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0.1 Basin formation and syn-rift sedimentation in the Palaeogene Upper Rhine Graben: effect of complex inherited structure geometries within a uniformly extended crust

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Basin Fromation in the Palaeogene Upper Rhine Graben (URG) resulted from reactivation of major preexisting basement faults within a previously thinned ($\sim$ 25 km) crust. A relatively uniform extensional strain of about 5km has been determined for the URG. Eocene to Early Oligocene syn-rift sediments accumulated under restricted conditions. Local clastic supply from the graben flanks as well as strong intrabasinal variations in accommodation space due to differential tectonic subsidence, led to pronounced lateral variations of the depositional environment. Several sub-basins divided by swells formed within the graben. While the depocentres are characterized by pelagic marls and evaporites, on the swells mainly shallow-water, palustrine and fluvial deposits accumulated. Three mayor Phases of intense evaporation were interrupted by temporary changes towards brackish or freshwater conditions. These deposits form three major base level cycles which can be traced throughout the entire graben and allow the definition of subformations. The width of the rift (L_f) varies between 30 and almost 60 km. The basin geometry shows narrow deep basins flanked by high uplifted graben shoulders, while the swells are located in broader graben segments with low relief along the flanks. Volumetric balancing of several cross sections (lost area method) shows an approximately constant graben area (lost area) of about (125 km^2) and indicates the graben volume stays almost constant along strike of the URG. At a supposedly constant ΔL of 5 km the compensation depth of faulting (depth of detatchment) coincides with the thickness to the Moho, as well as the elastic thickness, indicating a brittle deformed crust above a ductile deformed man-

tle. As the amount of extension was almost constant, tectonic subsidence was largely controlled by changes in the rift width (L_f), resulting in a variable crustal stretching factor β along the graben. Strain concentration (high β) lead to the development of deep, trough-like basins, like the Potash Basin in the narrowest part of the southern URG bounded by shallow areas in the wider parts of the rift the Colmar Swell to the north or the Rhine Bresse Transfer Zone to the south. This kind of strain concentration by the along-strike variation in rift width is the principal factor controlling depocenter development in extensional basins. In the Upper Rhine Graben those basin and swell forming changes in the rift width are controlled by two sets of inherited structures. The non-parallel striking of the so-called (N to NW oriented) Rhenish Lineament causes a slightly widening of the graben. The Variscan terrane boundaries, however are perpendicular to the graben axis and form mayor transfer fault systems, which sharply delimit the Sub-basins.