

Quartz grain surface features and diagenetic fabric associated with Carboniferous strata in the western Minas Basin

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Examination of quartz grain features by scanning electron microscopy combined with x-ray analysis and thin section petrology can reveal much valuable information of paleoenvironmental significance. The relative abundance of feature associations and the recognition of relict textures can aid in the recognition of specific depositional environments and earlier evolutionary episodes of the quartz grains. Processes operating within diagenetic environments may, unfortunately, lead to the obliteration of earlier formed features rendering the history of the quartz grains uncertain. Five distinct assemblages of quartz surface textures and diagenetic fabrics can be recognized within the Carboniferous sequence bordering the north shore of the Minas Basin. These assemblages, and their associated lithostratigraphic units, are reviewed below:

AGE	FORMATION/GROUP	ASSEMBLAGE	PALAEOENVIRONMENTAL DIAGNOSIS
(1) Late Westphalian B Early Westphalian C	*Fowler Head Fm./ (Morien Group)	subangular - angular outline, chonchoidal fractures; straight steps, arcuate steps, solution precipitation surfaces, silica globules, scaling, stepped cleavage	grains originated from a tropical - subtropical environment "fresh" fracture surfaces suggest short transport distance
(2) Late Namurian	Parrsboro Fm./ (Riverdale Group)	abundant, coalescing quartz overgrowths, calcite infilling of porosity and fractures	subsurface diagenesis
(3) Late Viséan Early Namurian	(A) Sand Grains West Bay Fm./ (Canso Group)	surrounded - round outline; euhedral quartz grains, silica pellicles, silica plastering, silica flowers, silica rosettes, stepped cleavage, fractures, percussion pits; solution pits	igneous/metamorphic quartz fragments with (?) aeolian grains in a high-energy saline, alkaline, aqueous environment
	(B) Clay/Mudstone West Bay Fm./ (Canso Group)	microcrystalline dolomite (red facies); microcrystalline pyrite (gray-green facies with microcrystalline calcite	alternating, oxidizing and reducing environments
(4) Viséan	SubzoneC?/ (Windsor Group)	angular-subangular outline, stepped cleavage, etch patterns, solution pitting, chemical scaling	high energy, saline, alkaline, aqueous environment

* Previously unrecognized lithostratigraphic unit