



## XV CONGRESO GEOLÓGICO CHILENO “GEOCIENCIAS HACIA LA COMUNIDAD”

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

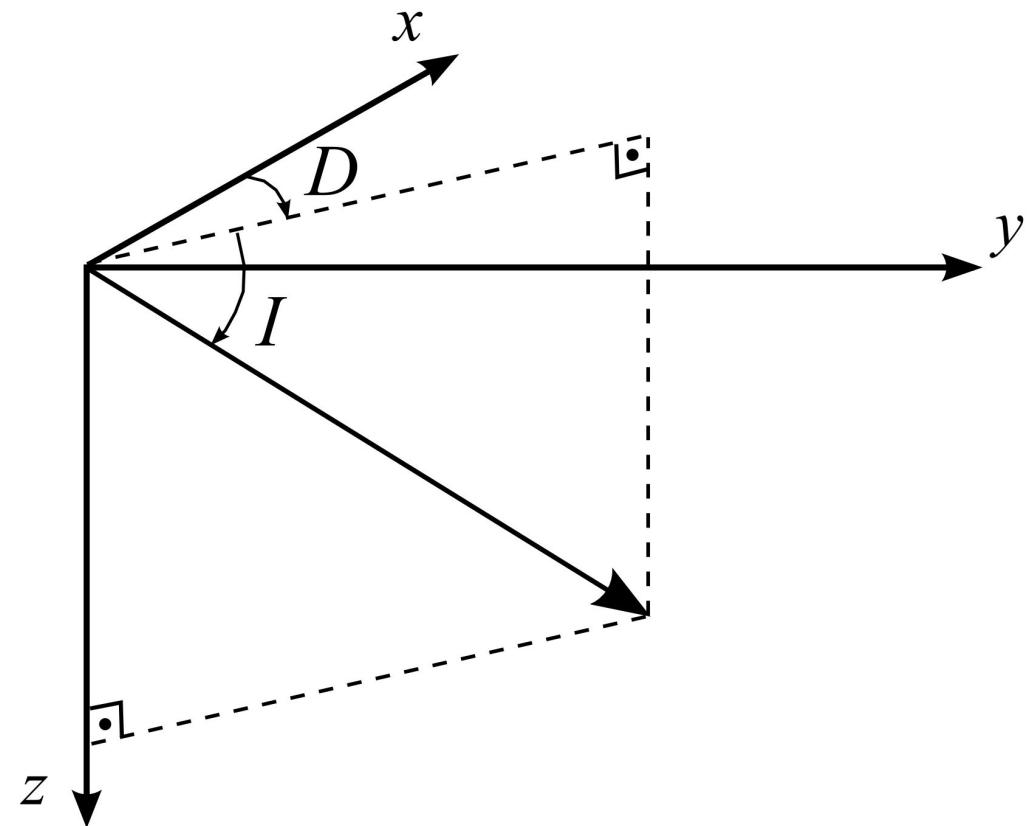
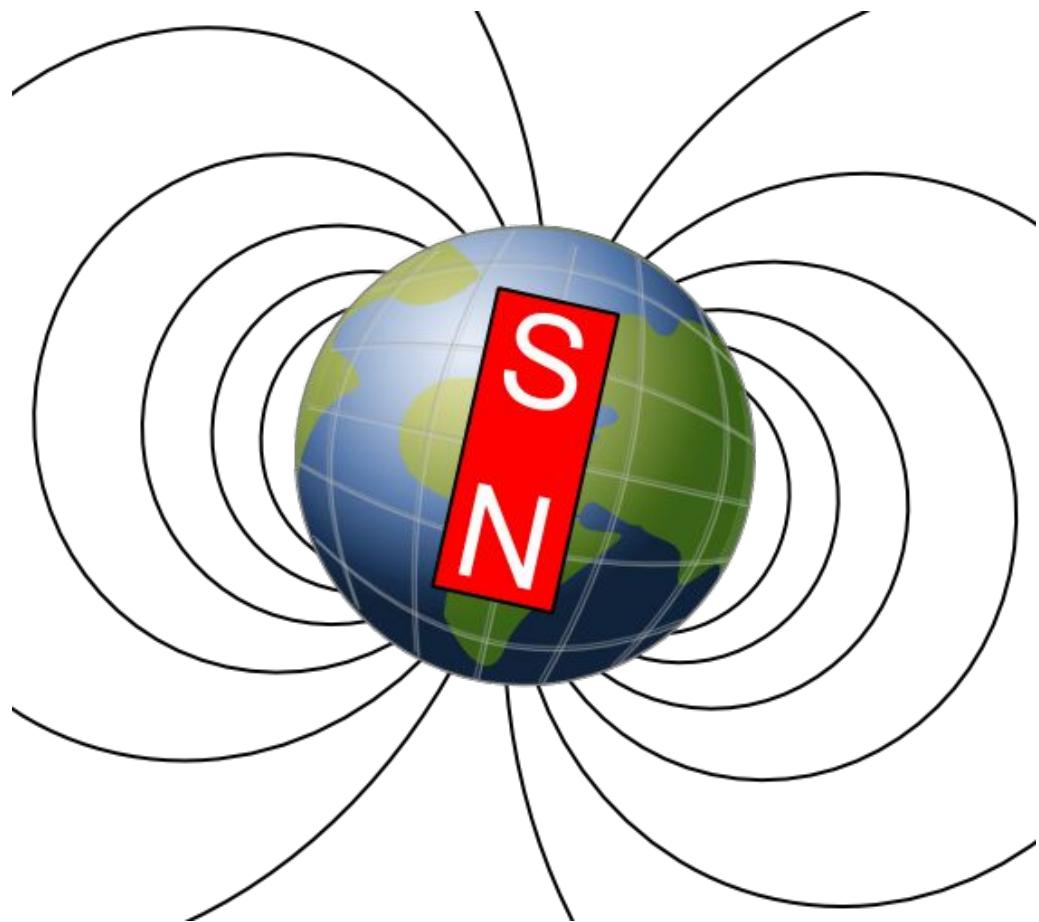


# Total magnetization direction through cross-correlation: an example in Serra do Cabral (Brazil)

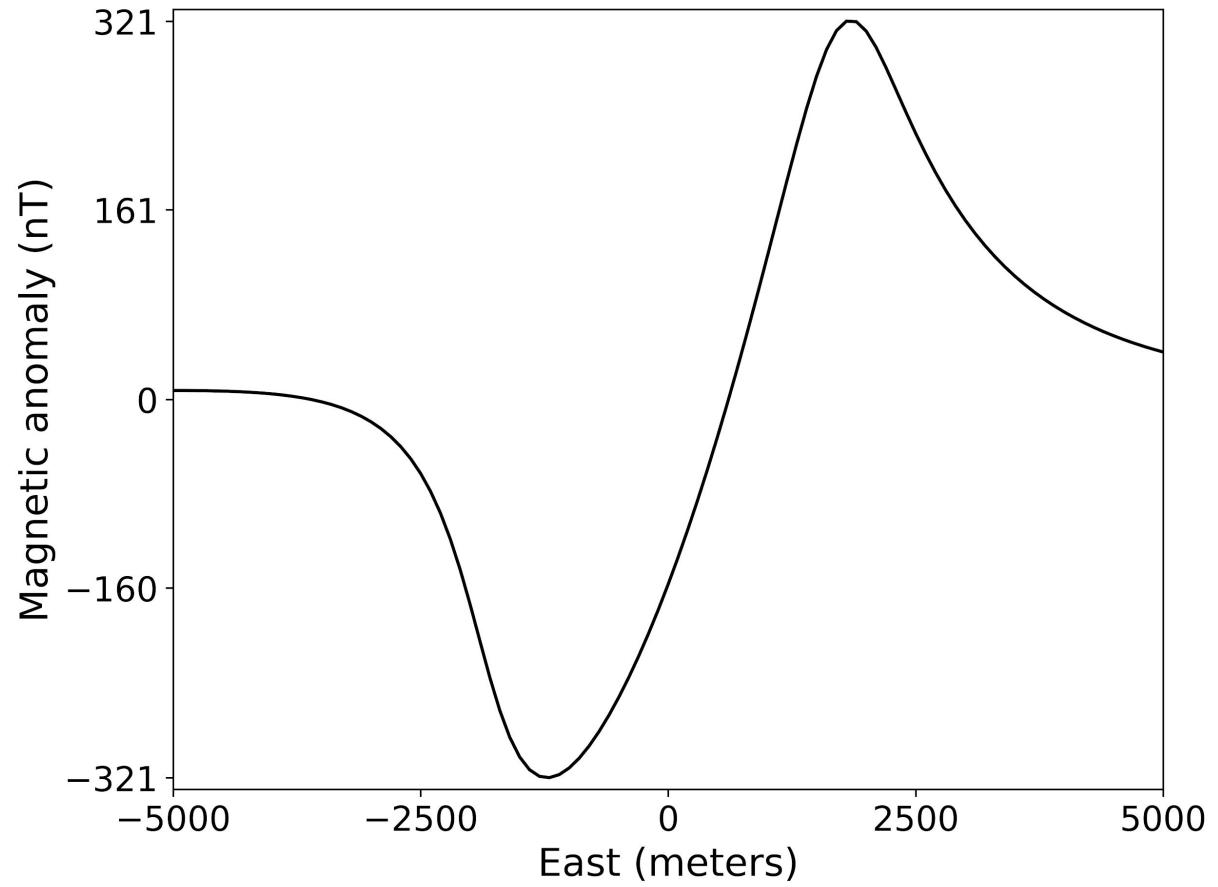
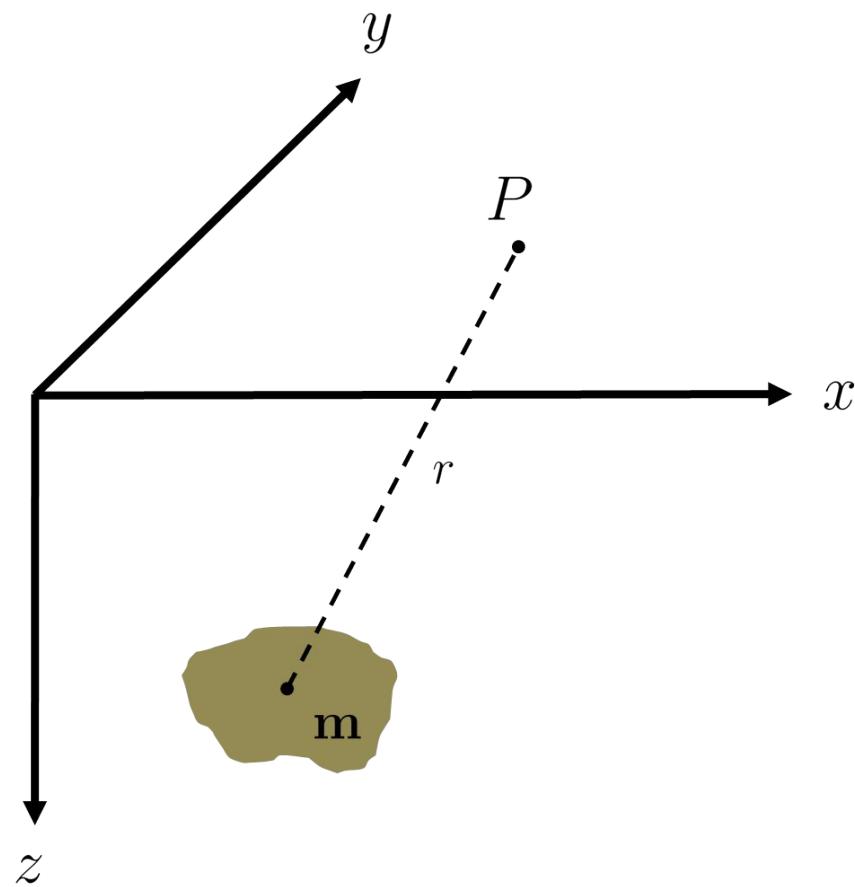
Nelson Ribeiro Filho\* & Rodrigo Bijani & Cosme Ponte-Neto

Concepción, November 21, 2018

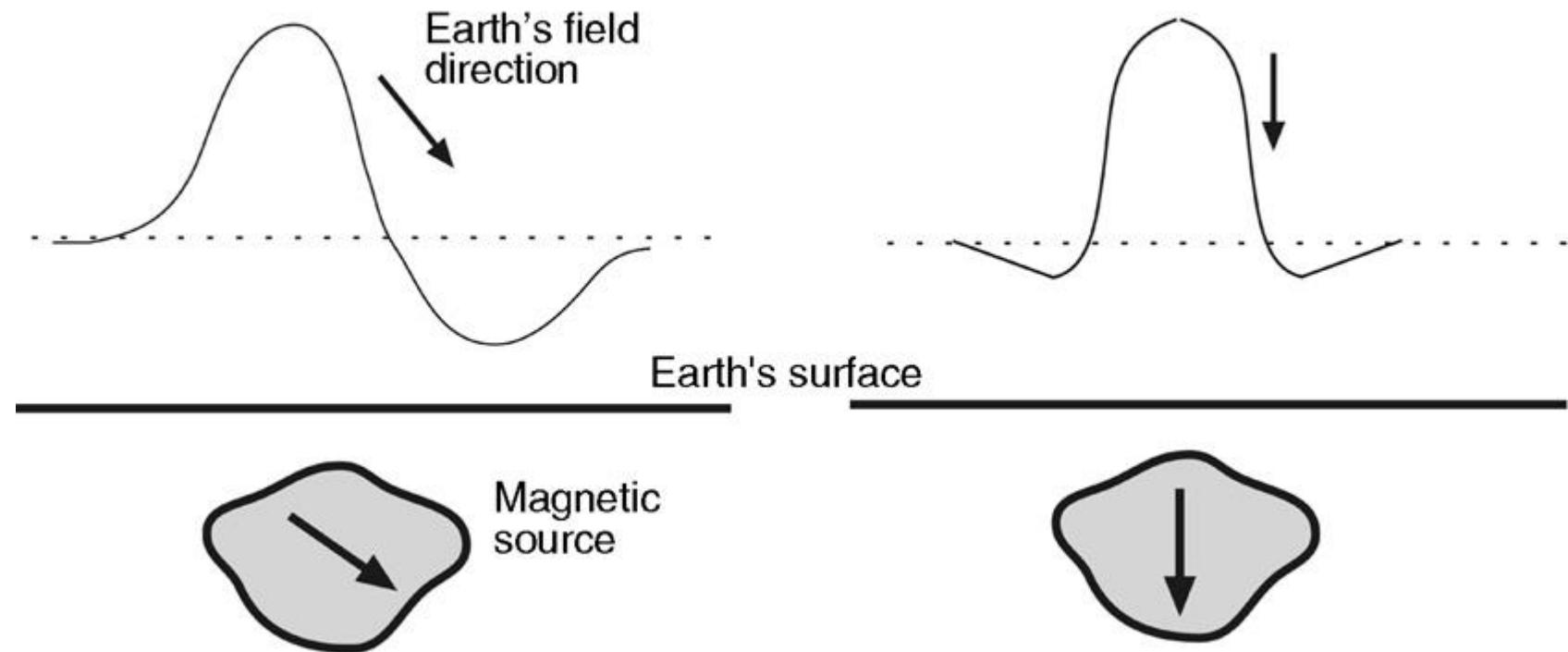
# Earth magnetic field



# 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

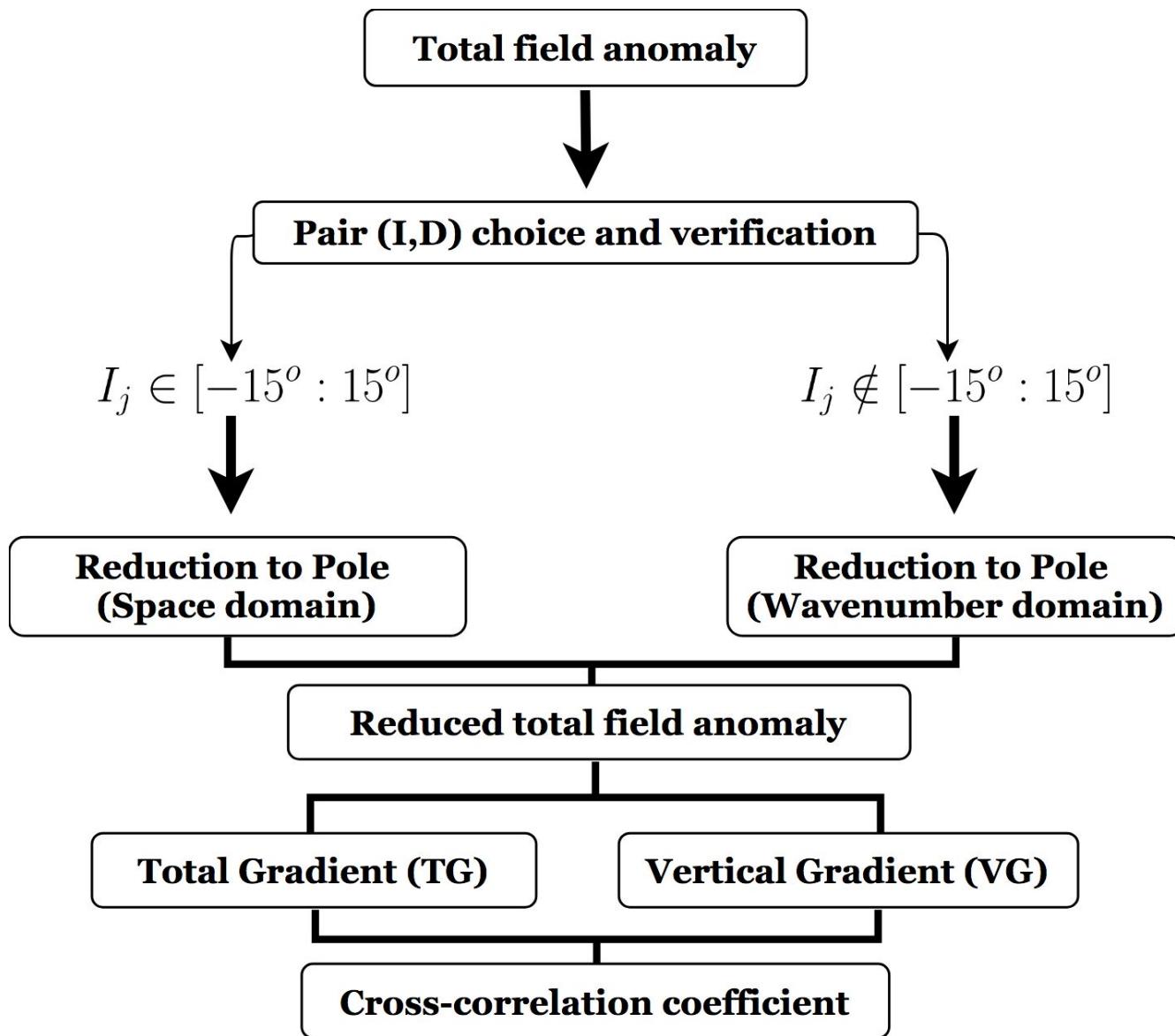
Multi-domain  
transforms

Cross-correlation  
techniques

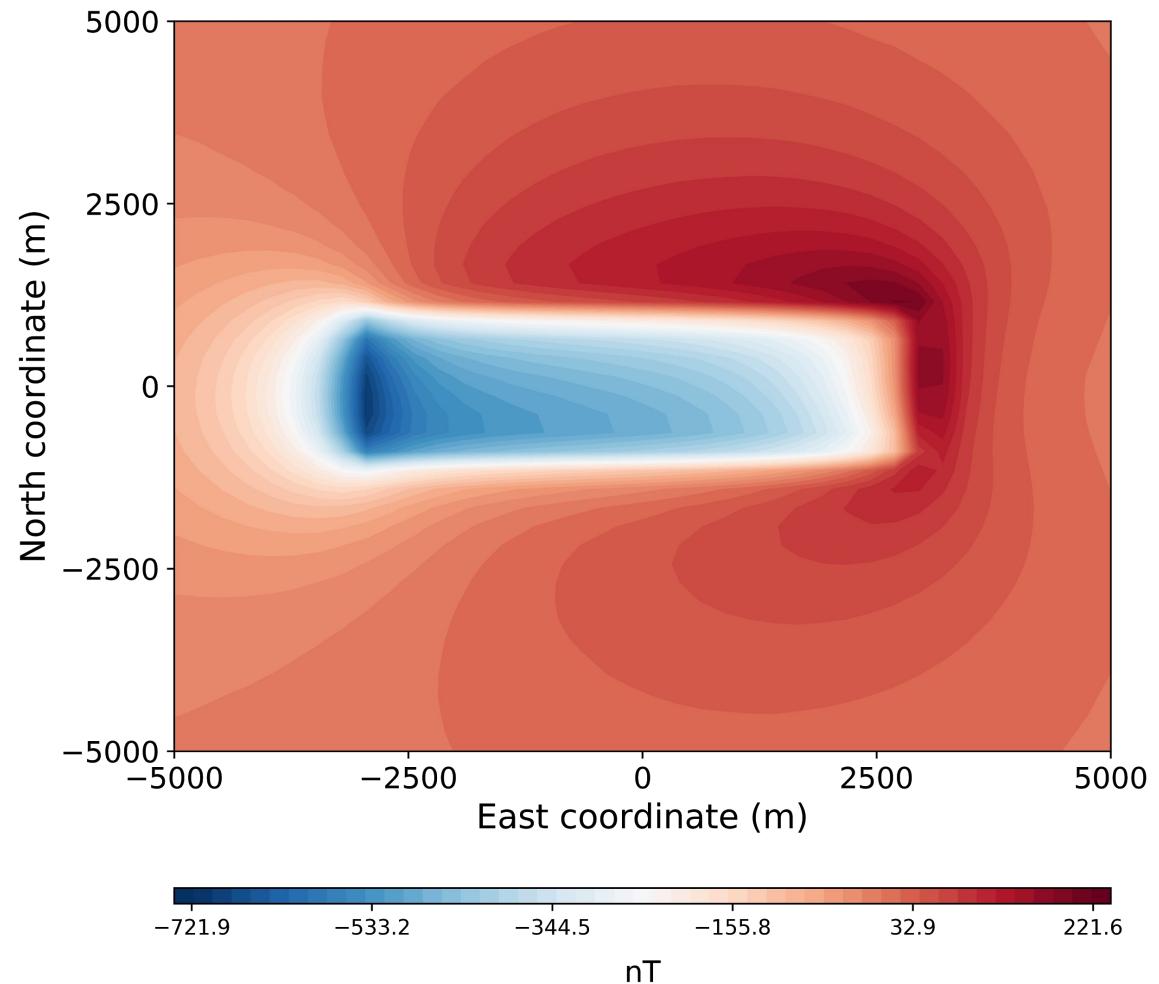
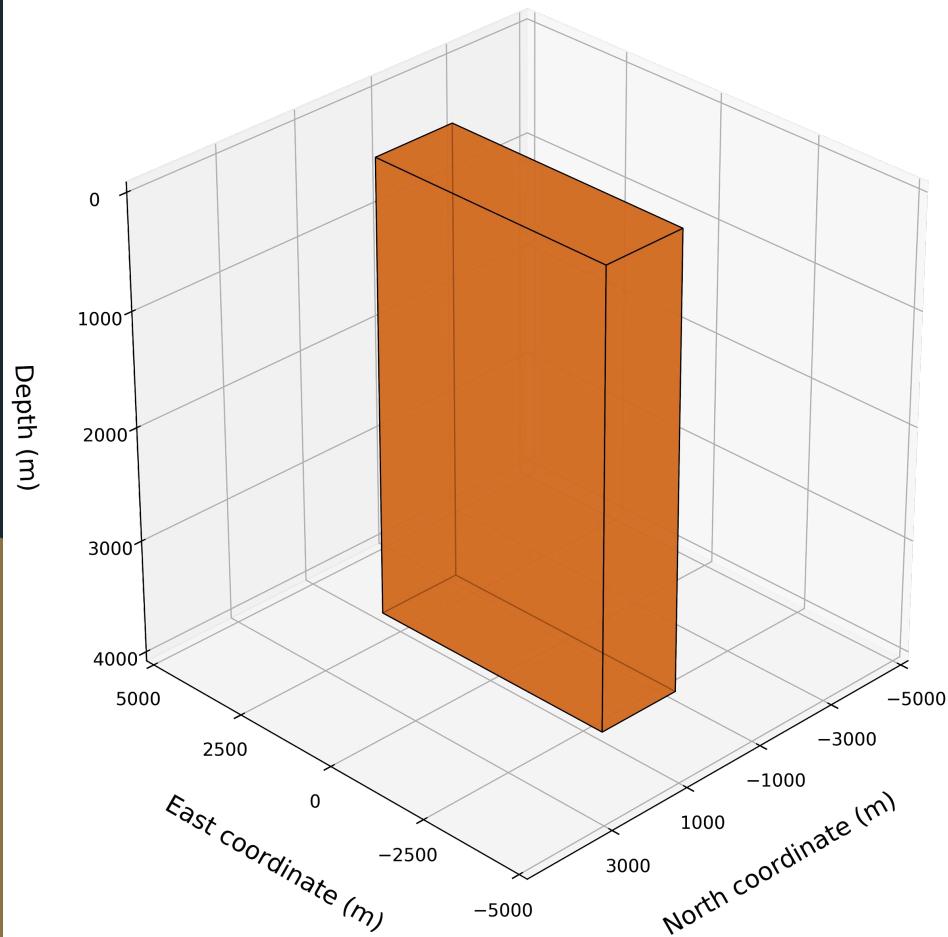
# Cross-correlation - Methodology

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

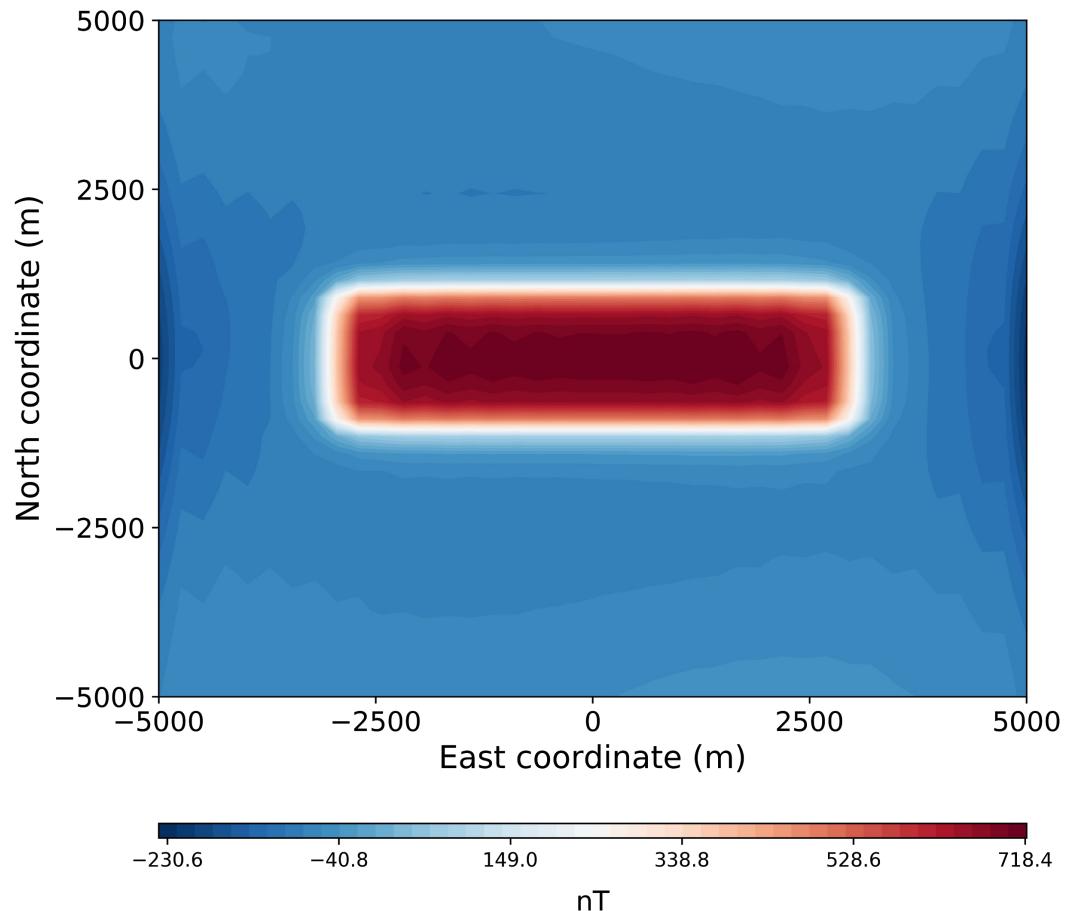
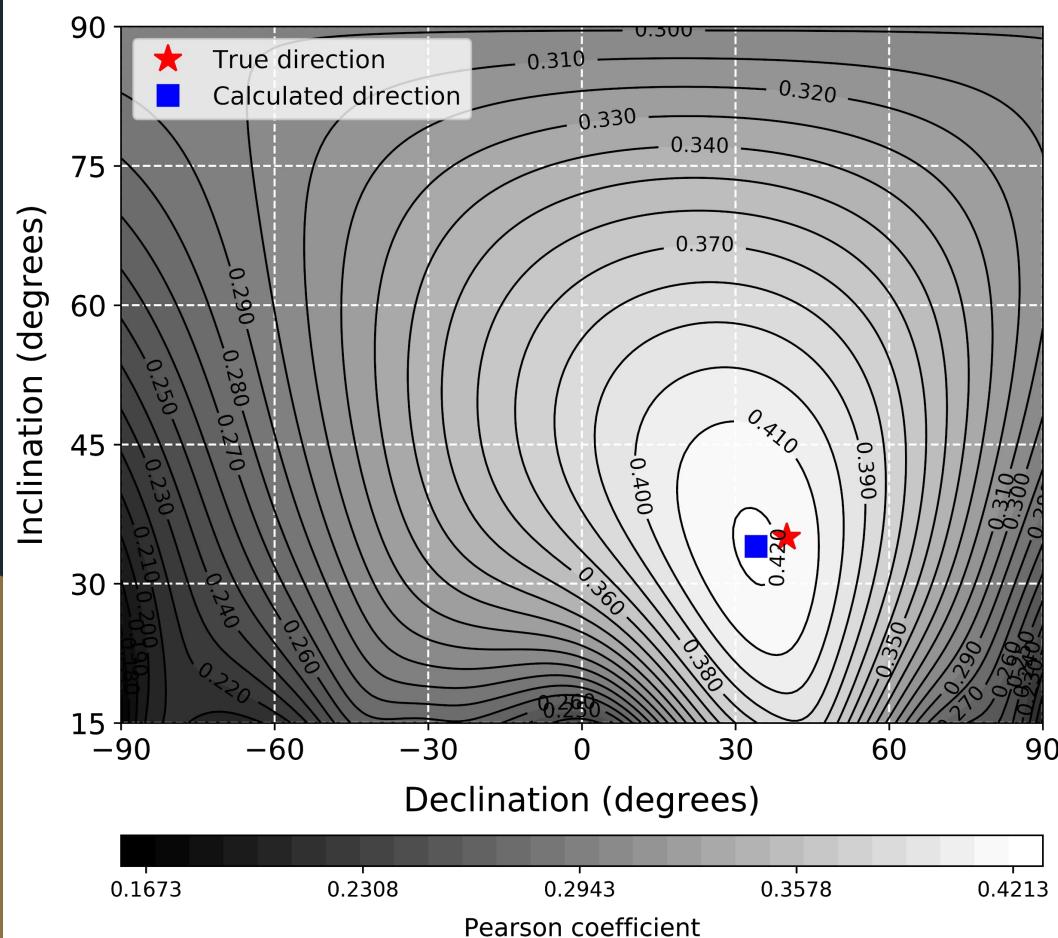
# Cross-correlation - Methodology



# Synthetic dike model



# Synthetic dike model



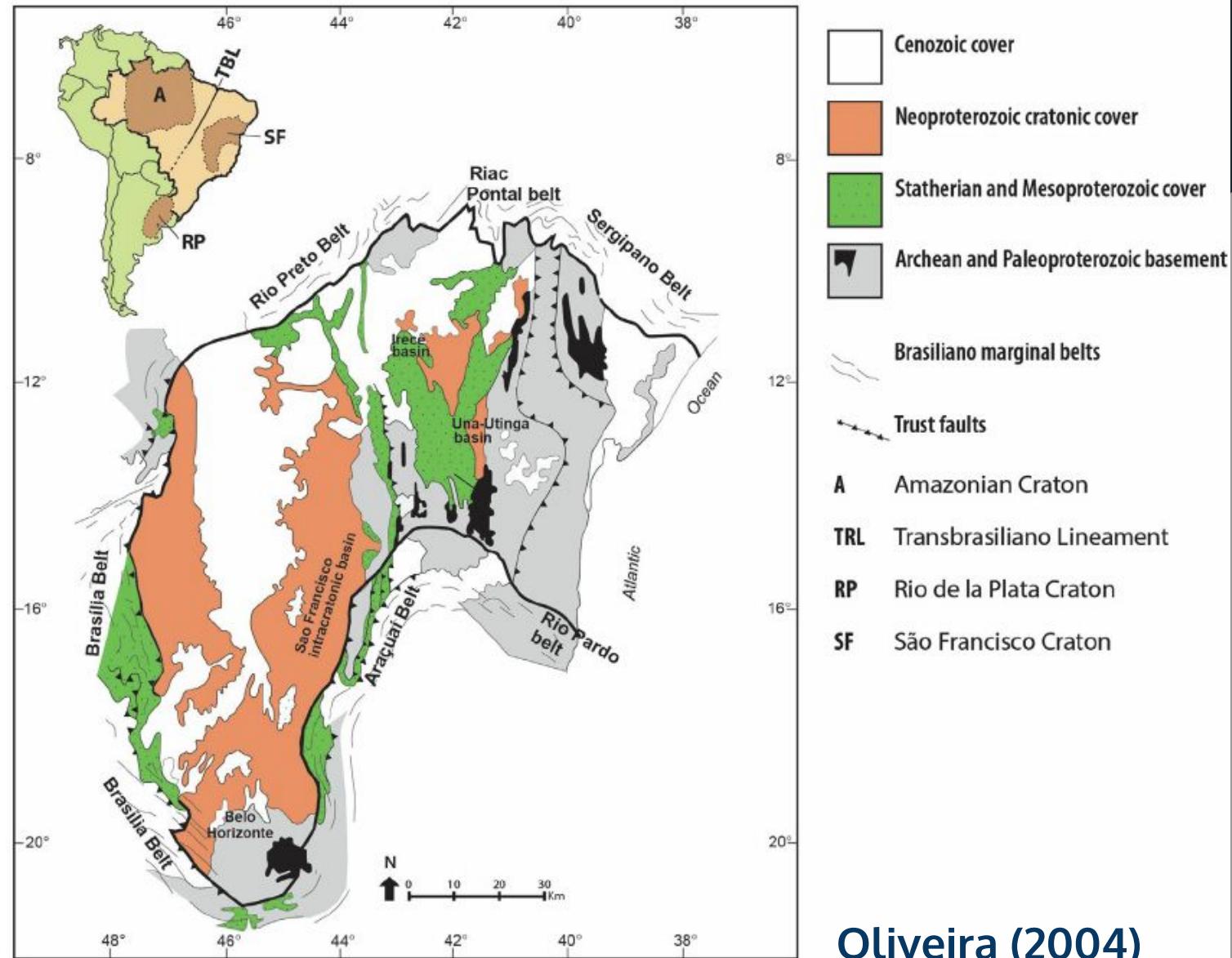
# Serra do Cabral: location, geological settings and results

# Serra do Cabral - Location



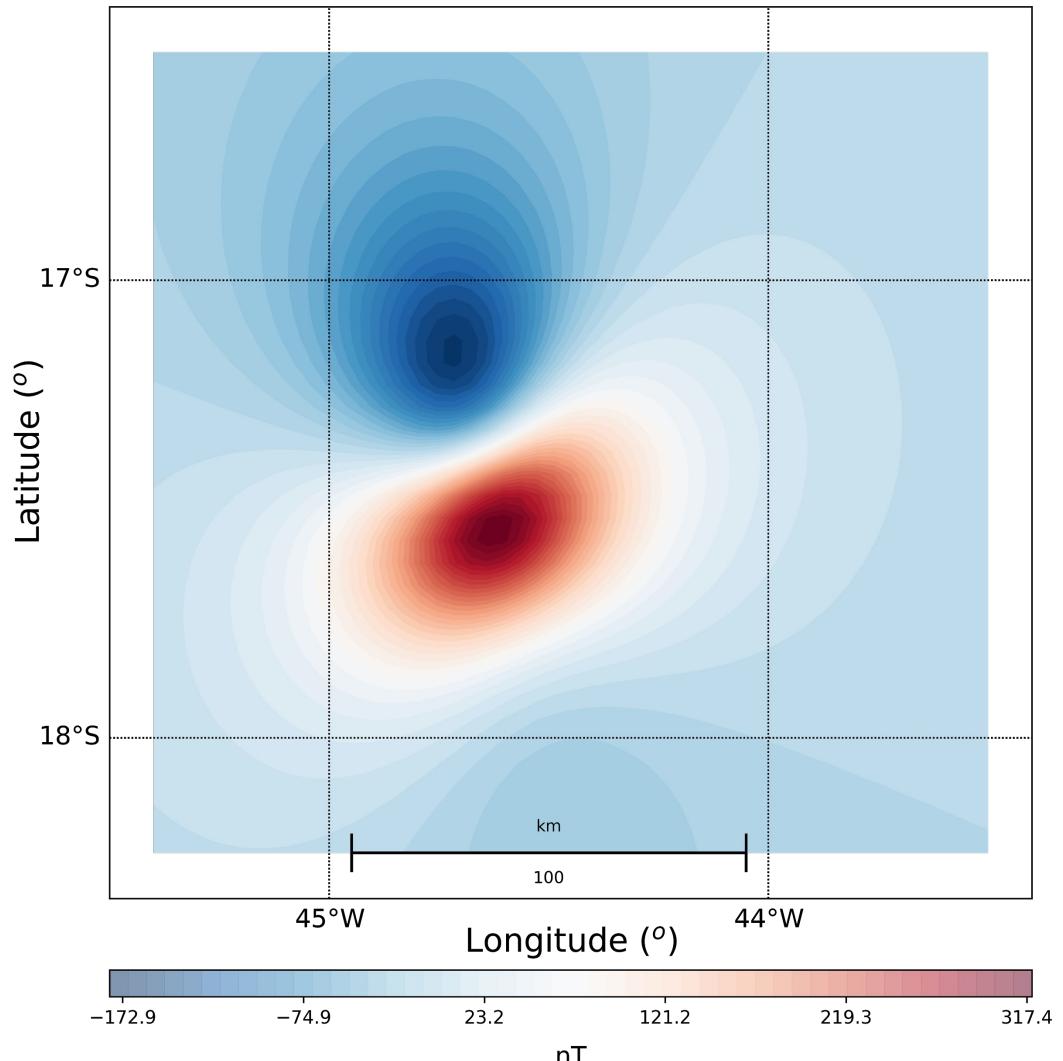
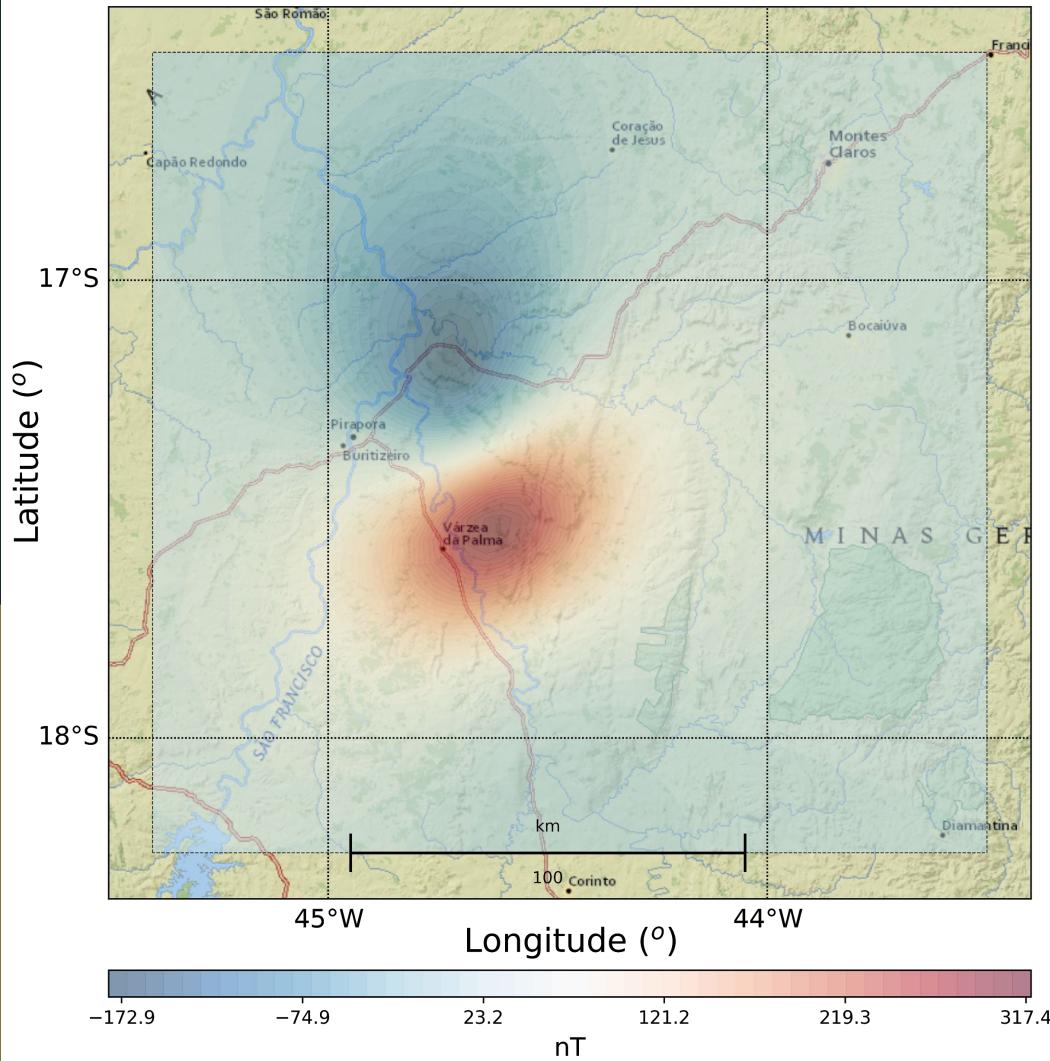
# Serra do Cabral - Geology

- ★ 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

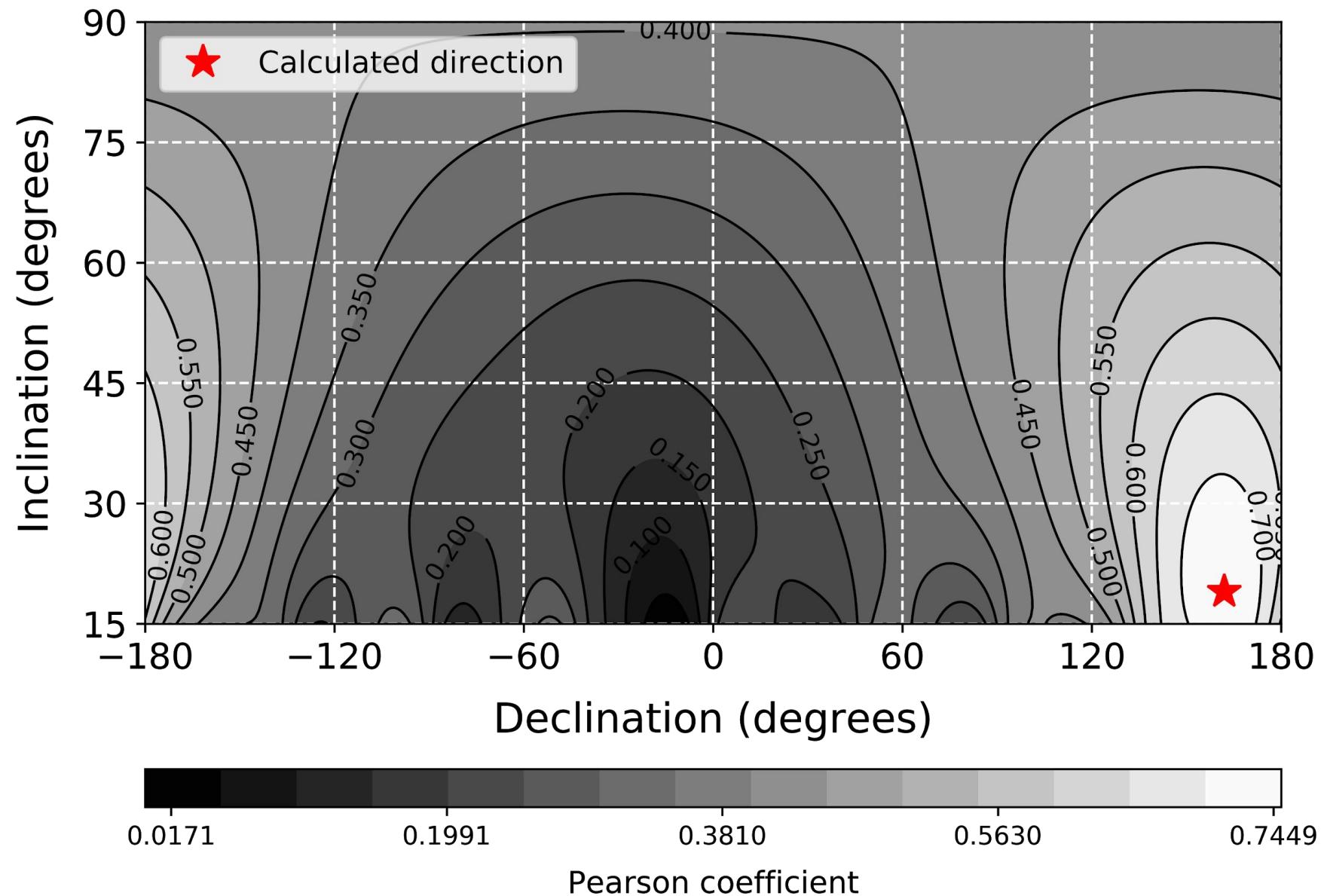


Oliveira (2004)

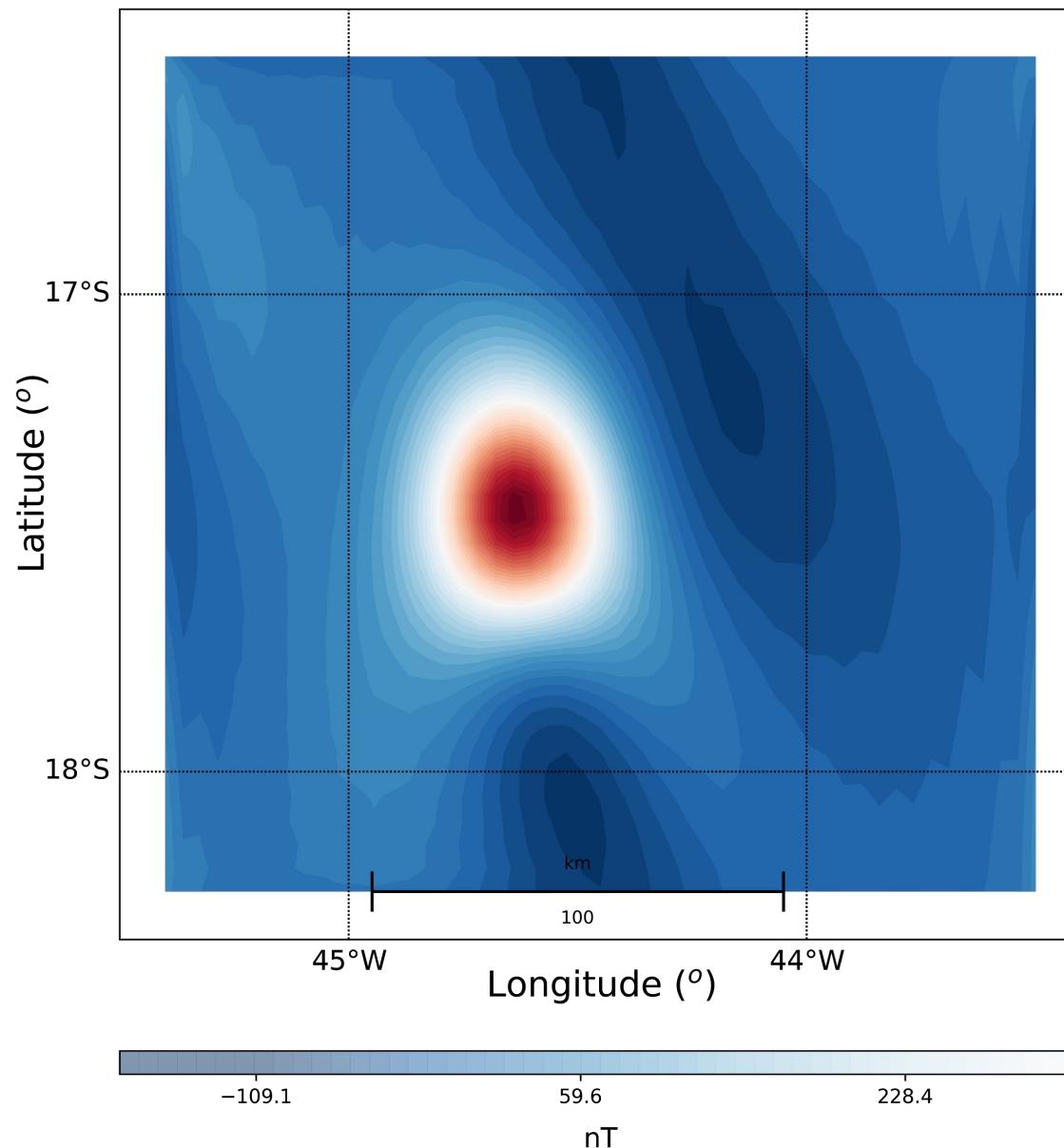
# Serra do Cabral - Anomaly



# 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)

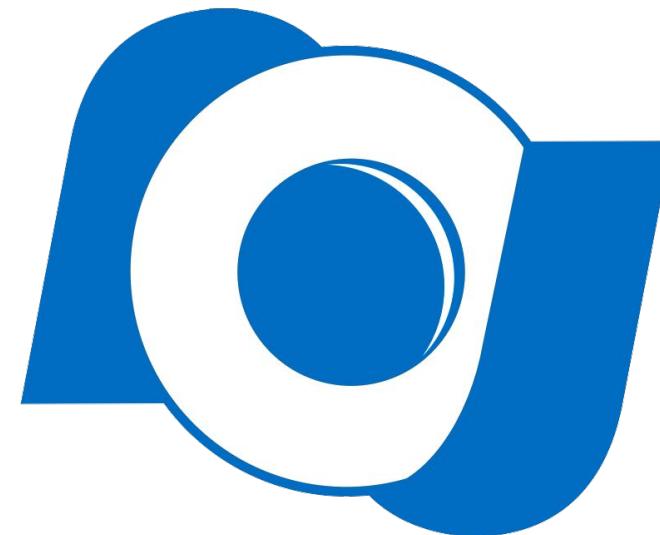
- Ussami, 1981  
( $I = 17.5^\circ, D = 17^\circ$ )
- Ponte-Neto, 2008  
( $I = 20.5^\circ, D = 45.2^\circ$ )

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



GitHub

# Acknowledgements



*Conselho Nacional de Desenvolvimento  
Científico e Tecnológico*