Environmental changes as seen from a molecular perspective: Using electrons spectroscopy to investigate environmentally relevant aqueous solutions

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The molecular surface of aqueous solutions may show surprisingly different properties compare to its bulk[1]. Far from being only a scientifically peculiar fact, important phenomena that affect environmental changes on a global scale are linked to the molecular composition at this region[2]. Indeed the uptake of gas phase molecules by liquids is a surface phenomenon and the molecules present at that region ultimately will drive the adsorption rate. For example the up-take of carbon dioxide by seawater will depend on what protonated species are at the

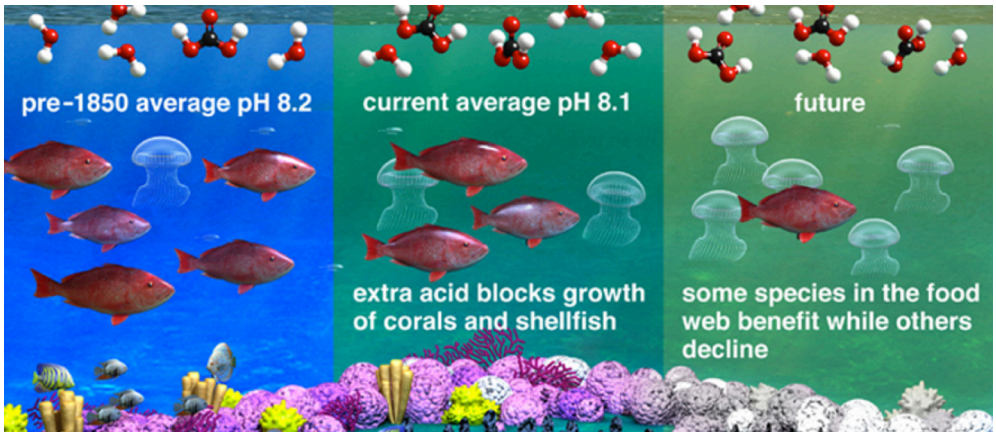

Figure 1
Marine life and ocean pH changes.

surface. As we may see on Fig. 1, small changes in the oceans pH, due to adsorption of CO_2, may drastically affect marine life population. Modeling future chances more precisely are key to ameliorate the problem, which critically depends on our knowledge about the processes involved. Aerosols, present also at the upper atmosphere, are a major unknown in climate models [3]. These particles are typically a mixture of both organic and inorganic molecules. Due to their reduced size, it is unlikely that using the average bulk composition will be sufficient to describe its climate relevant properties. We plan to show how XPS, which is surface sensitive and element specific, can help improving the present knowledge in the area.

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[3] IPCC, in *Climate Change 2007* (Ed.: S. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M. Tignor and H. L. Miller), Cambridge University Press, United Kingdom and New York, NY, USA, **2007**, p. 996.