**Data sources**

1. **Main Databases**

This study used NASA (2021) to collect data associated with climatological parameters and the FAO.56 Crop evapotranspiration - Guidelines for computing crop water requirements (Allen et al., 2006) to determine the cocoa crop and soil associated characteristics. Those sources of information in conjunction with multiples cocoa case studies supports the required data for model formulation, development and solution.

1. **NASA - POWER**

The NASA Prediction of worldwide energy resources (POWER) project is a repository of data associated with modeling various climatic parameters on earth. The platform allows downloading multiples parameters in different frequencies (i.e., hourly, daily, monthly, and annually), serving three central user communities, (i) renewable energy, (ii) sustainable buildings, and (iii) agroclimatology. The project process ground measured data, satellite data, and assimilated data derived from Modern-Era Retrospective analysis for Research and Applications (MERRA-2) and Goddard Earth Observing System (GEOS) 5.12.4 developed by Global Modeling and Assimilation Office (GMAO) for supporting NASA activities (NASA, 2021) and (White et al., 2008). Several studies worldwide demonstrate the NASA-POWER usefulness at supporting climatic data considering the near real-time data availability and the data reliability (Bai et al., 2010; Monteiro et al., 2018; Rodrigues & Braga, 2021; Srivastava et al., 2020; White et al., 2011).

Table Q1: NASA - POWER database characteristics

NASA - POWER database characteristics

|  |  |  |  |
| --- | --- | --- | --- |
| Parameters | Factors | Spatial Resolution | Frequency-horizon |
| Climatic | Temperature (Mean, Max, Min), Relative Humidity, Wind speed, Precipitation, Radiation | 0.5°x0.5°  55.66 km x 55.66 km | Daily  1981- nowadays |

Table Q2: Parameters name

Parameters name

|  |  |  |
| --- | --- | --- |
| Parameter name | Parameter name in POWER | Acronym |
| Minimum temperature | MERRA-2. Temperature at 2 Meters Minimum |  |
| Maximum temperature | MERRA-2. Temperature at 2 Meters Maximum |  |
| Relative humidity | MERRA-2. Relative Humidity at 2 Meters |  |
| Precipitation | MERRA-2. Precipitation Corrected |  |
| Wind speed | MERRA-2. Wind Speed at 2 Meters |  |
| All-sky solar radiation | CERES SYN1deg All Sky Surface Shortwave Downward Irradiance |  |
| Clear-sky Solar radiation | CERES SYN1deg Clear Sky Surface Shortwave Downward Irradiance |  |

1. **FAO**

The FAO document Crop evapotranspiration - Guidelines for computing crop water requirements allow for various parameters associated with soil conditions and characteristics of multiple annual and perennial crops. The document also provides a detailed description for calculating different instances, such as evapotranspiration, yield response factor, and total water availability (Allen et al., 2006).