

Type	Eq. no.	Relationships for lidar extinction	References
Cloud liq. (cl)	(1)	$\sigma_{\text{copol,cl}} = \frac{\text{WC}_{\text{cl}}(3/2)}{Re \rho_{\text{liq}}}$ with $\rho_{\text{liq}} = 1$	Hu et al. (2007b)
Cloud ice (ci)	(2)	$\sigma_{\text{copol,ci}} = \left(\frac{\text{WC}_{\text{ci}}}{119}\right)^{1/1.22}$	Heymsfield et al. (2005)
	(3)	$\sigma_{\text{copol,ci}} = \left(\frac{\text{WC}_{\text{ci}}}{a_3}\right)^{1/b_3}$ with $a_3 = 89 + 0.6204T$ and $b_3 = 1.02 - 0.0281T$	Heymsfield et al. (2005)
	(4)	$\sigma_{\text{copol,ci}} = \left(\frac{\text{WC}_{\text{ci}}}{527}\right)^{1/1.32}$	Heymsfield et al. (2014)
	(5)	$\sigma_{\text{copol,ci}} = \left(\frac{\text{WC}_{\text{ci}}}{a_2}\right)^{1/b_2}$ with $a_2 = 0.00532(T + 90)^{2.55}$ and $b_2 = 1.31e^{(0.0047T)}$	Heymsfield et al. (2014)
Type	Eq. no.	Relationships for radar reflectivity	References
Cloud liq. (cl)	(8)	$Z_{\text{copol,cl}} = 0.048 \text{WC}_{\text{cl}}^{2.00}$	Atlas (1954)
	(9)	$Z_{\text{copol,cl}} = 0.03 \text{WC}_{\text{cl}}^{1.31}$	Sauvageot and Omar (1987)
	(10)	$Z_{\text{copol,cl}} = 0.031 \text{WC}_{\text{cl}}^{1.56}$	Fox and Illingworth (1997)
Cloud ice (ci)	(11a)	$Z_{\text{copol,ci}} = 10^{\left(\frac{\log_{10}(\text{WC}_{\text{ci}}) + 1.70 + 0.0233T}{0.072}\right) / 10}$	Hogan et al. (2006)
	(12)	$Z_{\text{copol,ci}} = \left(\frac{\text{WC}_{\text{ci}}}{0.064}\right)^{\frac{1}{0.58}}$	Atlas et al. (1995)
	(13)	$Z_{\text{copol,ci}} = \left(\frac{\text{WC}_{\text{ci}}}{0.097}\right)^{\frac{1}{0.59}}$	Liu and Illingworth (2000)
	(14)	$Z_{\text{copol,ci}} = \left(\frac{\text{WC}_{\text{ci}}}{0.037}\right)^{\frac{1}{0.696}}$	Sassen (1987)
Precip. liq (pl)	(15)	$Z_{\text{copol,pl}} = \left(\frac{\text{WC}_{\text{pl}}}{0.0034}\right)^{\frac{7}{4}}$	Hagen and Yuter (2003)
	(16)	$Z_{\text{copol,pl}} = \left(\frac{\text{WC}_{\text{pl}}}{0.0039}\right)^{\frac{1}{0.55}}$	Battan (1973)
	(17)	$Z_{\text{copol,pl}} = \left(\frac{\text{WC}_{\text{pl}}}{0.00098}\right)^{\frac{1}{0.7}}$	Sekhon and Srivastava (1971)
Precip. ice (pi)	(11b)	$Z_{\text{copol,pi}} = 10^{\left(\frac{\log_{10}(\text{WC}_{\text{pi}}) + 1.70 + 0.0233T}{0.072}\right) / 10}$	Hogan et al. (2006)
	(18)	$Z_{\text{copol,pi}} = \left(\frac{\text{WC}_{\text{pi}}}{0.0218}\right)^{\frac{1}{0.79}}$	Liao and Sassen (1994)
	(19)	$Z_{\text{copol,pi}} = \left(\frac{\text{WC}_{\text{pi}}}{0.04915}\right)^{\frac{1}{0.90}}$	Sato et al. (1981)
	(20)	$Z_{\text{copol,pi}} = \left(\frac{\text{WC}_{\text{pi}}}{0.05751}\right)^{\frac{1}{0.736}}$	Kikuchi et al. (1982)