Toward Quantitative Remote Sensing of Pb Contamination from Legacy Mining (Kabwe, Zambia)

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Pb Detection in WorldView-2 Satellite Images

Heavy metals released by mining and ore processing pose grave human health and environmental risks [1]. Spectroscopy offers exciting new possibilities for detecting and monitoring contaminants [2]. However, linking field or laboratory analyses to remote sensing for quantitative environmental contaminant detection remains challenging. We attempt to couple field XRF [3] Pb concentrations in soil ([Pb], ppm) with satellite image analysis to locate other areas of high [Pb].

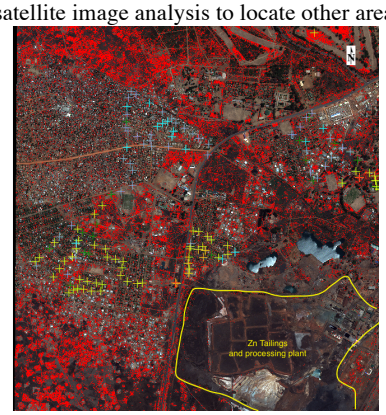

Figure 1: Classified WorldView-2 satellite image of Kabwe, Zambia with regions of possible high Pb contamination highlighted red and XRF sample locations colored by [Pb] overlain (+ [Pb] ≥ 10000 ppm, + [Pb] ≥ 5000 ppm, + [Pb] ≥ 2000 ppm, + [Pb] ≤ 1200 ppm, + [Pb] ≤ 400 ppm).

Discussion of Results

Classifying pixels by spectral character using [Pb] in soil samples examined at known locations throughout the image provides a map of probable areas of high Pb contamination. Additional work will investigate soil processes affecting contaminant spectroscopy and quantitative remote sensing.

[1] Hutchinson & Whitby (1974) *Environ. Conservation* **1**, 123-32. [2] Kemper & Sommer (2002) *Environ. Sci. Technol.* **36**, 2742-2747. [3] Rouillon & Taylor (2016) *Environ. Pollut.* **214**, 255-264.