Climate services for renewable electricity planning in West Africa

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In West Africa, renewable energy sources are abundant. Many countries in West Africa already have large shares of renewable power, mostly hydropower, in their electricity mix. Yet, many of these countries struggle to provide reliable electricity to their citizens, with electrification rates ranging from close to 80% in Ghana to only 14% in Niger. The stress on the existing power grids is further exacerbated by strong population and energy demand growth in the region.

To assist West African governments and policymakers in planning efforts to expand electricity supply using renewable sources such as solar, wind and hydropower on small and large scales, climate services are indispensable. This requires accurate estimations of the potential for these power sources at high resolution on (i) spatial scales in the order of kilometers and (ii) on temporal scales ranging from diurnal to seasonal, and how these patterns could change towards the future. This will at the same time enhance knowledge on the large-scale hydro-meteorological controls on these potentials, which can serve to better understand their potential evolution under future environmental change.

In the ERA4CS project CIREG (Climate information for Integrated Renewable Electricity Generation), we are working towards (i) creating a hybrid Regional Climate Model-Remote Sensing data product containing such high-resolution information on renewable electricity potential; (ii) designing methods to use such data to determine optimal locations, sizes, and energy mixes for renewable power production sites; and finally (iii) assessing the robustness of such approaches considering uncertainties in state-of-the-art modeling approaches and in future projections of climate change and socio-economic development. Optimally, this approach would become more generally applicable to other regions worldwide, particularly across Sub-Saharan Africa where big strides are still to be made regarding climate services.