

Algorithm name	Parent model	Stability		Parameterization of roughness length scales		Gustiness	References
		Unstable	Stable	Momentum z_0	Temperature and humidity $z_{\theta,q}$	No	
LS87	FVCOM	Similar to Businger et al. (1971)	Holtslag et al. (1990)	$z_0 = \alpha \frac{u_g^{*2}}{g} + 0.11 \frac{\nu}{u^*}$ $\alpha = 0.011$	$z_0 = z_{\theta,q}$	No	Liu and Schwab (1987)
C89	LLTM	Businger et al. (1971)	Holtslag et al. (1990)	$z_0 = \alpha \frac{u_g^{*2}}{g}$ $\alpha = 0.0101$	$z_0 = z_{\theta,q}$	No	Croley (1989a, b)
Z98L	WRF-Lake	Businger et al. (1971)	Holtslag et al. (1990)	$z_0 = 0.001$ m (Smith, 1988 for ocean)	$z_0 = z_{\theta,q}$ (Brutsaert, 1975 for ocean)	Fairall et al. (1996a, b), $\beta = 1.0$	Zeng et al. (1998)
J99	FVCOM, UG-CICE	Businger et al. (1971)	Beljaars and Holtslag (1991)	$z_0 = z \exp \left[-\kappa \left(\frac{2.7 \times 10^{-3}}{U} + 1.42 \times 10^{-4} + 7.64 \times 10^{-5} U \right)^{-1} \right]$ (Large et al., 1994)	$z_0 = z_{\theta,q}$ (Jordan et al., 1999 used Andreas, 1987 for ice surface)	No	Jordan et al. (1999), Hunke et al. (2015)
COARE	FVCOM	Businger et al. (1971), Convective behavior: Fairall et al. (1996a, b)	Beljaars and Holtslag (1991)	$z_0 = \alpha \frac{u_g^{*2}}{g} + 0.11 \frac{\nu}{u^*}$ α : function of wind speed	$z_{\theta,q} = \min \left(1.6 \times 10^{-4}, 5.8 \times 10^{-5} Rr^{-0.72} \right)$	Fairall et al. (1996a, b), $\beta = 1.2$	Fairall et al. (1996a, b), Edson et al. (2013)