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Intracratonic basins : subtle records of long wavelength deformations and eustasy – the case example of the Paris Basin

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Subtle vertical movements, major constraints for lithospheric and mantle dynamics models, are difficult to quantify and to date. In sedimentary basins, this quantification is based on subsidence measurements by backstripping. The error bars on this technique can be high, mainly in the low subsiding domains were dates, water depths and eustasy are important data. We developed a 3D high-resolution method of accommodation space measurement at the scale of intracratonic basins, with a precise quantification of the water depth. Based on this 3D quantification of the accommodation, it was possible to discriminate the deformation and the eustatic controls based on the principle that the basin-scale signal contain the eustasy and the local control is of tectonic origin. (1) The application of this technique to the Paris Basin questioned the importance of the long term subsidence signal versus major deformation events of at least European-scale (Mid and Neo-Cimmerian, Austrian, Senonian deformations..) that control, in the Paris Basin, major subsidence centers reorganization. (2) The stratigraphic record of the Paris Basin, with those excellent datings (inheritance of 2 centuries of biostratigraphy), is also a unique place for constraining eustasy, its timing (with now a good knowledge of the sea water temperatures since the Jurassic) and the order of magnitude of the sea level variations. Back, those sea level amplitude constraints can be inputs for a better quantification of the vertical movements.