No down-regulation of leaf photosynthesis in mature forest trees after three years of exposure to elevated CO2

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The photosynthetic responses of six species of mature forest trees to long-term exposure to elevated CO2 (ca. 530 ppm) were determined at the Swiss Canopy Crane (SCC) site near Basel, Switzerland. in the third year of growth in elevated CO2, using web-FACE technology, net photosynthesis (A(s)) in fully sunlit, upper canopy foliage was stimulated by ca. 40 did not differ from the instantaneous increase in A, found in ambient-grown leaves that were temporarily measured at elevated CO2. A complete lack of down-regulation of photosynthesis was found in all species and in both the early and the late growing season. Neither was leaf nitrogen content significantly affected by long-term exposure to elevated CO2. Our results document a persistent enhancement in leaf level photosynthesis in response to elevated CO2 in mature forest trees over a period of three years. Circumstantial evidence suggests that the additional assimilates feed into large sinks other than stem and shoot growth.
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