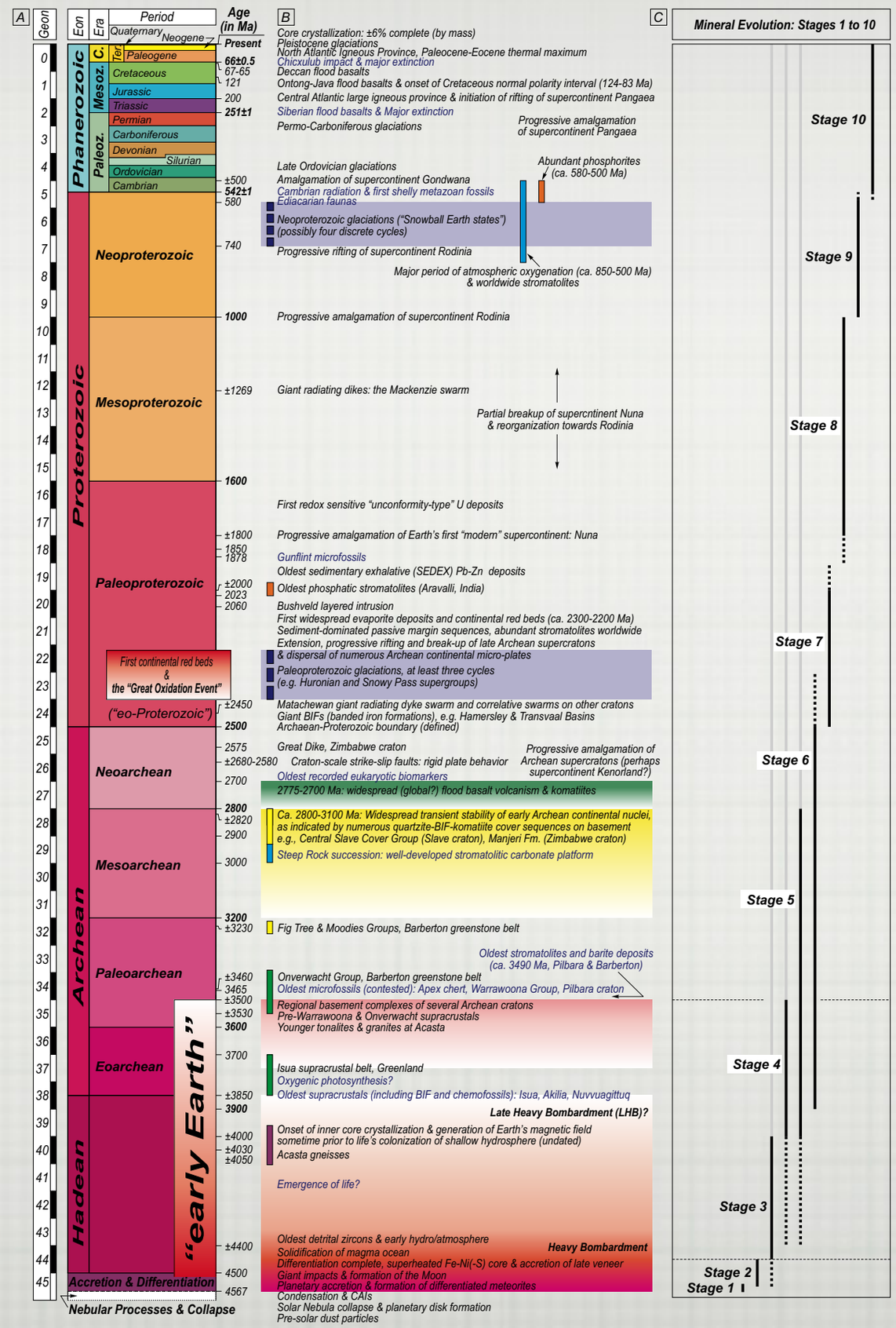
A
Geon
Eon
Era
Period
Age (in Ma)
B
C
Mineral Evolution: Stages 1 to 10
Quaternary
Neogene
Present
Phanerozoic
C.
Tert.
Paleogene
66±0.5
Mesoz.
Cretaceous
67-65
121
Jurassic
200
Triassic
251±1
Paleoz.
Permian
Carboniferous
Devonian
Silurian
Ordovician
±500
Cambrian
542±1
580
Proterozoic
Neoproterozoic
740
Mesoproterozoic
1000
±1269
Paleoproterozoic
1600
±1800
1850
1878
±2000
2023
2060
±2450
2500
("eo-Proterozoic")
First continental red beds & the "Great Oxidation Event"
Archean
Neoarchean
2575
±2680-2580
2700
2800
Mesoarchean
±2820
2900
3000
Paleoarchean
3200
±3230
±3460
3465
±3500
±3530
3600
Eoarchean
3700
±3850
3900
Hadean
±4000
±4030
±4050
±4400
4500
4567
"early Earth"
Accretion & Differentiation
Nebular Processes & Collapse
Core crystallization: ±6% complete (by mass)
Pleistocene glaciations
North Atlantic Igneous Province, Paleocene-Eocene thermal maximum
Chicxulub impact & major extinction
Deccan flood basalts
Ontong-Java flood basalts & onset of Cretaceous normal polarity interval (124-83 Ma)
Central Atlantic large igneous province & initiation of rifting of supercontinent Pangaea
Siberian flood basalts & Major extinction
Permo-Carboniferous glaciations
Progressive amalgamation of supercontinent Pangaea
Late Ordovician glaciations
Abundant phosphorites (ca. 580-500 Ma)
Amalgamation of supercontinent Gondwana
Cambrian radiation & first shelly metazoan fossils
Ediacarian faunas
Neoproterozoic glaciations ("Snowball Earth states") (possibly four discrete cycles)
Progressive rifting of supercontinent Rodinia
Major period of atmospheric oxygenation (ca. 850-500 Ma) & worldwide stromatolites
Progressive amalgamation of supercontinent Rodinia
Giant radiating dikes: the Mackenzie swarm
Partial breakup of supercntinent Nuna & reorganization towards Rodinia
First redox sensitive "unconformity-type" U deposits
Progressive amalgamation of Earth's first "modern" supercontinent: Nuna
Gunflint microfossils
Oldest sedimentary exhalative (SEDEX) Pb-Zn deposits
Oldest phosphatic stromatolites (Aravalli, India)
Bushveld layered intrusion
First widespread evaporite deposits and continental red beds (ca. 2300-2200 Ma)
Sediment-dominated passive margin sequences, abundant stromatolites worldwide
Extension, progressive rifting and break-up of late Archean supercratons & dispersal of numerous Archean continental micro-plates
Paleoproterozoic glaciations, at least three cycles (e.g. Huronian and Snowy Pass supergroups)
Matachewan giant radiating dyke swarm and correlative swarms on other cratons
Giant BIFs (banded iron formations), e.g. Hamersley & Transvaal Basins
Archaean-Proterozoic boundary (defined)
Great Dike, Zimbabwe craton
Craton-scale strike-slip faults: rigid plate behavior
Progressive amalgamation of Archean supercratons (perhaps supercontinent Kenorland?)
Oldest recorded eukaryotic biomarkers
2775-2700 Ma: widespread (global?) flood basalt volcanism & komatiites
Ca. 2800-3100 Ma: Widespread transient stability of early Archean continental nuclei, as indicated by numerous quartzite-BIF-komatiite cover sequences on basement e.g., Central Slave Cover Group (Slave craton), Manjeri Fm. (Zimbabwe craton)
Steep Rock succession: well-developed stromatolitic carbonate platform
Fig Tree & Moodies Groups, Barberton greenstone belt
Oldest stromatolites and barite deposits (ca. 3490 Ma, Pilbara & Barberton)
Onverwacht Group, Barberton greenstone belt
Oldest microfossils (contested): Apex chert, Warrawoona Group, Pilbara craton
Regional basement complexes of several Archean cratons
Pre-Warrawoona & Onverwacht supracrustals
Younger tonalites & granites at Acasta
Isua supracrustal belt, Greenland
Oxygenic photosynthesis?
Oldest supracrustals (including BIF and chemofossils): Isua, Akilia, Nuvvuagittuq
Late Heavy Bombardment (LHB)?
Onset of inner core crystallization & generation of Earth's magnetic field sometime prior to life's colonization of shallow hydrosphere (undated)
Acasta gneisses
Emergence of life?
Oldest detrital zircons & early hydro/atmosphere
Heavy Bombardment
Solidification of magma ocean
Differentiation complete, superheated Fe-Ni(-S) core & accretion of late veneer
Giant impacts & formation of the Moon
Planetary accretion & formation of differentiated meteorites
Condensation & CAIs
Solar Nebula collapse & planetary disk formation
Pre-solar dust particles
Stage 10
Stage 9
Stage 8
Stage 7
Stage 6
Stage 5
Stage 4
Stage 3
Stage 2
Stage 1