APPENDIX

C

Système International (SI) Units

In most fields of science, the SI system of units is the accepted standard. The SI base units are consistent with the metric system of measurement and are given in Table C.1. In addition to the base units, derived units are used in many applications. A selection of SI-derived units frequently used in physical climatology are given in Table C.2.

Supplementary dimensionless units for angles and some derived units using these are given in Table C.3. Prefixes to indicate decimal multiples of units are given in Table C.4. Some non-SI units that are in common use or appear in older references are given in Table C.5 with their SI equivalents.

TABLE C.1 SI Base Units

Quantity	Name	Symbol
Length	Meter	m
Mass	Kilogram	kg
Time	Second	s
Electric current	Ampere	A
Thermodynamic temperature	Kelvin	K
Amount of substance	Mole	mol
Luminous intensity	Candela	cd

TABLE C.2 Examples of SI-Derived Units

Quantity	Name	Symbol		
		In terms of SI base units	For special name	In terms of other units
Area	Square meter	m^2	–	–
Volume	Cubic meter	m^3	–	–
Speed, velocity	Meter per second	$m\ s^{-1}$	–	–

(*Continued*)

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TABLE C.2 Examples of SI-Derived Units *(cont.)*

Quantity	Name	Symbol		
		In terms of SI base units	For special name	In terms of other units
Acceleration	Meter per second squared	$m\ s^{-2}$	–	–
Divergence	Per second	s^{-1}	–	–
Vorticity	Per second	s^{-1}	–	–
Wave number	1 per meter	m^{-1}	–	–
Geopotential; dynamic height	Meter squared per second squared	$m^2\ s^{-2}$	–	–
Density	Kilogram per cubic meter	$kg\ m^{-3}$	–	–
Specific volume	Cubic meter per kilogram	$m^3\ kg^{-1}$	–	–
Luminance	Candela per square meter	$cd\ m^{-2}$	–	–
Frequency	Hertz	s^{-1}	Hz	–
Force	Newton	$m\ kg\ s^{-2}$	N	–
Pressure	Pascal	$m^{-1}\ kg\ s^{-2}$	Pa	$N\ m^{-2}$
Energy	Joule	$m^2\ kg\ s^{-2}$	J	N m
Power	Watt	$m^2\ kg\ s^{-3}$	W	$J\ s^{-1}$
Electric charge	Coulomb	s A	C	A s
Electric potential	Volt	$m^2\ kg\ s^{-3}\ A^{-1}$	V	$W\ A^{-1}$
Capacitance	Farad	$m^{-2}\ kg^{-1}\ s^4\ A^2$	F	$C\ V^{-1}$
Electric resistance	Ohm	$m^2\ kg\ s^{-3}\ A^{-2}$	Ω	$V\ A^{-1}$
Conductance	Siemens	$m^{-2}\ kg^{-1}\ s^3\ A^2$	S	$A\ V^{-1}$
Magnetic flux	Weber	$m^2\ kg\ s^{-2}\ A^{-1}$	Wb	V s
Magnetic flux density	Tesla	$kg\ s^{-2}\ A^{-1}$	T	$Wb\ m^{-2}$
Inductance	Henry	$m^2\ kg\ s^{-2}\ A^{-1}$	H	$Wb\ A^{-1}$
Luminous flux	Lumen	cd sr	lm	–
Illuminance	Lux	m^{-2} cd sr	lx	–
Dynamic viscosity	Pascal second	$m^{-1}\ kg\ s^{-1}$	–	Pa s
Moment of force	Meter Newton	$m^2\ kg\ s^{-2}$	–	N m

TABLE C.2 Examples of SI-Derived Units *(cont.)*

Quantity	Name	Symbol		
		In terms of SI base units	For special name	In terms of other units
Surface tension	Newton per meter	$kg\ s^{-2}$	–	$N\ m^{-1}$
Irradiance	Watt per square meter	$kg\ s^{-3}$	–	$W\ m^{-2}$
Entropy	Joule per kelvin	$m^2\ kg\ s^{-2}\ K^{-1}$	–	$J\ K^{-1}$
Gas constant, universal	Joule per kelvin	$m^2\ kg\ s^{-2}\ K^{-1}$	–	$J\ K^{-1}$
Specific heat capacity	Joule per kilogram kelvin	$m^2\ s^{-2}\ K^{-1}$	–	$J\ kg^{-1}\ K^{-1}$
Specific energy	Joule per kilogram	$m^2\ s^{-2}$	–	$J\ kg^{-1}$
Thermal conductivity	Watt per meter kelvin	$m\ kg\ s^{-3}\ K^{-1}$	–	$W\ m^{-1}\ K^{-1}$
Energy density	Joule per cubic meter	$m^{-1}\ kg\ s^{-2}$	–	$J\ m^{-3}$

TABLE C.3 SI Supplementary Units and Derived Units Formed Using Supplemental Units

Quantity	Name	Symbol
Plane angle	Radian	rad
Solid angle	Steradian	sr
Angular velocity	Radian per second	$rad\ s^{-1}$
Angular acceleration	Radian per second squared	$rad\ s^{-2}$
Radiant intensity	Watt per steradian	$W\ sr^{-1}$
Radiance	Watt per square meter per steradian	$W\ m^{-2}\ sr^{-1}$

TABLE C.4 Prefixes for Decimal Multiples and Submultiples of SI Units

Multiple	Prefix	Symbol	Submultiple	Prefix	Symbol
10^{18}	Exa	E	10^{-1}	Deci	d
10^{15}	Peta	P	10^{-2}	Centi	c
10^{12}	Tera	T	10^{-3}	Milli	m
10^{9}	Giga	G	10^{-6}	Micro	μ
10^{6}	Mega	M	10^{-9}	Nano	n
10^{3}	Kilo	k	10^{-12}	Pico	p
10^{2}	Hecto	h	10^{-15}	Femto	f
10^{1}	Deka	da	10^{-18}	Atto	a

TABLE C.5 Non-SI Units Commonly Used in Current or Past Literature With Conversion Factors

	Name	Symbol	Value in SI unit
Time	Minute	min	1 min = 60 s
	Hour	h	1 h = 60 min = 3600 s
	Day	d	1 d = 24 h = 86,400 s
Distance	Nautical mile	n mi	1 n mi = 1852 m
	Knot	kt	1 kt = 1 n mi h^{-1} = (1852/3600) m s^{-1}
	Ångström	Å	1 Å = 0.1 nm = 10^{-10} m
	Mile (USA, statute)	mi	1 mi = 1609.3 m
	Foot	ft	1 ft. = 0.3048 m
Mass	Pound	lb	1 lb = 0.4336 kg
	Metric ton	t	1 t = 10^3 kg
Area	Are	a	1 a = 1 dam^2 = 10^2 m^2
	Acre	acre	1 acre = 4046.8 m^2
	Hectare	ha	1 ha = 1 hm^2 = 10^4 m^2
Volume	Liter	l	1 l = 1 dm^3 = 10^{-3} m^3
	Gal	gal	1 gal = 3.785 × 10^{-3} m^3
Angle	Degree	°	1° = (π/180) rad
	Minute	′	1′ = (1/60)° = (π/10,800) rad
	Second	″	1″ = (1/60)′ = (π/648,000) rad
Force	Dyne	dyn	1dyn = 10^{-5} N
Energy	Calorie	cal	1 cal = 4.186 J
	British thermal unit	Btu	1 Btu =1054.6 J
	Erg	erg	1 erg = 10^{-7} J
Pressure	Bar	b	1 b = 0.1 MPa = 10^5 Pa
	Millibar	mb	1 hectoPascal (hPa)
	Standard atmosphere	atm	1 atm = 101,325 Pa
Water Flow	Sverdrup	Sv	1 Sv = 10^6 m^3 seawater s^{-1}