

# Interpretação 3

derivadas

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# Filtro de derivadas direcionais

- As derivadas: delimitar os limites de corpos e estruturas causadoras das principais anomalias.
- As anomalias de curto comprimento e maior gradiente são realçadas, e estas têm origem próxima da superfície.
- Derivadas horizontais de qualquer ordem podem ser escritas como:

$$F \left[ \frac{d^n \phi}{dx^n} \right] = (ik_x)^n F(\phi)$$

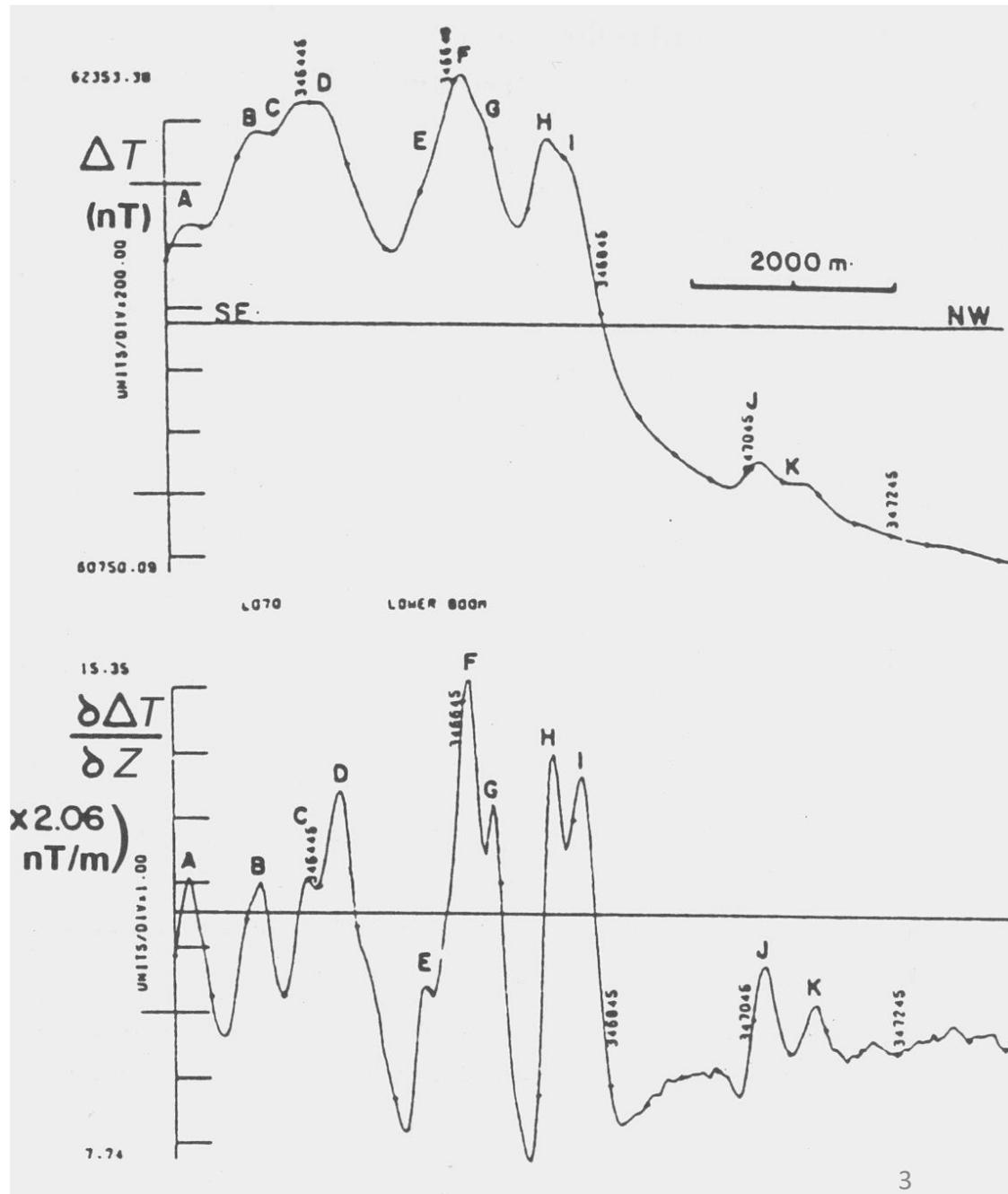
$$F \left[ \frac{d^n \phi}{dy^n} \right] = (ik_y)^n F(\phi)$$

segunda derivada vertical

$$F \left[ \frac{\partial^2 \phi}{\partial z^2} \right] = k_x^2 F(\phi) + k_y^2 F(\phi) = |k|^2 F(\phi)$$

# Derivada direcional

- Primeira derivada vertical: resalta bem o centro da distribuição de massa ou de susceptibilidade quando aplicada após a redução ao polo
- Primeira derivada vertical também resalta anomalias próximas à superfície



# Derivadas direcionais

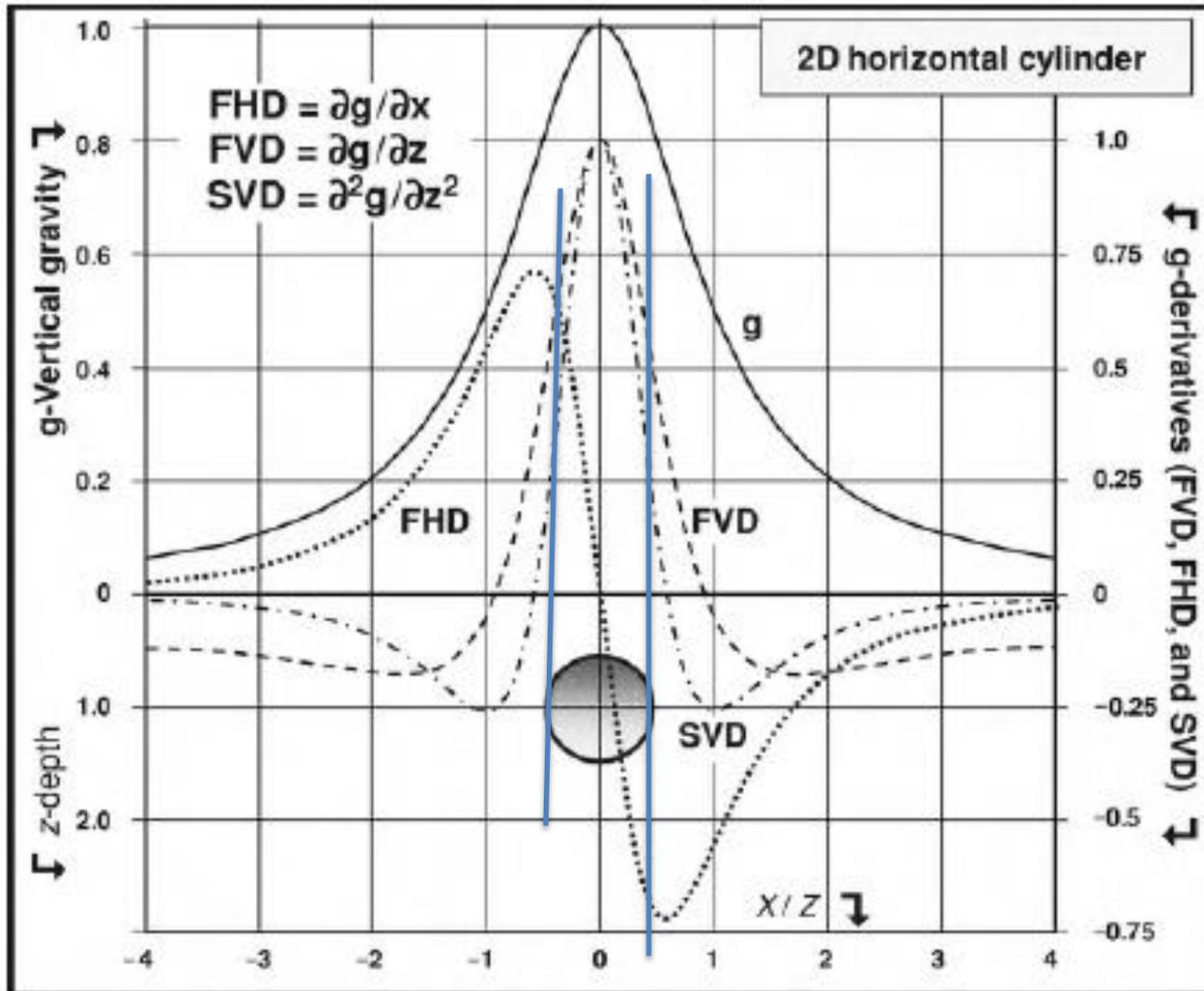


FIGURE 6.31 Illustrations of the vertical gravity ( $g$ ), first vertical derivative (FVD, dashed curve), the first horizontal derivative (FHD, dotted curve), and second vertical derivative (SVD, dot-dashed curve) gravity anomaly profiles over an infinitely long 2D horizontal cylinder striking perpendicular to the profile using normalized vertical and horizontal scales.

# Derivadas direcionais

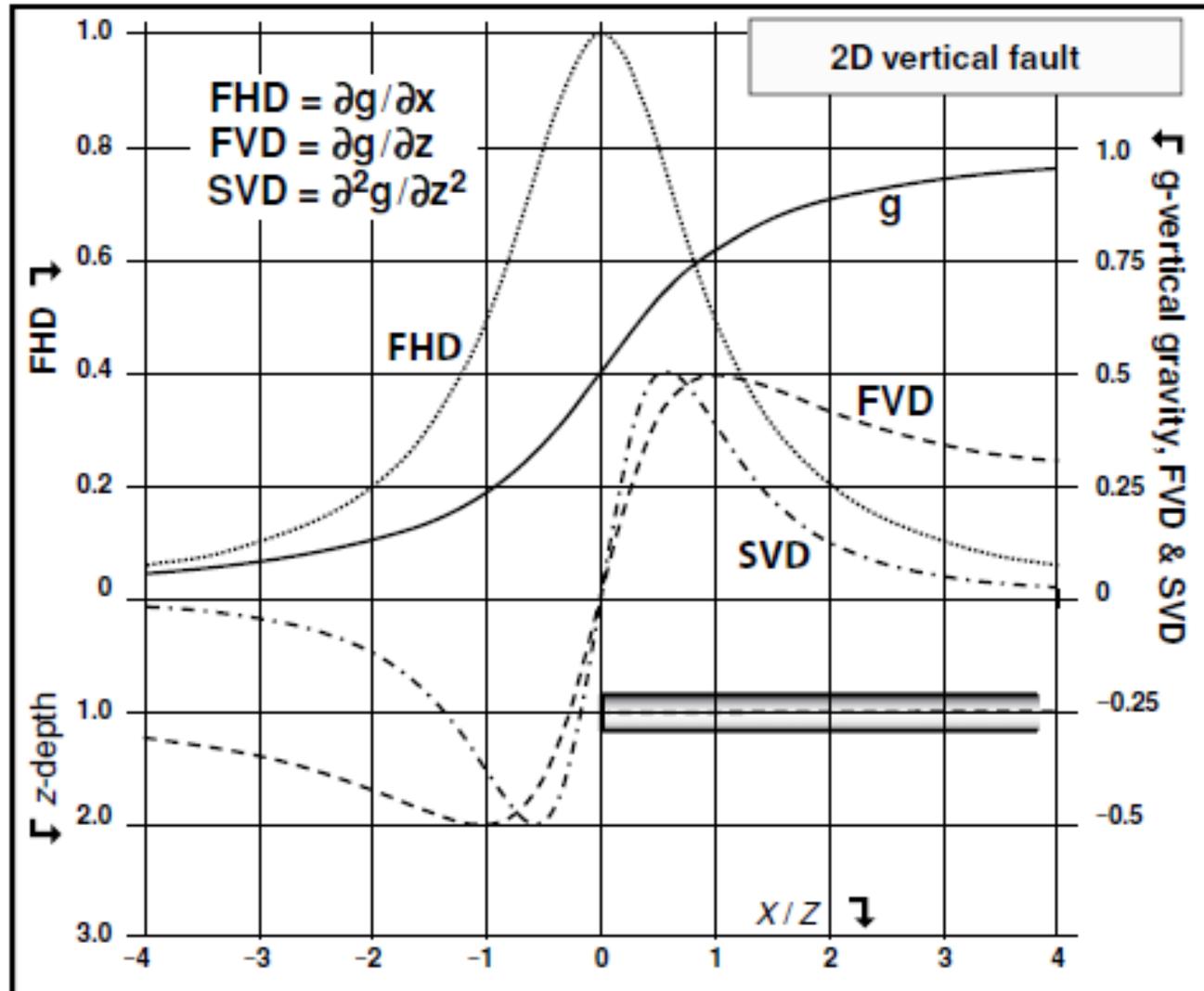
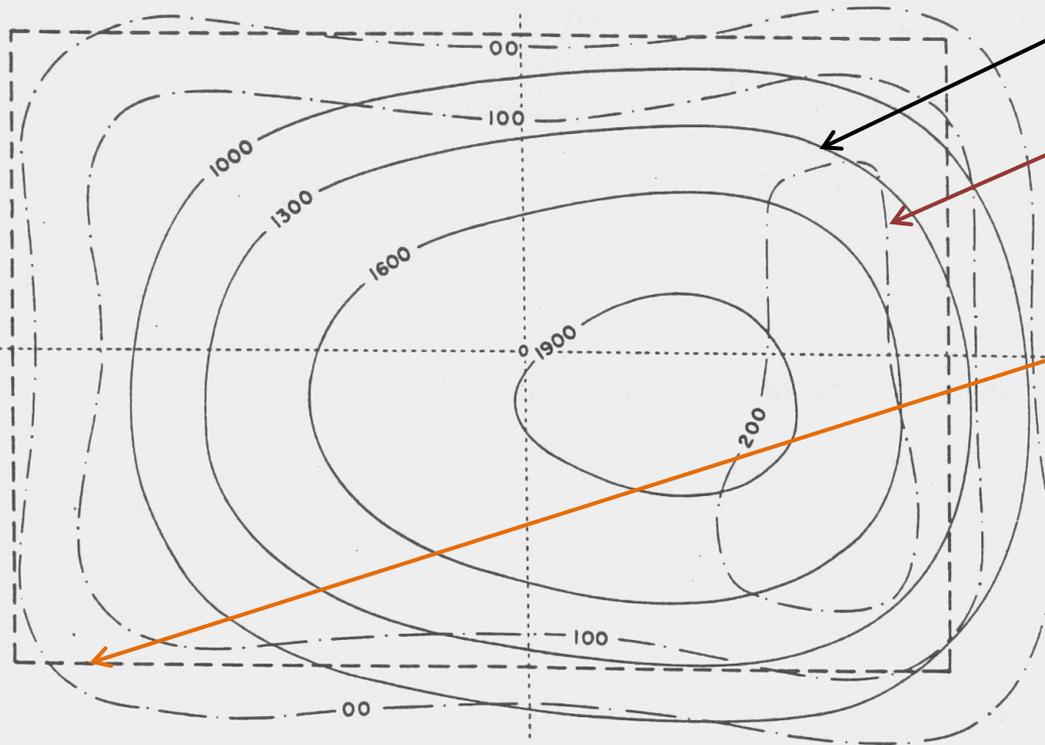


FIGURE 6.32 Illustrations of the vertical gravity ( $g$ ), first vertical derivative (FVG), the first horizontal derivative (FHD), and second vertical derivative (SVD) gravity anomaly profiles over an infinitely long vertical contact between geological units of differing densities which also represents the edge of a broad anomaly source. Line styles as in Figure 6.31.

# Derivada direcional

- segunda derivada vertical: resalta os limites do corpo quando aplicada à mapas.
- segunda derivada vertical boa resolução para prismas verticais



Anomalia de campo total (linha contínua, em nT),

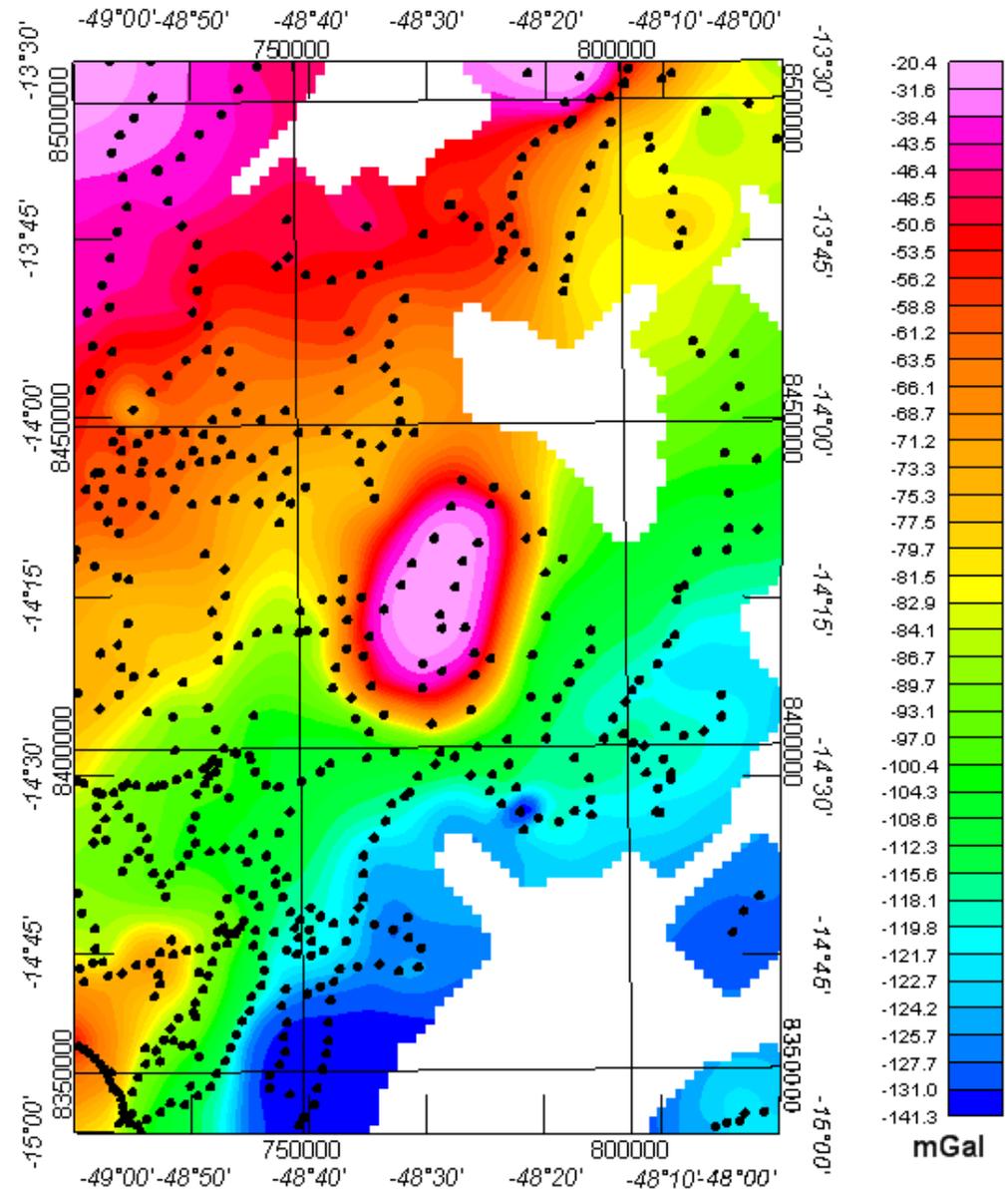
Segunda derivada do campo vertical (linha pontilhada e tracejada em  $\text{nT/m}^2$ ), de um prisma vertical (contorno do prisma é marcado pela linha tracejada, em m).

O campo indutor apresenta  $I=75^\circ$  e  $D = 0^\circ$ .

O contorno de  $0 \text{ nT/m}^2$  da segunda derivada vertical praticamente coincide com o limite do prisma

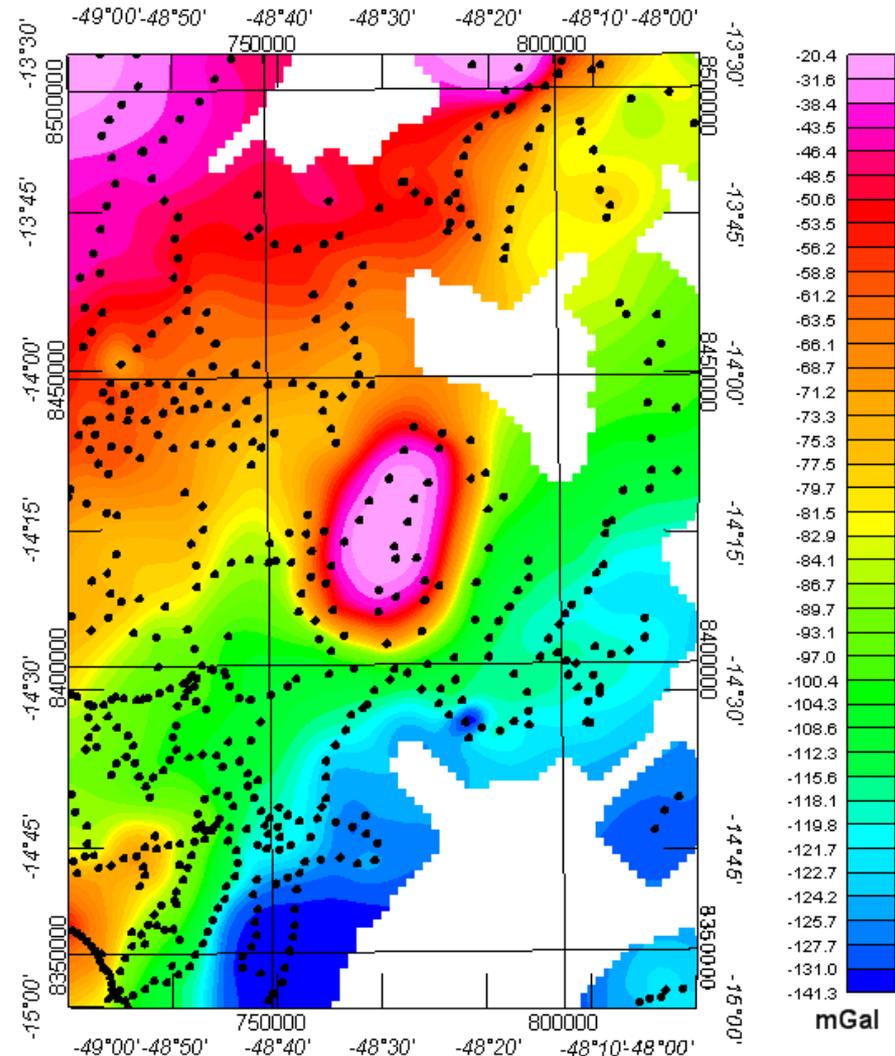
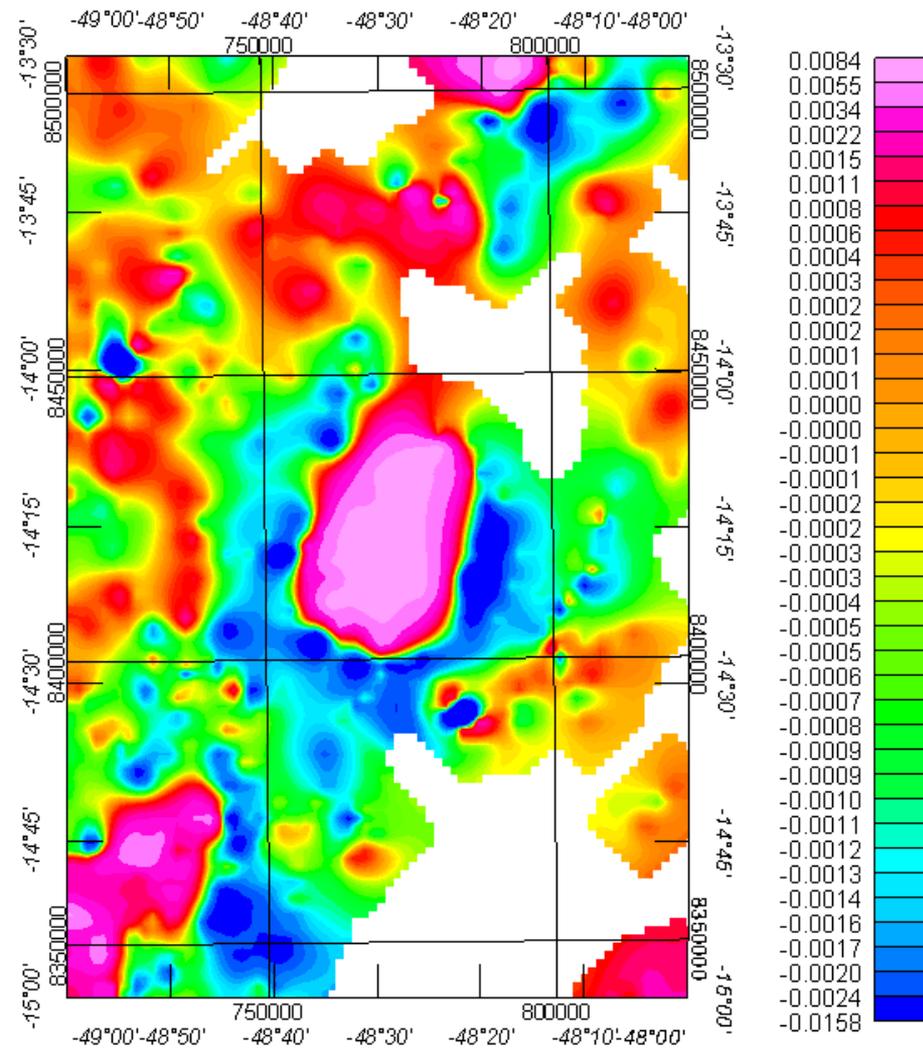
# Derivadas direcionais

Mapa de anomalia Bouguer de Niquelândia com a distribuição das estações gravimétricas.



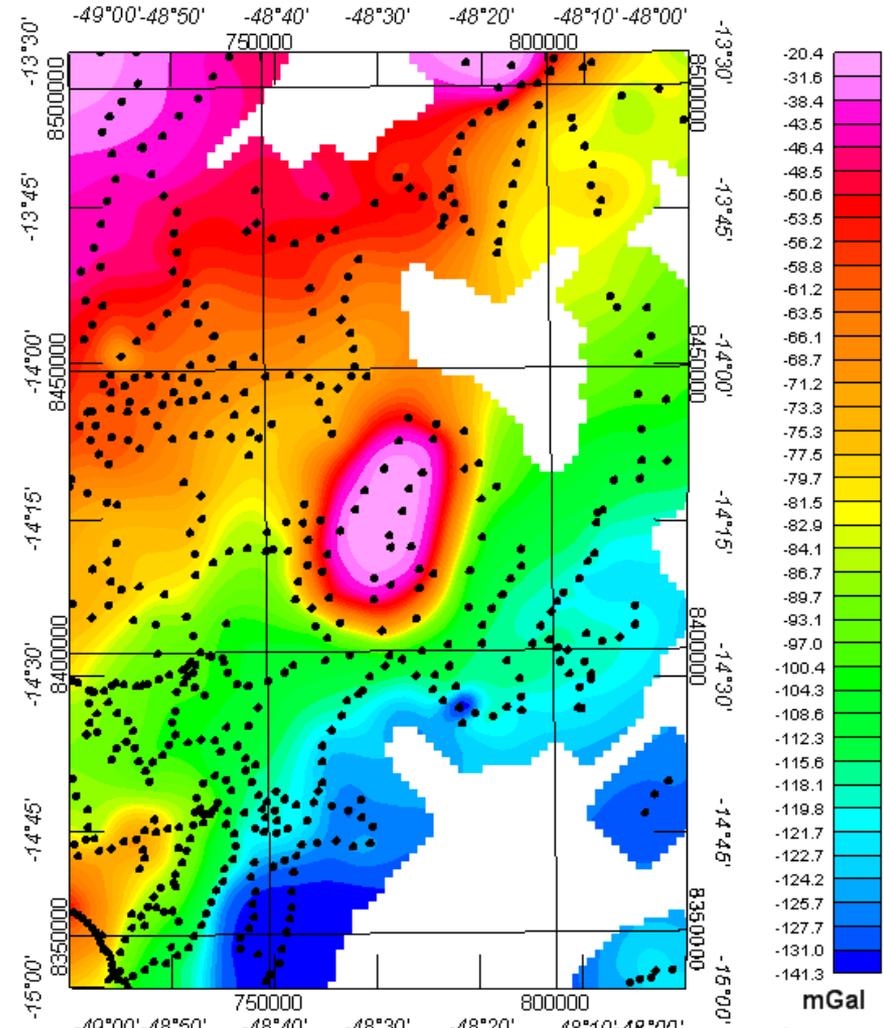
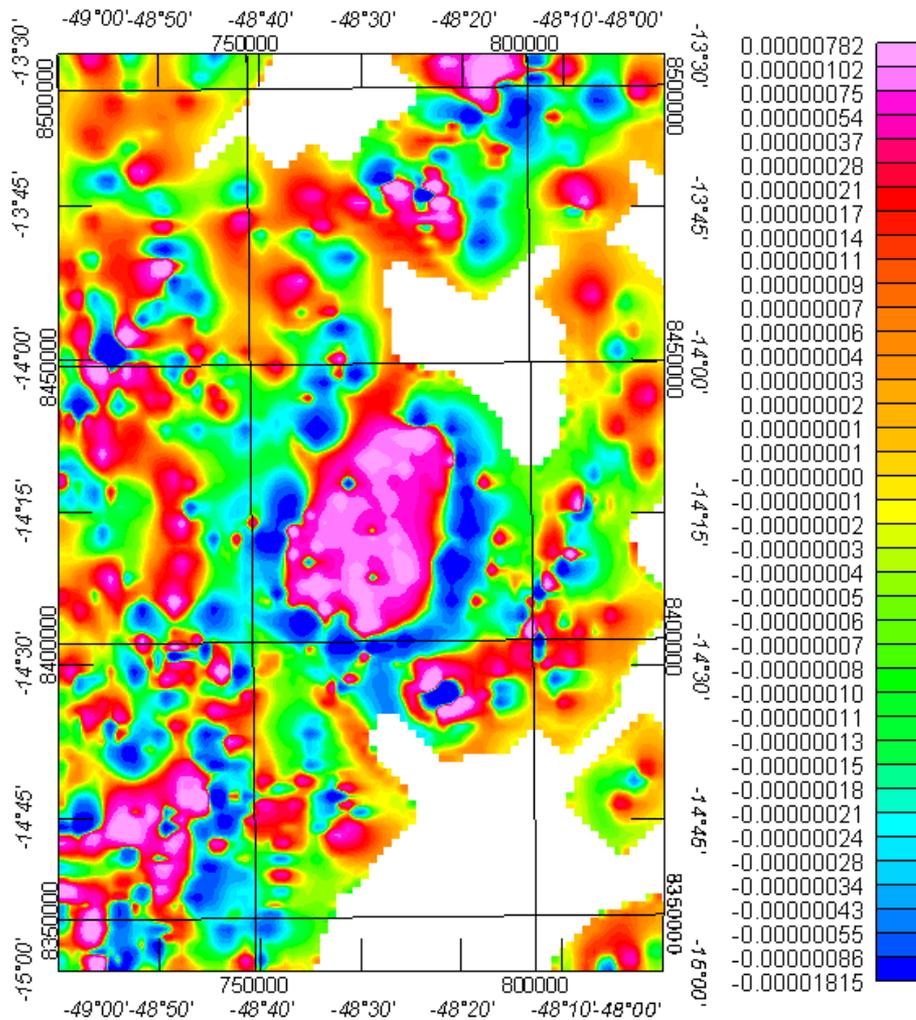
# Derivadas verticais

dg/dz (esquerda) – mGal/m

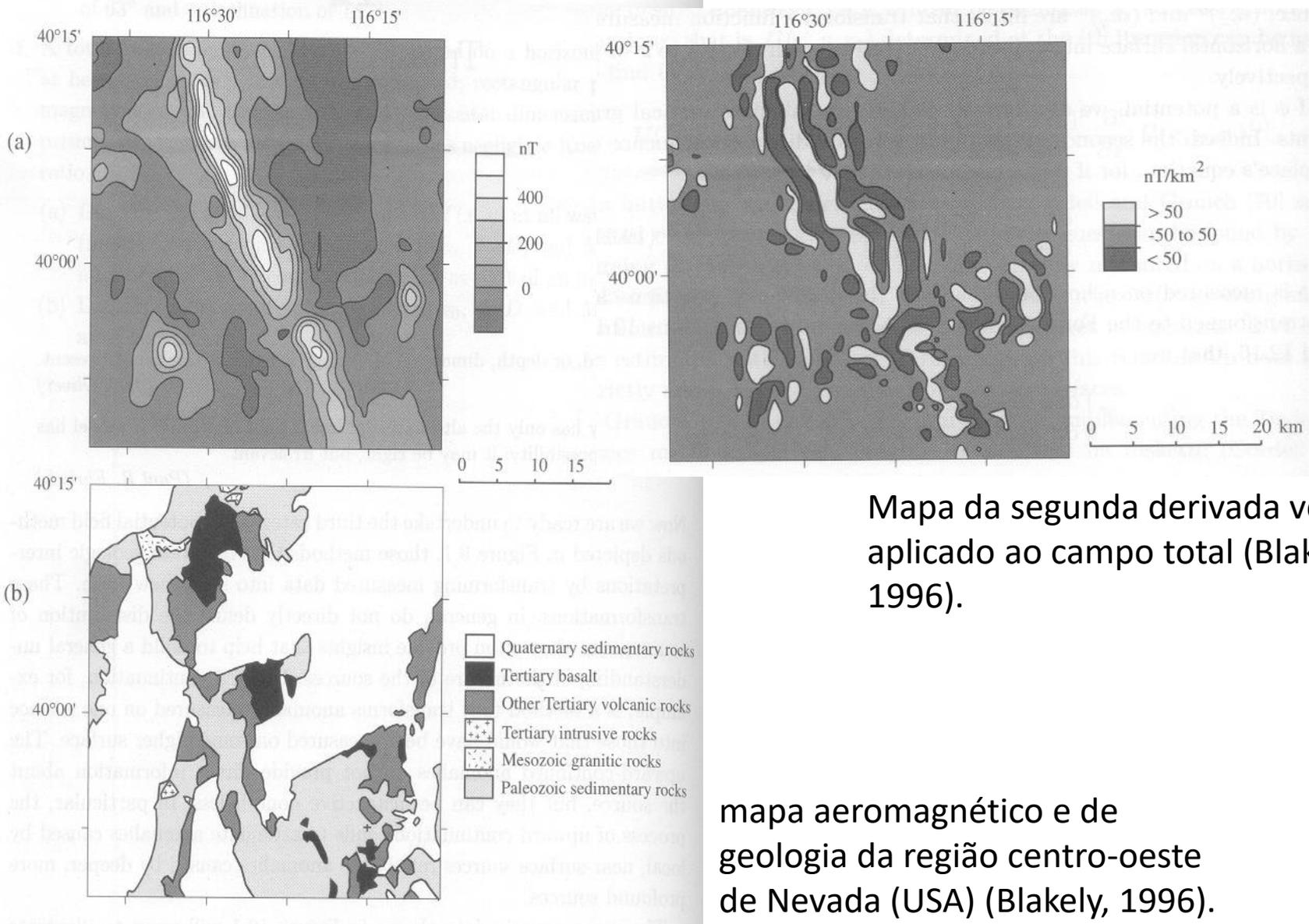


# Derivadas verticais

$d^2g/dz^2$  (esquerda) – mGal/m<sup>2</sup>



# Derivada vertical

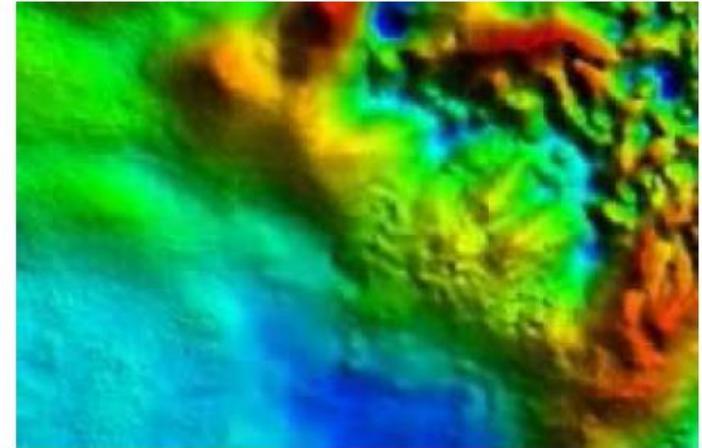
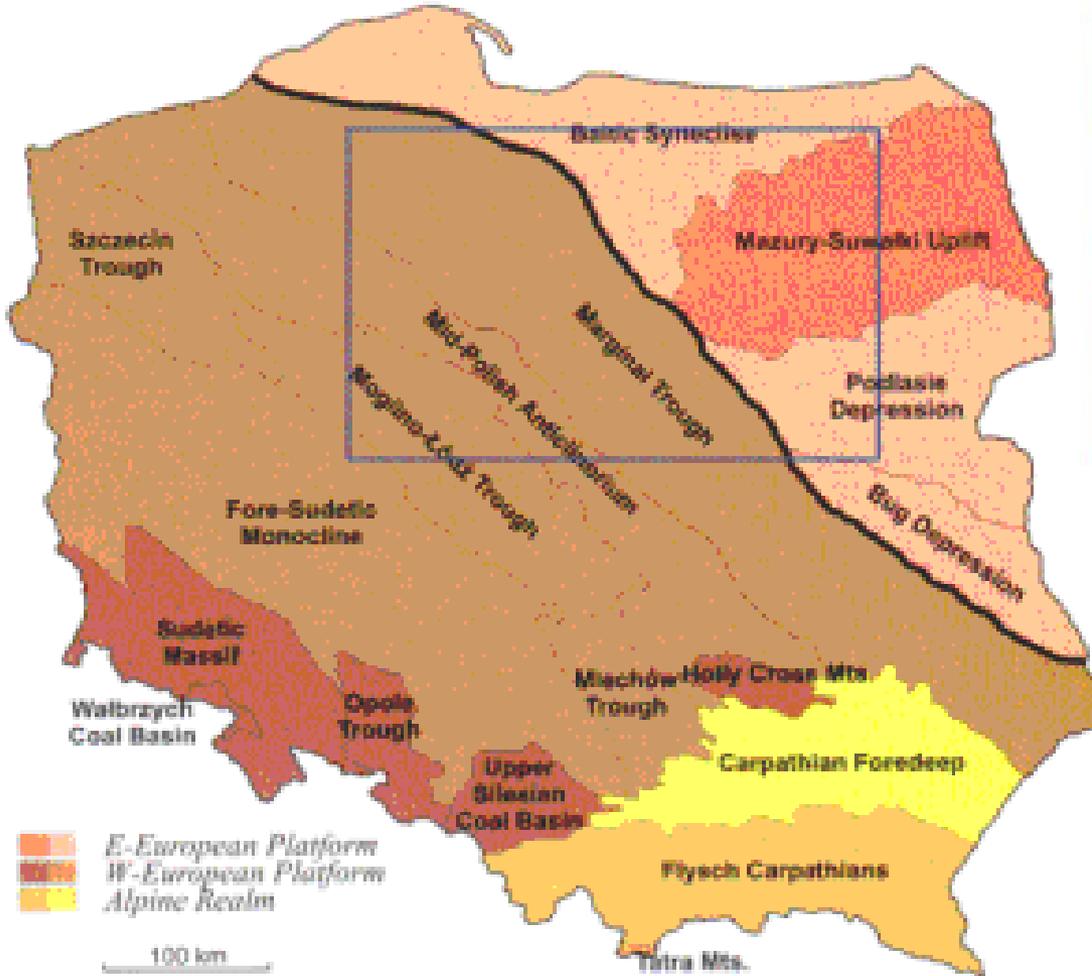


Mapa da segunda derivada vertical aplicado ao campo total (Blakely, 1996).

mapa aeromagnético e de geologia da região centro-oeste de Nevada (USA) (Blakely, 1996).

# examples

## Poland Main Structural Units

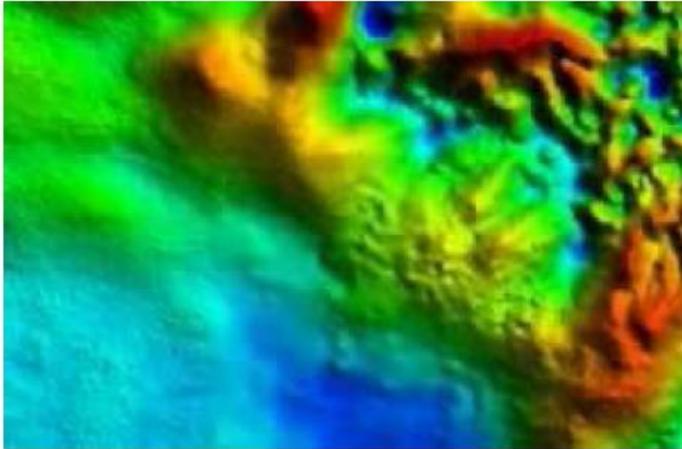


(c)

a) Mapa geológico da Polônia ,  
mostrando a divisão entre o  
embasamento cristalino mais raso da  
plataforma do leste europeu a NE e as  
coberturas sedimentares espessas, de  
idade Paleozoica e Mesozoica no SW. C)  
Anomalia magnética de campo total  
sobre a porção central da Polônia, de  
Geophysical Exploration Ltd  
([www.getech.com](http://www.getech.com)).

Primeira derivada vertical

$$F \left( \frac{\partial \phi}{\partial z} \right) = k_x F(\phi) + k_y F(\phi)$$

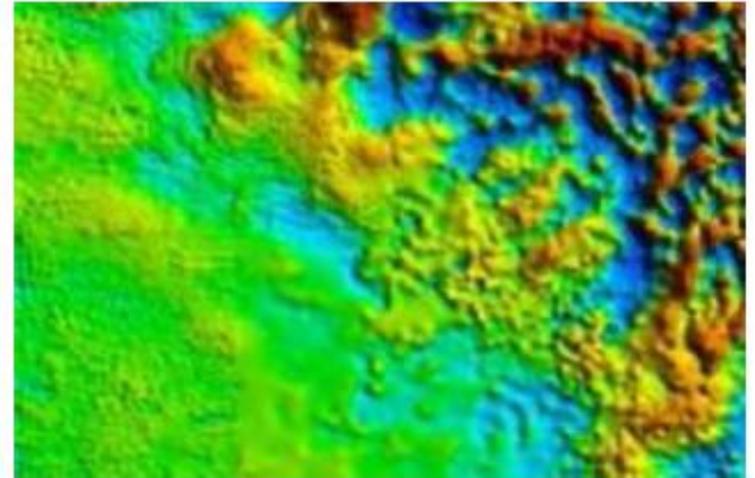


(c)

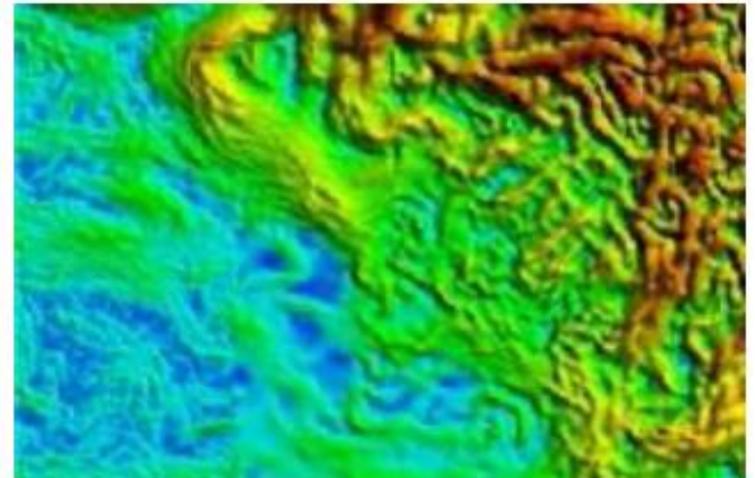
Primeira Derivada horizontal total

$$\frac{\partial f}{\partial h} = \sqrt{\left( \frac{\partial f}{\partial x} \right)^2 + \left( \frac{\partial f}{\partial y} \right)^2}$$

$$DHT = \sqrt{(ik_x F(\phi))^2 + (ik_y F(\phi))^2}$$



(b)



(d)