

Accepted Manuscript

Predictive geochemical mapping using environmental correlation

John Wilford, Patrice de Caritat, Elisabeth Bui

PII: S0883-2927(15)30029-9

DOI: [10.1016/j.apgeochem.2015.08.012](https://doi.org/10.1016/j.apgeochem.2015.08.012)

Reference: AG 3540

To appear in: *Applied Geochemistry*

Received Date: 2 July 2015

Revised Date: 18 August 2015

Accepted Date: 20 August 2015

Please cite this article as: Wilford, J., de Caritat, P., Bui, E., Predictive geochemical mapping using environmental correlation, *Applied Geochemistry* (2015), doi: 10.1016/j.apgeochem.2015.08.012.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



1 Predictive geochemical mapping using environmental correlation

2 John Wilford^{1,*} Patrice de Caritat^{1,2}, Elisabeth Bui³

3 ¹Geoscience Australia, GPO Box 378, Canberra ACT 2601, Australia

4 ²Research School of Earth Sciences, Australian National University, Canberra, ACT 2601, Australia

5 ³CSIRO Land and Water, GPO Box 1666, Canberra ACT 2601, Australia

6 *Corresponding author: Email john.wilford@ga.gov.au, Tel +61 2 6249-9455, Fax +61 2 6249-9999

7 Abstract

8 The distribution of chemical elements at the Earth's surface is complex and reflects the
9 geochemistry and mineralogy of the original substrate modified by environmental factors that
10 include physical, chemical and biological processes over time.

11 Geochemical data typically is illustrated in the form of horizontal maps or vertical cross-sections,
12 where the composition of regolith, bedrock or any other material is represented. These are primarily
13 point observations that frequently are interpolated to produce rasters of element distributions. Here
14 we propose the application of environmental or covariate regression modelling to predict and better
15 understand the controls on major and trace element geochemistry within the regolith. Available
16 environmental covariate datasets (raster or vector) representing factors influencing regolith
17 composition are intersected with the geochemical point data in a spatial statistical correlation model
18 to develop a system of multiple linear correlations. The spatial resolution of the environmental
19 covariates, which typically is much finer (e.g. ~90 m pixel) than that of geochemical surveys (e.g. 1
20 sample per 10 to 10,000 km²), carries over to the predictions. Therefore the derived predictive models
21 of element concentrations take the form of continuous geochemical landscape representations that
22 are potentially much more informative than geostatistical interpolations.

23 Environmental correlation is applied to the Sir Samuel 1:250 000 scale map sheet in Western Australia
24 to produce distribution models of individual elements describing the geochemical composition of the
25 regolith and exposed bedrock. As an example we model the distribution of two elements – chromium
26 and sodium. We show that the environmental correlation approach generates high resolution
27 predictive maps that are statistically more accurate and effective than ordinary kriging and inverse

Download English Version:

<https://daneshyari.com/en/article/6334848>

Download Persian Version:

<https://daneshyari.com/article/6334848>

[Daneshyari.com](https://daneshyari.com)