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A new modelling technique to simultaneous restore and forward model seismic sections

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In this presentation we show a new modeling technique to simulate basement architecture, heat-flow, subsidence and sedimentation patterns along a given seismic profile. Our software gives, in effect, the same results as existing section restoration techniques (i.e. the potential history of faulting and thinning during extension) and forward modeling techniques (i.e. the likely history of sedimentation, heat flow and subsidence). Our numerical model combines a kinematic description for sedimentation and upper crustal faulting with a dynamic description of lower crust and mantle flow, which deform according to non-newtonian power law rheological laws. This allows us to accurately simulate how lower crust and mantle deform in response to different patterns of faulting in time and space. Faulting geometries and timings must be interpreted from the seismic profile and input into the numerical model. We have calibrated these models with fully dynamic numerical models to validate our solutions. Finally, we present a case study of modeling a seismic section on the magma-poor West Iberia extensional margin.