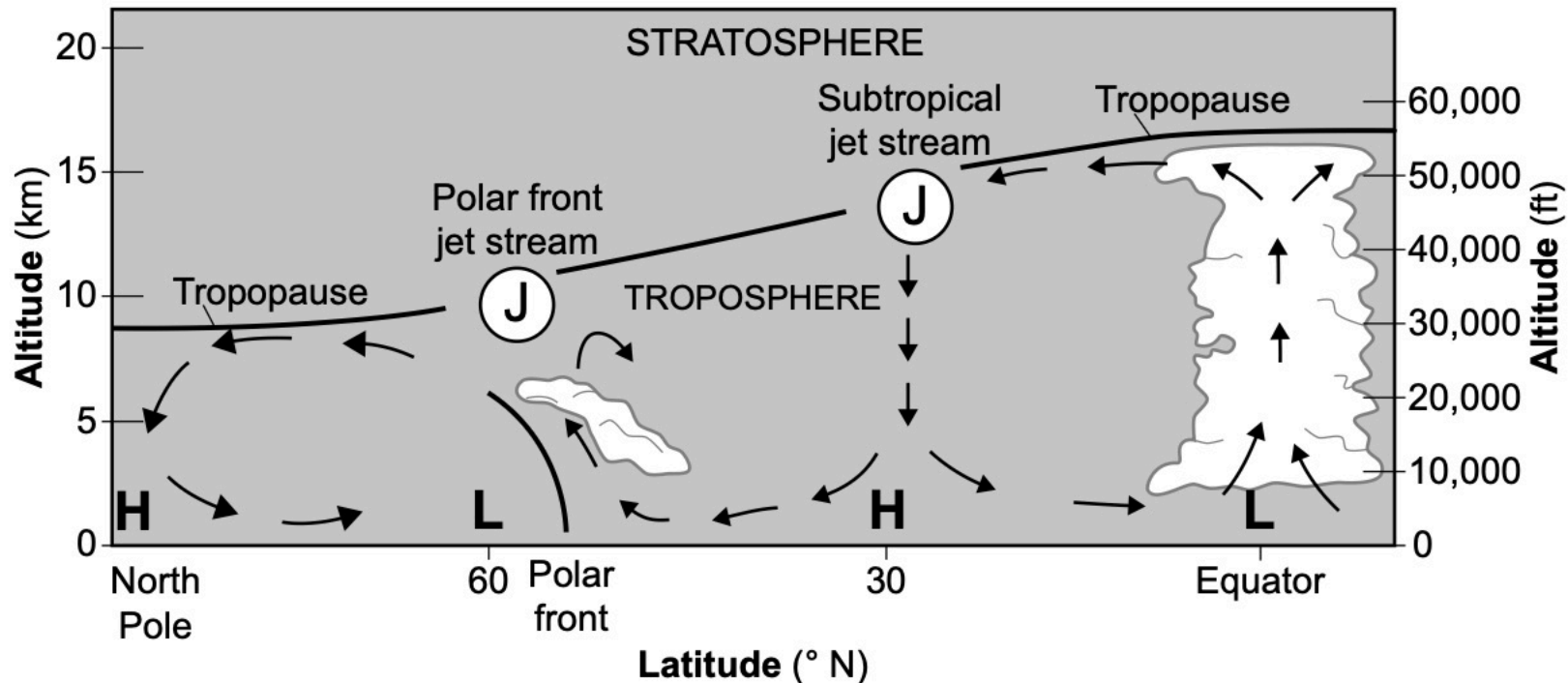
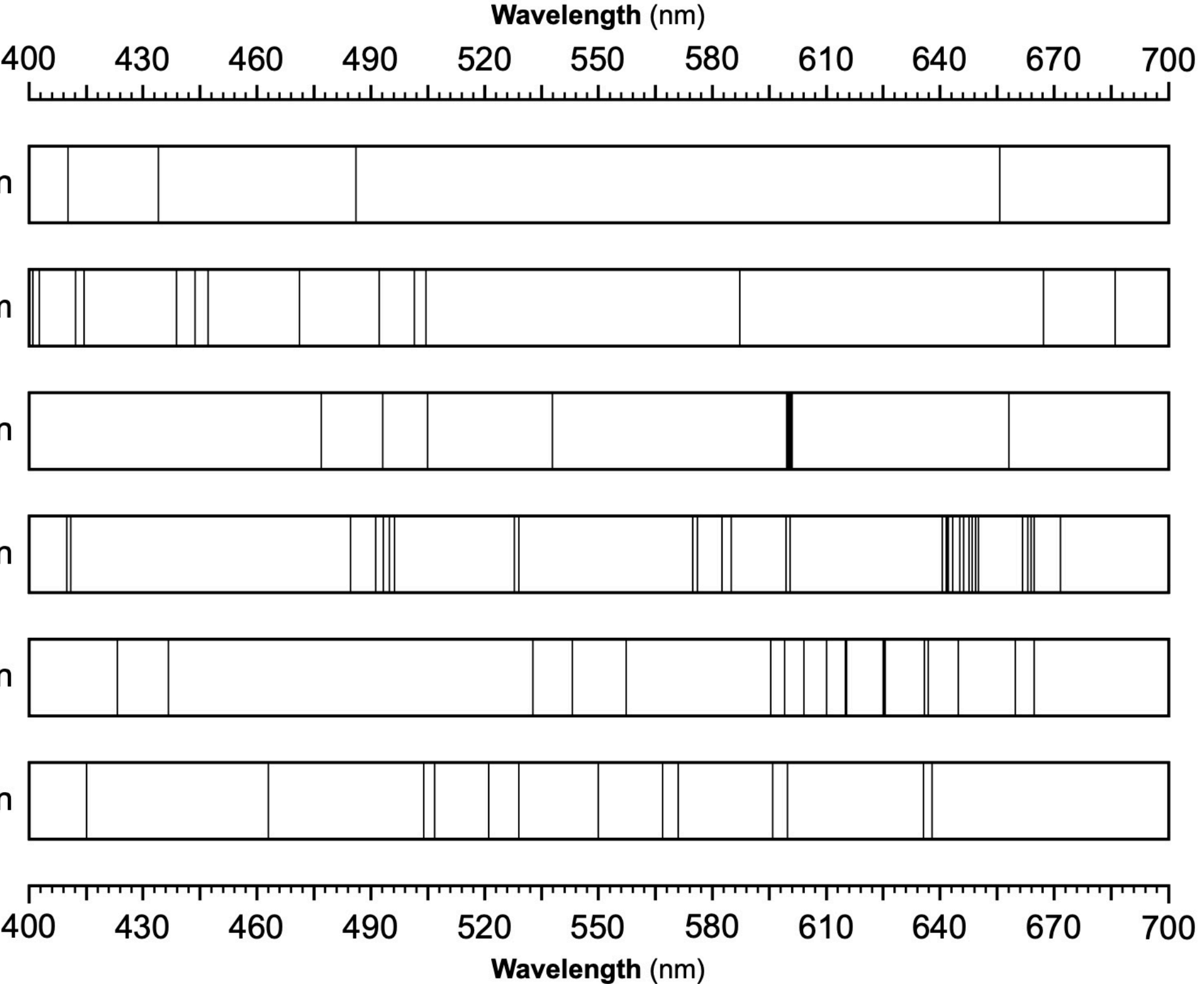


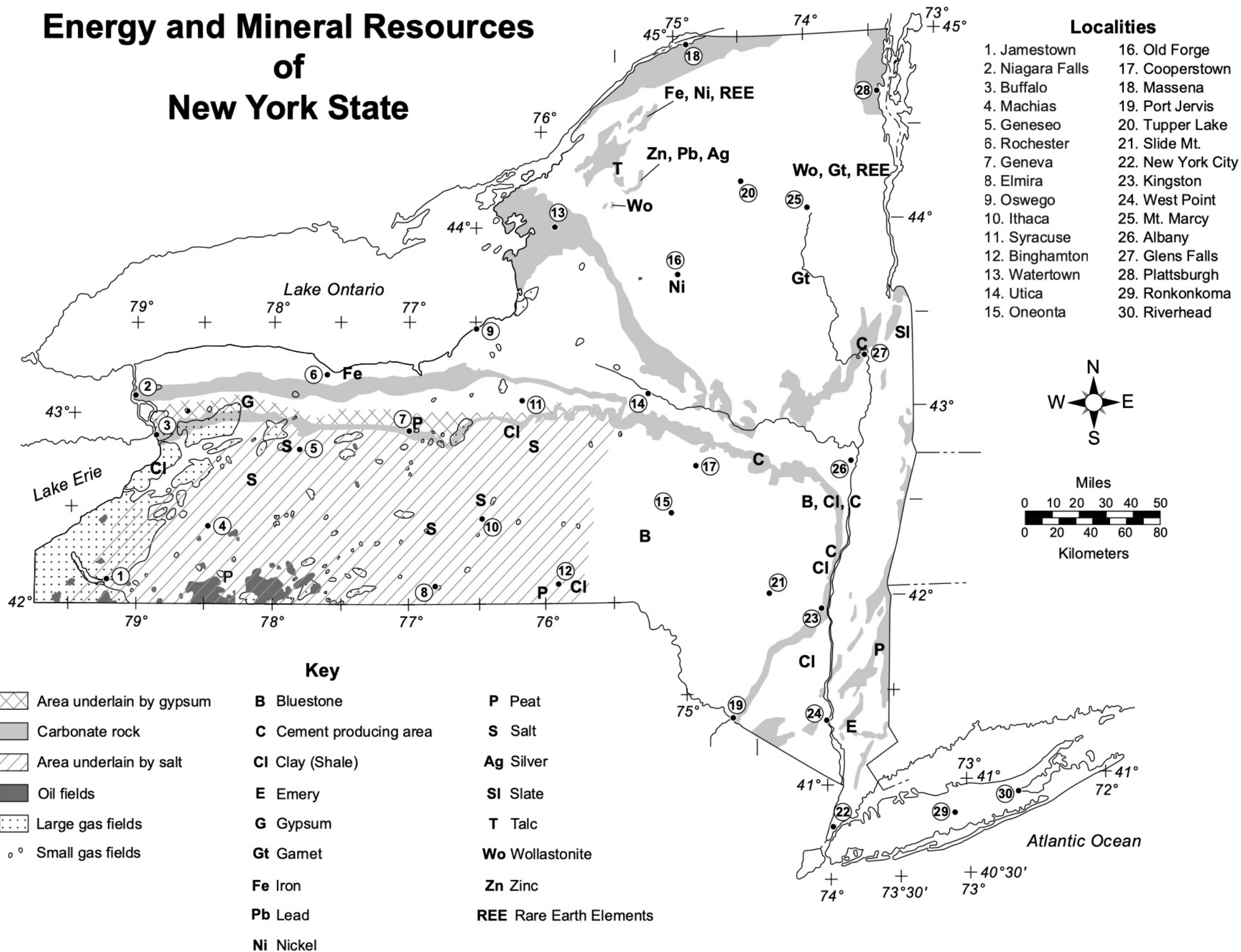
Cross Section Model of Earth's Lower Atmosphere



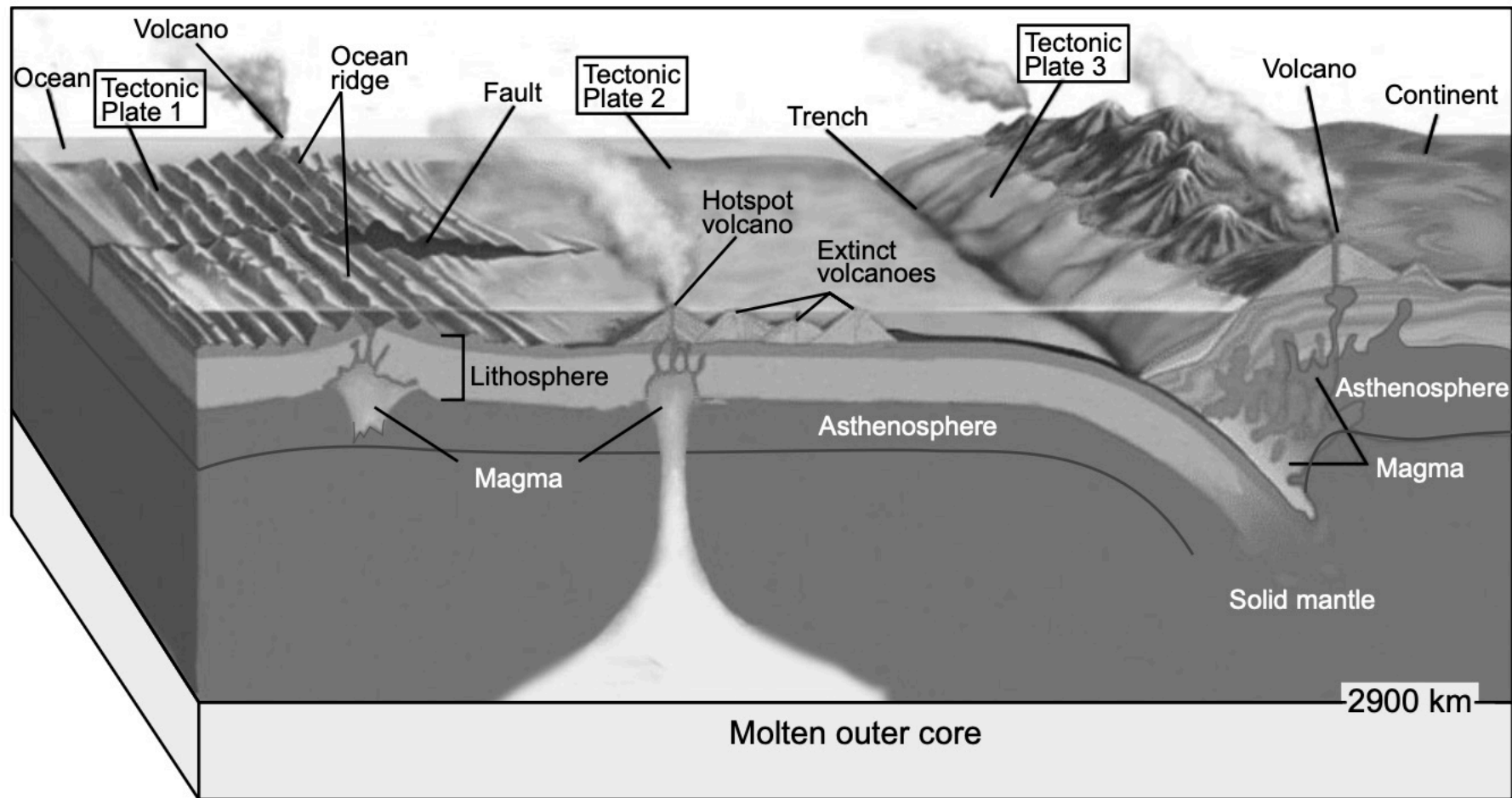
Emission Spectra of Some Elements from Stars



Energy and Mineral Resources of New York State

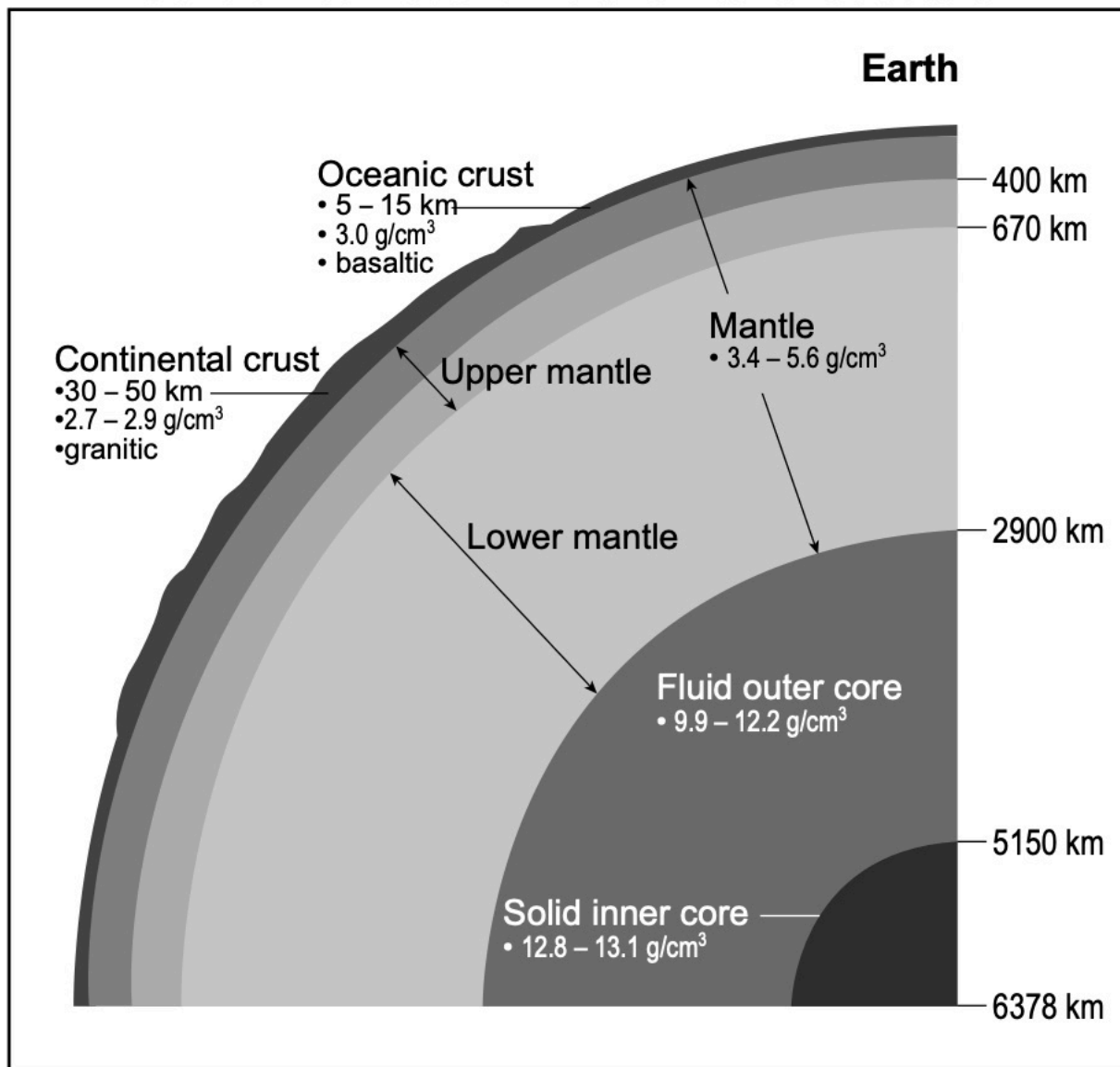


Generalized Cross Section Model of Earth's Surface and Interior



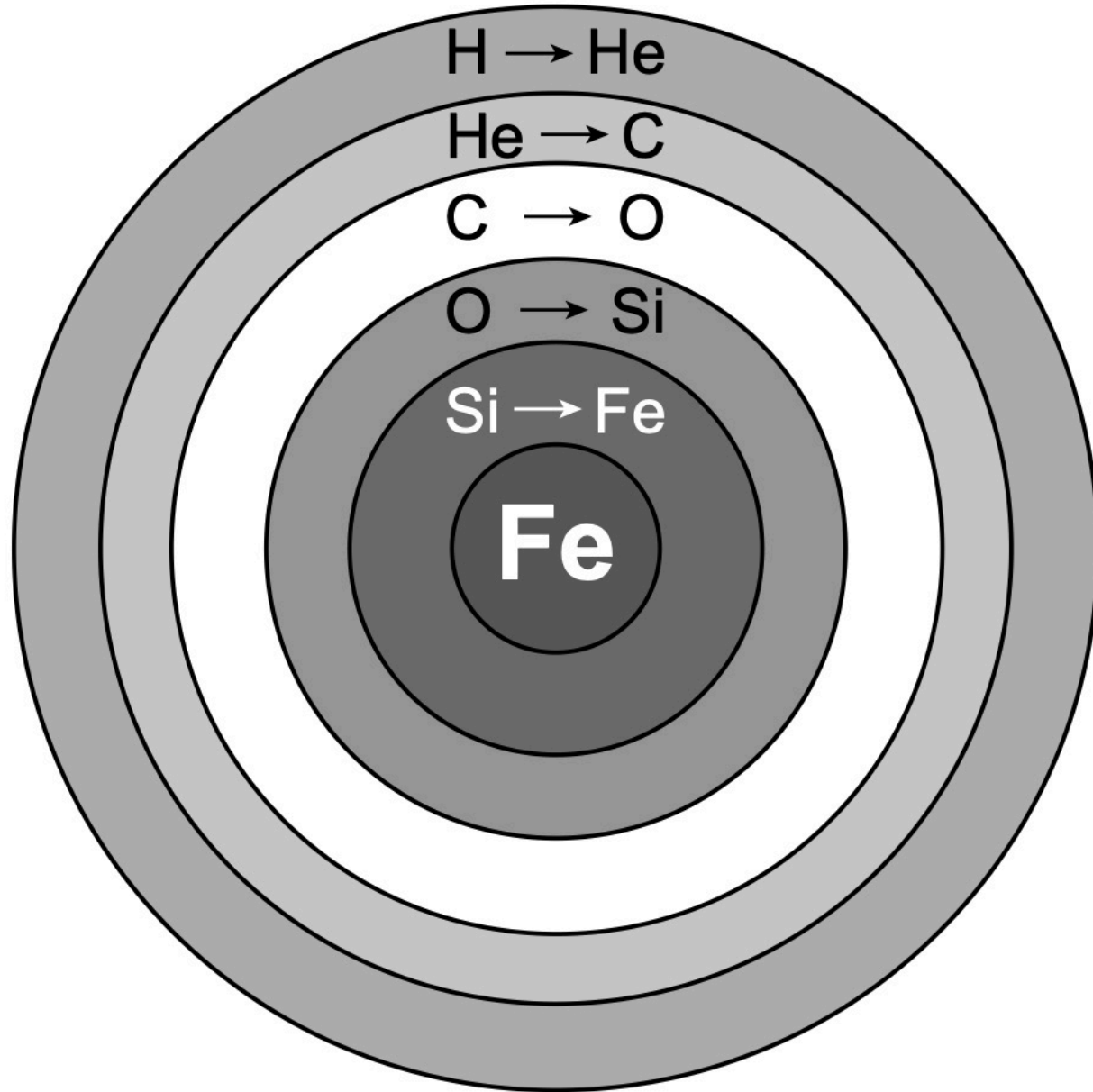
(Not drawn to scale)

Generalized Model of Earth's Interior Structure



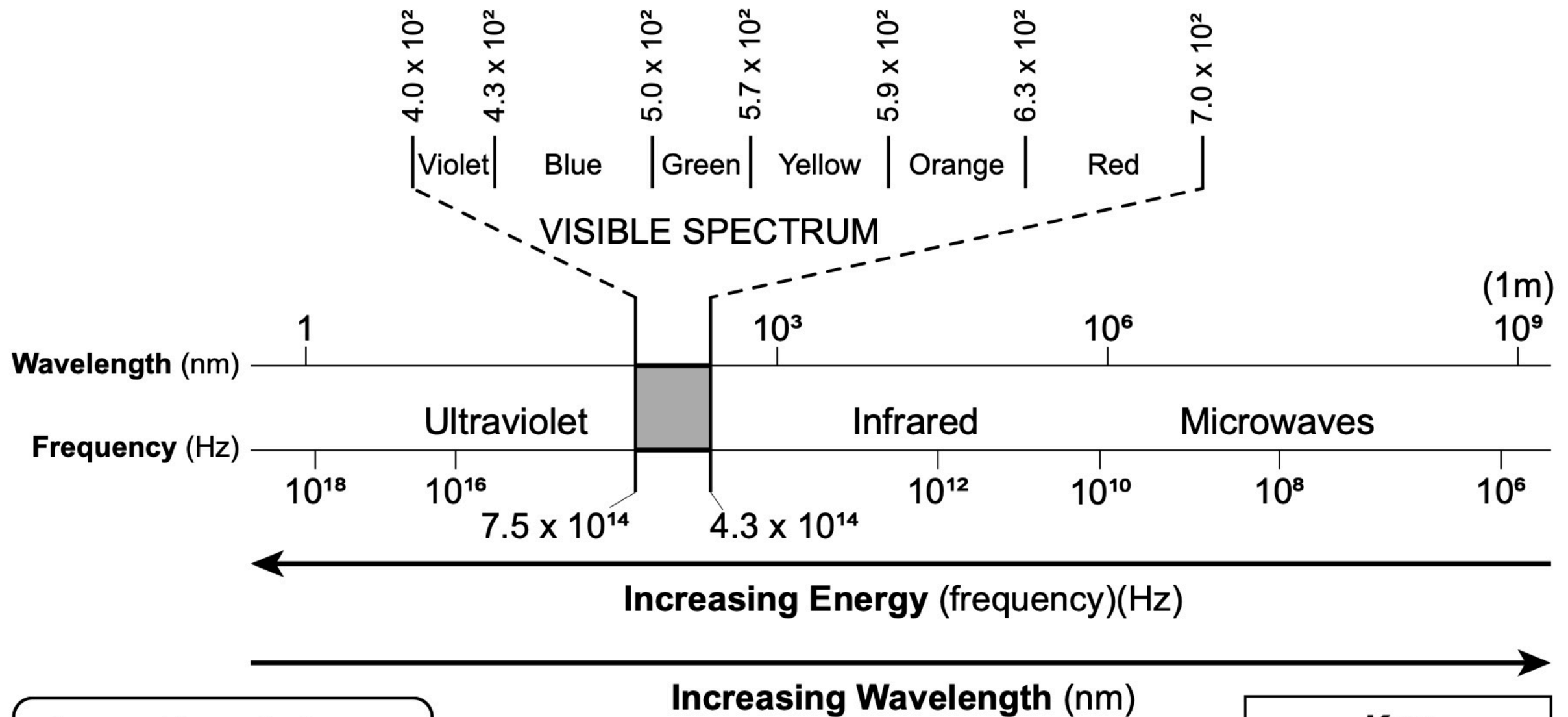
(Not drawn to scale)

Generalized Nucleosynthesis in a Massive Star



Stage	Duration
$\text{H} \rightarrow \text{He}$	7×10^6 years
$\text{He} \rightarrow \text{C}$	7×10^5 years
$\text{C} \rightarrow \text{O}$	600 years
$\text{O} \rightarrow \text{Si}$	6 months
$\text{Si} \rightarrow \text{Fe}$	1 day
Core Collapse	1/4 second

Generalized Portion of Electromagnetic Spectrum Related to Earth and Space Sciences

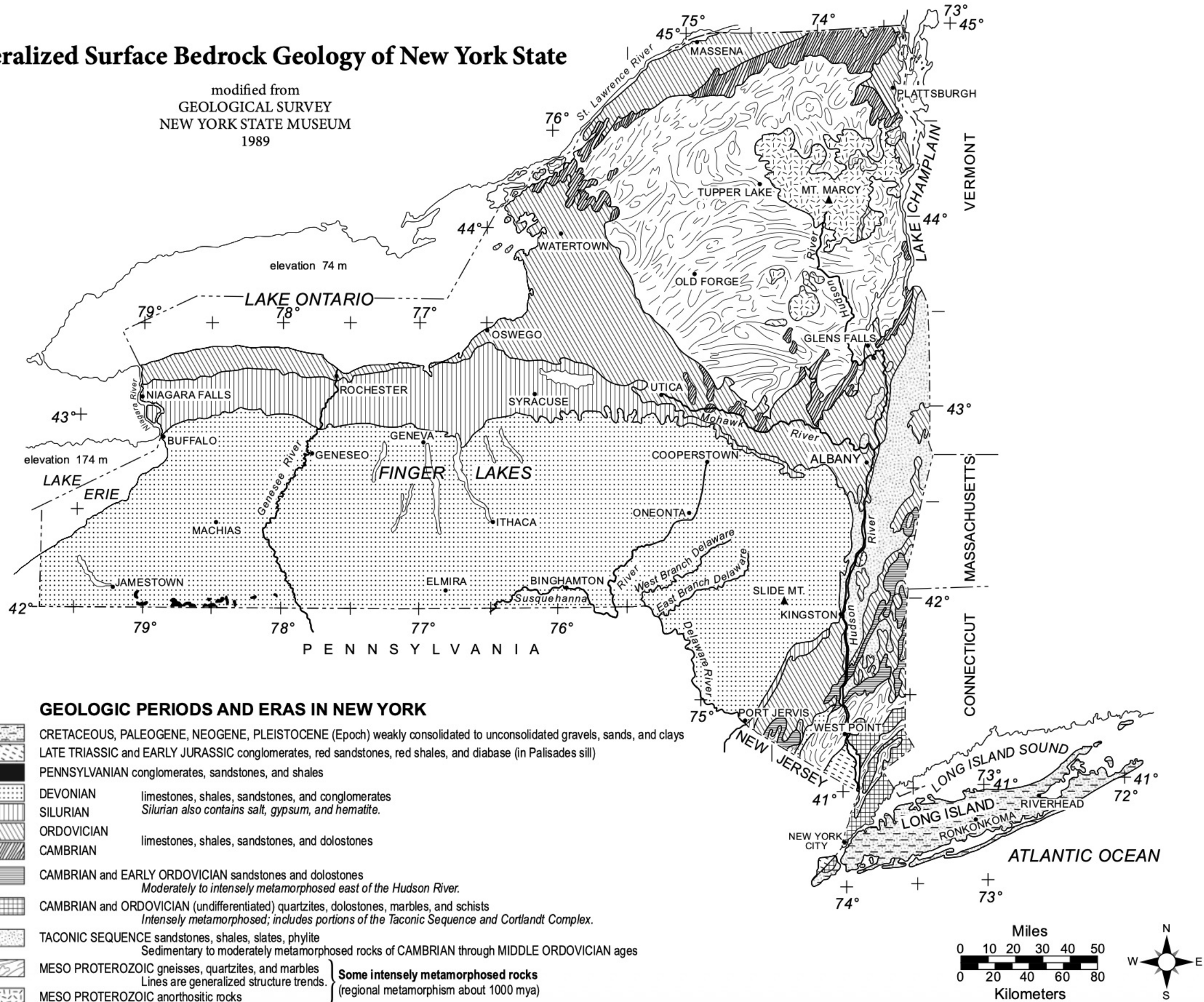


Spectral boundaries are not discrete, and there is an overlap in the biological effects between adjacent forms of electromagnetic radiation.

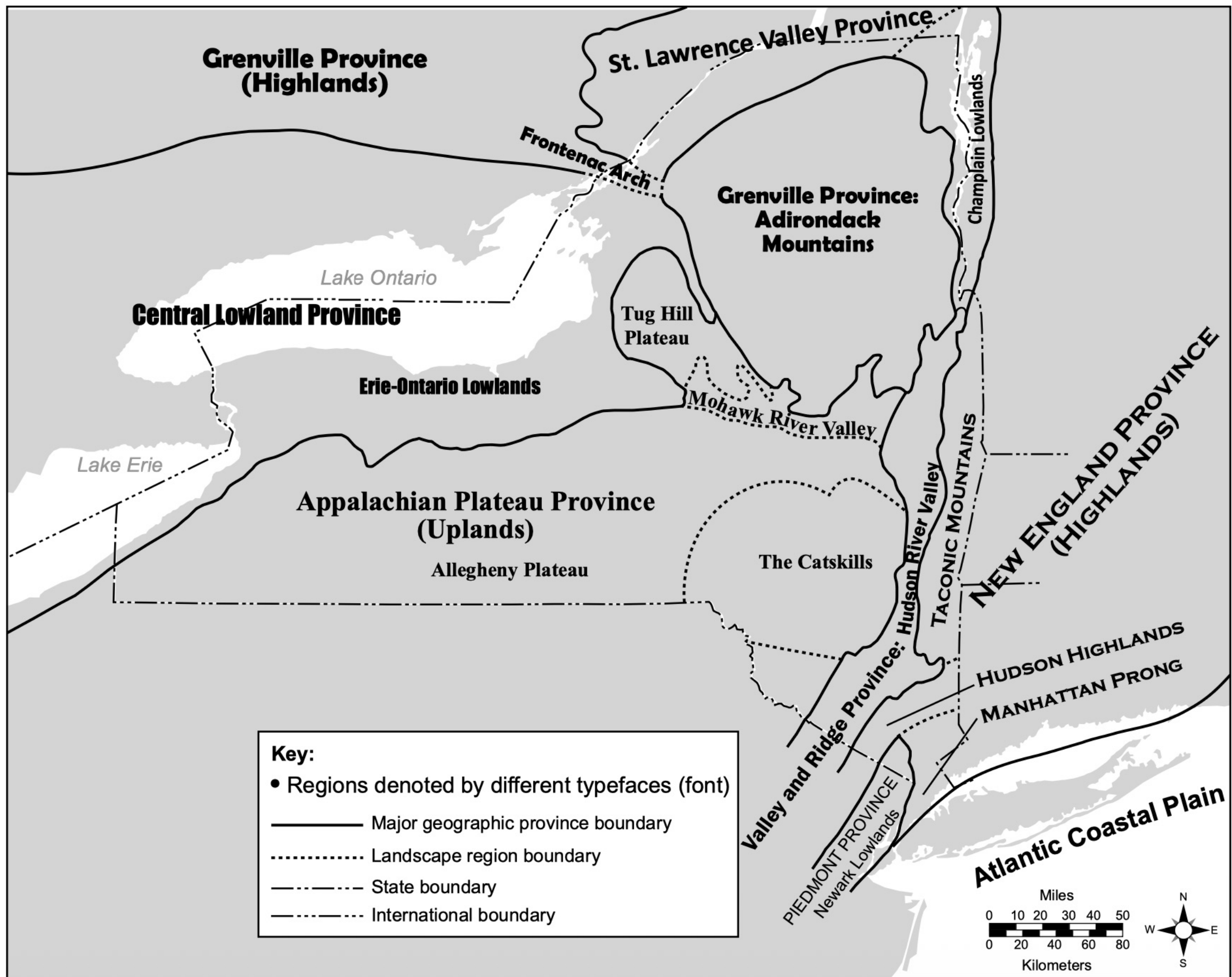
Key
nm = nanometer (10^{-9} meter)
Hz = hertz

Generalized Surface Bedrock Geology of New York State

modified from
GEOLOGICAL SURVEY
NEW YORK STATE MUSEUM
1989



Geographic Province and Landscape Regions of New York State



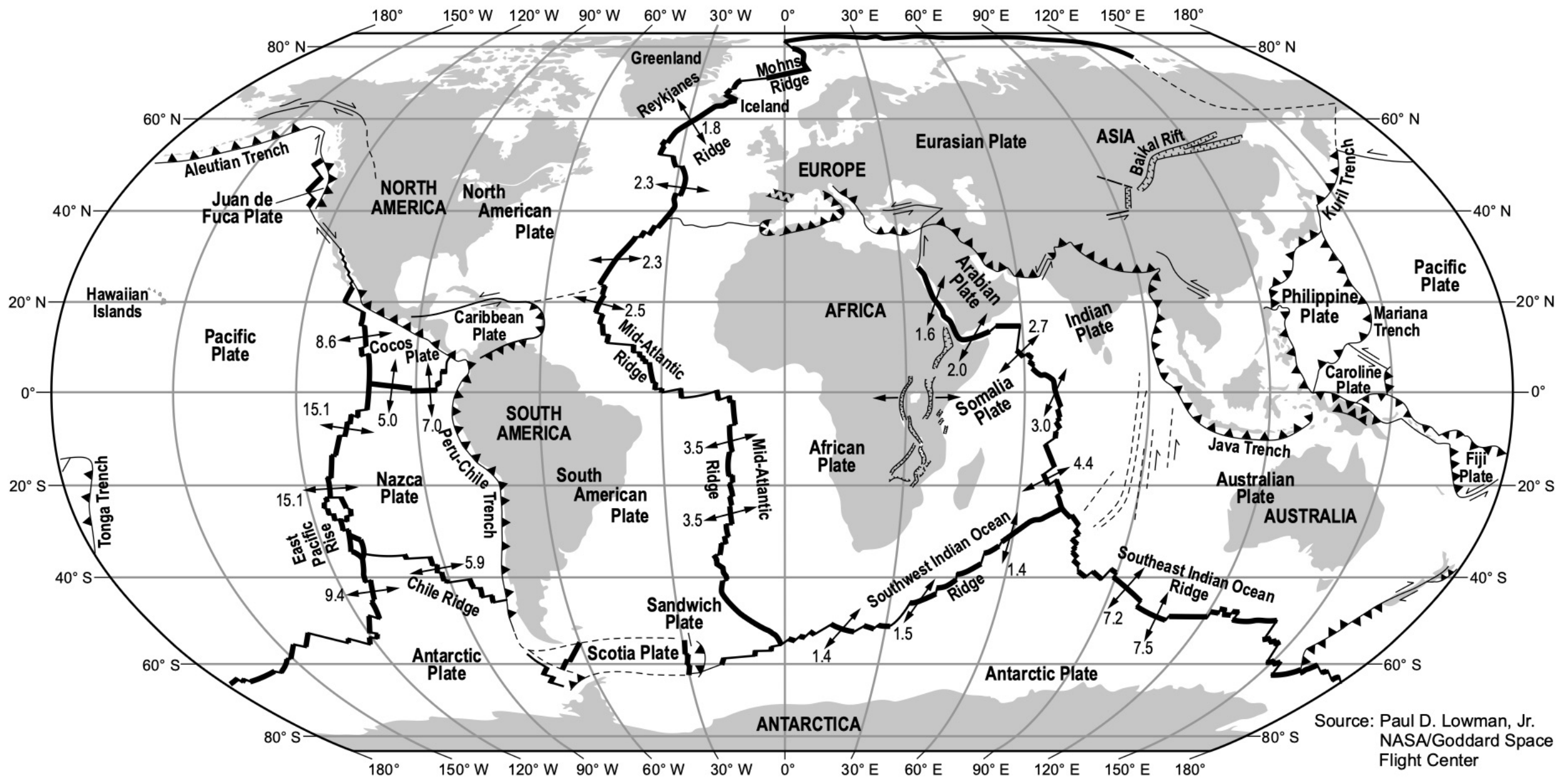
OF NEW YORK STATE



Geologically Important Radioactive Elements Used for Radiometric Dating

Parent Isotope	Daughter Decay Product	Approximate Half-life (years)	Useful Dating Range (years)	Materials That Can be Dated
Samarium-147 ^{147}Sm	Neodymium-143 ^{143}Nd	106 billion	10 million - 4.6 billion	Garnets, lunar fragments, and meteorites
Rubidium-87 ^{87}Rb	Strontium-87 ^{87}Sr	49.7 billion	10 million - 4.6 billion	Potassium-bearing minerals (mica, feldspar, hornblende), whole igneous or metamorphic rock
Uranium-238 ^{238}U	Lead-206 ^{206}Pb	4.5 billion	10 million - 4.6 billion	Uranium-bearing minerals (zircon, apatite, uraninite)
Uranium-235 ^{235}U	Lead-207 ^{207}Pb	703 million	10 million - 4.6 billion	Uranium-bearing minerals (zircon, apatite, uraninite)
Potassium-40 ^{40}K	Argon-40 ^{40}Ar	1.3 billion	100,000 - 4.6 billion	Potassium-bearing minerals (mica, feldspar, hornblende), igneous or metamorphic rock
Carbon-14 ^{14}C	Nitrogen-14 ^{14}N	5730	100 - 70,000	Organic materials, glacial ice containing carbon dioxide, groundwater, and ocean water

Global Tectonic Activity of the Last One Million Years



Source: Paul D. Lowman, Jr.
NASA/Goddard Space
Flight Center

KEY



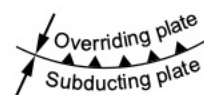
Divergent Plate boundary with transform faults
and total spreading rate, cm/year



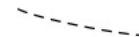
Major active transform fault or fault zone



Normal fault or rift; hachures on downthrown side

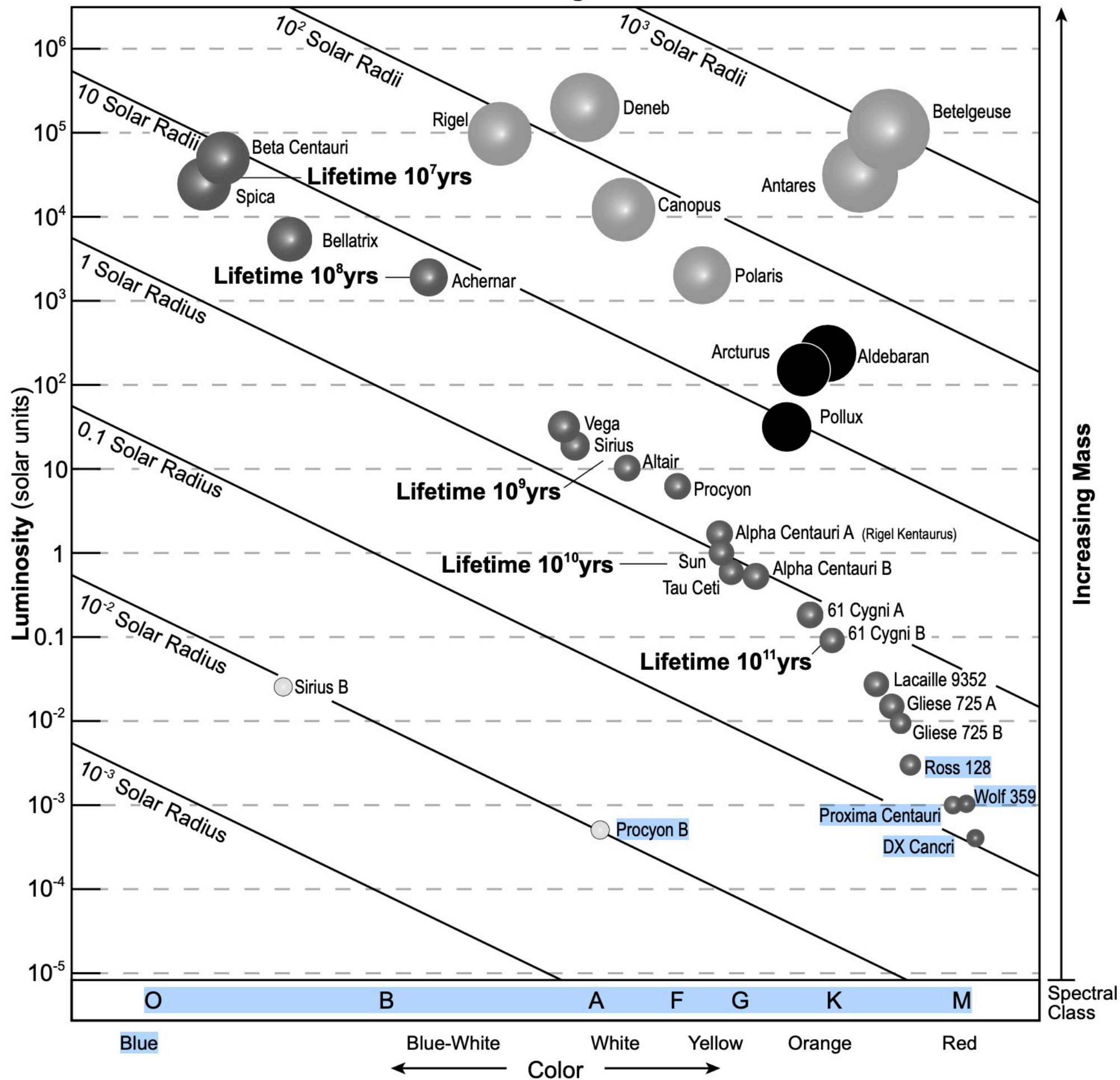


Convergent Plate boundary



Nature, location, or activity uncertain

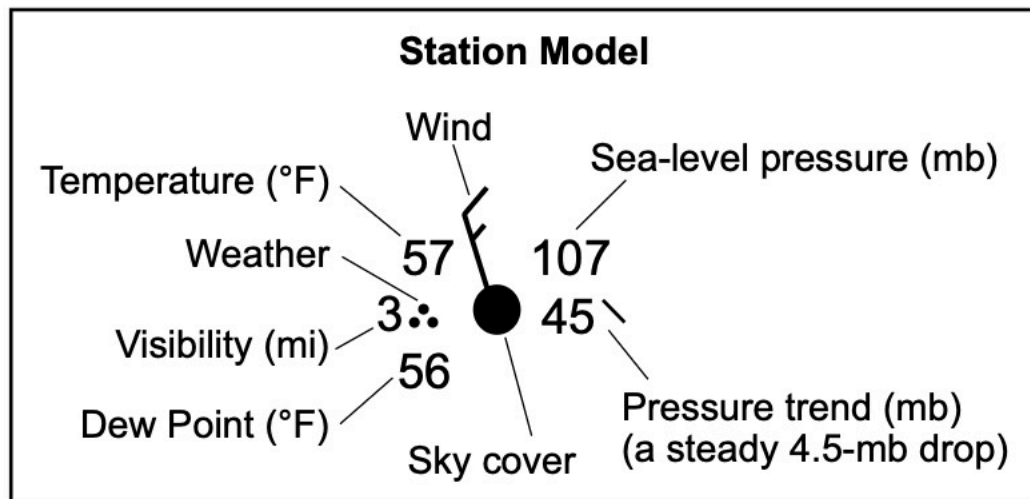
H-R Diagram



Approximate Surface Temperature Range (K) of Stars	
O	$\geq 28,000$
B	10,000 – 27,999
A	7500 – 9999
F	6000 – 7499
G	5000 – 5999
K	3500 – 4999
M	2000 – 3499

Key	
	SUPERGIANTS
	WHITE DWARFS
	MAIN SEQUENCE
	GIANTS

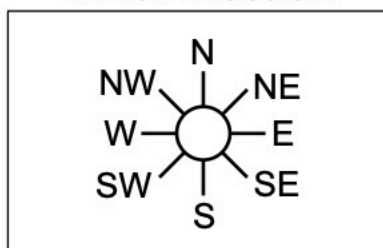
Key to Weather Map Symbols



Wind Speed

	Calm
	<5 knots
	5 knots
	10 knots
	20 knots
	25 knots
	50 knots

Wind Direction



Air Pressure

H	High
L	Low

Pressure

Sea-level pressure is plotted in tenths of millibars (mb) with the leading 10 or 9 omitted.

410: 1041.0 mb
 103: 1010.3 mb
 987: 998.7 mb
 872: 987.2 mb

Weather Conditions

	Intermittent			
	Light	Moderate	Heavy	
Rain	•	••	•••	
Snow	*	**	***	
Drizzle	••	•••	••••	
	Steady			
	Light	Moderate	Heavy	
Rain	••	•••	••••	
Snow	**	**	***	
Drizzle	••	•••	••••	
Thunderstorms				
	Light	Heavy		
Rain				
Snow				
Hail				
Hail				
Tornado				
Hurricane				
Sleet				
Snow grains				
Drifting snow				
Freezing Drizzle:				
	Light	Heavy		
Freezing Rain:				
	Light	Heavy		

Sky Cover

	No Clouds
	1/10
	1/4
	1/2
	3/4
	9/10
	Completely overcast
	Sky obscured

Pressure Trend (previous 3 hours)

	Rising continuously
	Falling continuously
	Rising, rising, falling
	Falling, steady, falling

Misc. Sky Cover

	Haze
	Smoke
	Dust/Sand
	Fog in patches
	Light fog
	Heavy fog

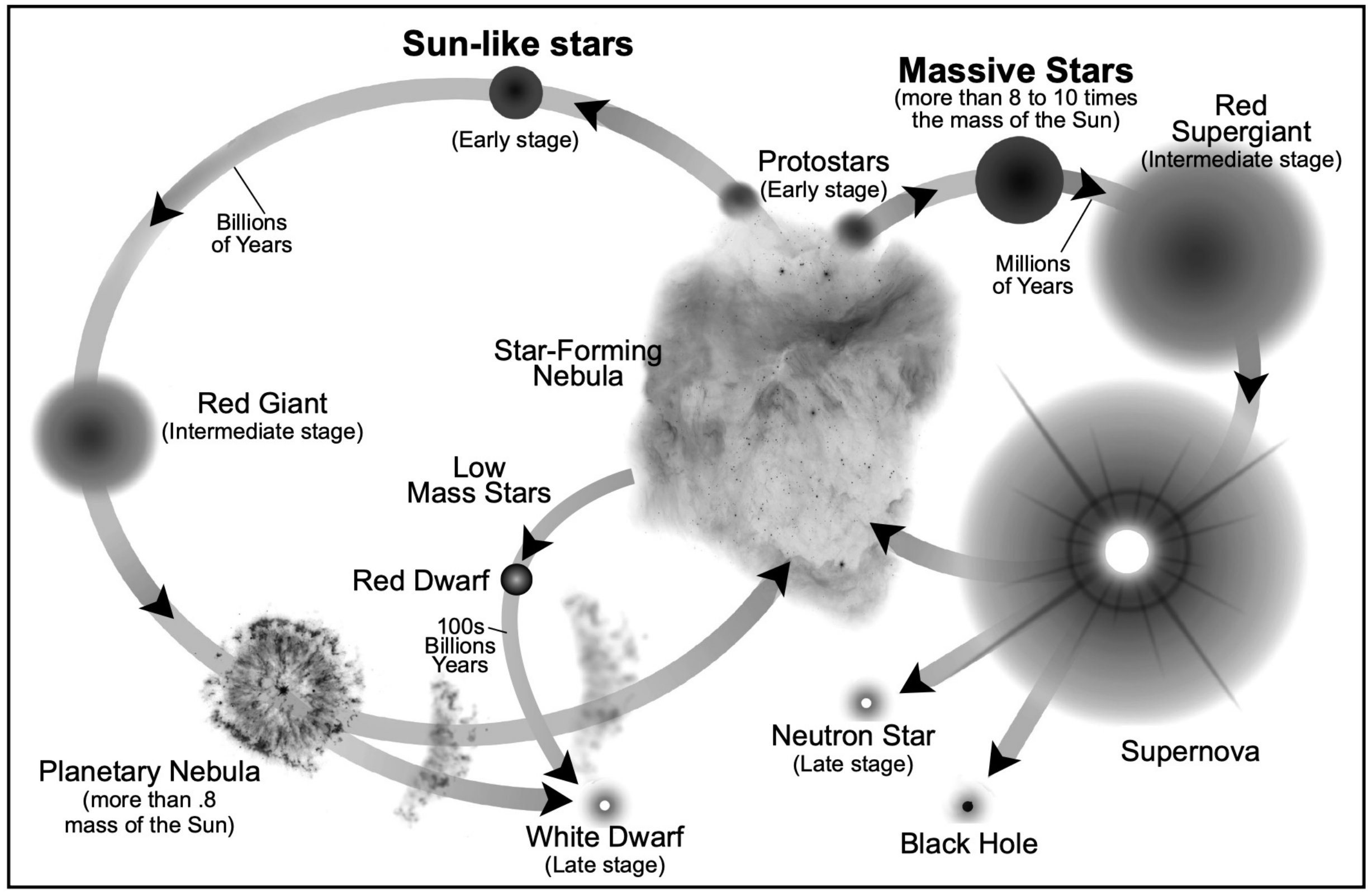
Showers

	Slight rain
	Moderate/Heavy rain
	Violent rain
	Sleet
	Slight snow
	Moderate/Heavy snow

Fronts

Cold	
Warm	
Stationary	
Occluded	

Life Cycles of Stars Model



Locations of Selected Hotspots



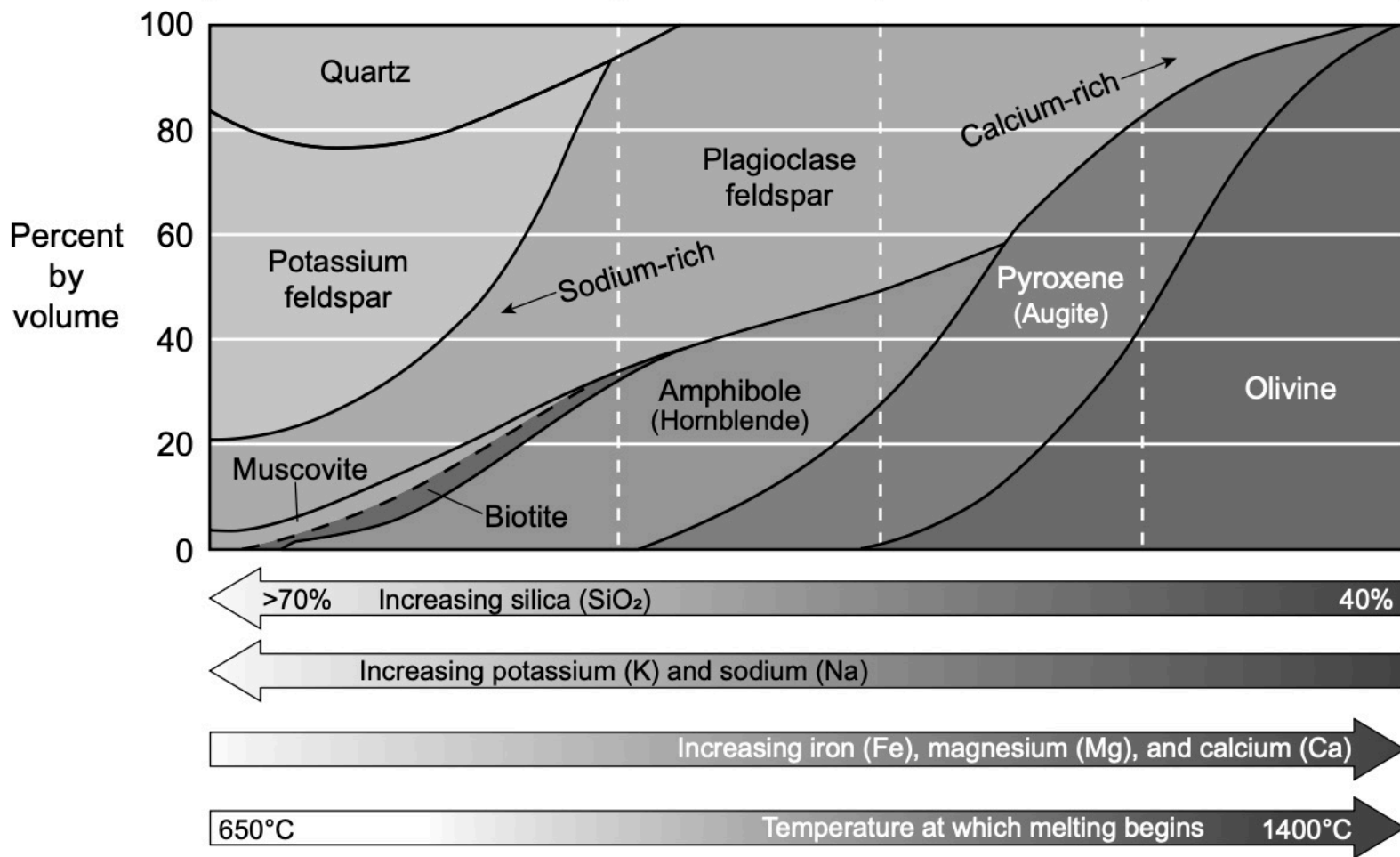
Key

— Approximate plate boundary

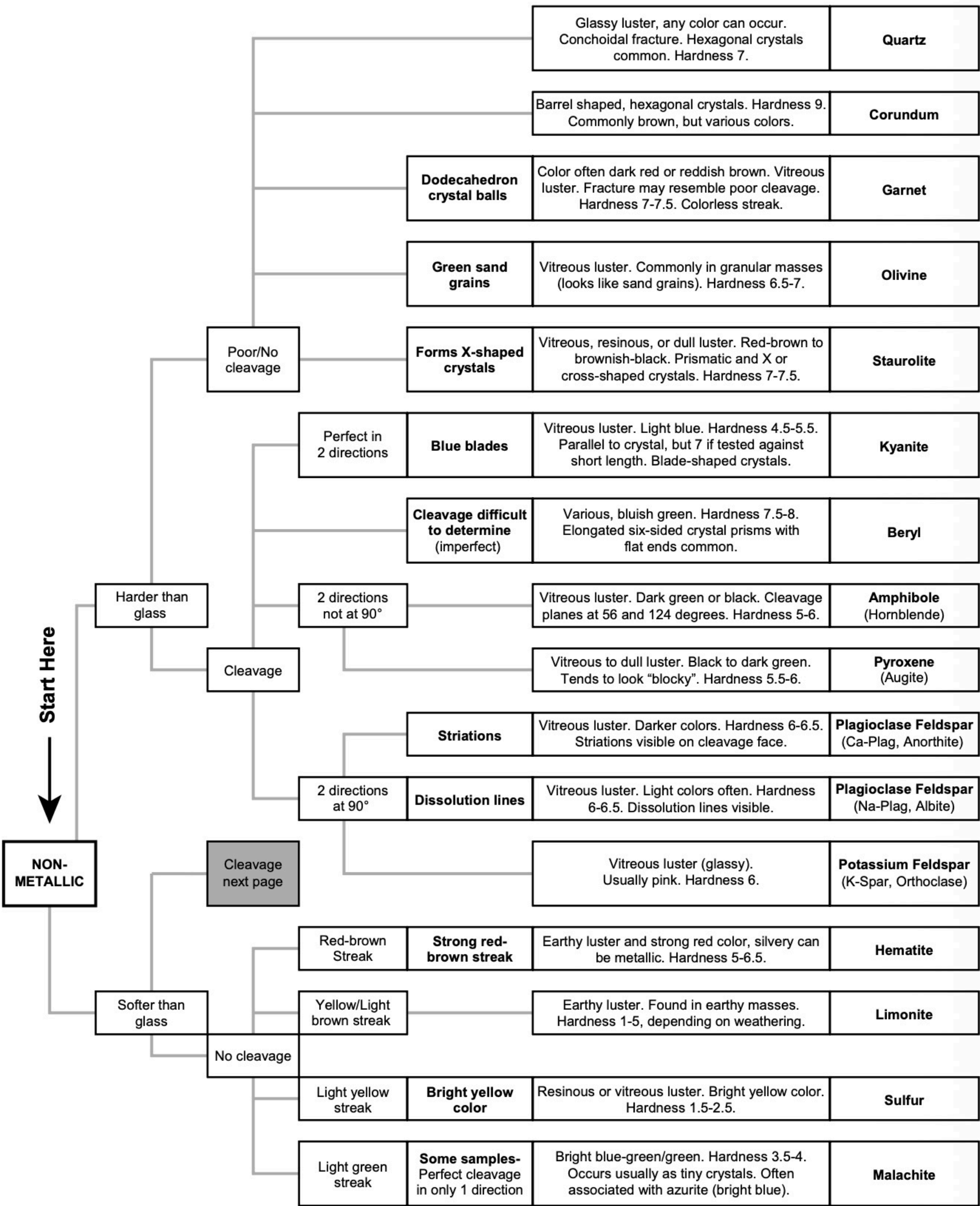
● Selected prominent hotspots

Mineral Composition of Igneous Rocks

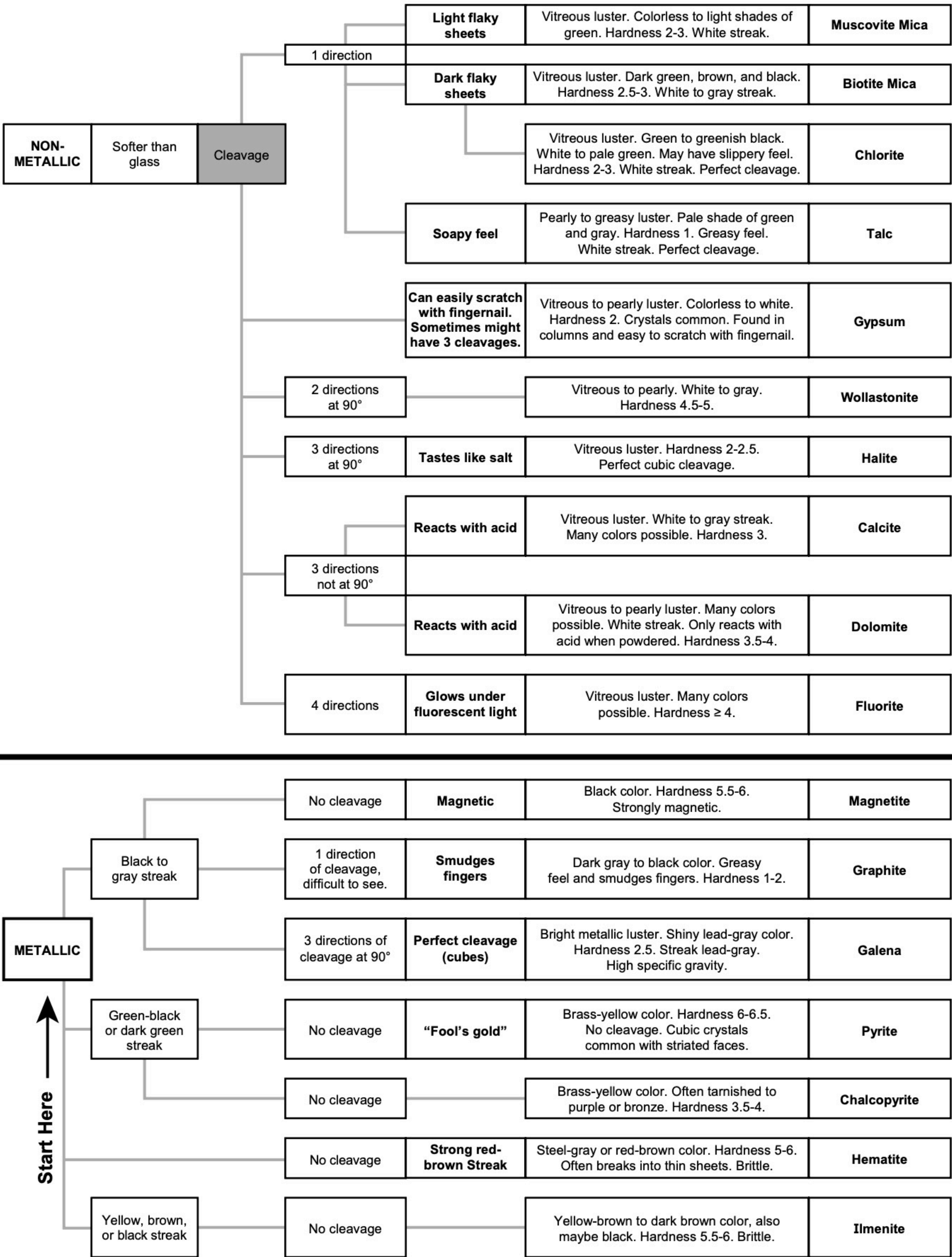
Composition	Felsic	Intermediate	Mafic	Ultramafic
Rock types	- Granite - Rhyolite	- Diorite - Andesite	- Gabbro - Basalt	- Peridotite - Komatiite



Mineral Identification Flowchart



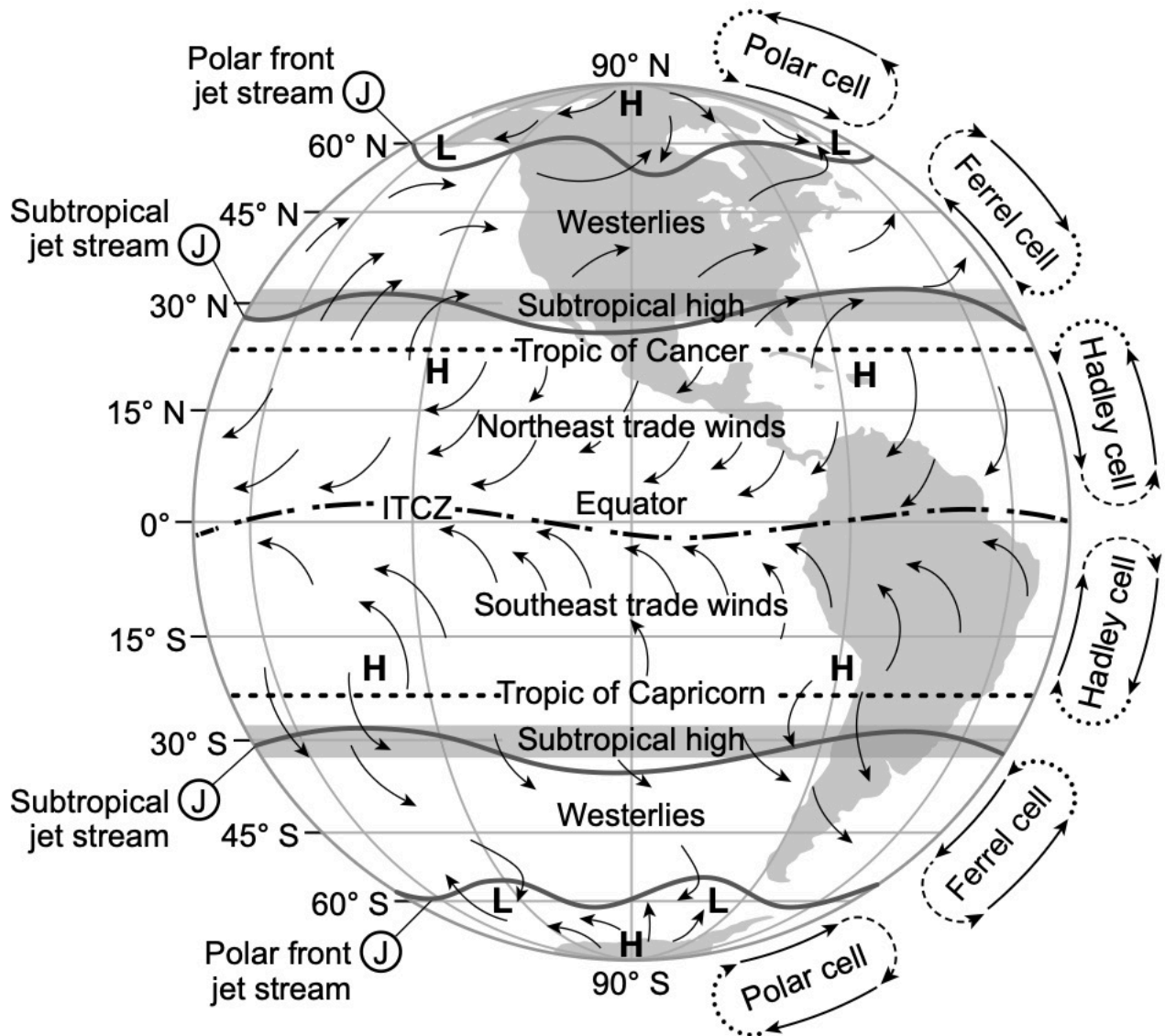
Mineral Identification Flowchart (Continued)



Model of Bowen's Reaction Series

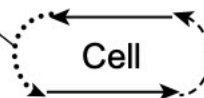
Temperature	Sequence of Mineral Crystallization from Magma	Igneous Rock Types	Visualization of Magma Crystallization
Highest Temperature 1400°C (first to crystallize) Cooling Magma Lowest Temperature 650°C (last to crystallize)	Olivine Pyroxene Amphibole Biotite Mica Potassium (K) Feldspar Muscovite Mica Quartz Discontinuous Series Continuous Series Calcium-rich (Ca) Sodium-rich (Na)	Ultramafic • Komatiite • Peridotite Mafic • Basalt • Gabbro Intermediate • Andesite • Diorite Felsic • Rhyolite • Granite	Ca-Feldspar Olivine Ca/Na-Feldspar Pyroxene Biotite Mica Na-Feldspar Amphibole K-Feldspar Muscovite Mica Quartz

Model of Generalized Planetary Wind Belts in the Troposphere



Key:

Descending
air



Rising
air

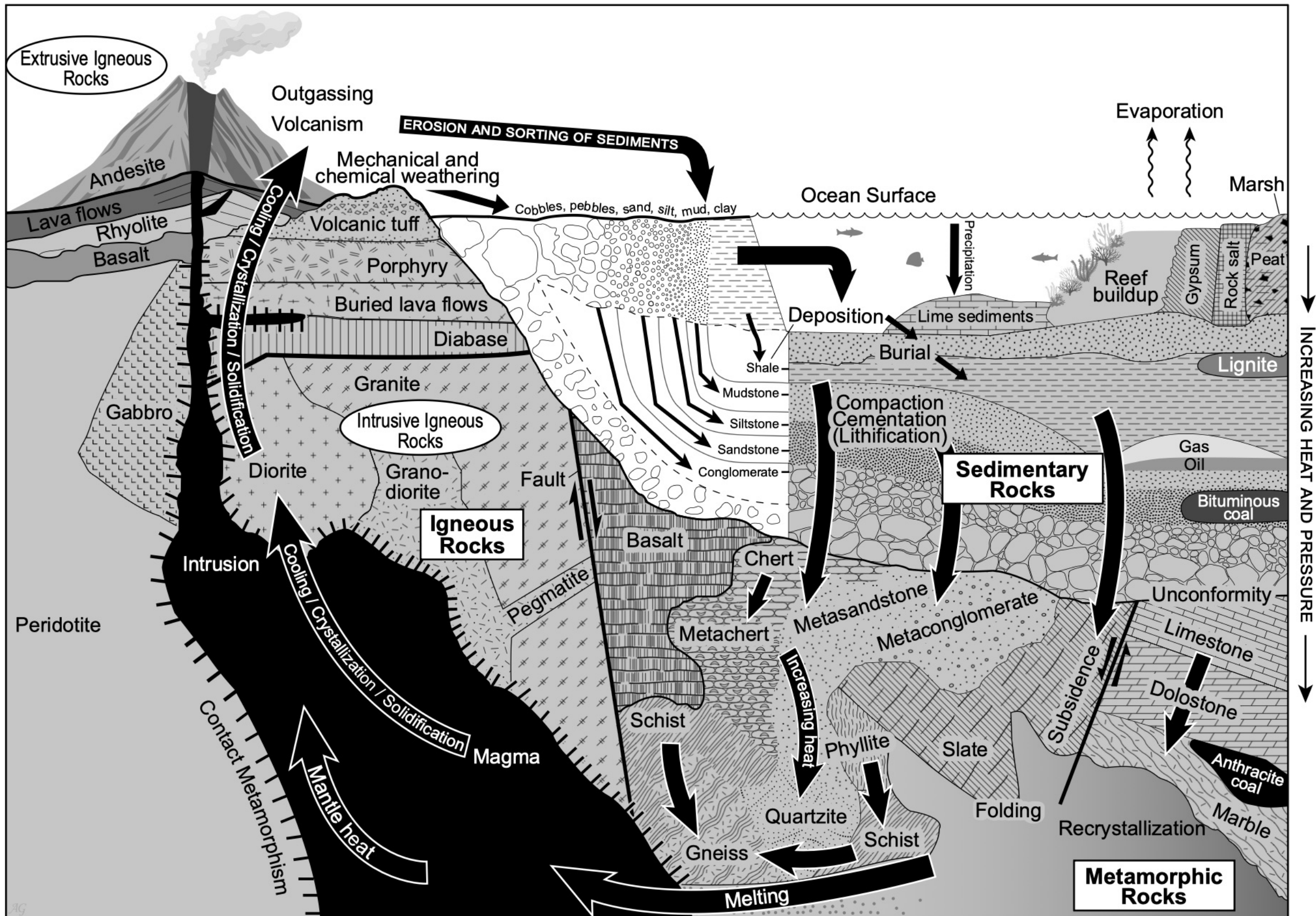
ITCZ: Intertropical
Convergence
Zone

The patterns shown on this map shift seasonally.

Mohs Hardness Scale

Hardness	Mineral Name	Tools
10.0	Diamond	
9.0	Corundum	
8.0	Topaz	
7.0	Quartz	
6.5		Steel nail
6.0	Orthoclase	
5.5		Glass plate
5.0	Apatite	
4.0	Fluorite	
3.5		Copper penny
3.0	Calcite	
2.5		Finger nail
2.0	Gypsum	
1.0	Talc	

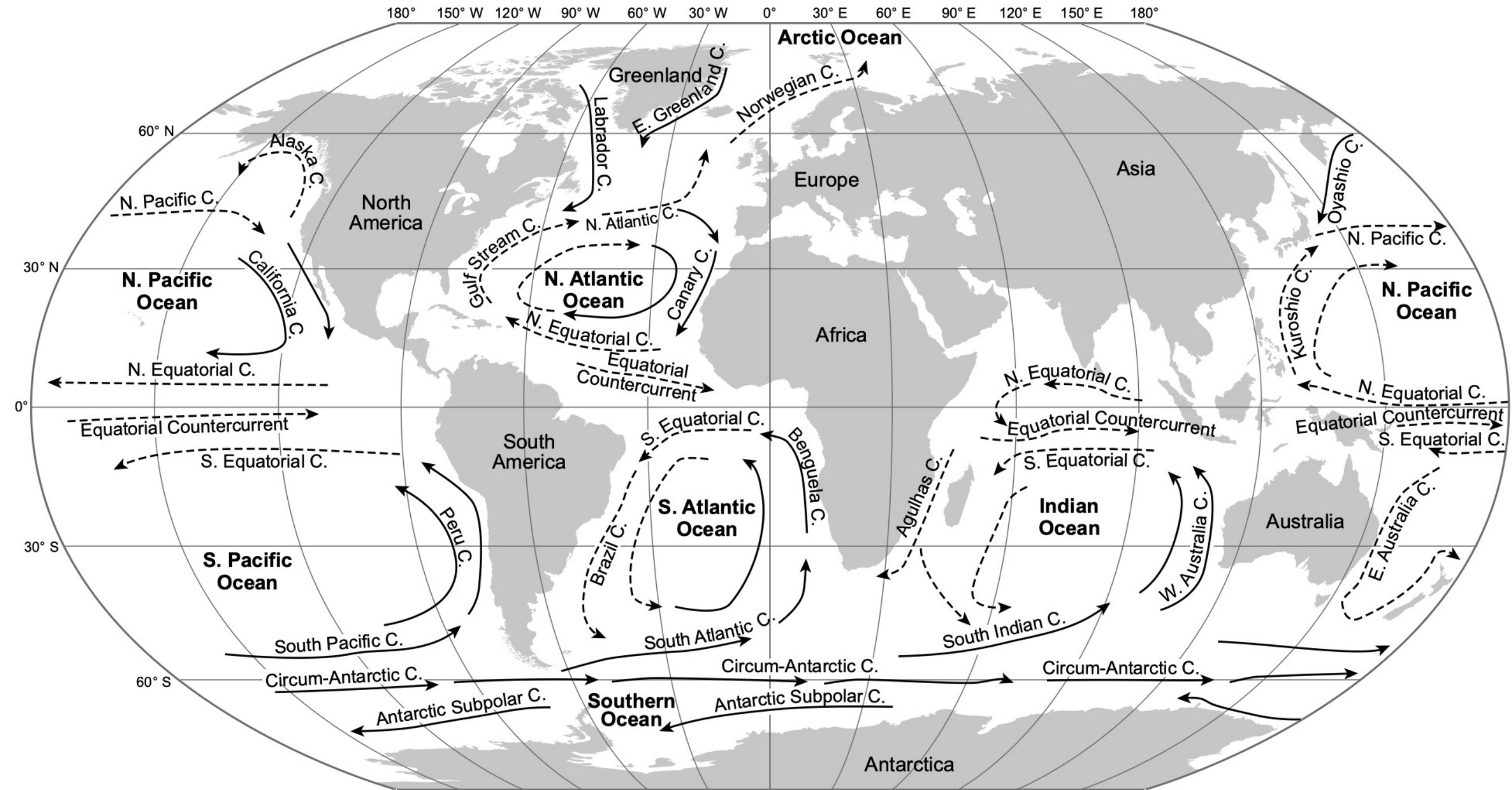
Rock Cycle Infographic



Solar System Objects Data Table

Celestial Object	Mean Distance from Sun (million km)	Period of Revolution (d=Earth days) (y=Earth years)	Period of Rotation at Equator	Eccentricity of Orbit	Equatorial Diameter (km)	Axial Tilt (°)
SUN	---	---	25.4 d	---	~1,391,400	7.25
MERCURY	57.9	88.0 d	58.7 d	0.206	4879	0.03
VENUS	108.2	224.7 d	243.7 d	0.007	12,104	177.36
EARTH	149.6	365.26 d	23 h 56 min	0.017	12,756	23.44
EARTH'S MOON	149.6 (0.384 from Earth)	27.3 d	27.3 d	0.055	3475	6.68
MARS	228.0	1.9 y	24 h 37 min	0.094	6792	25.19
CERES	414.0	4.6 y	9 h 5 min	0.079	~939	4.00
PALLAS	414.0	4.6 y	7 h 49 min	0.231	~513	84.00
JUPITER	778.5	11.9 y	9 h 54 min	0.049	142,976	3.13
SATURN	1432.0	29.4 y	10 h 39 min	0.054	120,536	26.73
URANUS	2867.0	84.0 y	17 h 15 min	0.047	51,118	97.77
NEPTUNE	4515.0	164.8 y	16 h 6 min	0.009	49,528	28.32
PLUTO	5906.4	248.0 y	6.4 d	0.244	2376	119.51
ERIS	~10,000.0	~557.6 y	1.1 d	0.436	2400	~78.30

Surface Ocean Currents Model



Key	
----->	Warm currents
—————>	Cold currents