Global warming caused by increasing amounts of greenhouse gases (GHGs) in the atmosphere is undoubtedly one of the most important environmental issues nowadays. The Earth is warmed by the incoming solar radiation, and it naturally emits longer wavelength thermal radiation back into space. However, some of this terrestrial infrared radiation is absorbed by gaseous constituents in the atmosphere, the so-called GHGs [1] (such as H_2O, CO_2, CH_4), and re-emitted in all directions, warming the atmosphere [2]. One of the most feasible options to reduce GHGs emissions is their sequestration.

This work is dedicated to the application of the Monte Carlo molecular simulation technique for the description of the modification of the interfacial behaviour of the methane/water and CO_2/water mixtures when they are in bulk or in confined conditions. Macroscopic (interfacial tension, adsorption) and microscopic (density profiles, interfacial thickness) properties are investigated. The molecule of methane is represented as a single Lennard Jones sphere [3], a simple molecular model that offers accurate results not only for phase equilibria but also for bulk properties in a wide pressure and temperature ranges. Concerning water, we have selected a rigid non polarizable model, the so-called TIP4P-2005 [4], because this model has been shown to provide very accurate estimates of water bulk properties, if compared with other similar approaches [5,6]. In the case of carbon dioxide, the EPM2 model was considered [7].