



Ultramafic Rocks at Gusev Crater, Mars, and their Relationship to Martian Meteorites.

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The Mars Exploration Rover (MER) Spirit discovered the first ultramafic rocks on the surface of Mars as it descended the south flank of 'Husband Hill' (Columbia Hills, Gusev crater). At Husband Hill, a sequence of four outcrop rocks was encountered and putatively called "Algonquin Class". The Alpha Particle X-Ray Spectrometer (APXS) and the Mössbauer (MB) spectra of these rocks indicate that the samples are relatively unaltered igneous rocks with high olivine content. A magmatic sequence of these four rocks becoming increasingly olivine-rich was postulated [1]. Data provided by the APXS showed the highest concentrations of Mg, Fe and the lowest contents of Al, K, Ca and Ti of almost all rocks encountered so far [2] for two samples from the Algonquin Class, 'Algonquin Iroquet' and 'Comanche Palomino'. Possibly, these four rocks could be derived from a primary magma as an olivine cumulate. Among the martian meteorites (SNCs) no such rock type is found. However, there is a close similarity of these rocks to the Martian meteorites with respect to elemental compositions. Among the SNCs the two chassignites contain mostly olivine and are thus classified as dunites.

As a matter of fact, the Ni concentrations of the Algonquin Class rocks are higher than in martian meteorites. Nickel is strongly partitioned into olivine. Assuming olivine is the host mineral of Ni, the source region of the igneous Algonquin Class rocks must contain considerably higher Ni concentrations than derived for the Martian mantle based on the SNC compositions [3].

Ref.: [1] Mittlefehldt D.W. et al. (2006) *LPSC* 37, #1505. [2] Gellert R. et al. (2006) *JGR*, 111, E02S05. [3] Wänke H. a. Dreibus G. (1988) *Phil. Trans. R. Soc. Lond. A* 325, 545.