2.10 Solar Radiation at the Earth's Surface

地球表面的太阳辐射

While the solar radiation incident on the Earth's atmosphere is relatively constant, the radiation at the Earth's surface varies widely due to:

- atmospheric effects, including absorption and scattering;
- local variations in the atmosphere, such as water vapour, clouds, and pollution;
- latitude of the location; and
- the season of the year and the time of day.

尽管入射到地球大气层的太阳辐射是相对稳定的，地球表面的太阳辐射的变化仍然很大，原因如下：

- 大气层的影响，包括吸收和散射
- 局部地区的大气层的变化，比如水蒸气，云层和污染
- 地区的纬度高低以及
- 一年中的不同季节和一天中的不同时间

The above effects have several impacts on the solar radiation received at the Earth's surface. These changes include variations in the overall power received, the spectral content of the light and the angle from which light is incident on a surface. In addition, a key change is that the variability of the solar radiation at a particular location increases dramatically. The variability is due to both local effects such as clouds and seasonal variations, as well as other effects such as the length of the day at a particular latitude. Desert regions tend to have lower variations due to local atmospheric phenomena such as clouds. Equatorial regions have low variability between seasons.

以上作用对于地球表面接收到的太阳辐射有多方面的影响，它们使得接收到的总功率，光的光谱成分以及光线入射地球表面的角度发生变化。除此之外的一个重要变化是，某一特定地区的太阳辐射的变化程度显著增强了。这一变化不仅受云层和季节变化等局部作用的影响，也受由纬度决定的白天的时间长短等其他因素的影响。沙漠地区的太阳辐射受大气条件比如云层的影响较小，而赤道地区的太阳辐射的季节变化较小。

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Solar radiation at the Earth's surface varies from the solar radiation incident on the Earth's atmosphere. Cloud cover, air pollution, latitude of a location, and the time of the year can all cause variations in solar radiance at the Earth's surface.

地球表面接收的太阳辐射与大气层接收的太阳辐射有差异。云层覆盖，空气污染，地区的纬度以及在一年中时间都会使地球表面接收的太阳辐射产生变化。

The amount of energy reaching the surface of the Earth every hour is greater than the amount of energy used by the Earth's population over an entire year.

地球表面一小时接收的能量可供给地球上所有人口一年的能量消耗。

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