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Recently, due to the advantage of renewable energy technologies, increasing the cost of fossil fuels, and its global warming effect, the use of distributed energy sources has been growing1. Moreover, accessibility to electric power results in social, economic, and technological advances. In the recent decade, the thermal energy demand has increased considerably because of urbanization, changes in lifestyles and consumption patterns2. On the other hand, due to environmental concerns, the use of renewable energies has received more attention.

Among the renewable sources, solar energy is presented as the ideal alternative to face energy change, with a multitude of technologies being developed to meet this demand. Solar resources can generate enough energy to supply the planet, and electricity can be obtained directly from photovoltaic modules16,29. Solar energy has registered 2020 a percentage close to 39% in terms of global participation, implying that more than one-third of the power plants are solar.

The energy generated by PV modules depends on several variables, such as the intensity of solar irradiance, ambient temperature, wind speed, module positioning and ventilation, environmental dust and pollution, and shadowing17. Although most of Africa receives over 2000 kWh/m2 of global solar radiation annually, Ethiopia has not fully capitalized on solar energy-generating plants on the continent. Due to its proximity to the equator, Ethiopia enjoys abundant solar resources. Accurate estimations of solar radiation are crucial for successful PV power generation in the region18.

Contribute to the understanding of solar radiation patterns on horizontal and tilted surfaces, which can aid in the optimization of solar panel installations and the calculation of system efficiencies.

The dataset compiled for this study can be used in a variety of applications, including climate modeling, agricultural planning, and the optimization of solar panel locations for solar energy producers. Researchers studying the potential of solar radiation can also utilize this dataset to estimate solar radiation for different collector tilt angles. Overall, this dataset was compiled to aid solar energy research, forecast future solar energy prospects, and support the development of sustainable energy solutions in Bahir Dar, Ethiopia.

Researchers can further investigate this dataset, conduct additional analysis, and build on the findings to advance their own research goals. They can also compare this dataset to others to evaluate the performance, effectiveness, or impact of various models, methodologies, or interventions. Furthermore, policymakers, industry professionals, and practitioners can use the insights from this dataset to inform evidence-based decision-making, develop strategies, and shape interventions related to renewable energy and sustainable development in the region.

Bahir Dar is situated in the northwestern region of Ethiopia, nestled along the southern shore of Lake Tana, the largest lake in the country. The city lies at an average elevation of around 1,800m (5,906 feet) above sea level, within the Ethiopian Highlands. The latitude of 11?36"N situates Bahir Dar well within the tropical climate zone, while the longitude of 37?23"E positions the city in the eastern region of Africa, adjacent to the Great Rift Valley.

Pyranometer Specifications: Model: Kipp & Zonen CMP11 Pyranometer, Spectral range of 285 to 2800nm, Sensitivity of 7 to 14 uV/W/m?, Response time of less than 5s, Zero offset A of less than 7W/m?, Zero offset B of less than 2W/m?, Directional error (up to 80? with 1000W/m? beam) of less than 10W/m?, Temperature dependence of sensitivity (between - 10?C to + 40?C) of less than 1%, Operating temperature range of -40?C to + 80?C, Maximum solar irradiance of 4000W/m?, and a Field of view of 180 degrees.

Data Logger Specifications: Model: Campbell Scientific CR1000X Measurement and Control Datalogger, Analog inputs: 16 single-ended or 8 differentials, Scan rate: Up to 100Hz, Memory: 4MB of battery-backed SRAM, 4 GB of flash, Operating temperature range: -40?C to + 70?C, Measurement types: Voltage, current, resistance, thermocouple, RTD, thermistor, frequency, Data storage: Memory card or built-in flash, Communication options: Ethernet, RS-232, RS-485, USB.

The pyranometer would be connected to one of the analog input channels on the CR1000X data logger as shown on Fig.1. The data logger programmed to read the pyrometer output voltage in every minute and store the solar radiation data (in W/m?) on the data storage device.

In addition, implemented rigorous validation and quality assurance procedures throughout the data collection process to ensure the reliability and accuracy of our dataset. When compared to other datasets in the field, our dataset stands out due to its distinct features. It provides for a specific geographical location called Bahir Dar city and covers five years from 2018 to 2022 and the dataset makes an important contribution to the field by filling research gaps and supplementing existing knowledge.