



# **Climate Change, Air Pollution and Global Challenges: Chapter 4. Biogenic Volatile Organic Compounds and Their Impacts on Biosphere-Atmosphere Interactions (Developments in Environmental Science)**

*Francesco Loreto, Silvano Fares*

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Biogenic volatile organic compounds (BVOC) play a critical role in biosphere–atmosphere interactions and are key constraints of the physical and chemical properties of the atmosphere, potentially influencing the climate and the quality of air, especially in the areas exposed to in situ release or long-range transport of anthropogenically polluted air masses. Under these conditions, reactive BVOC may contribute to ozone and particle production. The very large amount of BVOC emitted by vegetation, estimated today to more than 1000Tg C annually, is dominated by methanol and isoprenoids, released predominantly by forest species. Such a high rate of emission implies a large metabolic cost and hence likely indicates very important plant functional roles for these compounds. BVOC can be emitted by plants constitutively, or the emission may be induced in response to biotic and abiotic factors. Both constitutive and induced isoprenoids often act as defensive compounds and are crucial for plant protection in stressful environments. The importance of volatile isoprenoids as protecting molecules has been widely discussed. However, based on the use of genetically modified plants and novel technologies that allow detection of BVOC oxidation products, the idea is emerging that especially volatile isoprenoids act as antioxidants in planta, whereas they contribute to the oxidation potential of the atmosphere.

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