ABSTRACT

TITLE:	3D Strain and Relative Viscosity of Clasts in the Vallecito Conglomerate, SW Colorado
AUTHOR(S):	Hannula, Kimberly A.; Hanson, Reece
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ABSTRACT: Deformed cobbles in the Vallecito Conglomerate, a c. 1.7 Ga metaconglomerate found in the Needles Mountains of SW Colorado, show contrasting strain between different lithologies. Two-D finite strain ratios were calculated using the Rf/phi method for three clast populations: quartz/quartzite (including jasper and vein quartz), intermediate metavolcanic, and fine-grained mafic and/or pelitic clasts. Three-D finite strain and orientations of the long (x), intermediate (y) and short (z) directions were calculated using Adolf Yonkee's Strain3D program. Clasts were measured at five different sites in the drainage of Second Creek, west of the Middle Mountain anticline, near the stratigraphic base of the Vallecito Conglomerate. Each site contained exposures with three relatively orthogonal planes that represented deformed cobbles with the most strained, the intermediate, and the least strained orientations. Results show that quartz-rich clasts exhibited the least amount of strain, with Rs ranging from 1.24-1.56 in the x direction, 0.95-1.02 in the y direction and 0.63-0.81 in the z direction. Intermediate clast values were 1.65-1.78 in the x, 0.86-0.96 in the y, and 0.59-0.63 in the z direction. Mafic clasts showed the greatest finite strain with values of 1.78-2.97 in the x, 0.77-0.91 in the y, and 0.44-0.69 in the z direction. These strains imply that the clasts underwent constrictional strain. The x axes plunge moderately (45-57o) to the S-SW, the y axes plunge gently (5-30o) to the NW, and the z axes plunge gently to moderately (10-35o) to the NE. Comparing the relative strain of cobbles to those exhibiting the most intense deformation gives quantitative information on relative effective viscosity. Bulk finite strain was based off of the mafic clasts because of their large proportion at each site compared to the other lithologies. Relative effective viscosity ratios show that the quartz-rich cobbles have significantly more competent values ranging from 3.05 to 8.22, with an average of 4.67, while ratios of the intermediate clasts show values of 0.88-1.1. This study was modeled after Czeck-et al., (2009) in its methodology for calculating finite strain and effective viscosity and leads to similar results.