimising input resources such as land, water, pesticides and fertilisers. However, infrastructure cost remains a significant impediment to its widespread adoption in developing and emerging economies. Therefore, research and development investments to reduce costs would be greatly beneficial to improve global food security.

Development of comprehensive finer resolution downscaled climate projections, globally for all locations, with uncertainty measures, will be crucial to the ability of agrometeorologists to estimate future agricultural productivity and impacts on food security. It will also be pertinent to carry out deeper investigations and modelling experiments on micrometeorological fluxes of Green House Gases (GHGs) such as water vapour, methane, nitrous oxide etc. Improved understanding of source-sink behaviours will help to develop optimized management practices

and identify new options of cropping patterns which reduces GHGs emissions and maintains sustainable productivity.

More broadly agrometeorology has an important role informing other parts of the agricultural value chain to help optimise their operations. For example, the need for food preservation during packaging, transport and storage is climate sensitive. Hence, multidisciplinary research along the length of the value chain – not just on production itself - but in areas such as marketing, consumption demand, waste treatment and recycling will be important to future food security.

Addressing the above suggestions as high level research priorities, will place agrometeorologists well in contributing substantially to the achievement of the 2030 Sustainable Development Goals (SDGs).