



XV CONGRESO GEOLÓGICO CHILENO "GEOCIENCIAS HACIA LA COMUNIDAD"

18 AL 23 DE NOVIEMBRE DE 2018, UNIVERSIDAD DE CONCEPCIÓN,
CONCEPCIÓN, CHILE



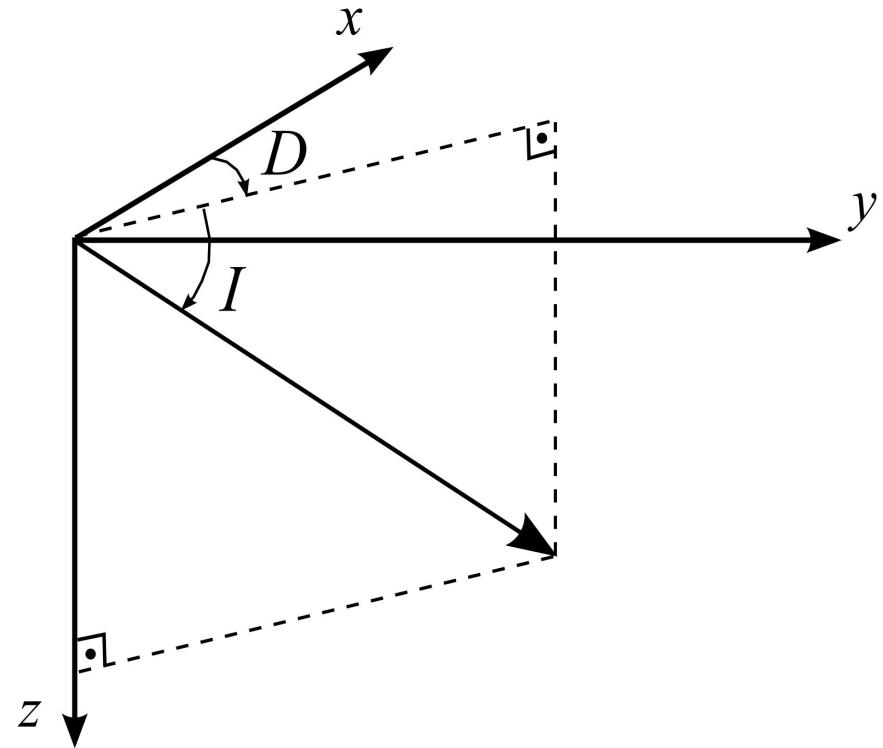
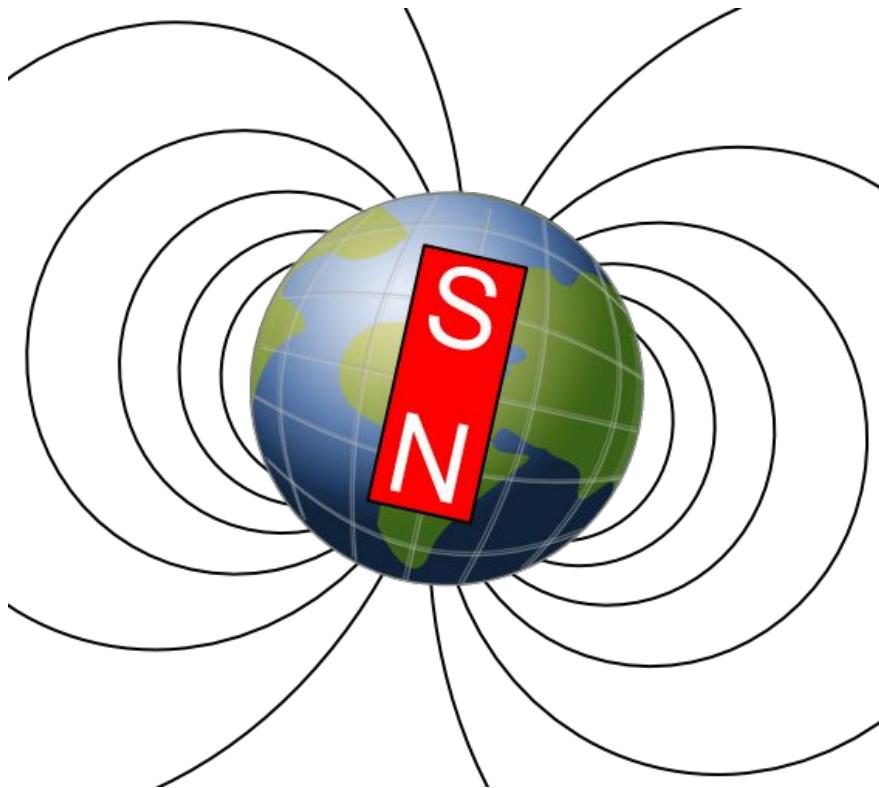
Observatório
Nacional

Total magnetization direction through cross-correlation: an example in Serra do Cabral (Brazil)

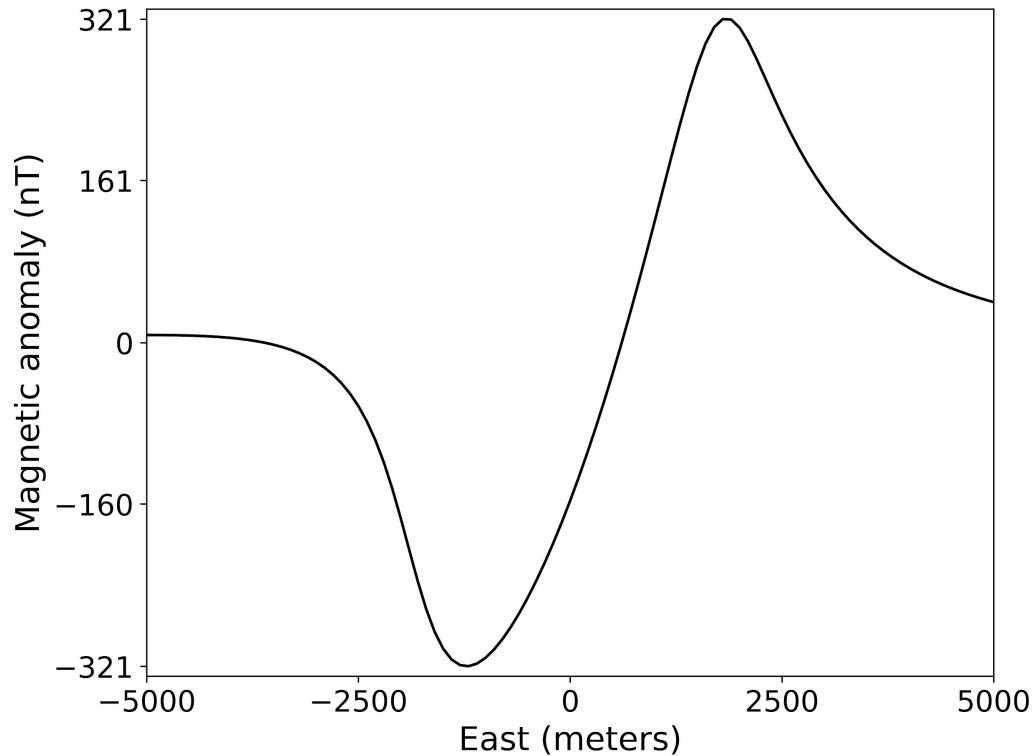
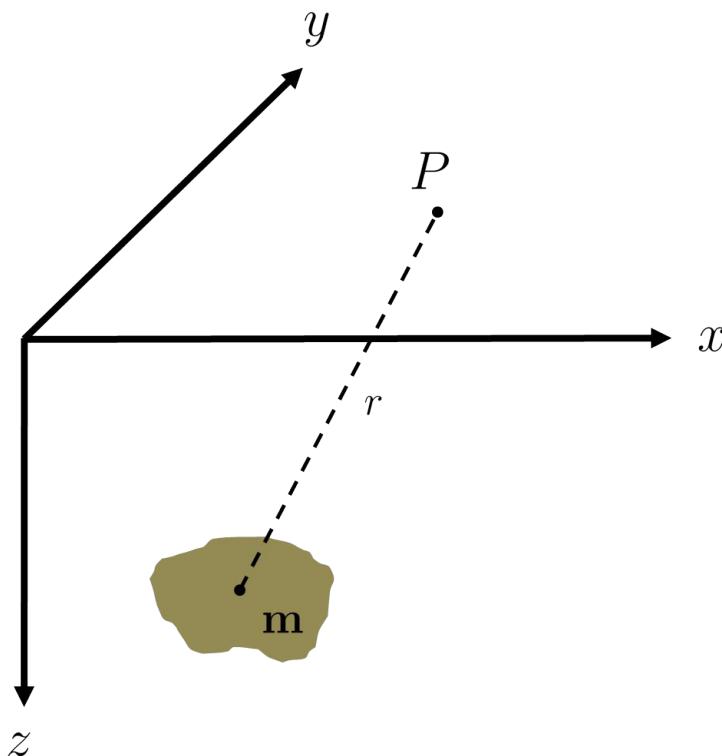
Nelson Ribeiro Filho* & Rodrigo Bijani & Cosme Ponte-Neto

Concepción, November 21, 2018

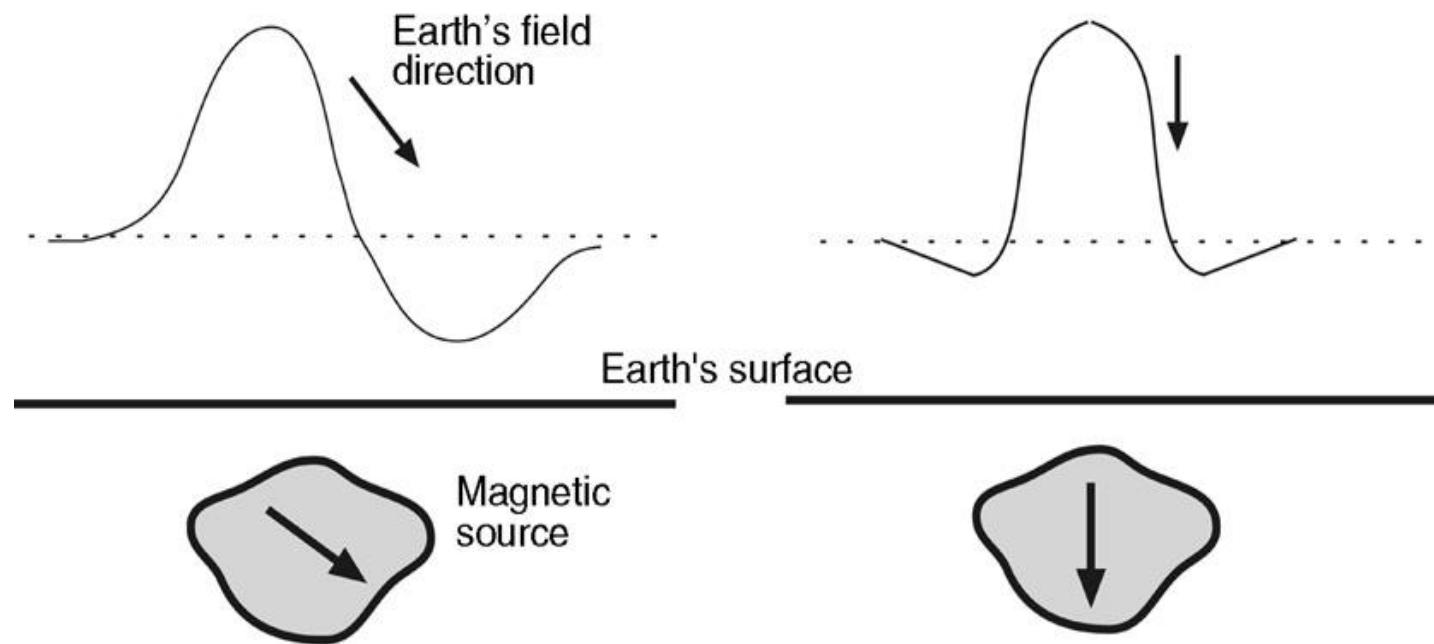
Earth magnetic field



How to interpret a magnetic anomaly?



Reduction to Pole filter (RTP)



$$\mathcal{F}[\phi_r] = \frac{1}{\Theta_m \Theta_f}$$

Total magnetization direction

Geophysical
inversion

Geophysical
modeling

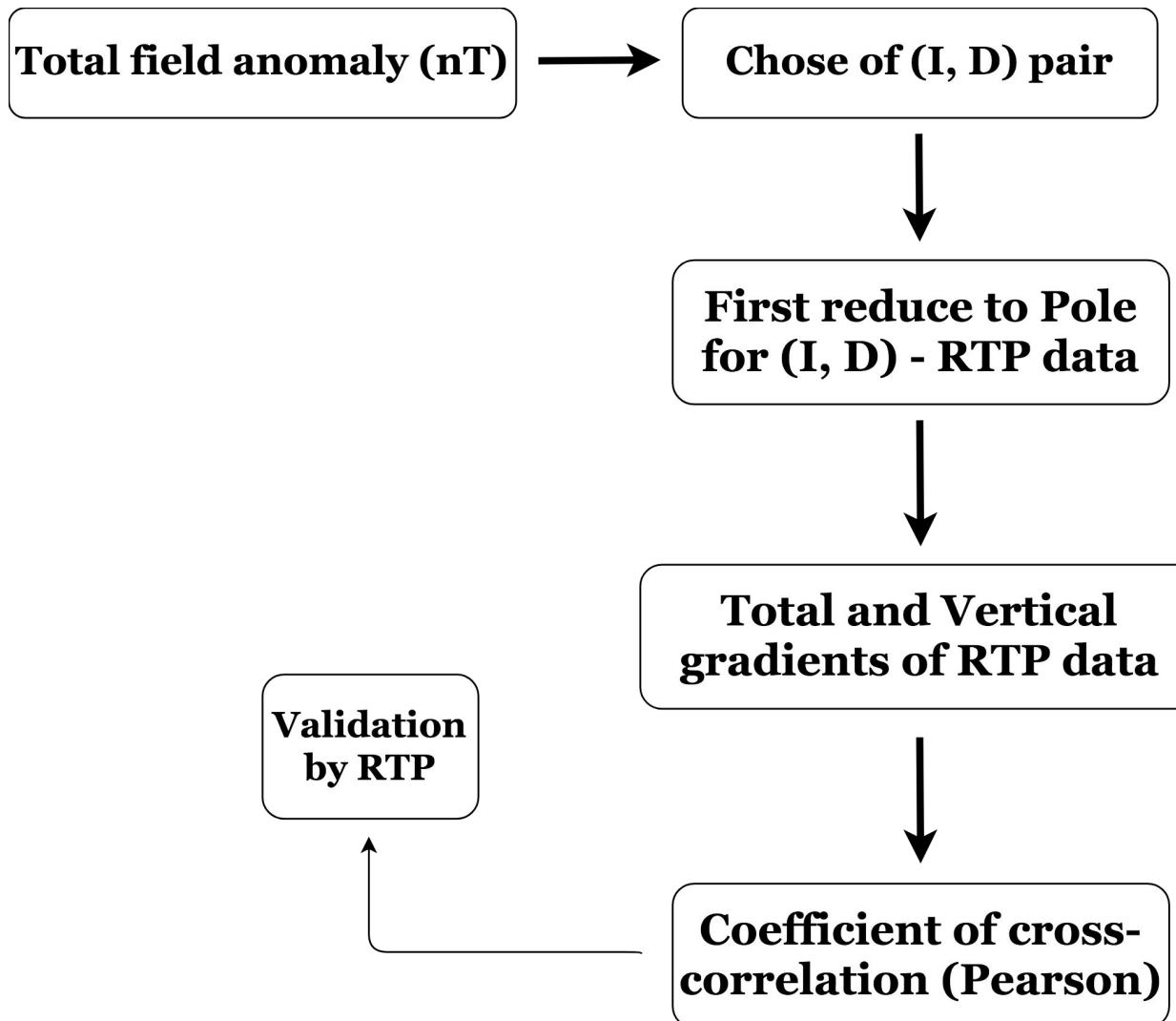
Multi-domain
transforms

Cross-correlation
techniques

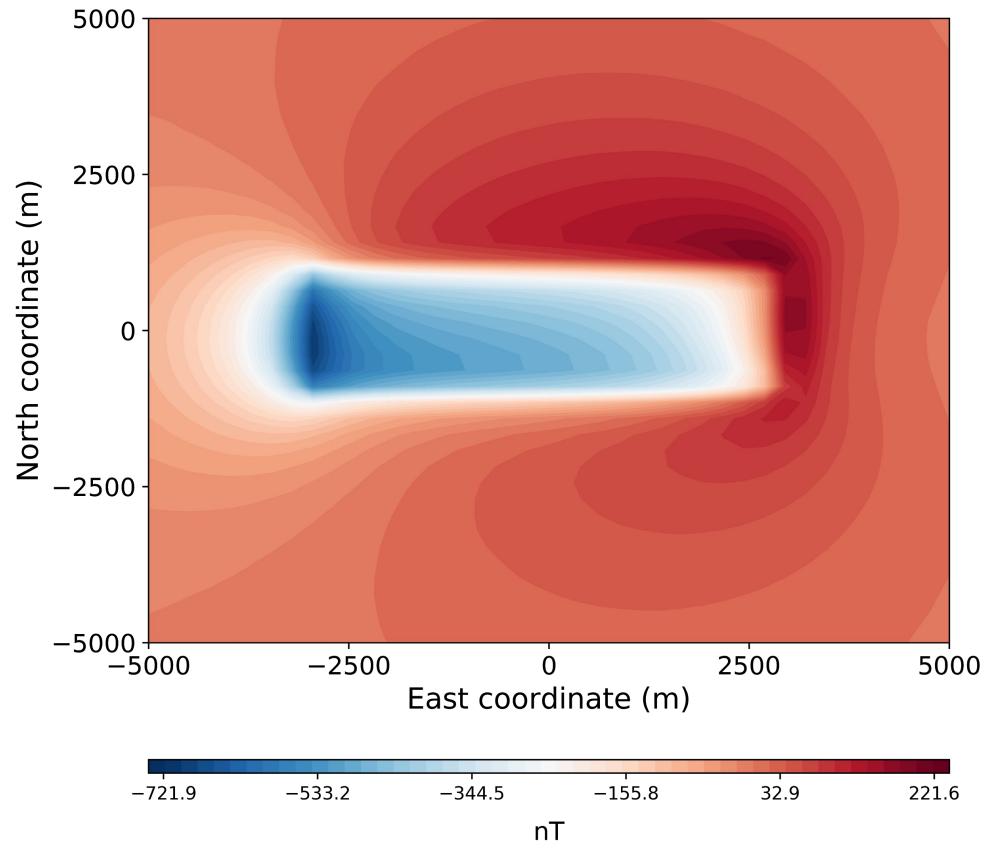
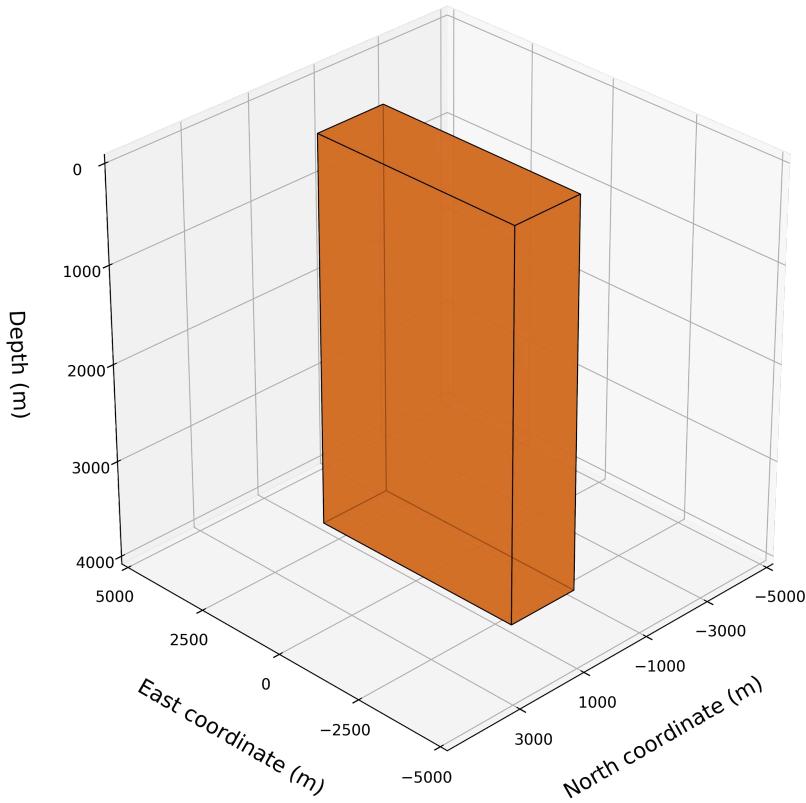
Cross-correlation - Methodology

$$CC(I_0, D_0) = \frac{\sum_i (T_i - \bar{T})(V_i - \bar{V})}{\sum_i (T_i - \bar{T})^2 \sum_i (V_i - \bar{V})^2}$$

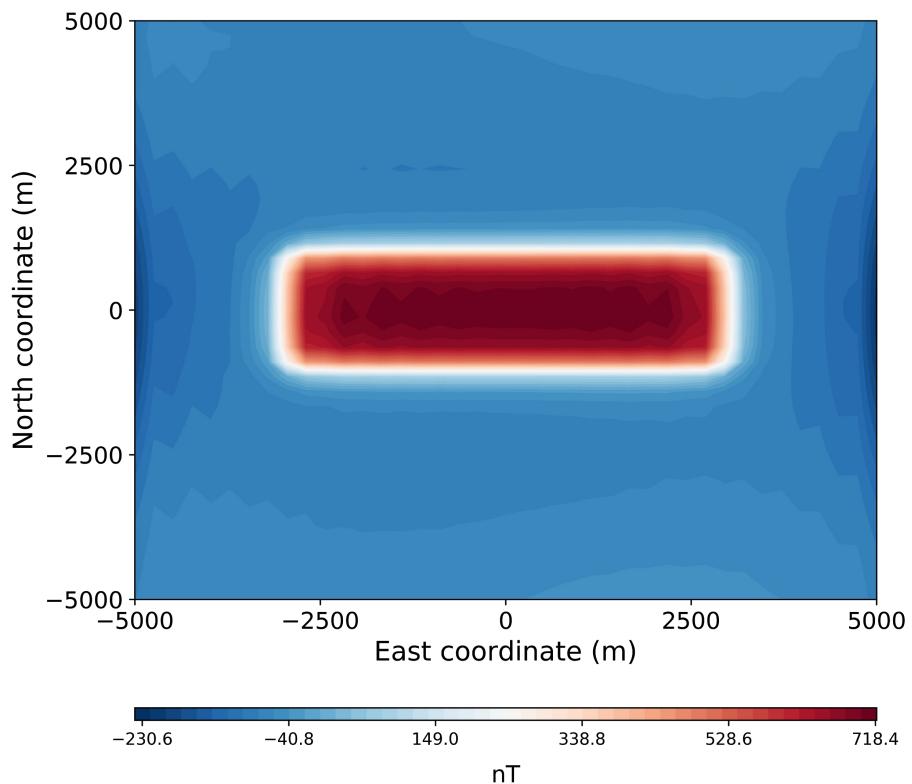
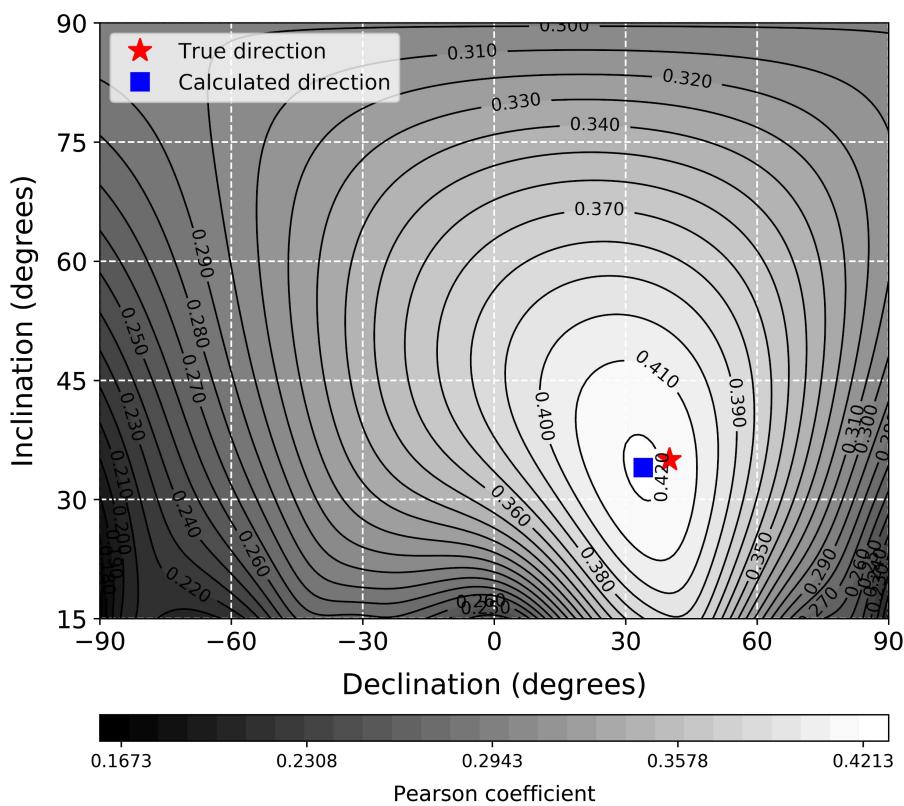
Cross-correlation - Methodology



Synthetic dike model

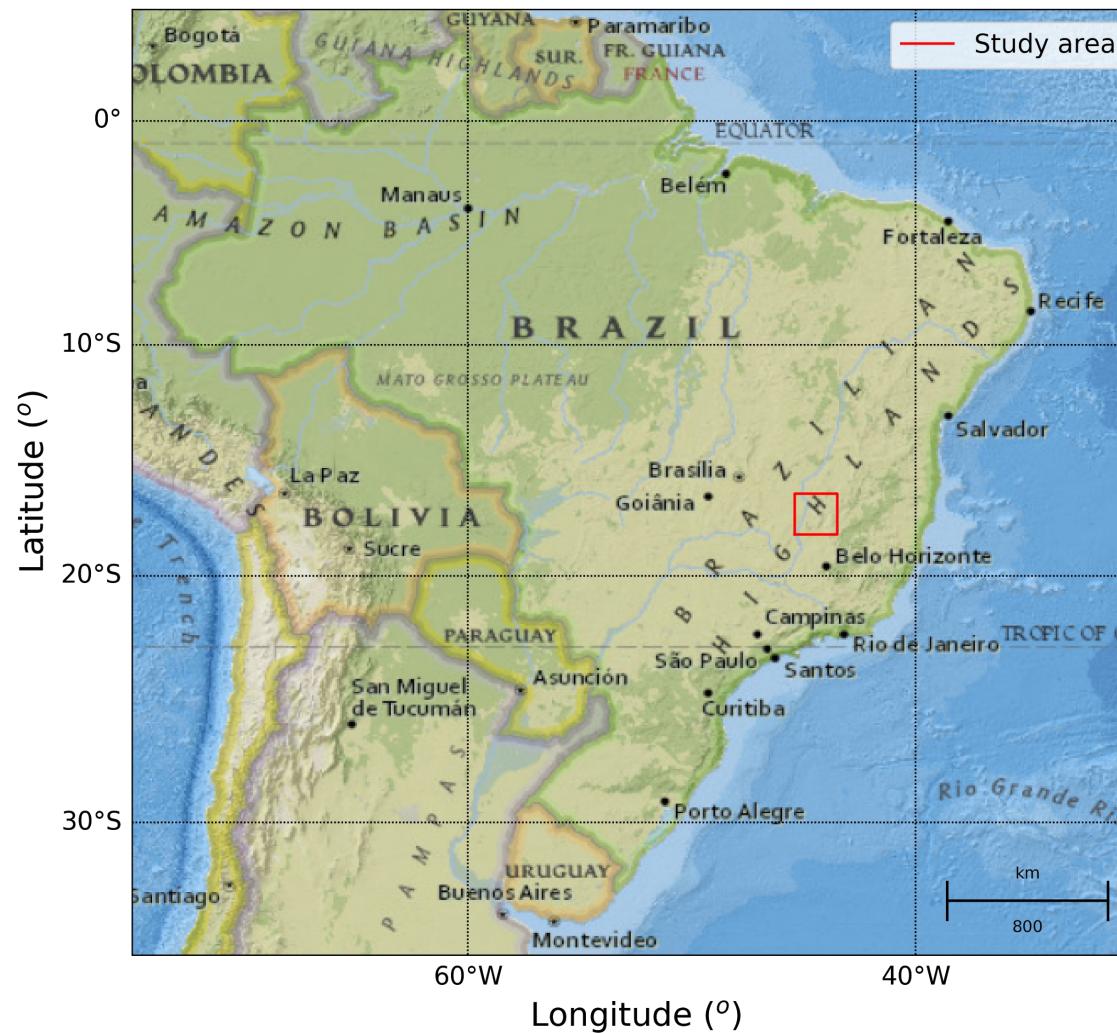


Synthetic dike model



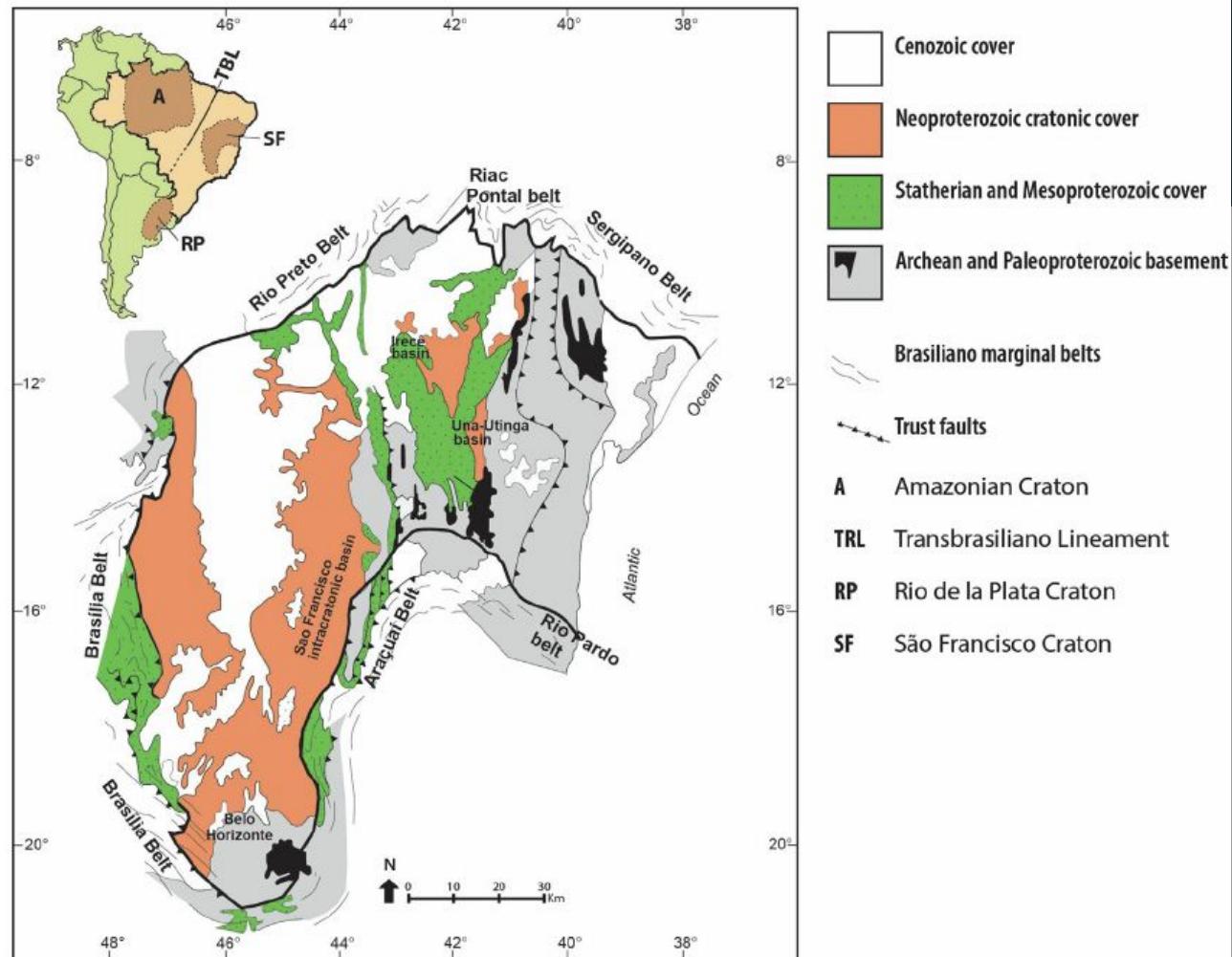
Serra do Cabral: location, geological settings and results

Serra do Cabral - Location



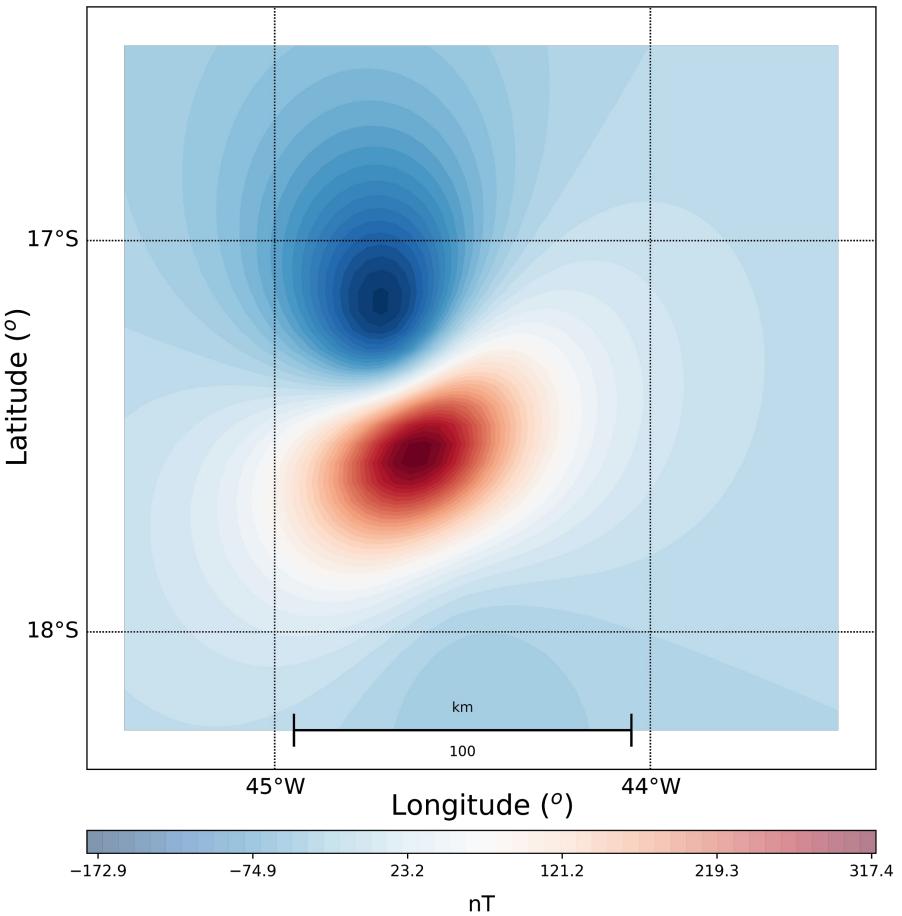
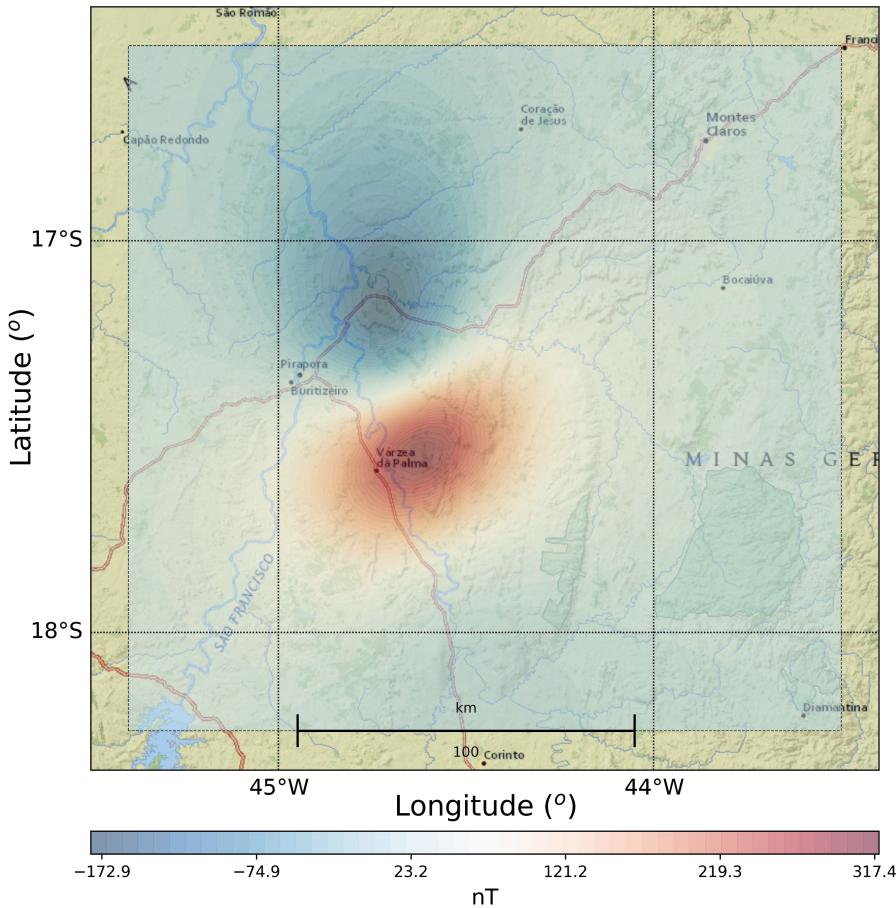
Serra do Cabral - Geology

- ★ South São Francisco craton
- ★ Tectonic and flexure units
- ★ Numerous cycles of magmatism
- ★ Igneous basement
- ★ Gneisses, granite and intrusive rocks
- ★ Layers of dolomite and limestone
- ★ Shallow layers of sandstone/quartzites

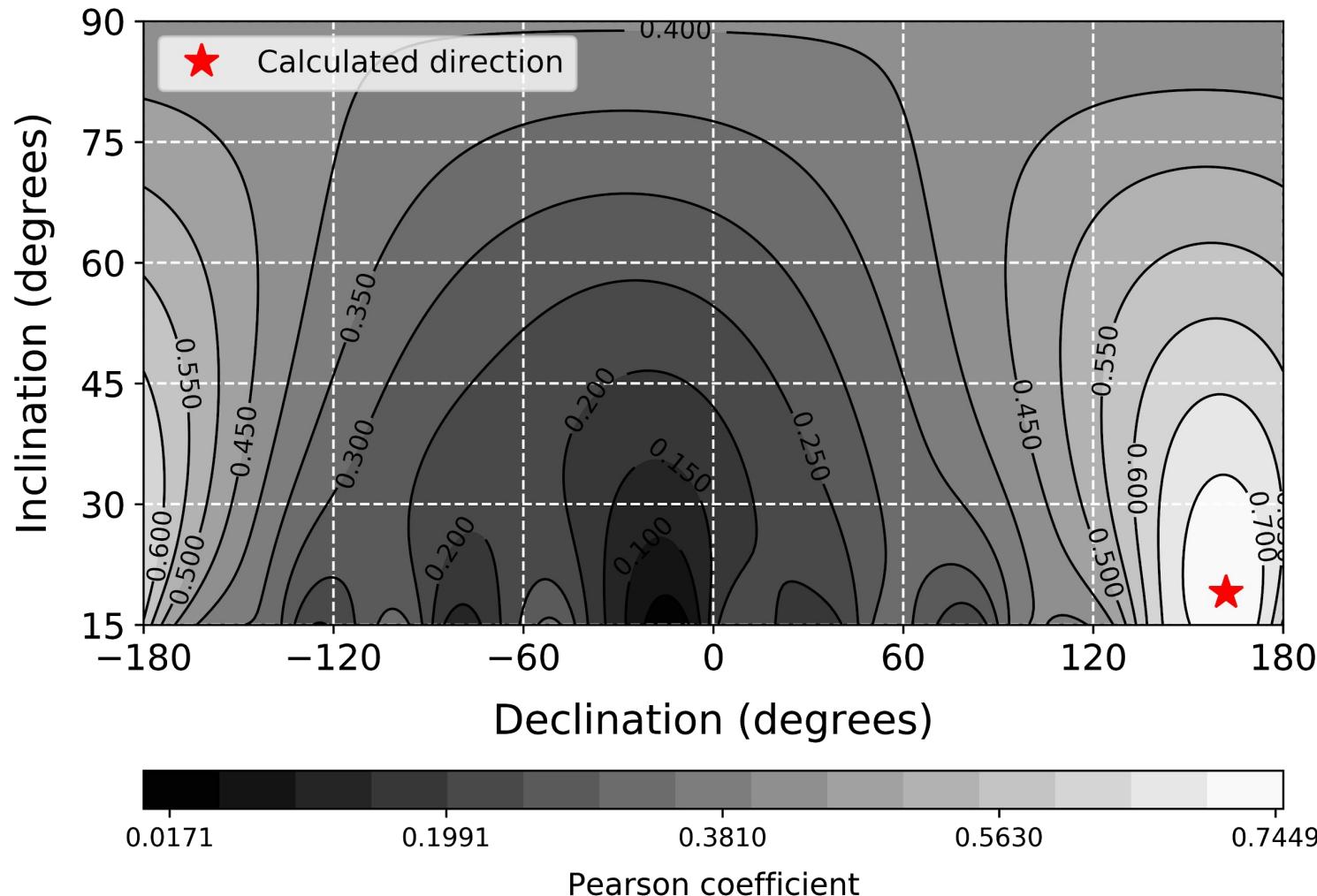


Oliveira (2004)

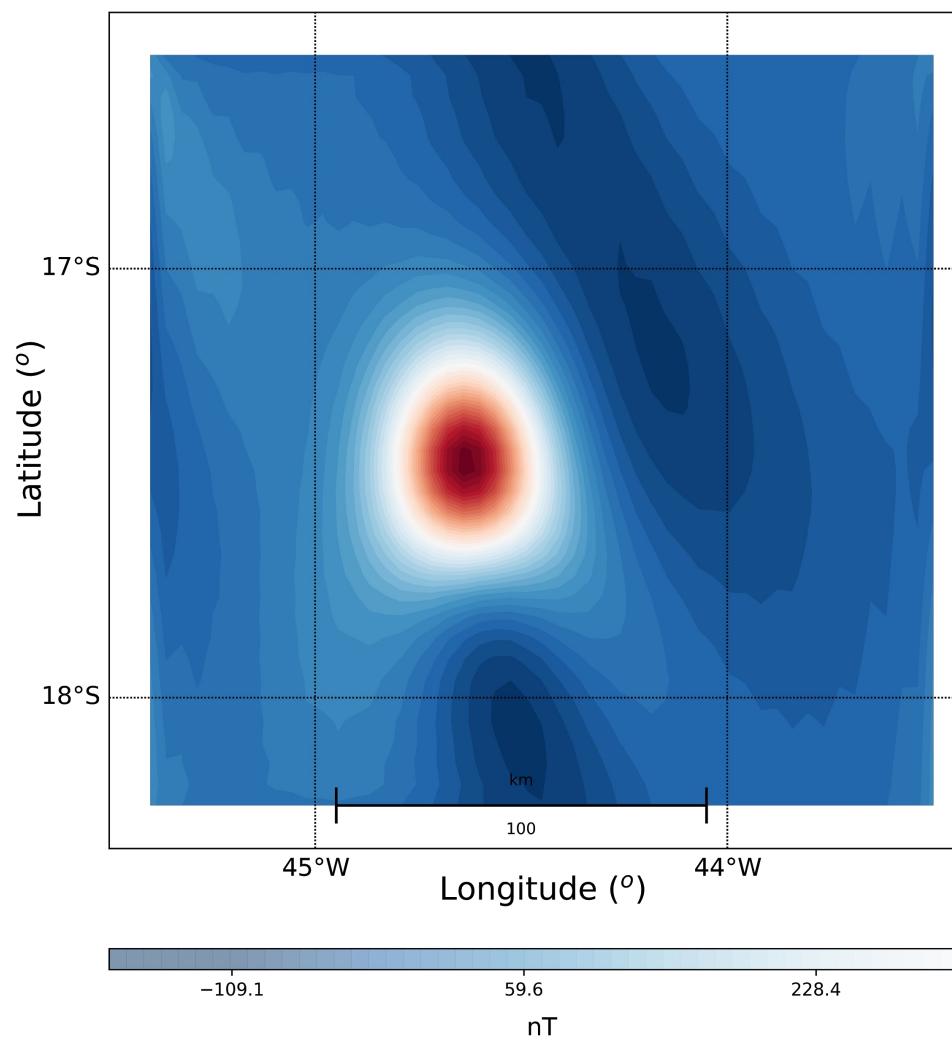
Serra do Cabral - Anomaly



Serra do Cabral - Results



Serra do Cabral - Validation



Conclusions

Good technique to calculate direction of magnetization

Serra do Cabral magnetic anomaly:
 $I = 19^\circ$, $D = 159^\circ$

Isolated intrusive rock-source (igneous or metamorphic)

- Ussami, 1981
($I = 17.5^\circ$, $D = 17^\circ$)
- Ponte-Neto, 2008
($I = 20.5^\circ$, $D = 45.2^\circ$)

<http://github.com/nelsondelimar/chile2018>



GitHub

Acknowledgements



Observatório
Nacional



*Conselho Nacional de Desenvolvimento
Científico e Tecnológico*