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Article

The global oxygen budget and its future projection

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Abstract

Atmospheric Oxygen (O_2) is the most crucial element on Earth for the aerobic organisms that depend on it to release energy from carbon-based macromolecules. This is the first study to systematically analyze the global O_2 budget and its changes over the past 100 years. It is found that anthropogenic fossil fuel combustion is the largest contributor to the current O_2 deficit, which consumed 2.0 Gt/a in 1900 and has increased to 38.2 Gt/a by 2015. Under the Representative Concentration Pathways (RCPs) RCP8.5 scenario, approximately 100Gt (gigatonnes) of O_2 would be removed from the atmosphere per year until 2100, and the O_2 concentration will decrease from its current level of 20.946% to 20.825%. Human activities have caused irreversible decline of atmospheric O_2. It's time to take actions to promote O_2 production and reduce O_2 consumption.

Key words: atmospheric oxygen; oxygen decline; oxygen budget; oxygen concentration;

1. Introduction

O_2 is the most crucial atmospheric component for lives on earth, which is maintained not only by the process of photosynthesis by green plants and algae but also the processes that consume O_2, such as respiration, combustion and decomposition [1]. Observations[2] have revealed that with the rapid development of industrialization and modern civilization, the concentration of atmospheric O_2 has been declining over the past 30 years. Simultaneously,

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