

Environmental Science:
A Global Concern
Sixth Edition
Chapter 11

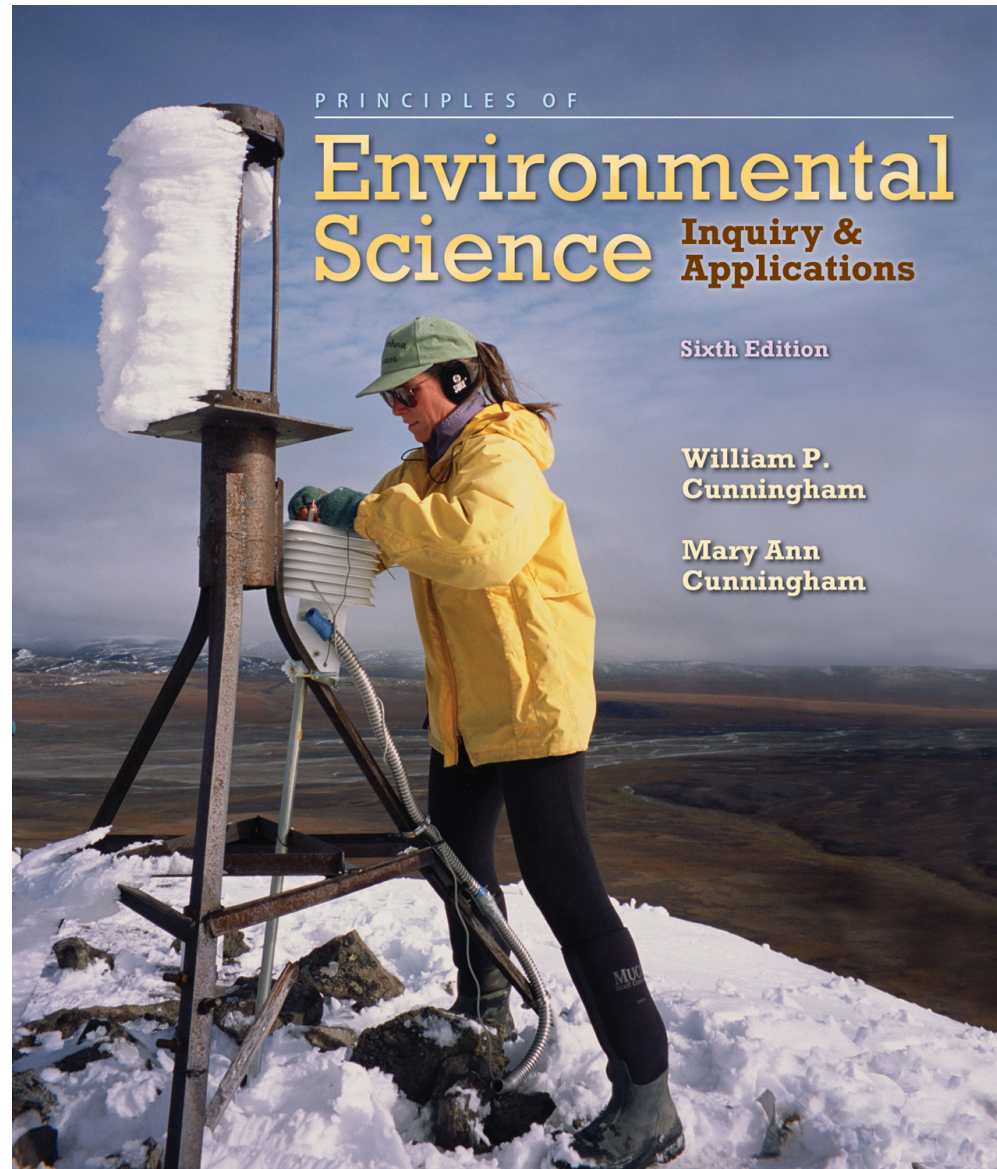




Figure 11_01

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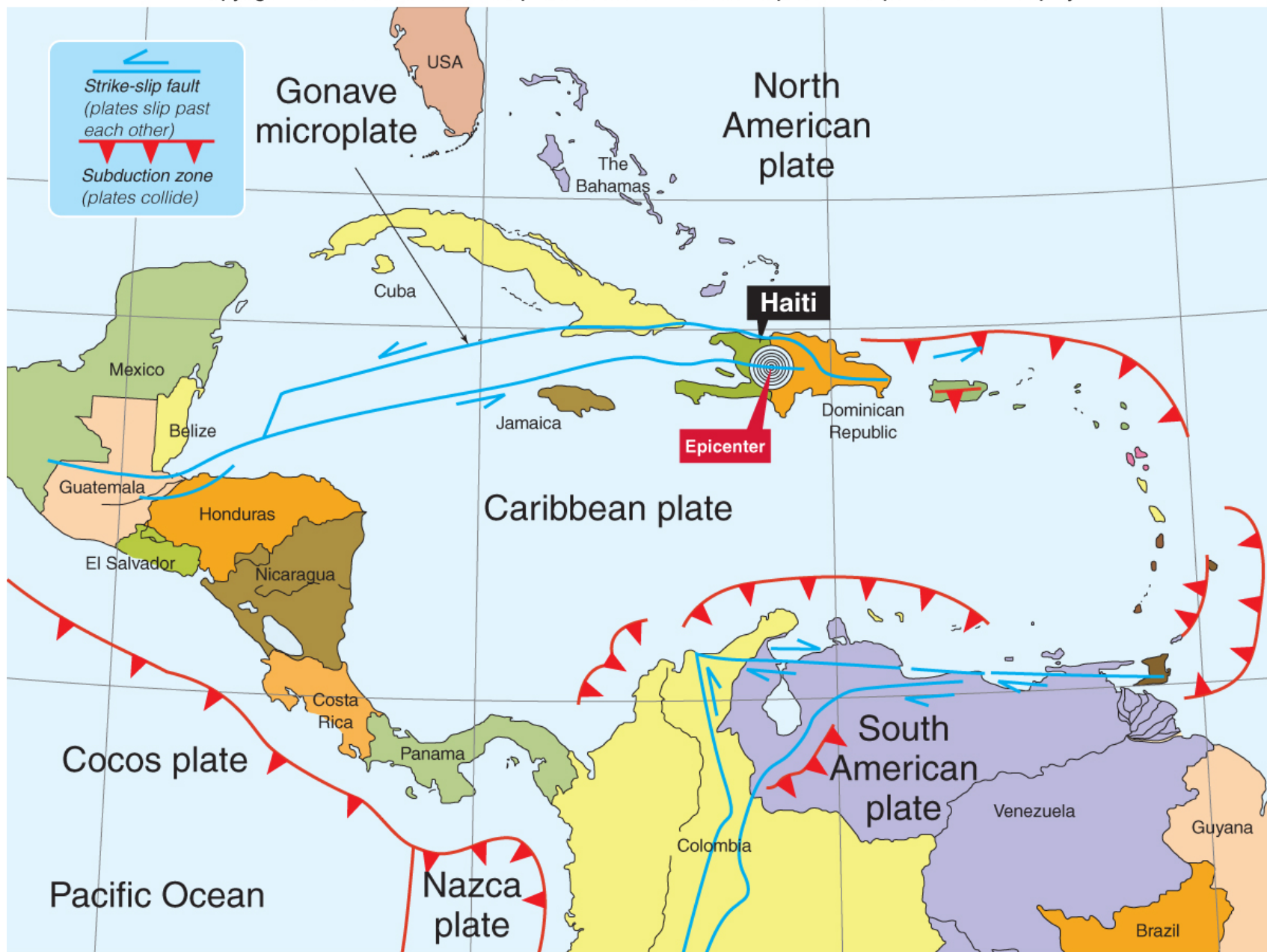
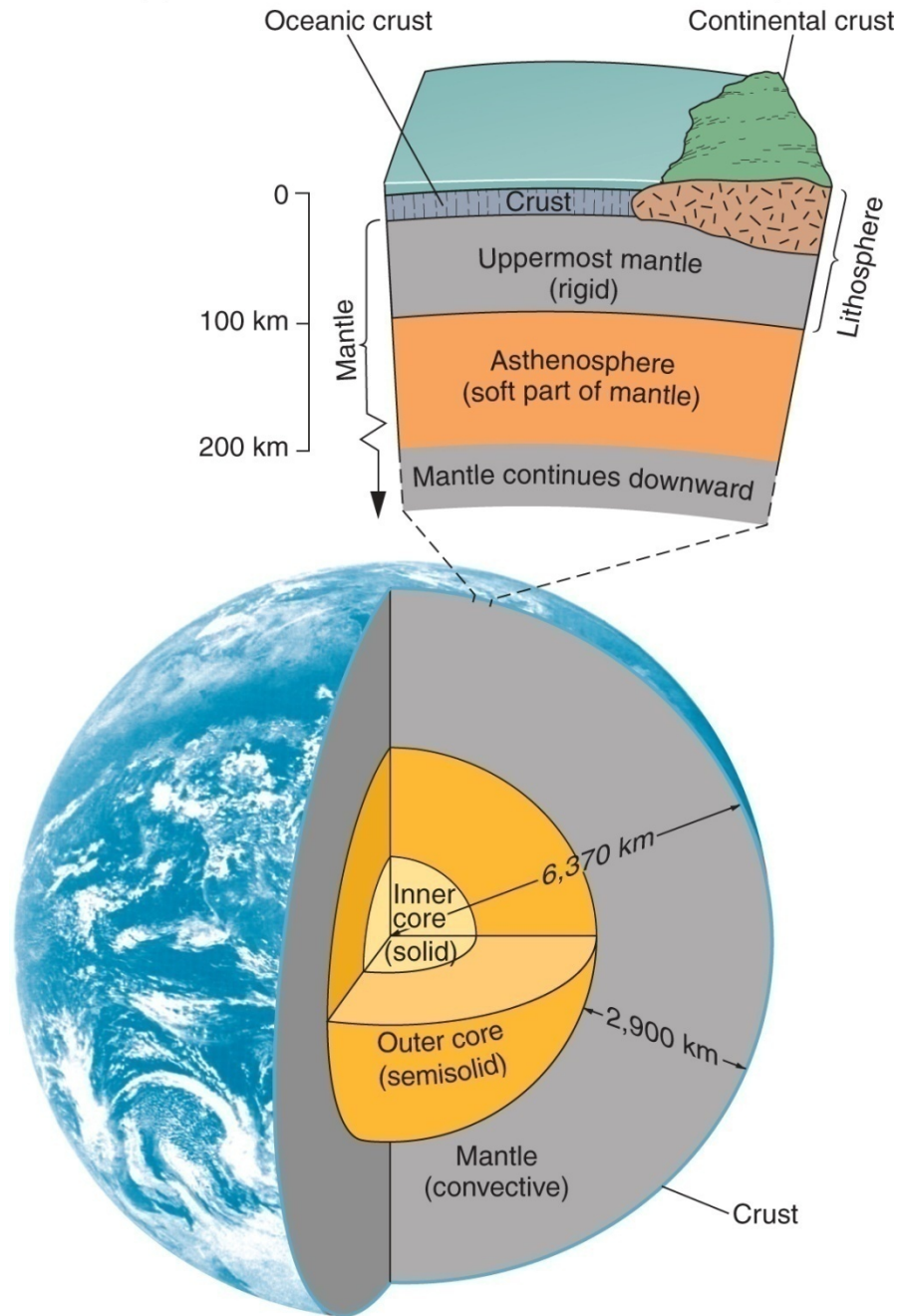


Figure 11_02

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Table 11.1 | Eight Most Common Chemical Elements (Percent) in Whole Earth and Crust

Whole Earth		Crust	
Iron	33.3	Oxygen	45.2
Oxygen	29.8	Silicon	27.2
Silicon	15.6	Aluminum	8.2
Magnesium	13.9	Iron	5.8
Nickel	2.0	Calcium	5.1
Calcium	1.8	Magnesium	2.8
Aluminum	1.5	Sodium	2.3
Sodium	0.2	Potassium	1.7

Figure 11_03

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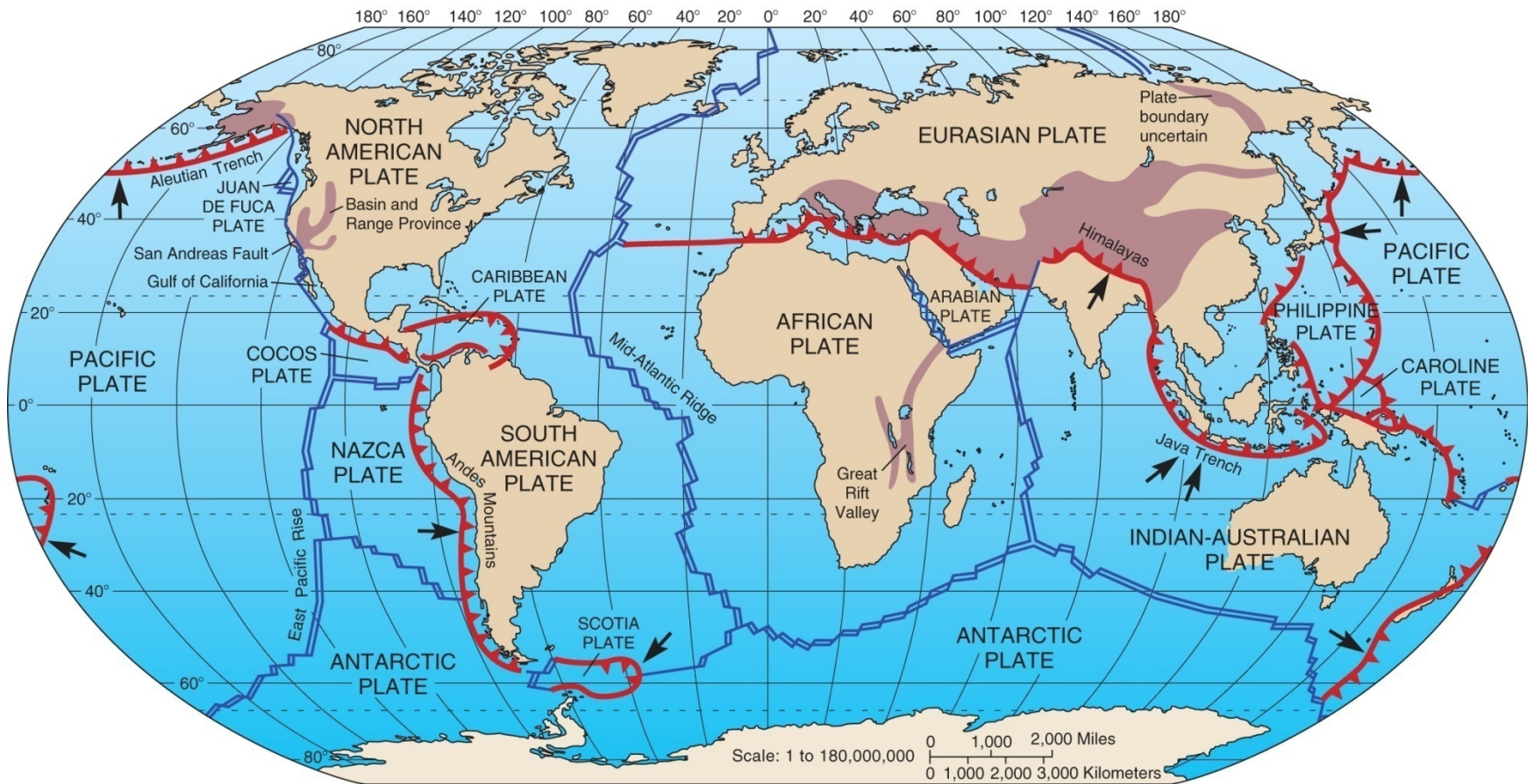
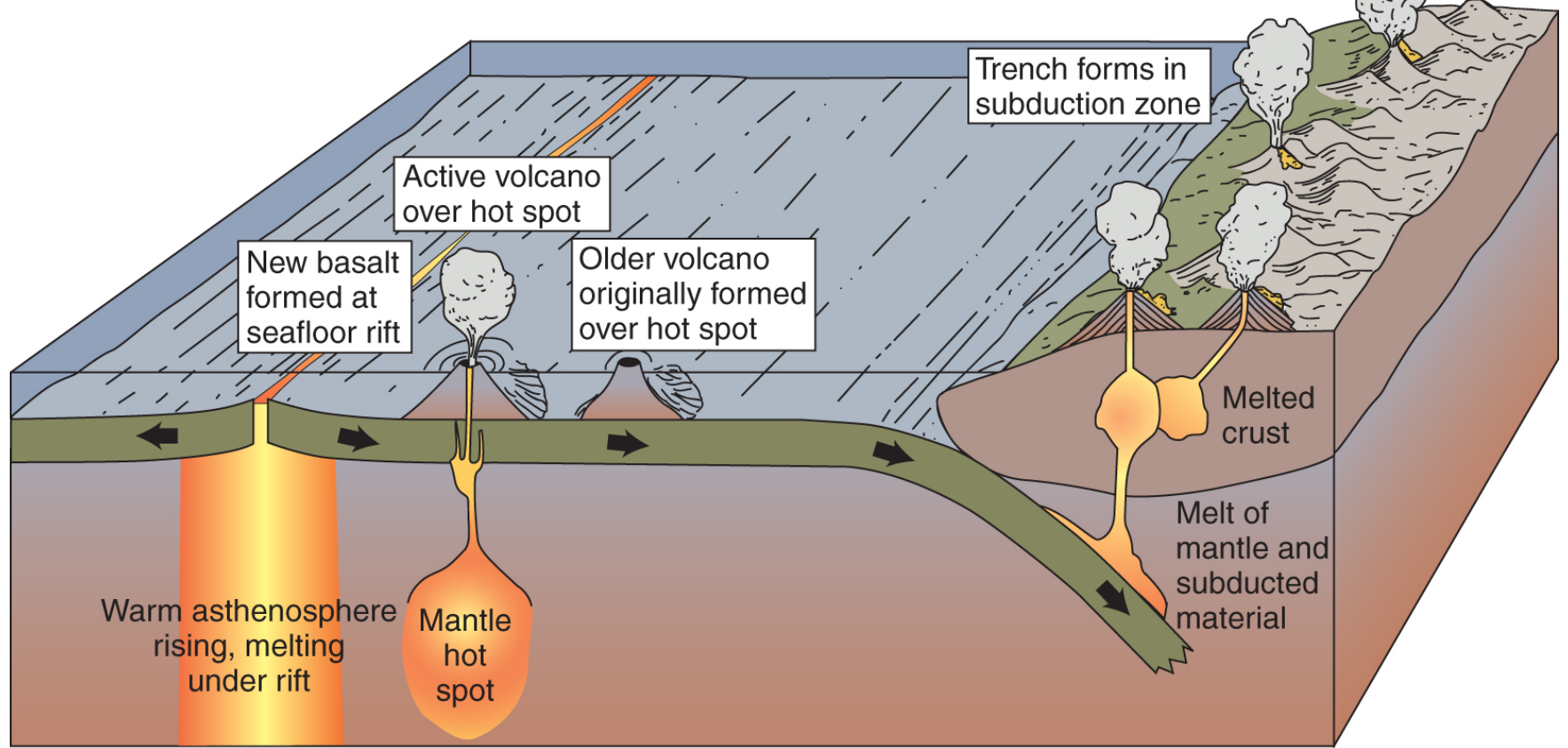


Figure 11_04

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Volcanoes on continent over subduction zone (where oceanic crust is forced downward)



200 million
years ago



Figure 11_06

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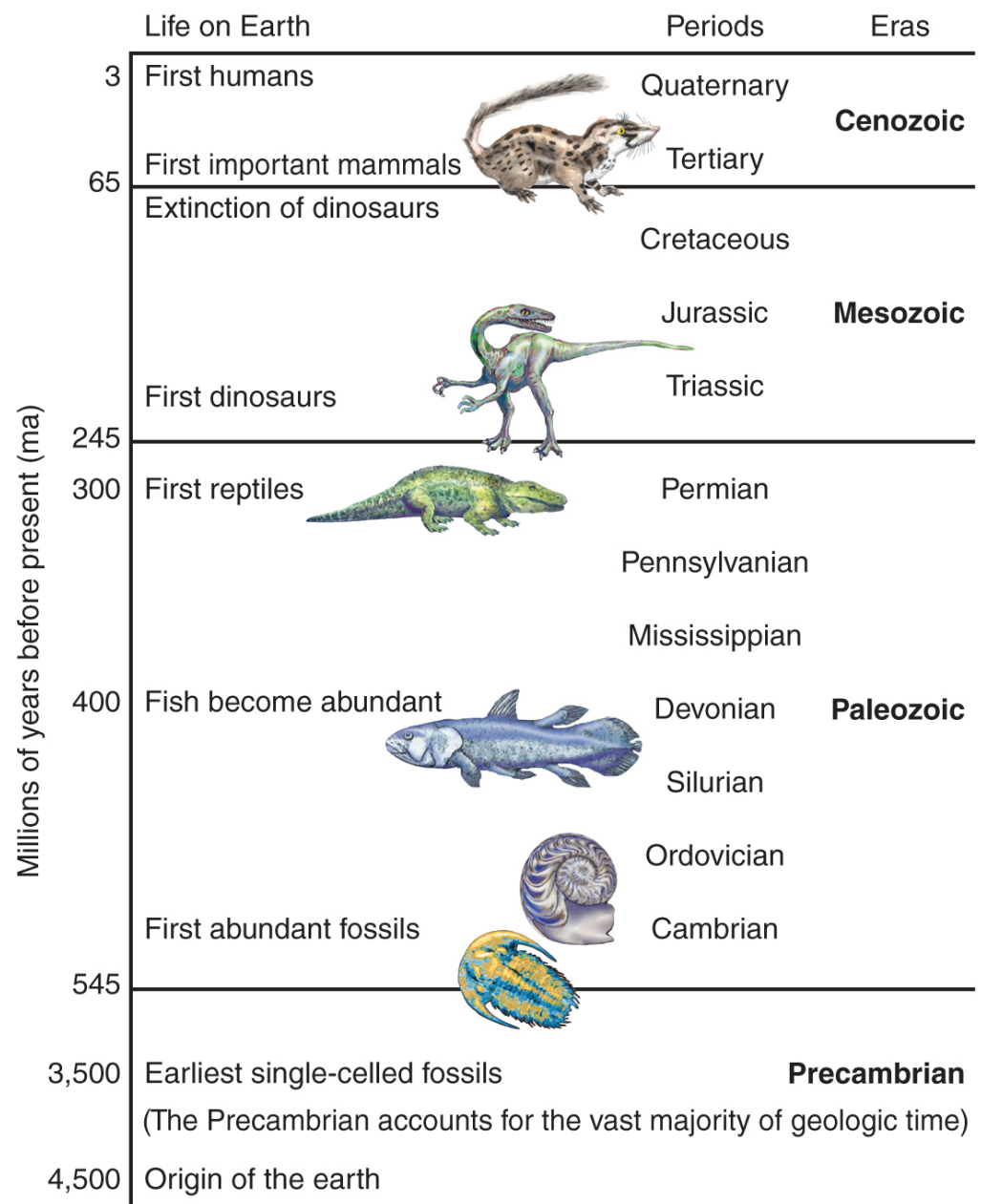


Figure 11_07

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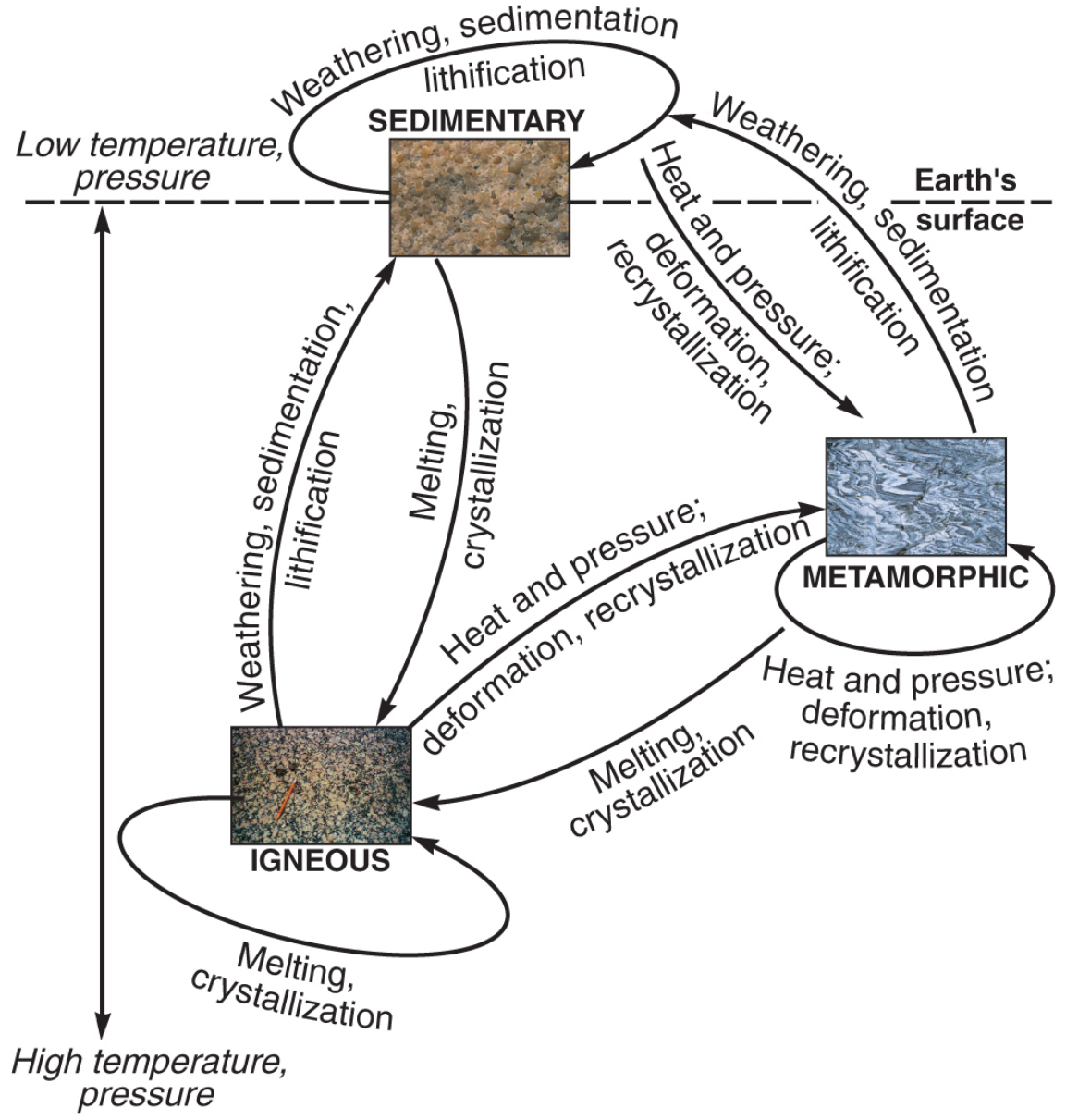
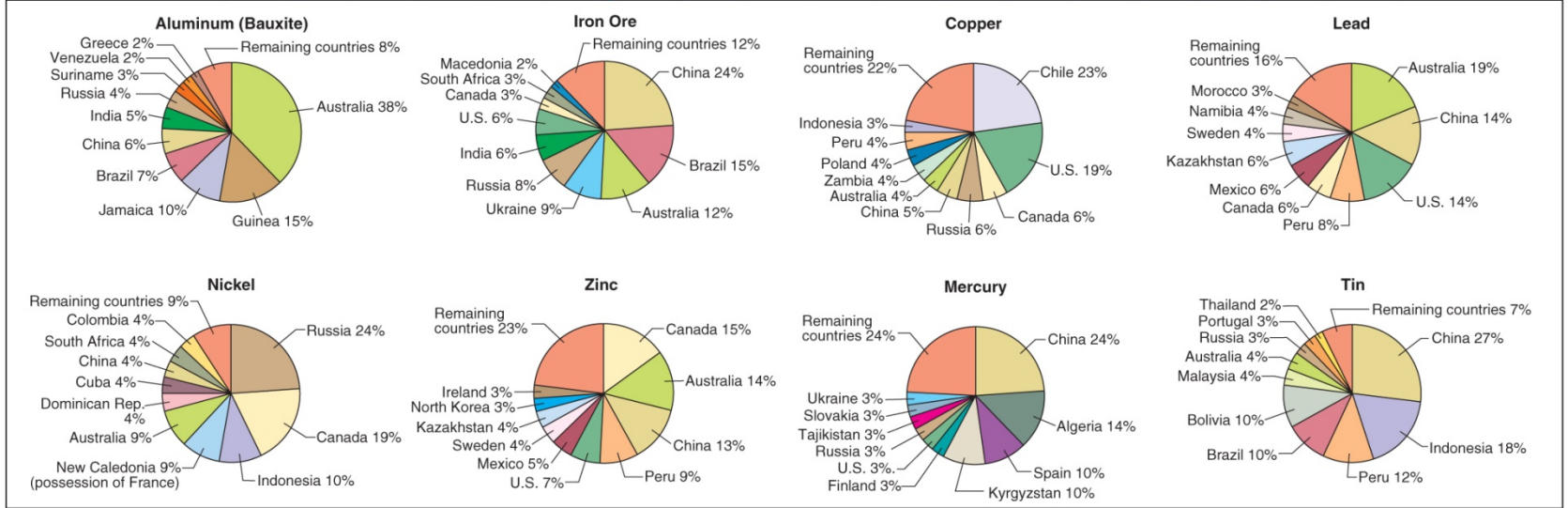
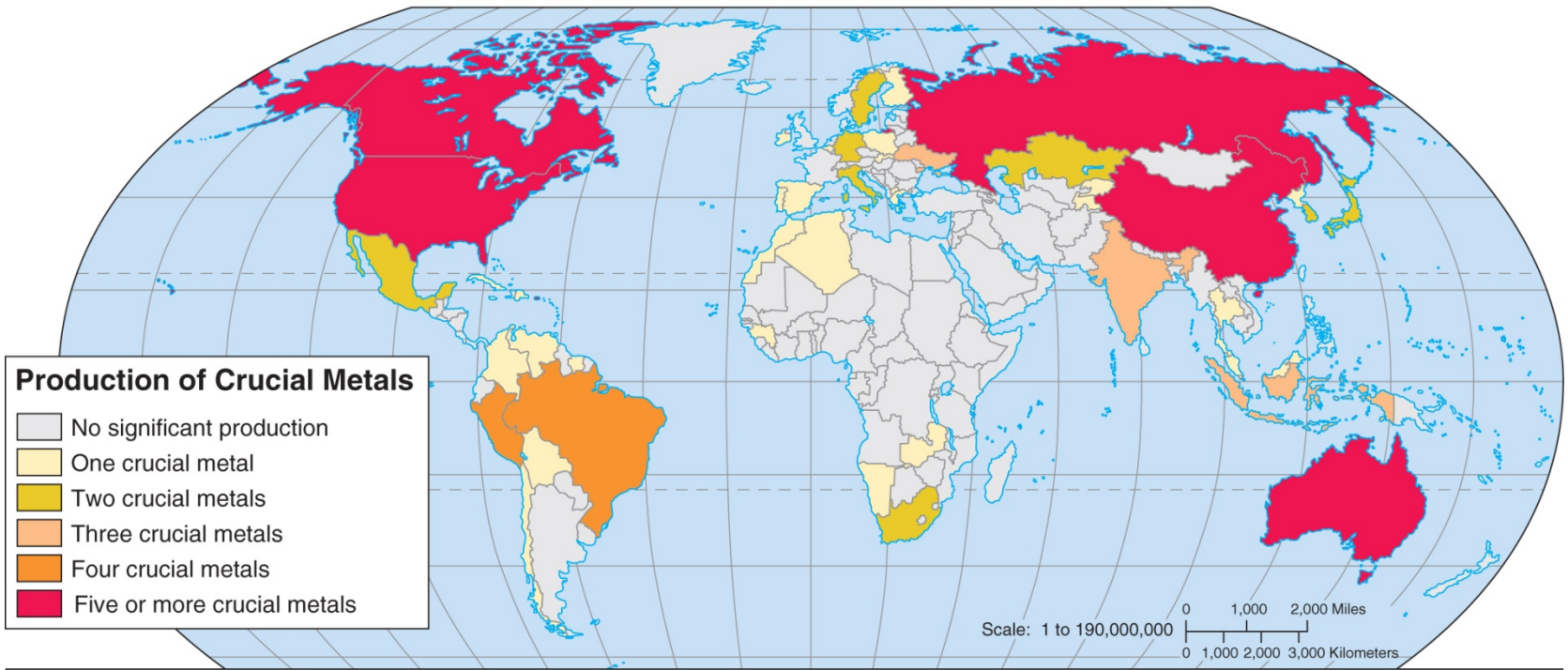


Table 11.2 | Primary Uses of Some Major Metals

Metal	Use
Aluminum	Packaging foods and beverages (38%), transportation, electronics
Chromium	High-strength steel alloys
Copper	Building construction, electric and electronic industries
Iron	Heavy machinery, steel production
Lead	Leaded gasoline, car batteries, paints, ammunition
Manganese	High-strength, heat-resistant steel alloys
Nickel	Chemical industry, steel alloys
Platinum group	Automobile catalytic converters, electronics, medical uses
Gold	Medical, aerospace, electronic uses; accumulation as monetary standard
Silver	Photography, electronics, jewelry

Figure 11_10

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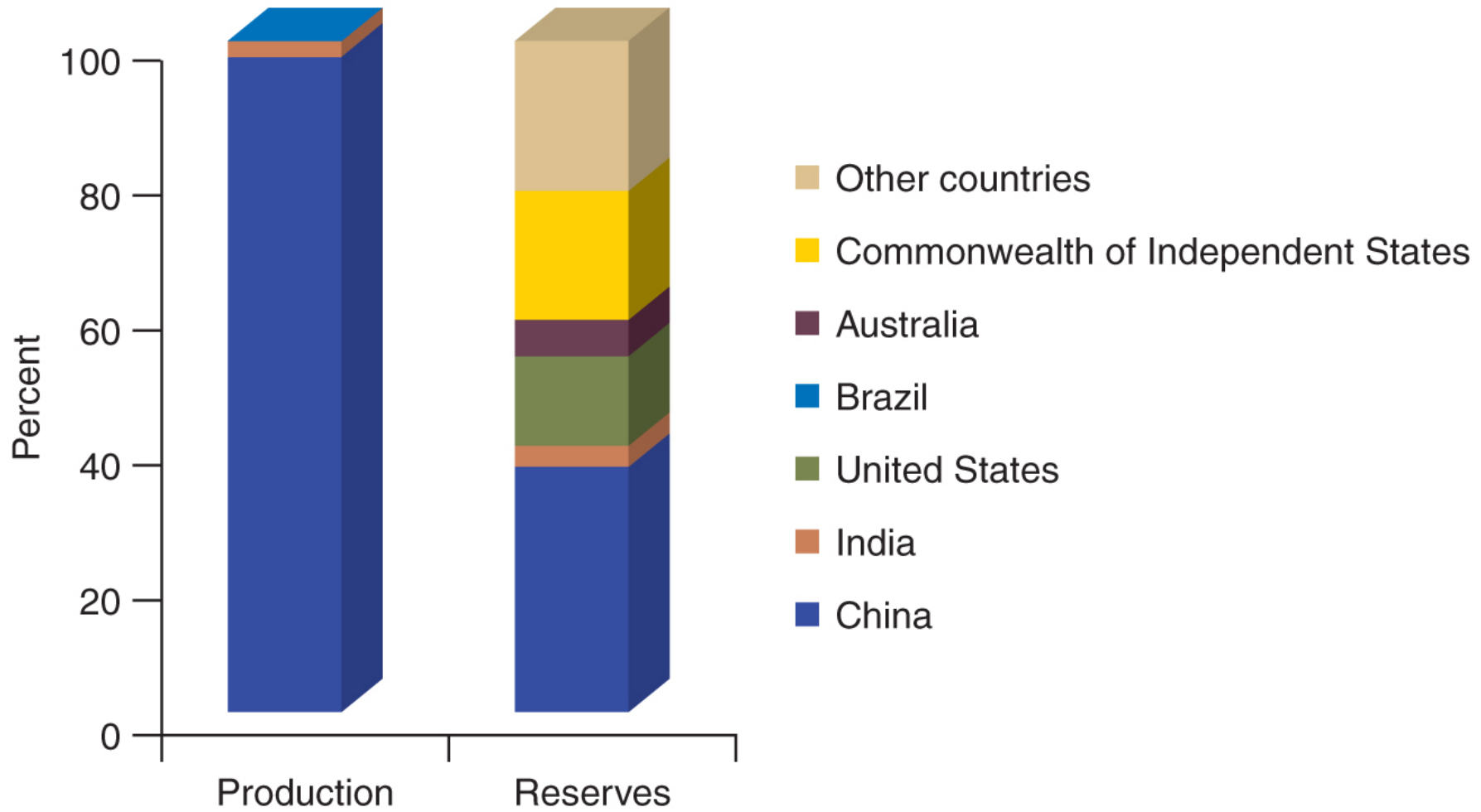


Table 11.3 | Energy Requirements in Producing Various Materials from Ore and Raw Source Materials

ENERGY REQUIREMENT (MJ/KG)¹

Product	New	From Scrap
Glass	25	25
Steel	50	26
Plastics	162	n.a. ²
Aluminum	250	8
Titanium	400	n.a. ²
Copper	60	7
Paper	24	15

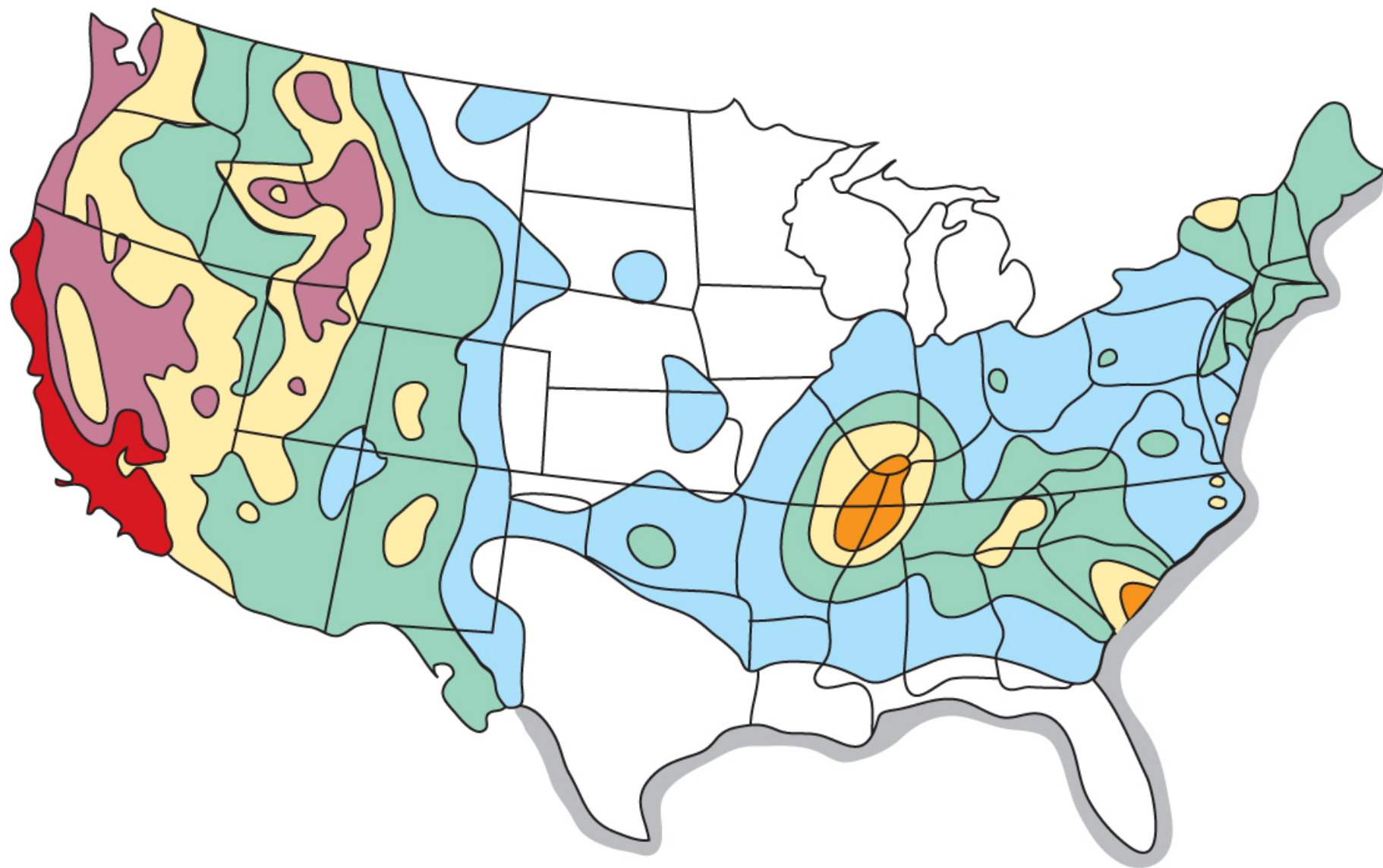
¹ Megajoules per kilogram.

² Not available.

Source: Data from E. T. Hayes, *Implications of Materials Processing*, 1997.

Figure 11_16

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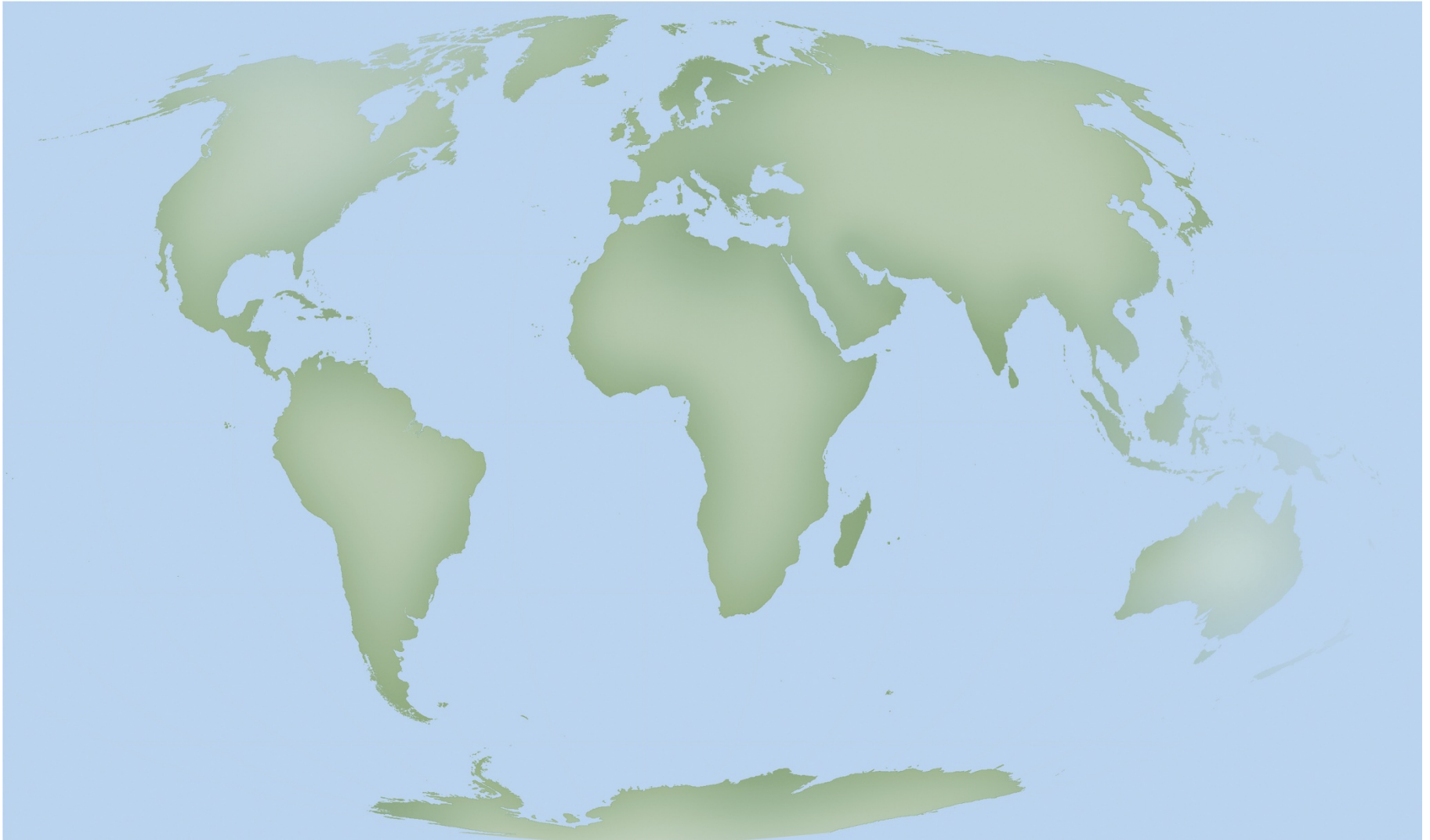


Figure 11_18

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