(a) Grid cell level

Landunit level
land cover types

Vegetated | Lake | Urban | Glacier | Crop

Column level
urban surfaces

Roof | Shade Wall | Impervious road | Sunlit Wall | Pervious road

(b)

CAM

$u_{atm}\, T_{atm}\, q_{atm}\, P_{atm}\, S_{atm}\, L_{atm}$

$H_{ac}\, E_{ac}\, I_{ac}\, L_{ac}\, S_{ac}\, \tau_{ac}$

Roughness sublayer

z_{atm}

CLMU

Urban canopy layer

(c)

$F_{cd,roof}$ T_{roof}

Roof

$T_{ig,roof}$

F_{rd} $F_{cv,roof}$

V_{vent}

T_{ac}
q_{ac}
u_{ac}

$F_{cd,shdw}$ $T_{ig,shdw}$ $F_{cv,shdw}$ T_{iB} $F_{cv,sunw}$ $T_{ig,sunw}$ $F_{cd,sunw}$

H_{roof}
E_{roof}

$F_{cv,floor}$

T_{sunw} $H_{sunw}\, E_{sunw}$ $H_{shaw}\, E_{shaw}$ T_{shaw}

Shaded Wall (shaw)

Sunlit Wall (sunw)

H_{wstht}
H_{aircon}

$H_{perroad}$
$E_{perroad}$

$H_{improad}\, E_{improad}$

Floor

$T_{ig,floor}$

$T_{perroad}$

$T_{improad}$

Pervious Road (perroad)

Impervious Road (improad)

$F_{cd,floor}$