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Sedimentary geology of the Palaeoarchaean Buck Ridge (South Africa) and Kittys Gap (Western Australia) volcano-sedimentary complexes

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Abstract

The two Palaeoarchaean volcano-sedimentary complexes of the Buck Ridge (Barberton Greenstone Belt, South Africa) and Kittys Gap (Coppin Gap Greenstone Belt, East Pilbara, Australia) have a similar geological setting and age (~3.45 Ga). The predominantly volcaniclastic sediments are concentrated at the top of these complexes, and experienced thorough, (very) early diagenetic silicification. In many places the silicification process has led to excellent preservation of the primary sedimentary structures. Elsewhere it has resulted in

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Fig. 1. Geological map of the Buck Ridge volcano-sedimentary complex in the upper Hooggenoeg Formation (map simplified after 0050 and 0185; for location in the southern Barberton greenstone belt see the inset). The entire succession has been tilted into a vertical orientation; younging direction is to the north. A–E refers to log locations. Locations of Fig. 5, Fig. 6, Fig. 8, Fig. 9 and Fig. 10 are indicated. Legend applies to the main figure, not to the inset.

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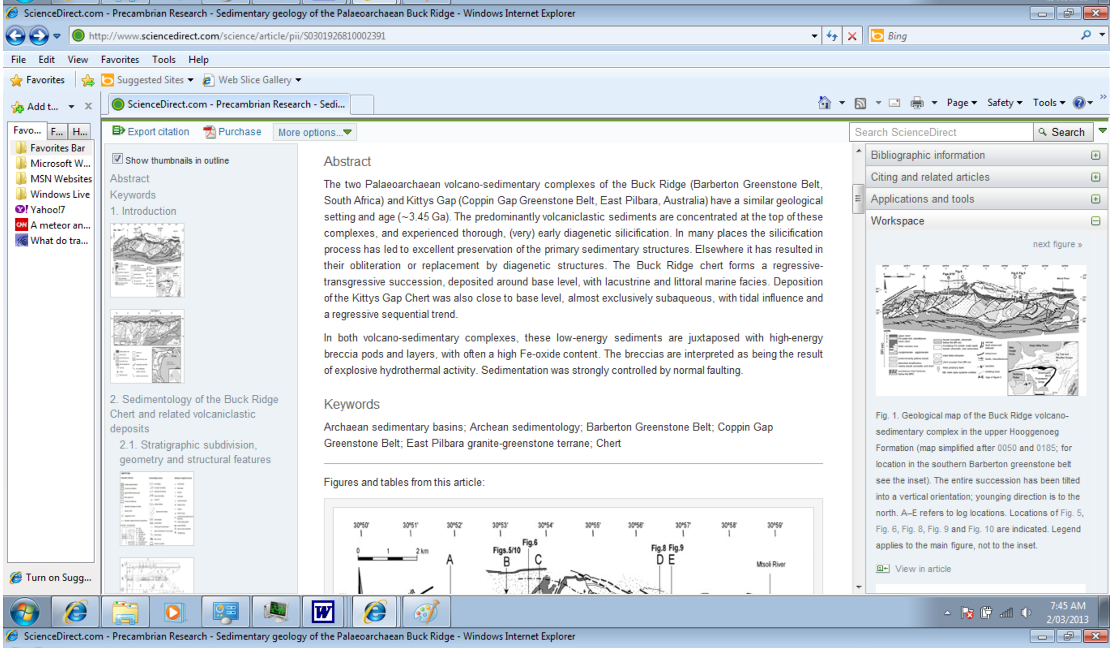

Abstract

The two Palaeoarchaean volcano-sedimentary complexes of the Buck Ridge (Barberton Greenstone Belt, South Africa) and Kittys Gap (Coppin Gap Greenstone Belt, East Pilbara, Australia) have a similar geological setting and age (~3.45 Ga). The predominantly volcaniclastic sediments are concentrated at the top of these complexes, and experienced thorough, (very) early diagenetic silicification. In many places the silicification process has led to excellent preservation of the primary sedimentary structures. Elsewhere it has resulted in their obliteration or replacement by diagenetic silicification structures. The Buck Ridge chert forms a regressive-transgressive succession, deposited around base level, with lacustrine and littoral marine facies. Deposition of the Kittys Gap Chert was also close to base level, almost exclusively subaqueous, with tidal influence and a regressive sequential trend.

In both volcano-sedimentary complexes, these low-energy sediments are juxtaposed with high-energy breccia pods and layers, with often a high Fe-oxide content. The breccias are interpreted as being the result of explosive hydrothermal activity. Sedimentation was strongly controlled by normal faulting.

Keywords

Archaean sedimentary basins; Archean sedimentology; Barberton Greenstone Belt; Coppin Gap Greenstone Belt; East Pilbara granite-greenstone terrane; Chert

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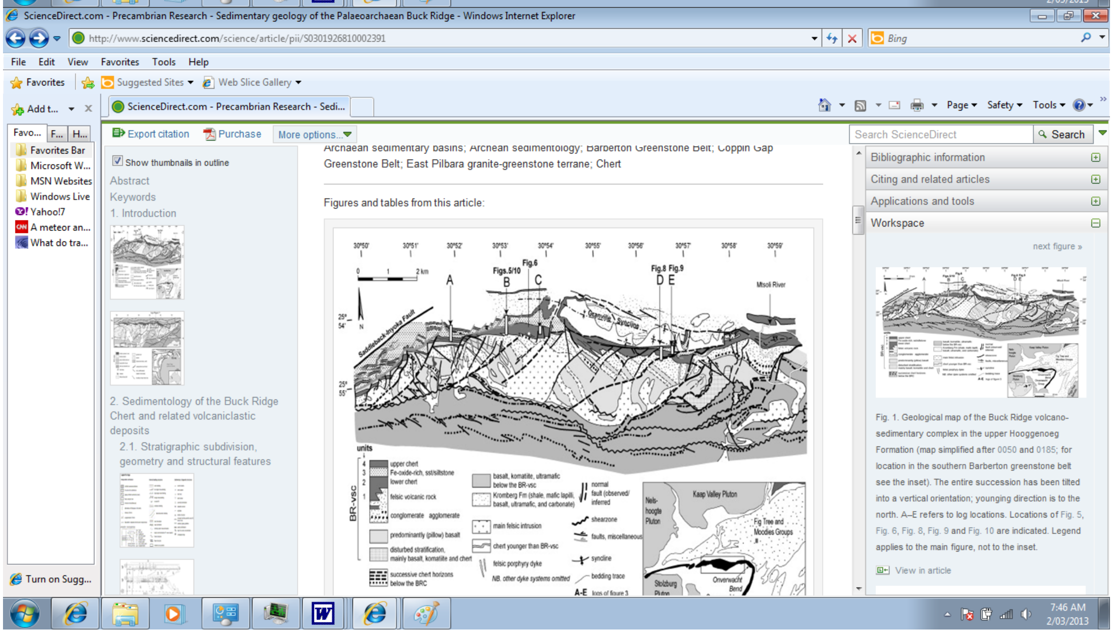

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