

## 2.25 Analysis of Solar Irradiance Data Sets

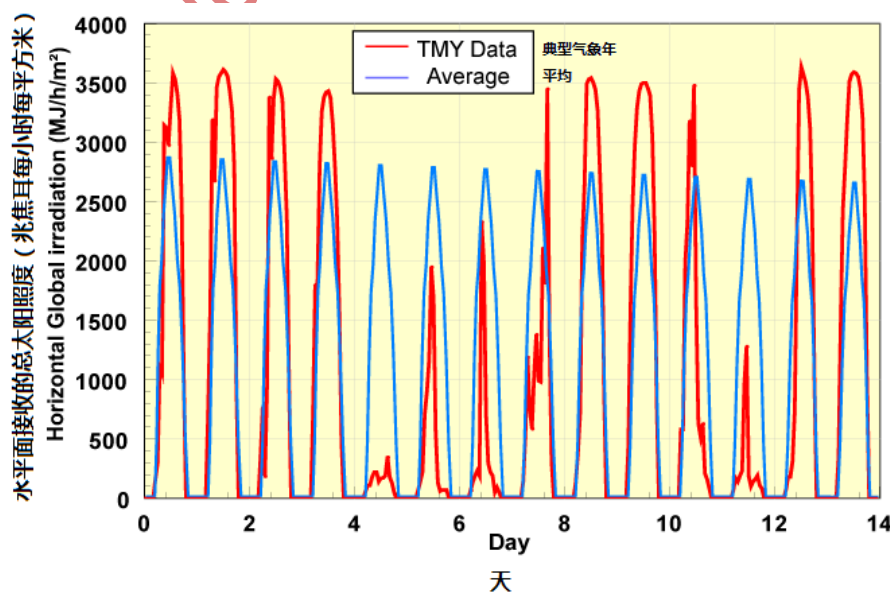
### 太阳辐射数据集分析

The most accurate measurements of solar radiation are obtained by a pyrometer placed at a location for a number of years, usually on the order of a decade or more, measuring the direct radiation every few minutes. However, the volume of data generated by this technique makes it impractical (and unnecessary) to provide the full data set for each location for PV system design. Instead, the data can be presented in several other formats.

最准确的太阳辐射数据是通过高温计得到的。它被固定放置于某一个位置十年甚至更长的时间，每隔几分钟测量一次直射辐射强度。然而，这种方法得到的数据集对于不同位置的光伏系统设计来说不够实用（也没有必要）。因此，人们通常采用其他几种形式来给出太阳辐射数据。

The most conceptually straight forward method of reducing the data set is to average the data over the measuring period. This form of data is called average daily, monthly or yearly radiation data. Although this data is useful for basic system design, the day-to-day variation in the solar radiation is lost. The loss of the day-to-day variation is critical since the design and performance of a system with, for example, 5 kWh/day nearly every day is quite different than one with 8 kWh/day on some days followed by several cloudy days with 2 kWh/day.

从概念上来讲，最直接的方法是对测量数据集在对应的测量时间上求平均。这种数据形式被称为日均、月均和年均辐射数据。尽管这种数据对基本的系统设计很有用，但它丢失了太阳辐射的逐日变化信息。这种信息丢失是很严重的，因为在系统设计和性能估计中，（例如）几乎每天都是 5 千瓦时的入射能量与有几天是 8 千瓦时，有几天是 2 千瓦时有很大不同。



## Comparison of TMY and average solar radiation data.

上图中为典型气象年数据和平均太阳辐射数据之间的比较。

The most common format for solar radiation data is TMY data (or TMY2 data used by the National Renewable Energy Laboratories in the USA) which includes daily variability in the data. TMY data sets are described in the following page. However, average solar radiation data, particularly for each month of the year is also extensively used in rough estimates on the amount of PV panels required.

最常用的太阳辐射数据形式是典型气象年（TMY）数据（或者是美国国家可再生能源实验室采用的 TMY2 数据），这种数据形式包含了日均辐射的变化情况。典型气象年数据集将在后文中介绍。然而，在粗略估算太阳能电池板数量时，平均太阳辐射数据，尤其是一年中的月平均数据仍然被广泛运用的。

An additional useful, although less common data which can be determined from the full radiation data sets, is the probability of having a certain number of cloudy days which occur in a row, whereby the definition of a cloudy day is usually a day where less than 50% of the theoretically expected radiation is received. For example, at a certain location, 4 cloudy days in a row may occur once a year and 5 cloudy days in a row may occur once every 5 years. This information is particularly useful in estimating storage sufficient requirements. However, this information is less commonly tabulated and, if used, must be determined from the original data sets.

另一个尽管不太常见但却很有用的数据是连续几天出现阴天的概率，它可以通过完整的辐射数据集得到。这里的阴天指的是接收到的太阳辐射低于理论值的 50% 的情况。举个例子来说，对于某一个地区来说，连续 4 天阴天的概率为一年一次，连续 5 天阴天的概率为 5 年一次。这些信息对于估计必需的储备很重要。然而，一般对于这类信息考虑较少，如果需要使用，需要从原始数据集中得到。