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Planetary Atmospheres: Structure and Composition

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Planetary atmospheres fall in two categories, the terrestrial ones and the giant ones. In the case of the terrestrial planets, the atmospheres are characterized by a composition dominated by CO_2 and N_2, with in addition, in the case of the Earth, O_2 and H_2O, mostly in liquid form. Giant planets' atmospheres are dominated by hydrogen and helium, with minor contributions from CH_4, NH_3 and other species in reduced form. Methane photodissociation leads to the presence of many hydrocarbons in their stratospheres. It is possible to understand the main features of planetary atmospheres through their formation scenario. A major remaining challenge is to understand how terrestrial planets evolved from relatively comparable early conditions to the extreme situations which we observe today. This paper will review our present knowledge and understanding of planetary atmospheres, and will discuss the open questions which will be addressed by future exploration.