**(a)**

Grid cell level

Land unit 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

Urban canopy layer

$z_{atm}$

CLMU

**(c)**

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

Roof    $T_{ig,roof}$

$V_{vent}$

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

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

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

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

$H_{roof}$
$E_{roof}$

$F_{cv,floor}$

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

Shaded Wall (shaw)

Sunlit Wall (sunw)

$H_{wstht}$
$H_{aircon}$

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

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

Floor    $T_{ig,floor}$

$T_{perroad}$    $T_{improad}$

$F_{cd,floor}$

Pervious Road (perroad)    Impervious Road (improad)