The atmosphere of early Earth contained little molecular oxygen. A significant increase in oxygen occurred ca. **2.4–2.0 billion years ago** in what is called the **Great Oxidation Event** (GOE). A large **positive excursion in carbon isotopic composition** in sedimentary carbonates is known to have occurred 2.2–2.0 billion years ago (the Lomagundi-Jatuli event), which provides evidence for an enhanced rate of organic carbon burial, i.e., enhanced net production of oxygen.

The **Proterozoic snowball Earth event** (global glaciation) occurred **2.3–2.2 billion years ago**, roughly coinciding with the GOE. Thus, a causal relationship between the GOE and the snowball Earth event has been suggested.

The snowball Earth event could have been **triggered by an increase in oxygen** in the atmosphere because it would have resulted in a significant **reduction of atmospheric methane level**, thereby **reducing the greenhouse effect** of the atmosphere and causing global glaciation.

On the other hand, **termination of the snowball Earth** event may have triggered the production of a **large amount of oxygen** because the extremely hot climate (~60 °C) immediately after the termination of the snowball Earth event must have significantly increased the supply of phosphate to the oceans, resulting in **large-scale blooms of cyanobacteria**, which could have produced large amounts of oxygen.

The postglacial transition of atmospheric oxygen levels may have promoted an ecological shift and biological innovations for oxygen-dependent life.