

DAFTAR PUSTAKA

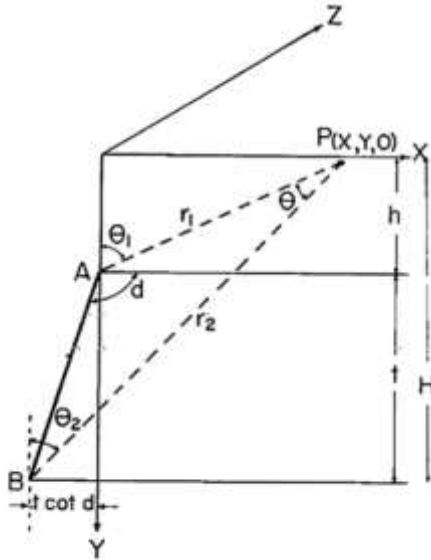
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LAMPIRAN

Lampiran 1: Turunan horizontal dan vertikal metode sinyal analitik

Profil anomaly magnetik diberikan oleh Nabighian (1972)



Gambar 1. Ilustrasi model penyebab anomaly magnetik 2D (Nabighian ,1972)

$$\Delta T = kFc 2 \sin d \left[\cos \phi \log \left(\frac{r_2}{r_1} \right) + \sin \phi (\theta_2 - \theta_1) \right]$$

Dimana: k = suseptibilitas

F = medan magnet bumi

$$r_1 = \sqrt{x^2 + h^2}$$

$$r_2 = \sqrt{(x + t \cot d)^2 + H^2}$$

$$\theta_1 = \arctan \frac{x}{h}$$

$$\theta_2 = \arctan \frac{(x+t \cot d)}{H}$$

Turunan horizontal anomali medan magnet yaitu:

Dengan asumsi $t \rightarrow \infty$, $\alpha = 2kTc \sin d$

$$\begin{aligned}\Delta T_x &= \frac{\partial \Delta T}{\partial x} \\ &= \alpha \frac{\partial (\cos \phi (\log((x+t \cot d)^2 + (h+t)^2) - \log(x^2 + h^2)) + \sin \phi (\arctan \frac{(x+t \cot d)}{(h+t)} - \arctan \frac{x}{h}))}{\partial x} \\ &= \alpha \frac{\partial (\cos \phi (-\log(x^2 + h^2)) + \sin \phi (-\arctan \frac{x}{h}))}{\partial x} \\ &= a \left(\cos \phi \frac{-x}{x^2 + h^2} + \sin \phi \frac{-h}{x^2 + h^2} \right)\end{aligned}$$

Selanjutnya dilakukan modifikasi terhadap ΔT_x

$$\begin{aligned}\Delta T_x &= a \left(\frac{-x \cos \phi - h \cos \phi}{x^2 + h^2} \right) \\ &= a \left[\sqrt{h^2 + x^2} \left(\frac{-x \cos \phi - h \cos \phi}{x^2 + h^2 (\sqrt{h^2 + x^2})} \right) \right], \sin \theta_1 = \frac{x}{\sqrt{h^2 + x^2}} \text{ dan } \cos \theta_1 = \frac{h}{\sqrt{h^2 + x^2}} \\ &= a \sqrt{h^2 + x^2} \left(\frac{-\sin \theta \cos \phi - \cos \theta \sin \phi}{x^2 + h^2} \right) \\ &= -a \frac{(\sin \theta \cos \phi + \cos \theta \sin \phi)}{\sqrt{h^2 + x^2}} \\ &= -a(\sin(\theta + \phi))/r\end{aligned}$$

Turunan vertikalnya yaitu: diberikan $t \rightarrow \infty$, $\alpha = 2kTc \sin d$, $h = (h - y)$

$$\Delta T_z = \frac{\partial \Delta T}{\partial y}$$

$$= a \frac{\partial(\cos \phi (-\log(x^2+(h-y)^2))+\sin \phi (-\arctan x/h-y))}{\partial y}$$

$$= a \left(\cos \phi \frac{h-y}{x^2+(h-y)^2} - \sin \phi \frac{x}{x^2+(h-y)^2} \right)$$

$$= a \left(\cos \phi \frac{h}{x^2+h^2} - \sin \phi \frac{x}{x^2+h^2} \right)$$

Melakukan modifikasi ΔT_z dengan cara yang sama dengan ΔT_x , sehingga diperoleh:

$$\Delta T_z = a(\cos \theta + \phi)/r$$

Lampiran 2. Penurunan rumus metode dekonvolusi euler

Penurunan rumus metode dekonvolusi euler didasari pada derajat homogenitas euler (N) yang di interpretasikan sebagai struktur indeks.). Misalkan f adalah fungsi dari tiga koordinat kartesis x, y dan z , dan ditulis sebagai $f(x,y,z)$. Fungsi $f(x,y,z)$ disebut homogen dengan derajat n jika memenuhi:

$$f(tx, ty, tz) = t^n f(x, y, z)$$

Misalkan $u = tx, v = ty, w = dz$ maka $\frac{\partial u}{\partial t} = x, \frac{\partial v}{\partial t} = y, \frac{\partial w}{\partial t} = z$

$f(u, v, w) = t^n f$, dengan melakukan operasi rantai diperoleh:

$$\frac{\partial f}{\partial u} \frac{\partial u}{\partial t} + \frac{\partial f}{\partial v} \frac{\partial v}{\partial t} + \frac{\partial f}{\partial w} \frac{\partial w}{\partial t} = \frac{\partial(t^n)}{\partial t} f$$

$$x \frac{\partial f}{\partial u} + y \frac{\partial f}{\partial v} + z \frac{\partial f}{\partial w} = nt^{n-1} f$$

$$x \frac{\partial f}{\partial tx} + y \frac{\partial f}{\partial ty} + z \frac{\partial f}{\partial tz} = nt^{n-1} f$$

Misalkan $t = 1$ diperoleh persamaan (2.20)

$$x \frac{\partial f}{\partial x} + y \frac{\partial f}{\partial y} + z \frac{\partial f}{\partial z} = nf$$

Efek sumber anomali terhadap distribusi medan magnet dapat ditulis sebagai berikut (Durrheim dan Cooper, 1998):

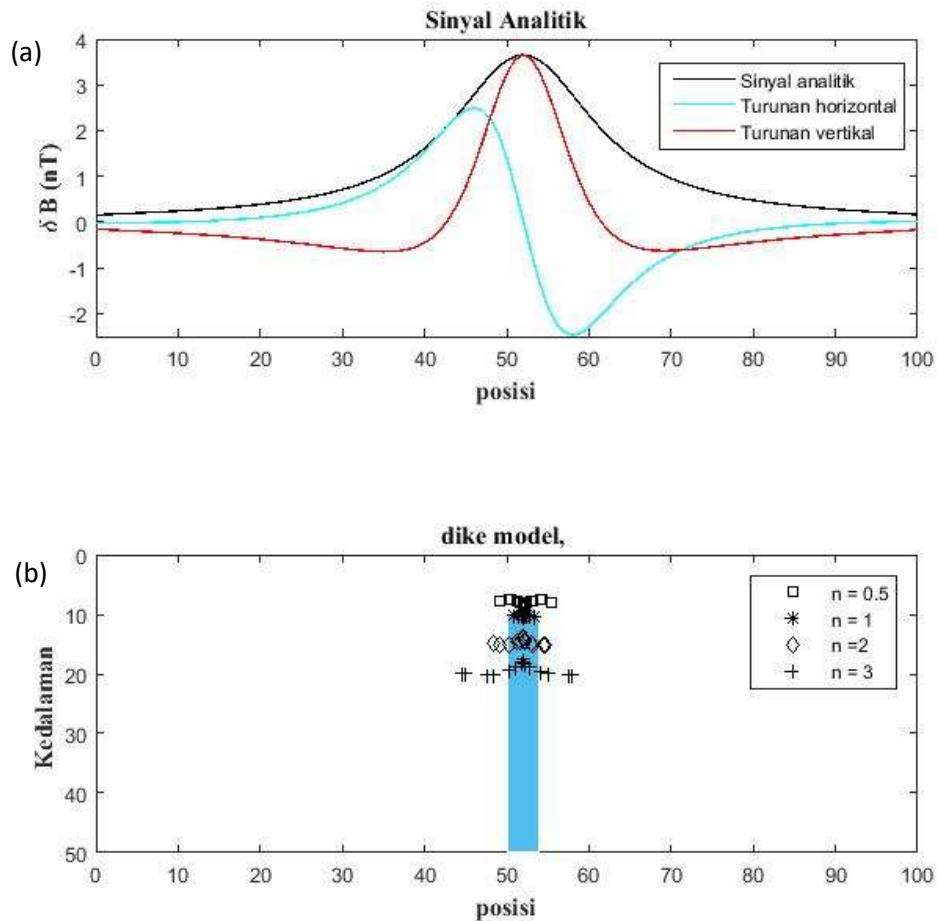
$f(x, y, z) = \frac{M}{r^N}$ dimana $r = \sqrt{x^2 + y^2 + z^2}$, untuk membuktikan $n = -N$ maka:

$$x \frac{\partial f}{\partial x} + y \frac{\partial f}{\partial y} + z \frac{\partial f}{\partial z} = \frac{M}{r^N}$$

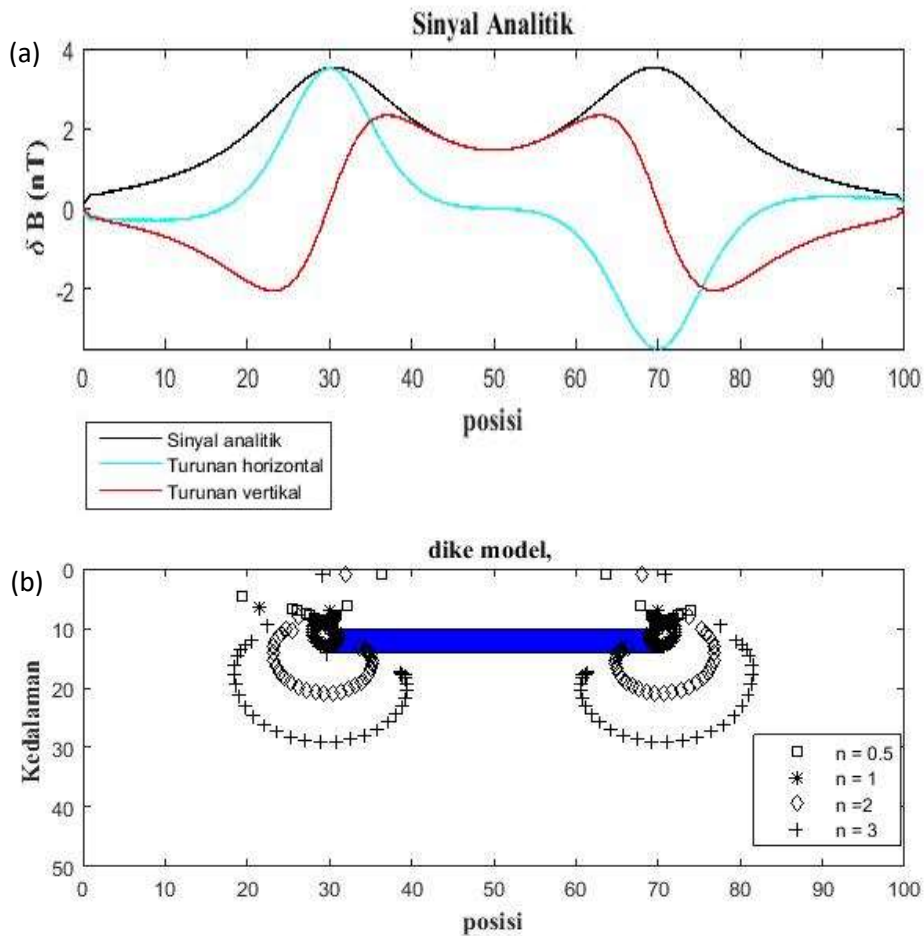
$$\begin{aligned}
&= x \frac{(-Nx)}{(x^2+y^2+z^2)^{\frac{N}{2}+1}} + y \frac{(-Ny)}{(x^2+y^2+z^2)^{\frac{N}{2}+1}} + z \frac{(-Nz)}{(x^2+y^2+z^2)^{\frac{N}{2}+1}} \\
&= \frac{-N(x^2+y^2+z^2)}{(x^2+y^2+z^2)^{\frac{N}{2}+1}} = \frac{-N}{(x^2+y^2+z^2)^{\frac{N}{2}}} = \frac{-N}{r^N} = -NM(x, y, z)
\end{aligned}$$

Terbukti bahwa $n = -N$

Lampiran 3. Aplikasi metode analitik sinyal dekonvolusi euler pada data sintetik

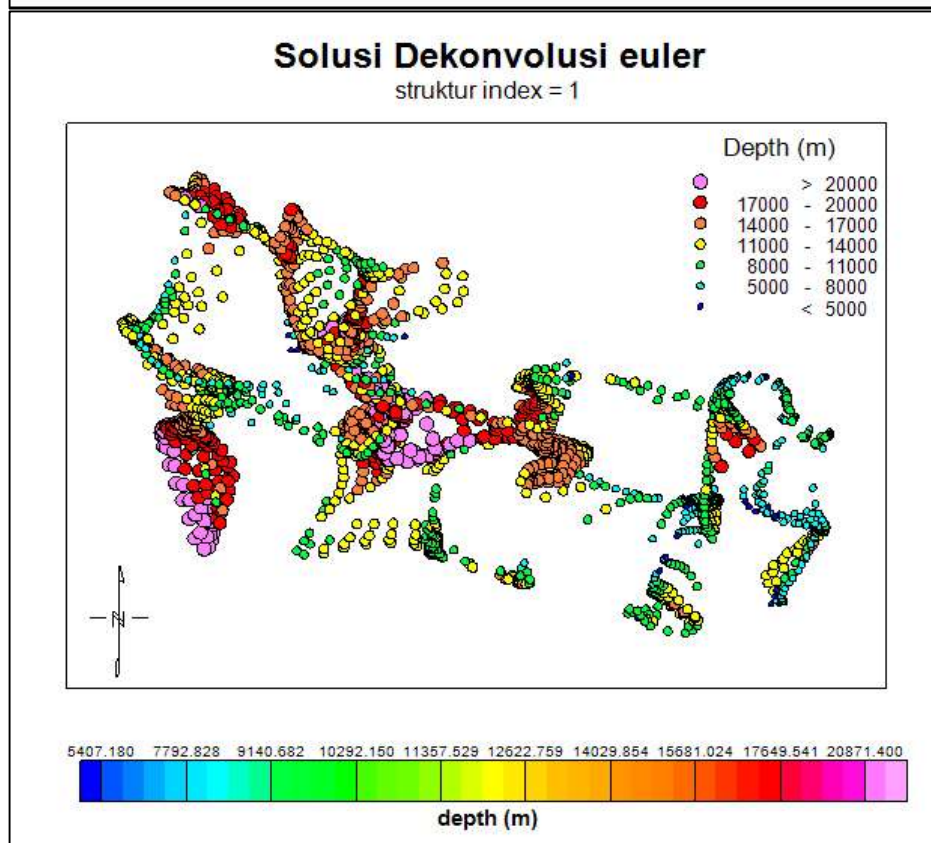
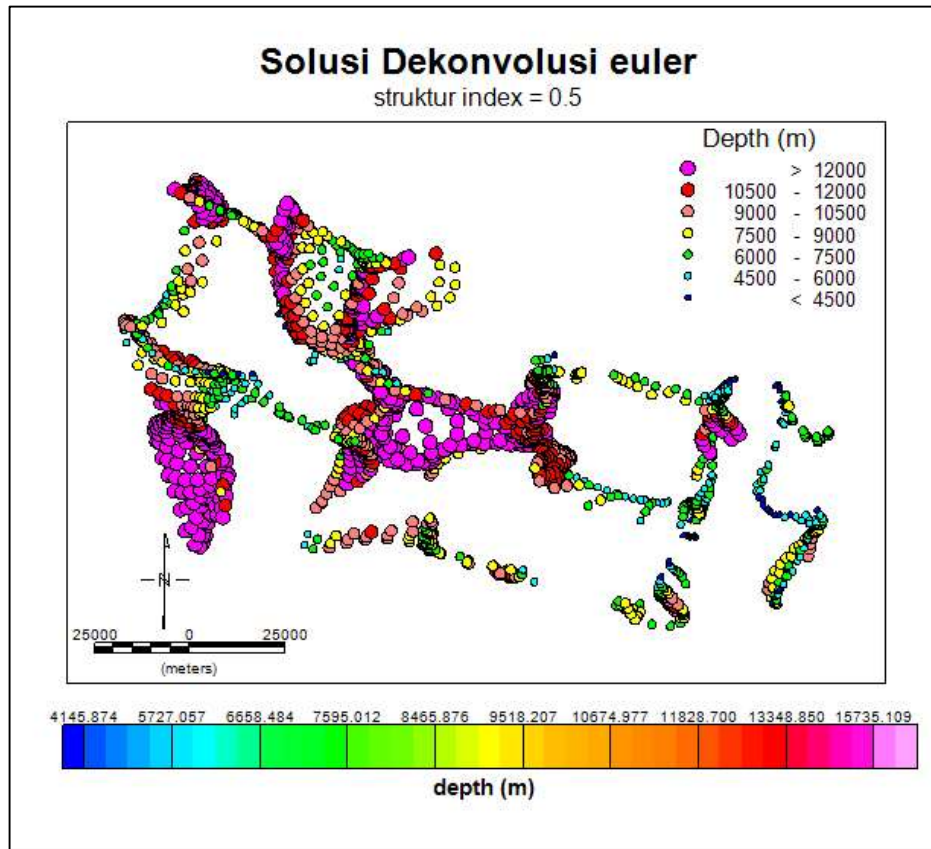


Gambar 2. Anomali magnetik yang disebabkan oleh anomaly sederhana berupa vertikal dike dengan posisi $x_0 = 50$ m; $z_0 = 10$ m; ketebalan = 40 m; lebar = 4 m..
(a) Amplitudo kurva sinyal analitik yang bersesuaian dengan posisi tubuh anomaly magnetik yang dibangun oleh kombinasi turunan horizontal dan turunan vertikal.
(b) Hasil dekonvolusi euler berupa solusi posisi dan kedalaman dengan struktur indeks yang berbeda.



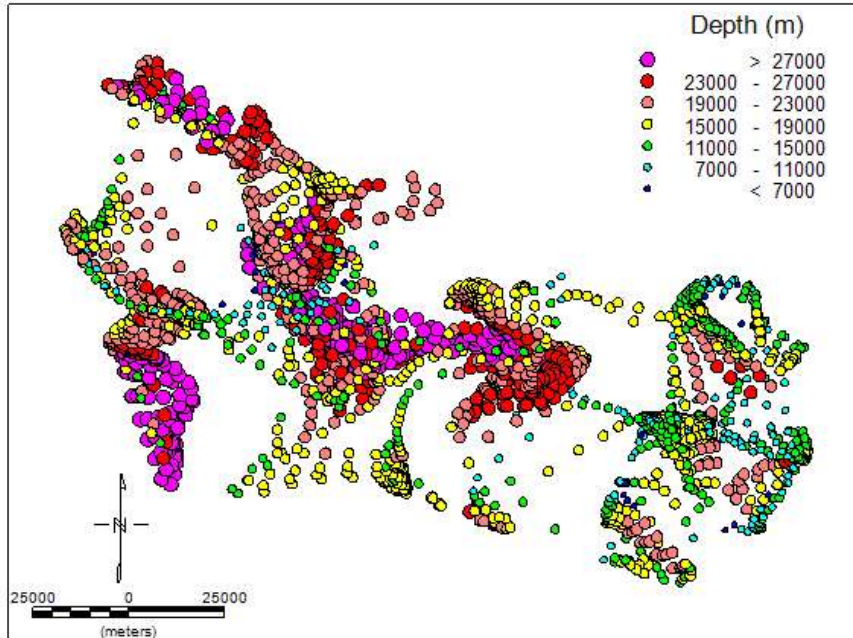
Gambar 3. anomali magnetik yang disebabkan oleh anomaly model sederhana berupa Horizontal dike dengan posisi $x_0 = 30 - 70$ m; $z_0 = 10$ m; ketebalan = 4 m; lebar = 40 m. (a) kurva sinyal analitik yang dibangun oleh turunan horizontal dan turunan vertikal menunjukkan amplitudo sinyal analitik bersesuaian pada tepi tubuh anomali. (b) Hasil dekonvolusi euler berupa solusi posisi dan kedalaman dengan struktur indeks yang berbeda.

Lampiran 4. Solusi kedalaman metode dekonvolusi euler dengan indeks struktur berbeda di Laut Seram



Solusi Dekonvolusi euler

struktur index = 2



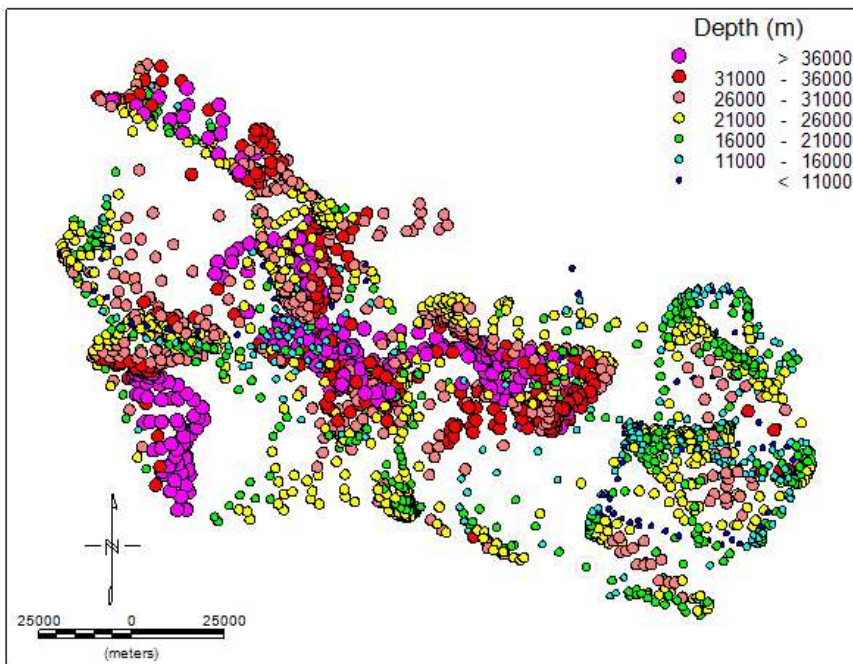
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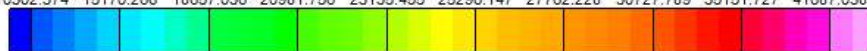
depth (m)

Solusi Dekonvolusi euler

struktur index = 3



10302.374 15170.266 18657.036 20981.756 23135.455 25296.147 27762.228 30727.789 35151.727 41687.038



depth (m)