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Daylighting under Sky Conditions in an Urban Area

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The correct use of natural lighting will depend on the study of the natural and urban conditions of a region. One of the main variables that determine the availability of natural light in a site is cloudiness, under each different type of condition of sky its dynamics will be different, identifying the frequency of this phenomenon and the predominant type of sky of a site, it is possible to generate better strategies for the use of the natural resource as a light resource.

This research focused on the study of the natural environment, the climatic elements that condition natural lighting in a site and its relationship with the existing urban environment of the Basin of Mexico.

The main variable that conditions this availability was studied, characterizing the different types of sky that occur in the Basin and from them generate strategies for use in the existing urban environment, since the characteristics and behavior of natural light outdoors will determine the final light availability indoors.

The methodology used for this characterization was divided into three important sources of information: on the one hand, the data generated in synoptic observatories carried out by a professional throughout the day on the state of the sky was gathered, on the other hand, it was systematized and processed. information from a TSI880 cloud camera installed on platforms of the Autonomous University of Mexico and finally satellite images acquired from the European satellite Sentinel 2 were processed by remote sensing, the 3 sources of information were compared to characterize the conditions of cloudy, partly cloudy and clear, yielding coefficients to represent the seasonal and diurnal frequency during a typical meteorological year.
The represented frequency was compared with the irradiance and horizontal illuminance variables of the site, which had an important correlation in the behavior of lighting levels with the presence of cloudiness.

The results of each one of them yielded different cloud cover coefficients, but within the range that characterizes each sky condition, therefore, satellite image processing could be used to determine and know the availability of illumination of a site, since synoptic observations are not always available in some cities and rural areas and there are very few daylight observation platforms with specialized equipment.

The visualization of cloud maps, in addition to their processing as images to obtain numerical data, is also important to know the distribution of greater or less cloud cover in a region, together with other urban variables represented in maps such as population and housing density, green areas, crowded areas or land uses, specific strategies can be generated. Knowing the frequency of cloud cover throughout the day and throughout the year will help us to know the availability of natural lighting in a region, whether it is direct or diffuse lighting, which should be used in different ways. These investigations help us to get to know cities better in order to take better advantage of natural features and generate key strategies in their planning and design.

Keyword 1

daylight design

Keyword 2

remote sensing

Keyword 3

sky conditions

Keyword 4

bioclimatic urbanism

Keyword 5

cloud cover

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