Both direct Sun glint and background sky reflectance are included in the radiative transfer calculations. However, the Sun glint contribution is removed from the look-up-tables (LUTs) so as to allow the historical approach of Gordon and Wang (1994a) to be used. The current Rayleigh LUTs are wind-speed dependent, but the aerosol LUTs assume a flat ocean. Thus the LUTs include diffuse sky reflectance but not specular reflection. There is thus an explicit correction for Sun glint, but not for diffuse sky reflectance, which is accounted for as part of the Rayleigh correction.

Even for sensors (such as SeaWiFS) that are designed with tilt capabilities allowing them to be oriented so that they do not look at the Sun's glitter pattern, there can still be significant residual glint radiance reaching the sensor, especially near the edges of the obvious glint area. This is corrected as follows.

Recall Eq. (3) of the Problem Formulation page:

$$L_{\mathrm{t}} = L_{\mathrm{R}} + [L_{\mathrm{a}} + L_{\mathrm{Ra}}] + T L_{\mathrm{g}} + t L_{\mathrm{wc}} + t L_{\mathrm{w}} \,,$$

where L_{g} is the direct Sun glint radiance. L_{g} is computed using the analytical Cox-Munk wind speed-wave slope distribution and the Sun and viewing geometry. (Wang and Bailey(2001) (Eq. 2) write the Sun glint radiance L_{g} in terms of a normalized Sun glint L_{GN}, which is defined by

$$L_{\mathrm{g}}(\lambda) \equiv F_{\mathrm{o}}(\lambda) T(\theta_{\mathrm{s}}, \lambda) L_{\mathrm{GN}} \,.$$

L_{GN} is computed using an azimuthally symmetric analytical form of the Cox-Munk wind speed–wave slope distribution for the given Sun and viewing directions, and an incident irradiance of magnitude $F_{\mathrm{o}}(\lambda) = 1\ \mathrm{W\,m^{-2}\,nm^{-1}}$. L_{GN} thus has the angular distribution of the surface-reflected radiance, but its units are 1/steradian. Note that L_{GN} is independent of wavelength.

During image processing, pixels with a value of $L_{\mathrm{GN}} > 0.005\ \mathrm{sr^{-1}}$ are masked out as having too much glint to be useful. Pixels with $L_{\mathrm{GN}} \leq 0.005\ \mathrm{sr^{-1}}$ have a glint correction applied before use.

For the glint correction, atmospheric attenuation occurs first along the path of the Sun's direct solar beam as the Sun's beam travels from the TOA to the sea surface; the associated transmittance is $T(\theta_{\mathrm{s}}, \lambda)$. Attenuation then occurs along the viewing direction from the sea surface back to the TOA; this transmittance is $T(\theta_{\mathrm{v}}, \lambda)$. These are both direct beam transmittances because only one particular path connects the Sun with a point on the sea surface that reflects the direct beam into the sensor (recall the left panel of Fig. 1 of the Atmospheric Transmittances page). The total "two-path" transmittance is the product of the transmittances. The glint radiance correction, which is subtracted from L_{t}, is then (Wang and Bailey(2001), Eqs. 4 and 5)

$$T(\theta_{\mathrm{v}}, \lambda) L_{\mathrm{g}}(\theta_{\mathrm{v}}, \lambda) = F_{\mathrm{o}}(\lambda) T(\theta_{\mathrm{s}}, \lambda) T(\theta_{\mathrm{v}}, \lambda) L_{\mathrm{GN}} \,,$$

where

$$T(\theta_{\mathrm{s}}, \lambda) T(\theta_{\mathrm{v}}, \lambda) = \exp\left\{ -[\tau_{\mathrm{R}}(\lambda) + \tau_{\mathrm{a}}(\lambda)] \left(\frac{1}{\cos\theta_{\mathrm{s}}} + \frac{1}{\cos\theta_{\mathrm{v}}} \right) \right\} \,, \tag{1}$$

and where $\tau_{\mathrm{R}}(\lambda)$ and $\tau_{\mathrm{a}}(\lambda)$ are the Rayleigh and aerosol optical thicknesses, respectively.

Wang and Bailey(2001) comment (page 4792, left column) that the effects of ozone absorption have already been accounted for before this state of processing. This is now also true for NO_2 absorption.

Note that the glint correction cannot be computed unless the aerosol optical thickness (AOT) $\tau_{\rm a}$ is known. The AOT is obtained in a two-step process. First, the measured $L_{\rm t}(\lambda)$ and the wind speed W are used to get a first estimate $\tau_{\rm a}^{(1)}(\lambda)$ of the AOT. This estimate is obtained using the algorithms described on the Aerosols page. This estimate is then used in Eq. (1), and the glint-corrected TOA radiance is then computed as

$$L_{\rm t}'(\lambda) = L_{\rm t}(\lambda) - F_{\rm o}(\lambda) T(\theta_{\rm s}, \lambda) T(\theta_{\rm v}, \lambda) L_{\rm GN}\,. \tag{2}$$

This gives the initial estimate $L_{\rm t}^{(1)'}(\lambda)$ of $L_{\rm t}'(\lambda)$. This value is then used again in the AOT algorithm to obtain the second estimate $\tau_{\rm a}^{(2)}(\lambda)$ for the AOT. The second AOT estimate is then used again in Eqs. (1) and (2) to obtain an improved estimate $L_{\rm t}^{(2)'}(\lambda)$. In practice, only two iterations give a satisfactory final estimate for the AOT, $\tau_{\rm a}(\lambda) = \tau_{\rm a}^{(2)}(\lambda)$, and thus for the glint-corrected TOA radiance. This final $\tau_{\rm a}(\lambda)$ is then used to compute the aerosol contribution to the TOA radiance, as described on the aerosol page.