means lesser scattering). Note that the correlative order of the results agrees with this physical explanation.

To summarize, an adequate answer to our hypothetical questioner is as follows:

1. Most PV engineering problems are properly solved using a monthly mean analysis. Then, equation (20.18) is the recommended choice.
2. If you require a day-to-day analysis, the choice of a particular diffuse-to-global correlation is not really critical. You can simply adhere to the widely extended practise of trusting on the "universal" character of equation (20.19). But, if you are interested in a specific site, you can perform slightly better by choosing a more site-specific correlation, providing it is derived from solar radiation measurements in a place having a similar climate to the concerned site.
3. Whichever possibility you choose, you must take a very important precaution. If your results are going to be compared with the results of another calculation (for example, comparing different PV module orientations for the same application), then be sure that they both use the same assumptions, correlations, model and data. Otherwise, the differences in the results would be completely meaningless. Although this caveat should be obvious, it still should be mentioned, because the literature contains several examples of different results derived from different correlations that were proposed as the basis of optimisation design exercises [23].

Finally, it should be mentioned that not only daily but also hourly based correlations have been proposed. These are correlations between the diffuse fraction of the hourly horizontal global irradiation, $F_{Dh} = D_h(0)/G_h(0)$, and the hourly clearness index, $K_{Th} = G_h(0)/B_{0h}(0)$. However, none of the hourly based correlations proposed so far is really satisfactory [6, 22], so that the associated complexity is not justified. Hence, they will be not considered here.

20.5.2 Estimation of the Hourly Irradiation from the Daily Irradiation

In some cases, the treatment of solar radiation is more easily understood at the instant time scale, that is, at the radiance level. Because irradiation over an hour (in Wh/m^2) is numerically equal to the mean irradiance during this hour (in W/m^2), irradiance values can be, to a certain extent, assimilated to hourly irradiation values. However, since the availability of hourly irradiation data is limited, the problem is how to estimate the hourly irradiation, given the daily irradiation.

To introduce the solution to this problem, it is highly instructive to observe that, in terms of extraterrestrial horizontal radiation, the ratio between irradiance, $B_0(0)$, and daily irradiation, $B_{0d}(0)$, can be theoretically determined from equations (20.4), (20.14) and (20.15).

$$\frac{B_0(0)}{B_{0d}(0)} = \frac{\pi}{T} \times \frac{\cos\omega - \cos\omega_S}{\left(\frac{\pi}{180}\omega_S\cos\omega_S - \sin\omega_S\right)} \qquad (20.22)$$

where the sunrise angle, ω_S, is expressed in degrees and T, the day length, is usually expressed in hours.