The Eocene Okanagan Valley shear zone (OVSZ) is a major extensional detachment within the southern Canadian Cordillera in British Columbia. The OVSZ delineates the western margin of the Shuswap Metamorphic complex juxtaposing mid-crustal, sillimanite-grade crystalline rocks against dominantly non-metamorphosed sedimentary and volcanic rocks. The OVSZ is a 1.5 km-thick, shallowly-west-dipping ductile shear zone and an upper brittle detachment fault; the shear zone grades upward from mylonitic amphibolite-facies gneiss (the Okanagan gneiss) to cataclasite. Extension across the OVSZ is estimated at 32-90 km; however, this has recently been challenged in adjacent areas where the presence of a major, crustal-scale detachment is questioned. Based on data from this study, extension across the southern OVSZ is now estimated at 35-75 km.

The Okanagan gneiss is the dominant lithological unit within the footwall of the OVSZ, and is composed of felsic orthogneiss and amphibolite-facies paragneiss and migmatite. The gneiss and cross-cutting Eocene felsic intrusions have undergone polyphase, non-coaxial deformation and significant flattening (general shear). Ductile deformation and migmatization of the gneiss continued until at latest ca. 48 Ma. High-precision U-Pb dating of zircon demonstrates that metabasic rocks within the paragneiss were intruded into marine sedimentary rocks at ca. 160 Ma (Middle Jurassic). Contrary to previous studies, the Okanagan gneiss is demonstrably Eocene in age and genetically-related to the OVSZ; it is not an exposed slice of Precambrian cratonic basement, and is unlike other gneisses exposed east and northeast of the Okanagan Valley within the Shuswap Metamorphic complex.

During motion on the OVSZ a series of E-W trending corrugations were developed that resulted in preservation of semi-continuous belts of hanging wall rocks in synformal keels interspersed with antiformal domes of footwall crystalline rocks well east of the presently exposed OVSZ. Recognition of these corrugations can be used to reconcile the apparent absence of major extension along portions of the OVSZ with the available geological mapping and structural, petrological, and thermobarometric data. Therefore, the importance of the OVSZ as a major crustal-scale detachment that exhumed mid-crustal rocks is confirmed.