Part III

Consistency Check of the mean radiance and irradiance

SSF ed. 1

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We define the angular distribution model of radiance such as

\[
ADM(\mu, \phi, \mu_0) = \frac{\pi I(\mu, \phi, \mu_0)}{\int \mu I(\mu, \phi, \mu_0) d\Omega}.
\]

To compute the irradiance, we apply the model

\[
F(\mu, \phi, \mu_0) = \frac{\pi I'(\mu, \phi, \mu_0)}{ADM(\mu, \phi, \mu_0)} = \frac{I'(\mu, \phi, \mu_0)}{I(\mu, \phi, \mu_0)} \int \mu I(\mu, \phi, \mu_0) d\Omega.
\]

Therefore, the irradiance in edition 1 is

\[
F_{\text{ed1}}(\mu, \phi, \mu_0) = \frac{\pi I_{\text{ed1}}(\mu, \phi, \mu_0)}{ADM_{\text{ed1}}(\mu, \phi, \mu_0)} = \frac{I_{\text{ed1}}(\mu, \phi, \mu_0)}{I_{\text{ed1}}(\mu, \phi, \mu_0)} \int \mu I_{\text{ed1}}(\mu, \phi, \mu_0) d\Omega.
\]

The irradiance in ES8 with edition 1 scene ID is

\[
F_{\text{es8,ssf}}(\mu, \phi, \mu_0) = \frac{\pi I_{\text{es8,ssf}}(\mu, \phi, \mu_0)}{ADM_{\text{es8}}(\mu, \phi, \mu_0)}
\]

\[
= \frac{I_{\text{es8}}(\mu, \phi, \mu_0)}{I_{\text{es8}}(\mu, \phi, \mu_0)} \int \mu I_{\text{es8}}(\mu, \phi, \mu_0) d\Omega.
\]
Clear-sky Ocean Mean radiance

1. The radiance in SSF ed 1 is higher than that in SSF r4 because of the scene ID difference in the sun glint region when the solar zenith angle is smaller than 30°.

2. The radiance in SSF ed 1 is lower than that in ES8 (except for the sun glint region and almost all angles when the solar zenith angle is greater than 80°).
Clear-sky Ocean Mean Irradiance

1. The irradiance in SSF ed 1 is lower than that in ES8 for all view zenith and solar zenith angles. An arithmetic average of 4 month of data is

\[
\begin{align*}
\text{SSF ed. 1} & \quad 73.8 \text{Wm}^{-2} \\
\text{ES8/SSF} & \quad 72.1 \text{Wm}^{-2} \\
\text{ES8 (4months)} & \quad 81.3 \text{Wm}^{-2} \\
\text{ES8 (8months)} & \quad 79.5 \text{Wm}^{-2}
\end{align*}
\]

2. The irradiance increases as the view zenith angle decreases when the solar zenith angle is between 0 to 10 degrees because of scene ID difference between r4 and ed. 1.

Clear-sky Desert

1. The radiance and irradiance in SSF ed. 1 is greater than those in ES8, which caused by scene ID difference.