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Earth Science Reference Tables

PHYSICAL CONSTANTS

Radioactive Decay Data

RADIOACTIVE ISOTOPE	DISINTEGRATION	HALF-LIFE (years)
Carbon-14	$C^{14} \rightarrow N^{14}$	5.7×10^{3}
Potassium-40	$K^{40} \rightarrow Ar^{40}$ / $K^{40} \rightarrow Ca^{40}$	1.3×10^{9}
Uranium-238	$U^{238} \rightarrow Pb^{206}$	4.5×10^{9}
Rubidium-87	$Rb^{87} \rightarrow Sr^{87}$	4.9×10^{10}

Specific Heats of Common Materials

MATERIAL	SPECIFIC HEAT (calories/gram • C)
Water – solid	0.5
Water – liquid	1.0
Water – gas	0.5
Dry air	0.24
Basalt	0.20
Granite	0.19
Iron	0.11
Copper	0.09
Lead	0.03

Properties of Water

Energy gained during melting	80 calories/gram
Energy released during freezing	80 calories/gram
Energy gained during vaporization	540 calories/gram
Energy released during condensation	540 calories/gram
Density at 3.98°C	1.00 gram/milliliter

EQUATIONS

Percent deviation from accepted value

$$\text{deviation (\%)} = \frac{\text{difference from accepted value}}{\text{accepted value}} \times 100$$

Eccentricity of an ellipse

$$\text{eccentricity} = \frac{\text{distance between foci}}{\text{length of major axis}}$$

Gradient

$$\text{gradient} = \frac{\text{change in field value}}{\text{distance}}$$

Rate of change

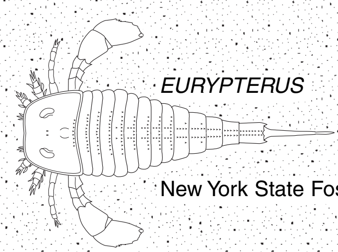
$$\text{rate of change} = \frac{\text{change in field value}}{\text{time}}$$

Density of a substance

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

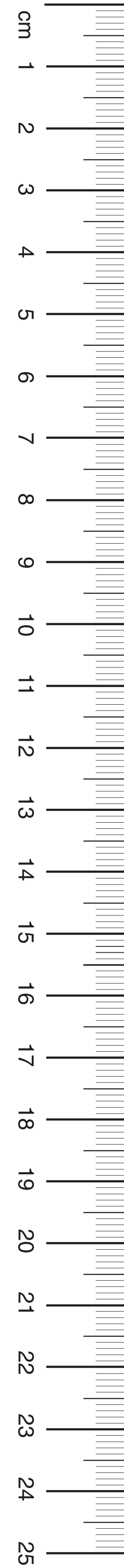
2001 EDITION

This edition of the Earth Science Reference Tables should be used in the classroom beginning in the 2000–2001 school year. The first examination for which these tables will be used is the January 2001 Regents Examination in Earth Science.



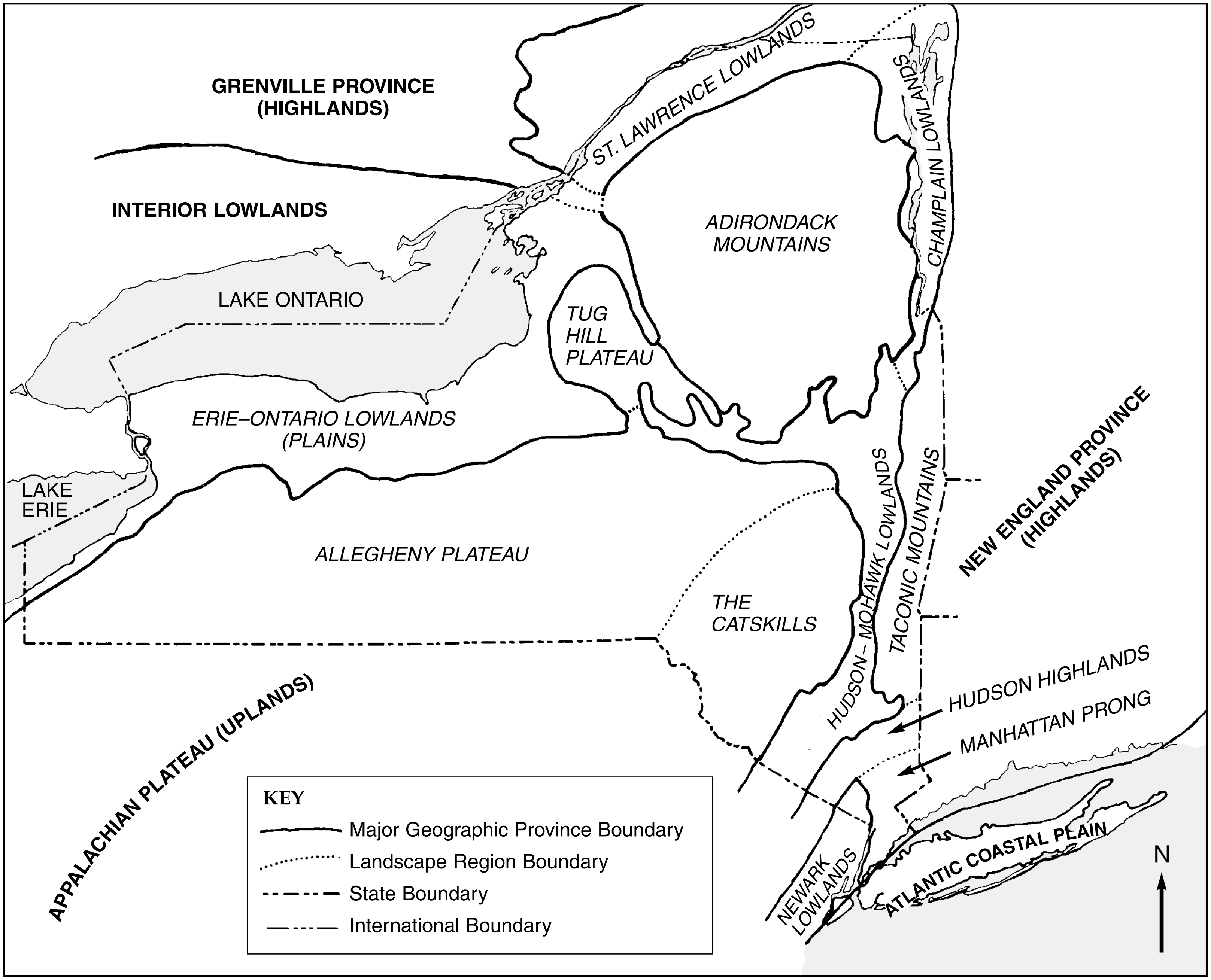
EURYPTERUS

New York State Fossil



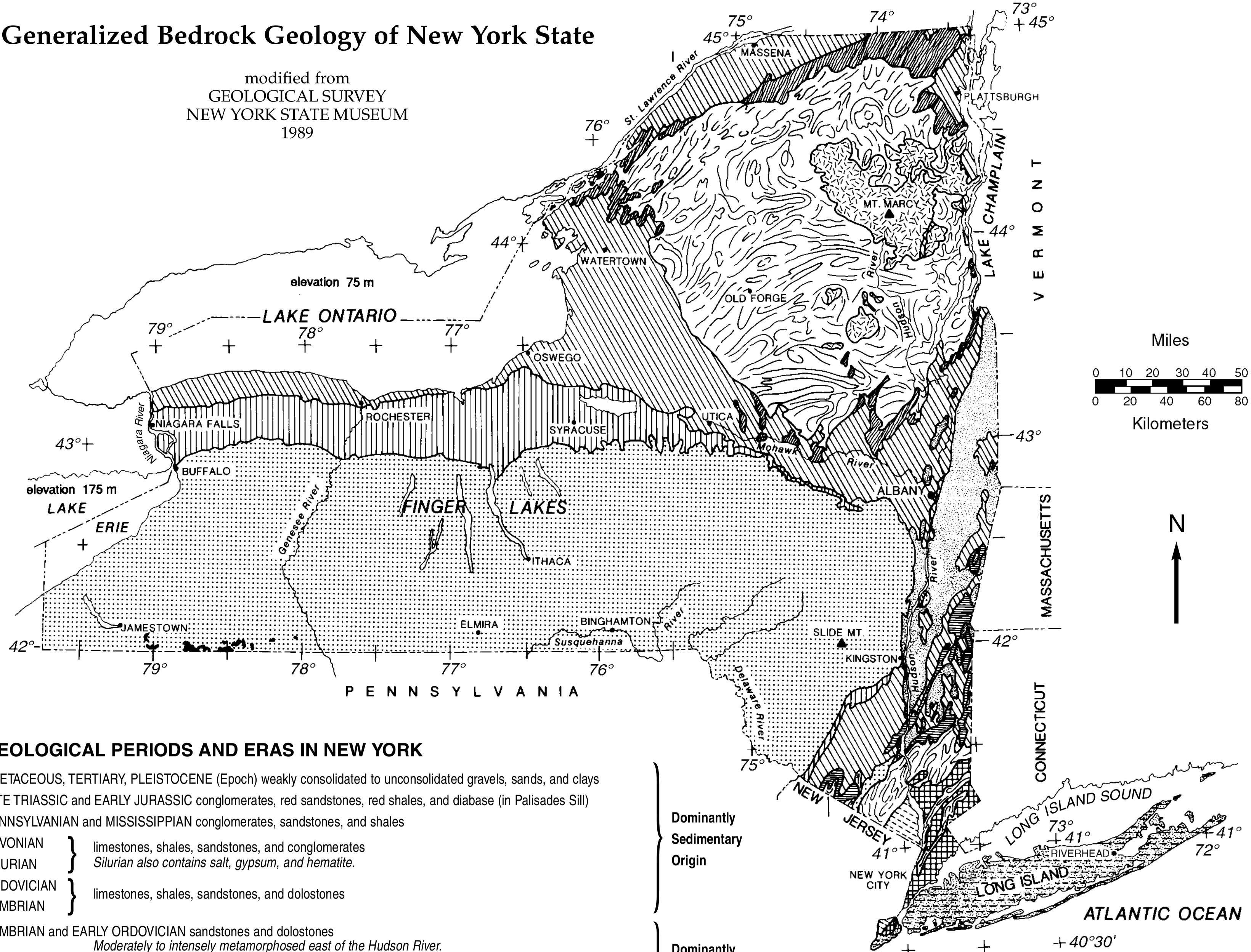
(Revised November 2006)

Generalized Landscape Regions of New York State



Generalized Bedrock Geology of New York State

modified from
GEOLOGICAL SURVEY
NEW YORK STATE MUSEUM
1989



GEOLOGICAL PERIODS AND ERAS IN NEW YORK

Dominantly Sedimentary Origin

- CRETACEOUS, TERTIARY, PLEISTOCENE (Epoch) weakly consolidated to unconsolidated gravels, sands, and clays
- LATE TRIASSIC and EARLY JURASSIC conglomerates, red sandstones, red shales, and diabase (in Palisades Sill)
- PENNSYLVANIAN and MISSISSIPPIAN conglomerates, sandstones, and shales
- DEVONIAN, SILURIAN } limestones, shales, sandstones, and conglomerates
  Silurian also contains salt, gypsum, and hematite.
- ORDOVICIAN, CAMBRIAN } limestones, shales, sandstones, and dolostones

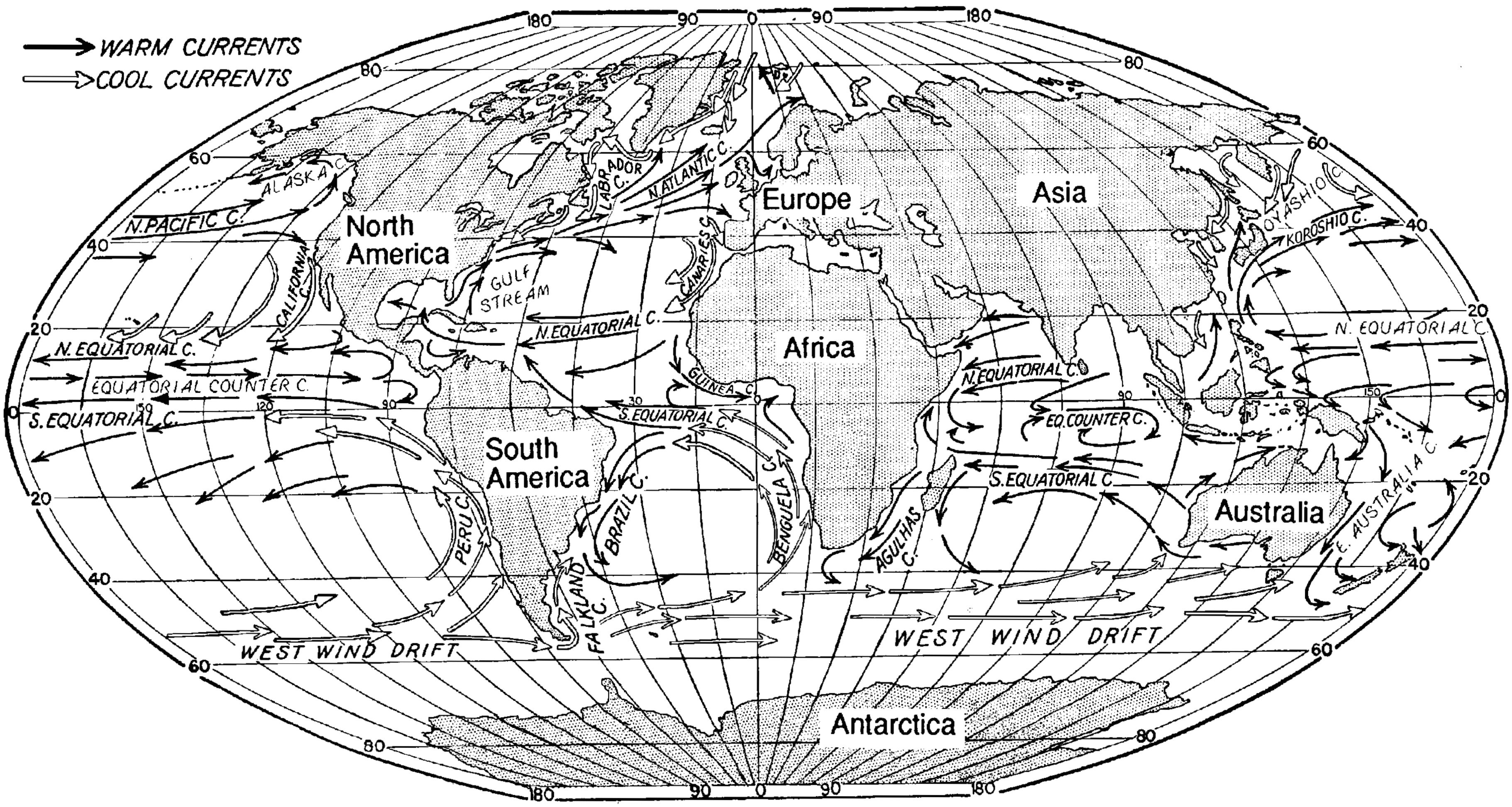
Dominantly Metamorphosed Rocks

- CAMBRIAN and EARLY ORDOVICIAN sandstones and dolostones
  Moderately to intensely metamorphosed east of the Hudson River.
- CAMBRIAN and ORDOVICIAN (undifferentiated) quartzites, dolostones, marbles, and schists
  Intensely metamorphosed; includes portions of the Taconic Sequence and Cortlandt Complex.
- TACONIC SEQUENCE sandstones, shales, and slates
  Slightly to intensely metamorphosed rocks of CAMBRIAN *through* MIDDLE ORDOVICIAN *ages.*

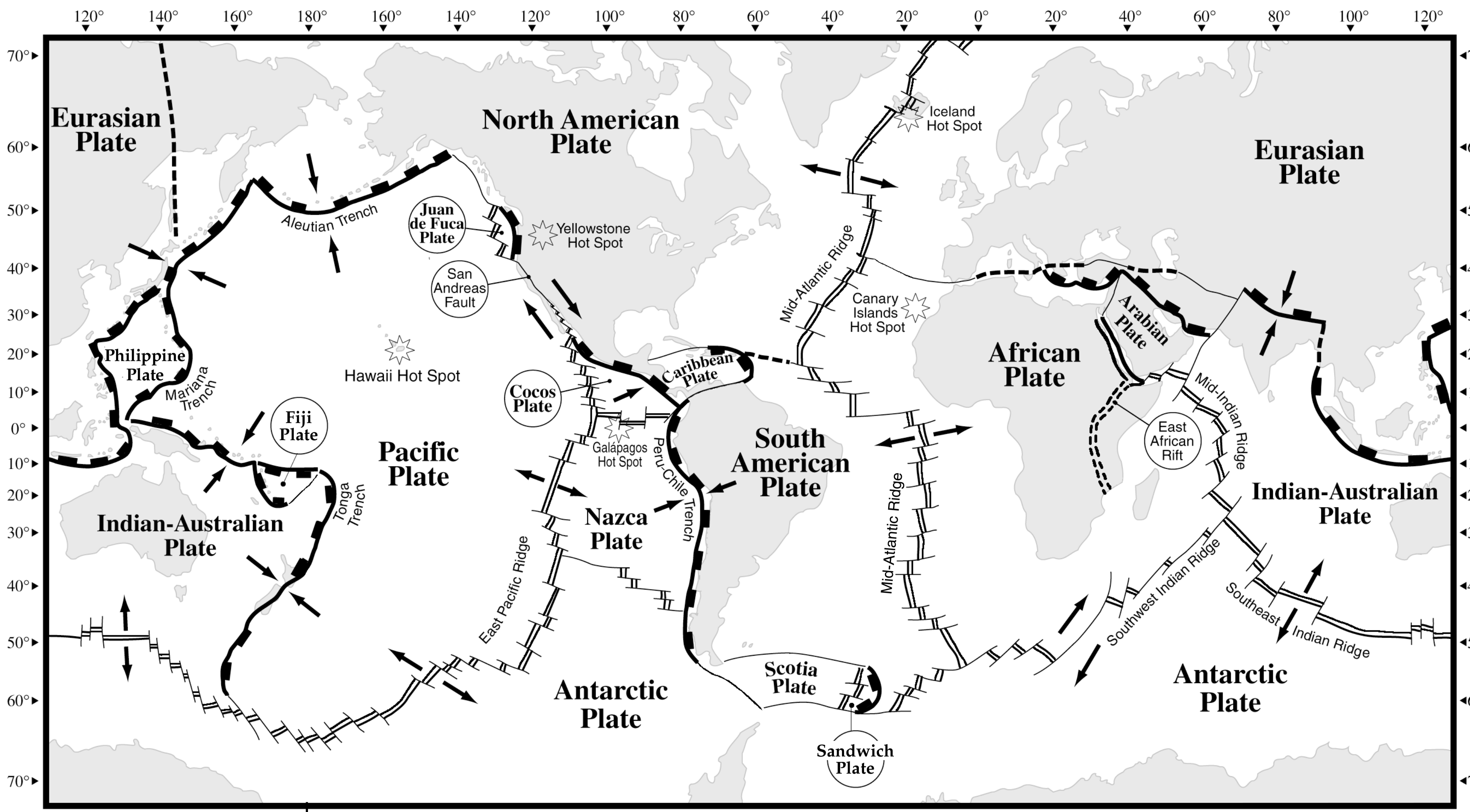
Intensely Metamorphosed Rocks (regional metamorphism about 1,000 m.y.a.)

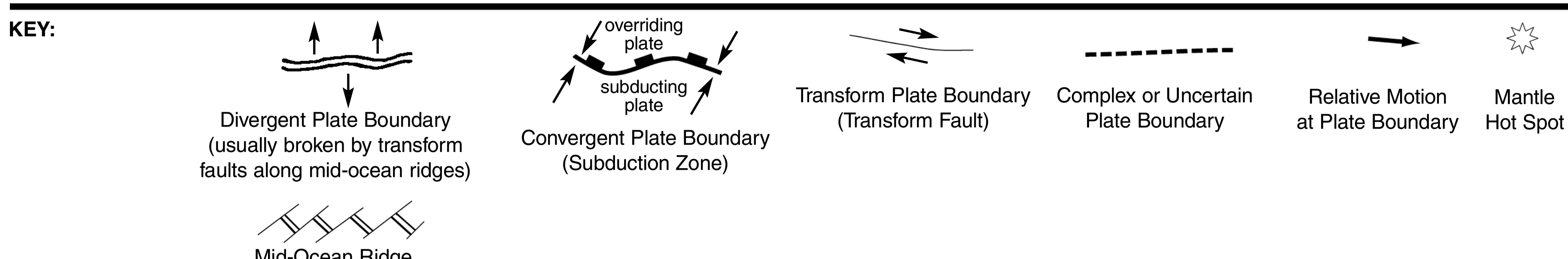
- MIDDLE PROTEROZOIC gneisses, quartzites, and marbles
  Lines are generalized structure trends.
- MIDDLE PROTEROZOIC anorthositic rocks

Surface Ocean Currents



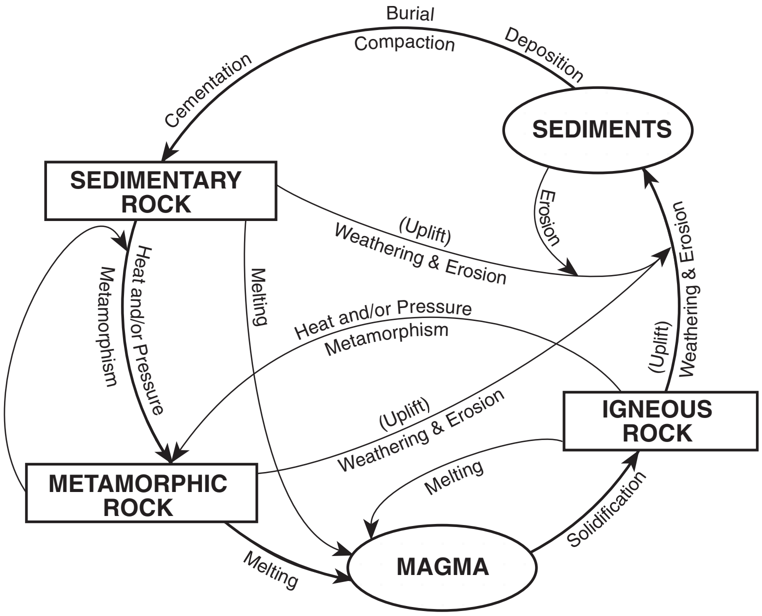
Tectonic Plates



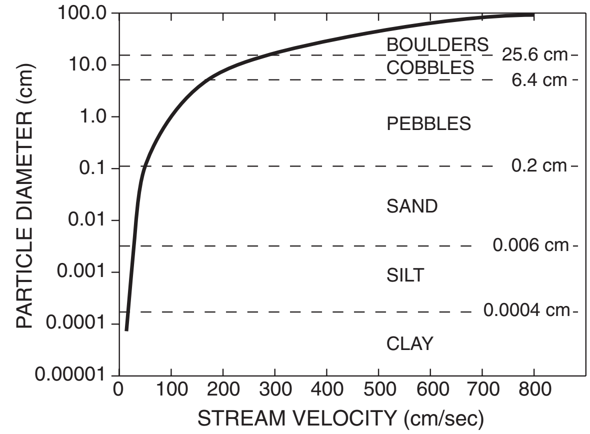


NOTE: Not all plates and boundaries are shown.

Rock Cycle in Earth's Crust

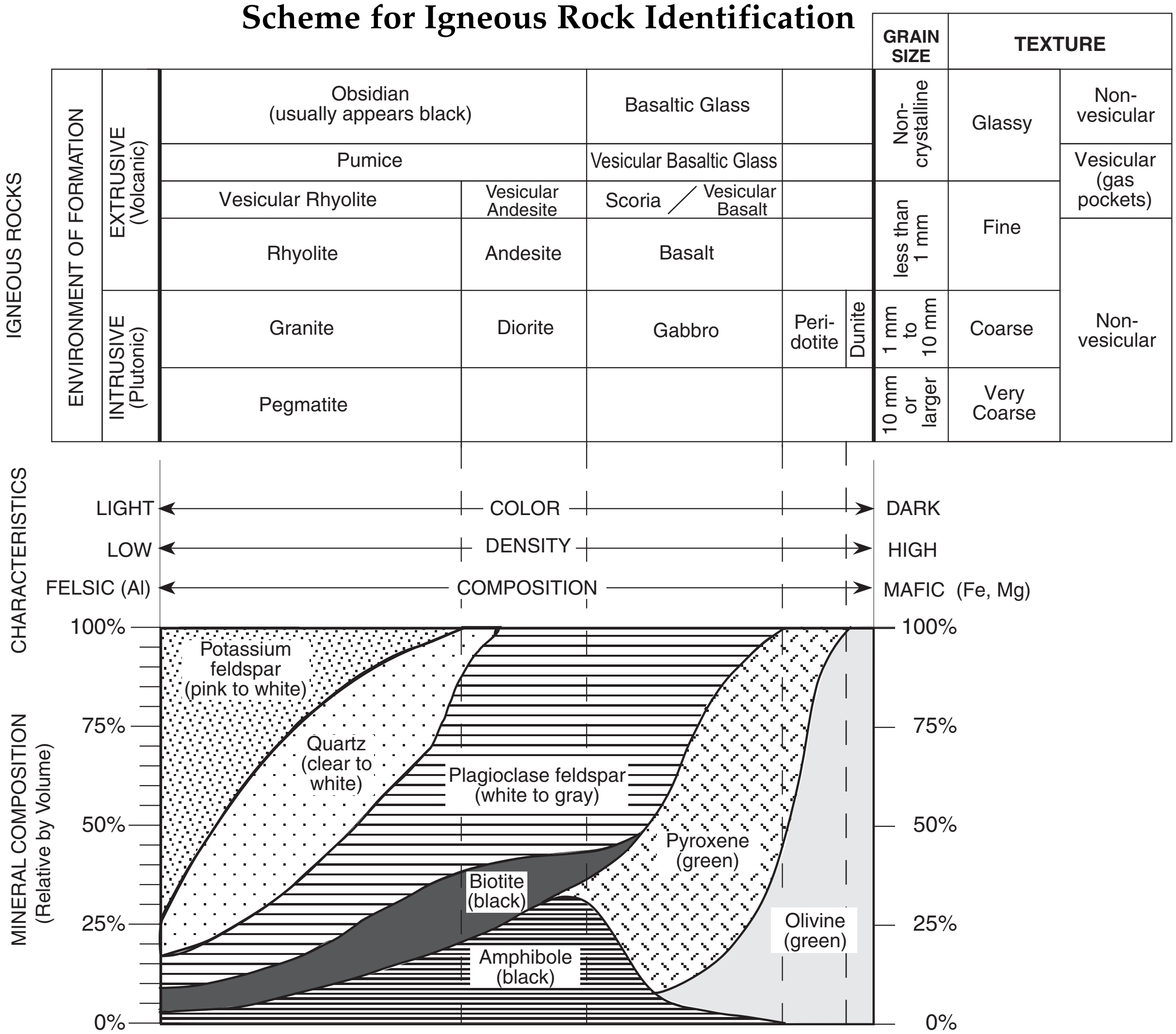


Relationship of Transported Particle Size to Water Velocity



*This generalized graph shows the water velocity needed to maintain, but not start, movement. Variations occur due to differences in particle density and shape.

Scheme for Igneous Rock Identification



Scheme for Sedimentary Rock Identification

INORGANIC LAND-DERIVED SEDIMENTARY ROCKS					
TEXTURE	**GRAIN SIZE**	**COMPOSITION**	**COMMENTS**	**ROCK NAME**	**MAP SYMBOL**
Clastic (fragmental)	Pebbles, cobbles, and/or boulders embedded in sand, silt, and/or clay	Mostly quartz, feldspar, and clay minerals; may contain fragments of other rocks and minerals	Rounded fragments	Conglomerate	
			Angular fragments	Breccia	
	Sand (0.2 to 0.006 cm)		Fine to coarse	Sandstone	
	Silt (0.006 to 0.0004 cm)		Very fine grain	Siltstone	
	Clay (less than 0.0004 cm)		Compact; may split easily	Shale	

CHEMICALLY AND/OR ORGANICALLY FORMED SEDIMENTARY ROCKS					
TEXTURE	**GRAIN SIZE**	**COMPOSITION**	**COMMENTS**	**ROCK NAME**	**MAP SYMBOL**
Crystalline	Varied	Halite	Crystals from chemical precipitates and evaporites	Rock Salt	
	Varied	Gypsum		Rock Gypsum	
	Varied	Dolomite		Dolostone	
Bioclastic	Microscopic to coarse	Calcite	Cemented shell fragments or precipitates of biologic origin	Limestone	
	Varied	Carbon	From plant remains	Coal	

Scheme for Metamorphic Rock Identification

TEXTURE		GRAIN SIZE	COMPOSITION	TYPE OF METAMORPHISM	COMMENTS	ROCK NAME	MAP SYMBOL
FOLIATED	MINERAL ALIGNMENT	Fine	MICA	Regional	Low-grade metamorphism of shale	Slate	
		Fine to medium	MICA, QUARTZ, FELDSPAR, AMPHIBOLE, GARNET	(Heat and pressure increase with depth)	Foliation surfaces shiny from microscopic mica crystals	Phyllite	
			MICA, QUARTZ, FELDSPAR, AMPHIBOLE, GARNET, PYROXENE		Platy mica crystals visible from metamorphism of clay or feldspars	Schist	
	BAND-ING	Medium to coarse	MICA, QUARTZ, FELDSPAR, AMPHIBOLE, GARNET, PYROXENE		High-grade metamorphism; some mica changed to feldspar; segregated by mineral type into bands	Gneiss	
NONFOLIATED		Fine	Variable	Contact (Heat)	Various rocks changed by heat from nearby magma/lava	Hornfels	
		Fine to coarse	Quartz	Regional or Contact	Metamorphism of quartz sandstone	Quartzite	
			Calcite and/or dolomite		Metamorphism of limestone or dolostone	Marble	
		Coarse	Various minerals in particles and matrix		Pebbles may be distorted or stretched	Metaconglomerate	