Preface

Carbon cycle research integrates ecology and the earth sciences. Although the importance of CO₂ as a greenhouse gas was described by Svante Arrhenius in 1896, the importance of the carbon cycle was not fully realized until quite recently. Starting in 1957, direct measurements of atmospheric CO₂ levels have revealed a rapid increase. In 1988, the severe consequences of this increase were acknowledged at an international level. Today, carbon cycle research is a very active field, with many issues yet to be resolved. For example, we do not yet know where all of the carbon emitted by human activities ends up. As a result of this and other unresolved issues, whole new methodologies are being developed and explored, such as the use of satellite imagery in conjunction with model calculations and precise measurements of chemical reactions involving carbon.

This module is written with the nonscience major in mind, and so the basics are covered but some of the gritty details are left out. A fairly extensive list of suggested reading materials at the end of the module should point the inspired in the right direction.

Because the carbon cycle is intimately linked to the cycles of other major nutrients, including nitrogen, phosphorus, and sulfur, I recommend Fred T. Mackenzie’s Global Change Instruction Program module, Global Biogeochemical Cycles and the Physical Climate System, as an accompaniment to this document. As CO₂ plays a key role in climate, the module by Christine A. Ennis and Nancy H. Marcus, Biological Consequences of Global Climate Change, is also recommended.

This module is broken into four chapters, each of which might take two or more class periods to cover. I have tried to make each chapter as independent as possible, with separate questions and discussion topics for each. The topics covered get progressively more complex from one chapter to the next.

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