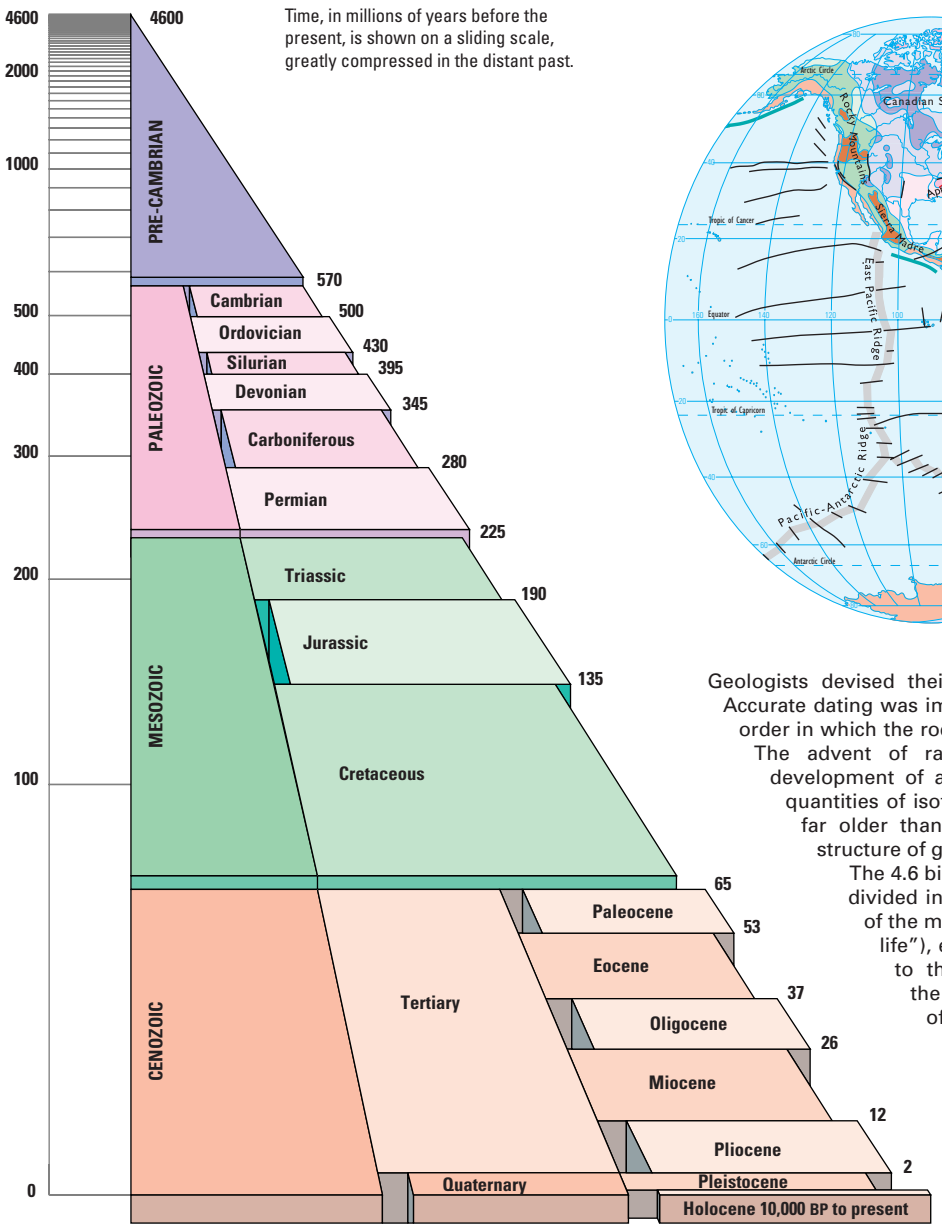
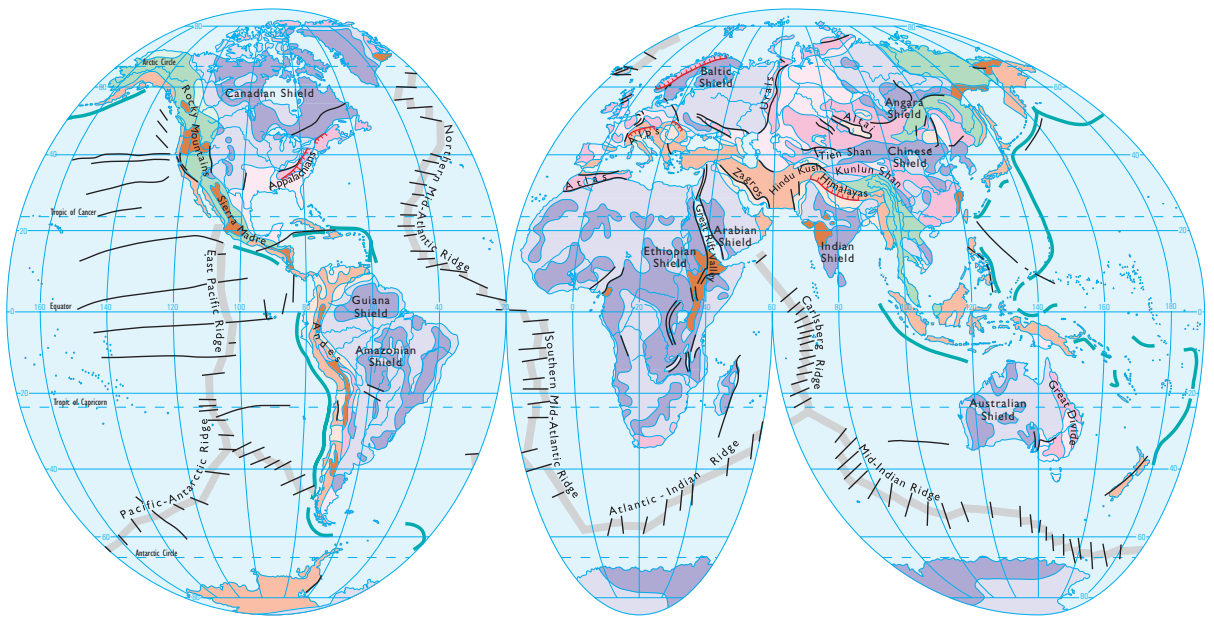
US p70-71 AOW HB IWG 06 2176706 2:28 pm Page 71

GEOLOGICAL TIME





Geologists devised their timescale on the basis of relative, not calendar, ages. Accurate dating was impossible and estimates were often bitterly disputed, but the order in which the rocks were formed could be deduced from careful observation. The advent of radioactive dating – culminating in the 1950s with the development of a mass spectrometer capable of accurately measuring tiny quantities of isotopes – appears to have settled the arguments. The Earth is far older than geologists first imagined, but their painstakingly-created structure of geological time has withstood the advent of high technology.

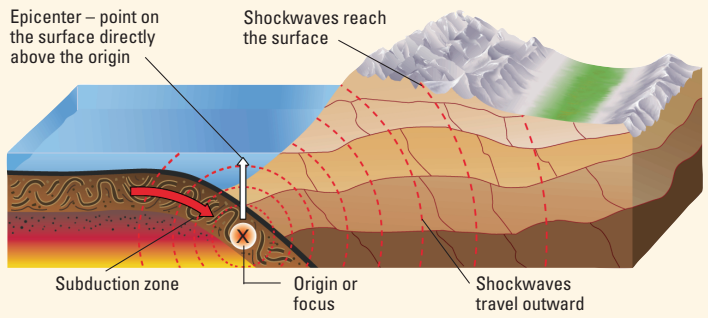
The 4.6 billion (4,600 million) years since the formation of the Earth are divided into four great eras, further split into periods and, in the case of the most recent era, epochs. The present era is the Cenozoic ("new life"), extending backward through "middle life" and "ancient life" to the Pre-Cambrian, named after the Latin word for Wales, the location of some of the earliest known fossils. Most of the Earth's geological history is encompassed by the Pre-Cambrian: though traces of ancient life have since been found, it was largely the proliferation of fossils from the beginning of the Paleozoic era onward, some 570 million years ago, which first allowed precise subdivisions to be made.

Like the Cambrian, most are named after regions exemplifying a period's geology. Others – such as the Carboniferous ("coal-bearing") or the Cretaceous ("chalk-bearing") – are more directly descriptive.

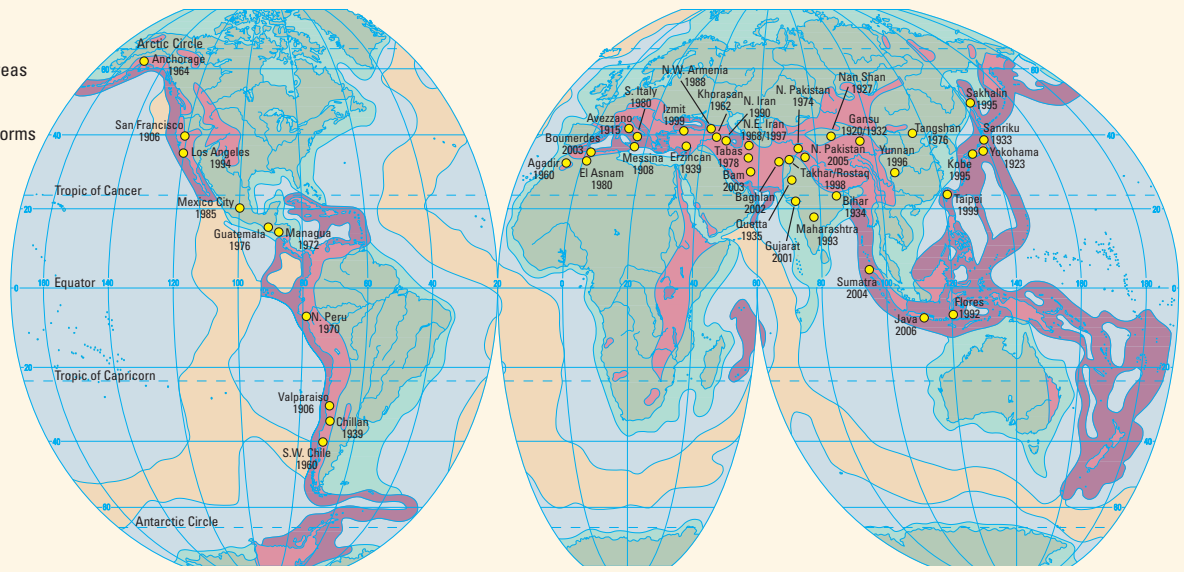
- Pre-Cambrian shields
- Sedimentary cover on Pre-Cambrian shields
- Paleozoic (Caledonian and Hercynian) folding
- Sedimentary cover on Paleozoic folding
- Mesozoic folding
- Sedimentary cover on Mesozoic folding
- Cenozoic (Alpine) folding
- Sedimentary cover on Cenozoic folding
- Intensive Mesozoic and Cenozoic vulcanism
- Principal faults
- Oceanic marginal troughs
- Midoceanic ridges
- Overthrust faults

EARTHQUAKES

Earthquake magnitude is usually rated according to either the Richter or the Modified Mercalli scale, both devised by seismologists in the 1930s. The Richter scale measures absolute earthquake power with mathematical precision: each step upward represents a tenfold increase in the amplitude of the shockwave. Theoretically, there is no upper limit, but most of the largest earthquakes measured have been rated at between 8.8 and 8.9. The 12-point Mercalli scale, based on observed effects, is often more meaningful, ranging from I (earthquakes noticed only by seismographs) to XII (total destruction); intermediate points include V (people awakened at night; unstable objects overturned), VII (collapse of ordinary buildings; chimneys and monuments fall), and IX (conspicuous cracks in ground; serious damage to reservoirs).



- Mobile land areas
- Submarine zones of mobile land areas
- Stable land platforms
- Submarine extensions of land platforms
- Midoceanic volcanic ridges
- Oceanic platforms
- 1976 Principal earthquakes and dates (since 1900)



Earthquakes are a series of rapid vibrations originating from the slipping or faulting of parts of the Earth's crust when stresses within build up to breaking point. They usually happen at depths varying from 5 to 20 miles. Severe earthquakes cause extensive damage when they take place in populated areas, destroying structures and severing communications. Most initial loss of life occurs due to secondary causes such as falling masonry, fires, and flooding.

Notable Earthquakes Since 1900

Year	Location	Mag.	Deaths
1906	San Francisco, USA	8.3	3,000
1906	Valparaiso, Chile	8.6	22,000
1908	Messina, Italy	7.5	83,000
1915	Avezzano, Italy	7.5	30,000
1920	Gansu (Kansu), China	8.6	180,000
1923	Yokohama, Japan	8.3	143,000
1927	Nan Shan, China	8.3	200,000
1932	Gansu (Kansu), China	7.6	70,000
1933	Sanriku, Japan	8.9	2,990
1934	Bihar, India/Nepal	8.4	10,700
1935	Quetta, India*	7.5	60,000
1939	Chillan, Chile	8.3	28,000
1939	Erzincan, Turkey	7.9	30,000
1960	S. W. Chile	9.5	2,200
1960	Agadir, Morocco	5.8	12,000
1962	Khorasan, Iran	7.1	12,230
1964	Anchorage, USA	9.2	125
1968	N. E. Iran	7.4	12,000
1970	N. Peru	7.8	70,000
1972	Managua, Nicaragua	6.2	5,000
1974	N. Pakistan	6.3	5,200
1976	Guatemala	7.5	22,500
1976	Tangshan, China	8.2	255,000
1978	Tabas, Iran	7.7	25,000
1980	El Asnam, Algeria	7.3	20,000
1980	S. Italy	7.2	4,800
1985	Mexico City, Mexico	8.1	4,200
1988	N.W. Armenia	6.8	55,000
1990	N. Iran	7.7	36,000
1992	Flores, Indonesia	6.8	1,895
1993	Maharashtra, India	6.4	30,000
1994	Los Angeles, USA	6.6	51
1995	Kobe, Japan	7.2	5,000
1995	Sakhalin Is., Russia	7.5	2,000
1996	Yunnan, China	7.0	240
1997	N. E. Iran	7.1	2,400
1998	Takhar, Afghanistan	6.1	4,200
1998	Rostaq, Afghanistan	7.0	5,000
1999	Izmit, Turkey	7.4	15,000
1999	Taipei, Taiwan	7.6	1,700
2001	Gujarat, India	7.7	14,000
2002	Baghlan, Afghanistan	6.1	1,000
2003	Boumerdes, Algeria	6.8	2,200
2003	Bam, Iran	6.6	30,000
2004	Sumatra, Indonesia	9.0	250,000
2005	N. Pakistan	7.6	74,000
2006	Java, Indonesia	6.4	6,200

An earthquake off the coast of Sumatra on December 26, 2004, triggered a deadly tsunami that swept across the Indian Ocean, causing devastation in many countries, in particular Sri Lanka, India, Thailand, and Indonesia, where the loss of life was greatest.

* now Pakistan

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