

## Baseline concentrations and spatial distribution of heavy/trace elements in soils of Medak district, Andhra Pradesh, India

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Geochemical characterization was carried out in soils developed on diverse bedrocks in the Medak district of Andhra Pradesh, India. Eight hundred and eighty-three soil samples (560-topsoil, 323-subsoil) were collected in the district from undisturbed locations using a stratifying site selection strategy to capture the diversity of parent materials and soils. The topsoil comprised of 0-25 cm depth interval and is a composite sample collected from three locations making a triangle with a distance of ~10 m between each sample. The subsoil samples were collected from a 25 cm thick section from a depth range of 70 to 95 cm. The samples were analyzed for 29 elements (As, Ba, Cd, Co, Cr, Cu, F, Mo, Ni, Pb, Rb, Se, Sr, Th, U, V, Y, Zn, Zr, Si, Al, Fe, Mn, Mg, Ca, Na, K, Ti and P) by Philips MagiX PRO model PW 2440 X-ray fluorescence spectrometer and baseline levels for these elements are presented. Results reveal that the correlation between the geochemical patterns in the soils developed on different litho-variants is not straight forward but some general trends could be observed. Texture analysis revealed that soil particle size distribution influenced the contents of trace elements differently in soils developed on diverse bedrocks. The application of principal component analyses and enrichment factor revealed that the regional parent materials and pedogenesis are the primary factors influencing the concentrations of trace elements while anthropogenic activities have secondary influence. Distribution maps for individual element is prepared to understand their geochemical behaviour, indicate valuable information on the concentration, spatial variations, sources and possible enrichment pathways in soil environment, providing an overview and framework to more detailed site investigations, and to highlight areas for further follow-up in terms of contaminated land. The present study aims to (i) establish the upper baseline concentrations of the heavy and trace metals in soil (ii) evaluate natural versus anthropogenic influence factors that affect the spatial distribution of these toxic trace metals and (iii) know the associations of different elements using simple statistical tools.

## Dependence of the level of argide interferences on light PGEs during laser ablation of sulphides on the configuration of ICP-MS

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*In situ* analysis of Platinum Group Elements (PGEs) in a broad range of solid samples including sulphides, silicates and inclusions is of increasing interest in ore deposit research. LA-ICP-MS is one of the preferred analytical methods for this application with the ability to analyse these elements accurately [1] down to very low levels. However, analysis of light PGEs (Ru, Rh and Pd) in magmatic sulphides is hampered by the argide interferences (+40 amu) on their main isotopes <sup>99</sup>Ru, <sup>101</sup>Ru, <sup>103</sup>Rh, <sup>105</sup>Pd, and <sup>106</sup>Pd from the major sulphide elements such as Co (59), Ni (61), Cu (63 and 65) and Zn (66), leading to poor accuracy and high detection limits.

The level of measured argide interferences depends on both the rate of their generation (mainly controlled by plasma temperature) and the effectiveness of the mass-spectrometer configuration in minimising the ability of polyatomic interferences to reach the detector. The latter should depend on the range of kinetic energies of ions with a given size and mass/charge ratio at the time they enter the mass-spectrometer, and the ability to separate the paths of high energy ions and low energy polyatomic interferences of the same mass/charge ratio.

This work focuses on understanding the factors that control the efficiency of separation of Ru, Rh and Pd ions from Co, Ni, Cu and Zn argides. We compare a range of ICP-MS configurations with and without collision/reaction cells. To facilitate comparison, similar flow rates of He in the laser sample cell and Ar carrier gases were used, and mass spectrometers were tuned to optimise sensitivity and mass-bias, and to minimise oxide production rates. We conclude that the best results are achieved with ion lens configurations that allow for a number of stopping potentials along the ion path to the detector.

[1] Gilbert *et al.* (2010) *GCA*, this volume.