
The global carbon cycle is a topic of great interest because it is a critical controller of earth's climate. Despite the great amount of research done on the global carbon cycle, many gaps remain in our knowledge of the underlying processes that control the short and long-term carbon cycles and that have had a significant impact on past and present climate. It is clear that a better understanding of the processes would greatly enhance our understanding of the influence of present day events and perturbations that control climate. The author has elegantly addressed in great detail how the geological record can be used to interpret changes and processes affecting the long-term carbon cycle. He has done a marvelous job at combining and contrasting the literature to provide both succinct and comprehensive discussion detailing the historical interpretation and contemporary development of hypotheses underlying the function of the global carbon cycle. The book is coherent, well organized, and easily read without having to be an expert. Neither is much background knowledge needed of the many disciplines, such as geology and biogeochemistry, required to develop an understanding of the chronology of major processes and components affecting the cycling of carbon through earth's recent geological history. It's refreshing to see the author present a complex and multifaceted scientific discipline in a manner comprehensible to anyone with an interest in any aspect of the carbon cycle.

The book is divided into six chapters describing mainly factors affecting long-term carbon cycling. The author touches on aspects of the short-term carbon cycle to introduce the long-term carbon cycle and also how sulfur and oxygen have influenced it. The sections of the book follow a logical progression by introducing components of both the short- and long-term carbon cycle before a more detailed exposition of the biogeochemistry and geologic events that have contributed to forming our atmosphere as we know it today.

Chapter 1 introduces the short- and long-term carbon cycles in addition to an introductory discussion on modeling of the Phanerzoic carbon cycle. The short-term carbon cycle is distinguished from the long-term cycle by having carbon transformation rates between reservoirs ranging from days to tens of thousands of years. The processes of photosynthesis and organic matter formation both in the terrestrial and marine environments are main controllers of the short-term cycle. The concentration of the two principle carbon-based atmospheric gases, carbon dioxide and methane, can change as a result of perturbations to the cycle, such as caused by the burning of fossil fuel and through deforestation. The long-term cycle is distinguished by the transfer of carbon from the short-term cycle entering rocks and the mantle with turnover rates of millions of years. A main distinguishing component of the long-term cycle is the consumption of atmospheric carbon dioxide when it reacts with calcium–magnesium silicate rocks...

In Chapter 2, the weathering of silicate rocks and carbonates is described in detail over multimillions of years. Organic matter accumulation is cited in Chapter 3 as an important removal mechanism of atmospheric carbon dioxide. The rise of vascular plants during the Devonian period established the importance of the five soil components controlling soil development. Jenny's fundamental concepts are used to establish the factors affecting the weathering rate through the production of organic acids by root exudates and decomposer activity parameters of temperature effects and activation energy. The author refers to primarily the GEOCARB model to describe carbon dioxide and methane degassing fluxes in nondimensional parameters. Throughout the remainder of the book, the author presents a complex and multifaceted scientific discipline in a manner comprehensible to anyone with an interest in any aspect of the carbon cycle.