Appendix B

List of Symbols

Only the principal symbols are listed. Symbols formed by adding primes, overbars, or subscripted indices are not listed separately. Boldface type indicates vector quantities. Where symbols have more than one meaning, the section where the second meaning is first used is indicated in the list.

a	Radius of Earth
b	Buoyancy
c	Phase speed of a wave
c_p	Specific heat of dry air at constant pressure
c_{pv}	Specific heat of water vapor at constant pressure
c_v	Specific heat of dry air at constant volume
c_w	Specific heat of liquid water
d	Grid distance
e	Internal energy per unit mass
f	Coriolis parameter ($\equiv 2\Omega \sin\phi$)
g	Magnitude of gravity
$\mathbf{g}$	Gravity
$\mathbf{g^*}$	Gravitational acceleration
h	Depth of fluid layer; moist static energy (Section 2.9.1)
i	Square root of -1
$\mathbf{i}$	Unit vector along the x axis
$\mathbf{j}$	Unit vector along the y axis
$\mathbf{k}$	Unit vector along the z axis
k	Zonal wave number

l	Mixing length; meridional wave number
m	Mass element; vertical wave number; planetary wave number (Section 13.4)
m_v	Molecular weight of water
n	Distance in direction normal to a parcel trajectory; meridional index for equatorial waves (Section 11.4)
$\mathbf{n}$	Unit vector normal to a parcel trajectory
p	Pressure
p_s	Standard constant pressure; surface pressure in σ coordinates (Section 10.3.1)
q	Quasi-geostrophic potential vorticity; water vapor mixing ratio
q_s	Saturation mixing ratio
r	Radial distance in spherical coordinates
$\mathbf{r}$	Position vector
s	Generalized vertical coordinate; distance along a parcel trajectory (Section 3.2); entropy (Section 2.7); dry static energy (Section 2.9.1)
t	Time
$\mathbf{t}$	Unit vector parallel to a parcel trajectory
u^*	Friction velocity
u	x component of velocity (eastward)
v	y component of velocity (northward)
w	z component of velocity (upward)
w^*	Vertical motion in log-pressure system
x, y, z	Eastward, northward, and upward distance, respectively
z^*	Vertical coordinate in log-pressure system
$\mathbf{A}$	Arbitrary vector
A	Area
B	Convective available potential energy
C_d	Surface drag coefficient
D_e	Depth of Ekman layer

E Evaporation rate

E_I Internal energy

$\mathbf{F}$ Force; EP flux (Section 10.2)

$\mathbf{Fr}$ Frictional force

G Universal gravitational constant; zonal force (Section 10.2)

H Scale height

J Diabatic heating rate

K Total horizontal wavenumber; kinetic energy (Section 9.3)

K_m Eddy viscosity coefficient

L A length scale

L_c Latent heat of condensation

M Mass; mass convergence in Ekman layer (Section 8.4); absolute zonal momentum (Section 9.3); angular momentum (Section 10.3)

N Buoyancy frequency

P Available potential energy (Section 7.3); precipitation rate (Section 11.3)

$\mathbf{Q}$ Q vector

R Gas constant for dry air; distance from the axis of rotation of Earth to a point on the surface of Earth (Section 1.3); diabatic energy generation rate (Section 10.4)

$\mathbf{R}$ Vector in the equatorial plane directed from the axis of rotation to a point on the surface of Earth

R^* Universal gas constant

S_p $\equiv -T\partial \ln\theta/\partial p$, stability parameter in pressure coordinates

T Temperature

U Horizontal velocity scale

V Speed in natural coordinates

δV Volume increment

$\mathbf{U}$ Three-dimensional velocity vector

$\mathbf{V}$ Horizontal velocity vector

W Vertical motion scale

X	Zonal turbulent drag force
Z	Geopotential height
α	Specific volume
β	$\equiv df/dy$, variation of the Coriolis parameter with latitude; angular direction of the wind (Section 3.3)
γ	$\equiv c_p/c_v$, ratio of specific heats
ε	Rate of frictional energy dissipation
ζ	Vertical component of relative vorticity
η	Vertical component of absolute vorticity; weighting function for heating profile (Section 11.3)
θ	Potential temperature
$\dot{\theta}$	$\equiv D\theta/Dt$, vertical motion in isentropic coordinates
θ_e	Equivalent potential temperature
κ	$\equiv R/c_p$, ratio of gas constant to specific heat at constant pressure; Rayleigh friction coefficient (Section 10.6)
λ	Longitude, positive eastward
μ	Dynamic viscosity coefficient
ν	Angular frequency; kinematic viscosity (Section 1.2.2)
ρ	Density
σ	$\equiv -RT_0 p^{-1} d\ln\theta_0/dp$, standard atmosphere static stability parameter in isobaric coordinates
	$\equiv -p/p_s$, vertical coordinate in σ system (Section 10.3); "density" in isentropic coordinates (Section 4.6)
τ_d	Diffusive time scale
τ_E	Eddy stress
ϕ	Latitude
χ	Geopotential tendency; meridional streamfunction; tracer mixing ratio
ψ	Horizontal streamfunction
ω	Vertical velocity ($\equiv dp/dt$) in isobaric coordinates
$\boldsymbol{\omega}$	Vorticity vector

Γ $\equiv -dT/dz$, lapse rate of temperature

Γ_d Dry adiabatic lapse rate

Φ Geopotential

Π Ertel potential vorticity; Exner function

Θ Potential temperature deviation

Ω Angular speed of rotation of Earth

$\boldsymbol{\Omega}$ Angular velocity of Earth