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# A theory of time-dependent compaction by fracturing and pressure solution

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Porous rocks under compressional stress conditions are subject to compaction creep. A previous micromechanical model, dealing with (partially) water-filled carbonates was able to predict strain rates of the compaction at macroscopic level by combining microscopic fracturing and pressure solution at microscopic level and using a statistical upscaling. Building on this model we investigated the time-dependence of the pressure solution and the overall compaction and created a new theory of compaction by developing a statistical theory of time-dependence of pressure solution.

Long-term creep experiments on carbonate samples were used to test the model which was able to predict the rate of compaction and its time-dependence in largely different effective stress, temperature and fluid chemistry conditions.