Geophysical Research Abstracts
Vol. 17, EGU2015-14870, 2015
EGU General Assembly 2015


# Rapid spatio-temporal variations in rift zone deformation, Corinth rift, Greece

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The Gulf of Corinth is a young and highly active rift (<5 Ma) in its initial stages of development. An abundance of marine geophysical data and onshore exposures makes it an ideal case study for investigating early rift and fault development. Using a high resolution chronstratigraphic and rift fault model we investigate along strike variations in the basin development within the rift over the past 1-2 Myr and establishing a history of fault activity on major basin controlling faults, at temporal resolutions of ca. 100 kyr or less. We focus on variations in depocentre development and the distribution of displacement and faulting along and across the rift axis; focussing on the partitioning of deformation between N-dipping and S-dipping faults.

The rift basin geometry has a complex history and varies spatially along strike of the rift. We highlight a major change in rift structure ca. 600 ka, changing from a complex rift zone to a uniform asymmetric graben. Syn-rift isochore maps identify two stages that accommodate this change: 1. a switch in rift polarity from a dominant N-thickening depocentre to a dominant S-thickening depocentre between ca. 620-420 ka (a rapid change in rift structure and strain distribution). This change is accommodated by transfer of activity between major faults but also by formation of numerous non-basement cutting small faults. 2. Progressive localization of deformation onto major N-dipping faults on the rift's southern margin. This is characterised by depocentre growth and linkage and increased activity on major N-dipping faults since $\sim$340 ka, with faults becoming kinematically and geometrically linked with almost equal slip rates along strike by ca. 130 ka.

Ultimately our results show that the early evolution of a rift fault network can be complex but that a dominant fault set eventually forms even in the earliest stages of rifting. Furthermore a switch in rift polarity is a progressive process with deformation becoming distributed before localizing onto a final dominant fault set, but this process can occur rapidly on a timescale of 100's kyr.