

Principal symbols

Roman capital letters

A	covariance matrix of the analysis errors
B	Planck's function
B	background covariance matrix
C	phase speed
	cloud fraction
	thermal capacity, or heat capacity
	economic cost of protecting against a weather event
C_G	group speed
C_P	phase speed
C_R	real part of a phase speed
D	rate of water loss through drainage within the substrate
D_Θ	soil-water diffusivity
E	evaporation rate
ET	evapotranspiration rate
F	all terms on the right side of a prognostic equation
	flux
Fr_x	frictional acceleration in the x direction
G	sensible heat flux between the surface and subsurface
H	rate of gain or loss of heat
	sensible heat flux between the surface and the atmosphere
	mean depth of a fluid
	scale height
H	forward operator, observation operator
H_S	heat flux within the substrate
I	longwave radiation intensity
I_\downarrow	downward-directed longwave radiation intensity
I_\uparrow	upward-directed longwave radiation intensity
J	cost function
K	highest permitted wavenumber
	transfer coefficient

K	Kalman gain matrix
	Weight matrix of analysis
K_{Θ}	hydraulic conductivity
K_{Hs}	thermal diffusivity of a substrate
L	domain length
	latent heat of evaporation
	horizontal length scale
	economic loss from a weather event
L_R	length scale of the Rossby radius of deformation
M	model dynamic operator
P	wave period
	rate of water input through precipitation
P	error covariance matrix
Q	direct-solar radiation intensity
Q_v	rates of gain or loss of water vapor through phase changes
Q	covariance matrix of the model forecast errors
R	rhomboidal truncation
	gas constant for air
	Rossby radius of deformation
	net-radiation intensity
	rate of water loss through surface runoff
	radius of influence
R	covariance matrix of the observation errors
RH	relative humidity
S	source or sink of water substance
T	temperature
	turbulent, eddy, or Reynolds' stress
	triangular truncation
T_a	atmospheric temperature a short distance above the surface
T_g	temperature of the ground surface
T_s	temperature within the substrate
U	mean wind speed
V	value, economic value
\vec{V}	velocity vector
V_T	terminal velocity
X	vector of atmospheric state variables

Roman small letters

a	radius of Earth
c	specific heat

c_p	specific heat at constant pressure
e	Coriolis parameter
	base of natural logarithms
f	Coriolis parameter
	generic dependent variable
g	acceleration of gravity
h	depth of a fluid
i	$\sqrt{-1}$
k	wavenumber
	kinetic energy
	von Karman constant
	weighting coefficient in statistical analysis
k_s	soil thermal conductivity
l	length scale of energy-containing turbulence
m	map-scale factor
	integer wavenumber
n	integer wavenumber
o	observation
p	pressure
	probability
p_s	pressure at the land or water surface
p_t	pressure at the top of a model
q	specific humidity
	diffuse solar radiation
q_s	saturation specific humidity
r	radius of Earth
	radial distance
t	time
u	east–west component of wind
u_*	friction velocity
v	north–south component of wind
w	vertical component of wind
x	east–west space coordinate
	general space coordinate
\mathbf{x}	state vector
y	north–south space coordinate
\mathbf{y}	observation vector
z	vertical space coordinate – distance above or below surface of substrate
z_o	roughness length

Greek capital letters

Δ	change or difference in some quantity, operator spatial filter length scale
Δx	grid increment
Θ	volumetric soil-moisture content
Ω	rotational frequency of Earth

Greek small letters

α	albedo generic dependent variable
γ	vertical lapse rate of temperature
γ_d	dry adiabatic lapse rate of temperature
δ	Kronecker delta
ε	alternating unit tensor emissivity error
θ	potential temperature
λ	longitude amplification factor wavelength
μ	dynamic viscosity coefficient thermal admittance
π	pi
ρ	density
σ	Stefan–Boltzmann constant terrain-following vertical coordinate standard deviation
τ	momentum stress, or shearing stress relaxation coefficient
ϕ	latitude
ω	frequency of a wave

Common subscripts and superscripts

E	applies on Earth's surface
G	applies on a grid
I	imaginary part of a number

R	real part of a variable
T	transpose
a	analysis atmosphere
b	background
g	ground or substrate surface
i	grid-point index in x direction
j	grid-point index in y direction
k	grid-point index in z direction
m	wavenumber
o	observation
p	wavenumber applies at constant pressure
s	saturation surface substrate or soil
τ	point on the discrete time axis