

DAFTAR PUSTAKA

- Aguira, S. (2019). *Identifikasi Zona Subduksi Sulawesi Utara Untuk Mengetahui Genesa Pembentukan Gunung Colo Menggunakan Metode Tomografi Waktu Tempuh Double-Difference*. Yogyakarta: Universitas Gadjah Mada.
- Apandi & Bachri. (1997). *Peta Geologi Lembar Kotamobagu, Sulawesi*. Bandung: Pusat Penelitian dan Pengembangan Geologi.
- Bachri, S. (2006). *Stratigrafi Lajur Volkano-Plutonik Daerah*. *JSDG*, 94 - 106.
- Bachri, S., Sukido, & Ratman, N. (1993). *Peta Geologi Lembar Tilamuta, Sulawesi*, skala 1:250.000. Bandung: Pusat Penelitian dan Pengembangan Geologi.
- Baxter. (2000). *Earthquake Basics*. Newark: Delaware Geological Survey.
- BBC UK. (2022). *Convection currents and plate movement*. Retrieved from BBC UK: <https://www.bbc.co.uk/bitesize/guides/zss8rwx/revision/3>
- Borrero, F., Hess, F., Hsu, J., Kunze, G., Leslie, S., Letro, S., . . . Snow, T. (2008). *Geology, the Environment, and the Universe*. McGraw Hill.
- Britannica. (2012). *Investigating Plate Tectonics, Earthquakes, and Volcanoes*. New York: Britannica Educational Publishing.
- Carlile, J., Digdowirogo, S., & Darius, K. (1990). *Geological setting, characteristics and regional exploration for gold in the volcanic arcs of North Sulawesi, Indonesia*. *Journal of Geochemical Exploration*, 105 - 140.
- Effendi & Bawono. (1997). *Peta Geologi Lembar Manado, Sulawesi Utara*. Bandung: Pusat Penelitian dan Pengembangan Geologi.
- Feynman, R., Leighton, R., Sands, M., & Hafner, E. (1965). *The Feynman Lectures on Physics* (Vol. I). AAPT.
- Frisch, W., Meschede, M., & Blakey, R. (2011). *Plate Tectonics : Continental Drift and Mountain Building*. New York: Springer.
- Gadallah, M., & Fisher, R. (2009). *Exploration Geophysics*. Berlin: Springer.
- Grandis, H. (2009). *Pengantar Pemodelan Inversi Geofisika*. Jakarta: HAGI.
- Hall, R. (2012). *Late Jurassic–Cenozoic Reconstructions of the Indonesian Region and The Indian Ocean*. *Tectonophysics*, 1 - 41.
- Hall, R., & Spakman, W. (2015). *Mantle Structure and Tectonic History of SE Asia*. *Tectonophysics*, 1 - 32.
- Hall, R., & Wilson, M. (2000). Neogene Sutures in Eastern Indonesia. *Journal of Asian Earth Sciences*, 781 - 808.

- Hamblen, W., & Christiansen, E. (2004). *Earth's Dynamic Systems* (10th ed.). New Jersey: Prentice Hall.
- Hamilton, W. (1979). *Tectonics of the Indonesian Region*. U.S. Govt. Print. Off.
- Hurukawa, N. (2008). *Practical Analyses of Local Earthquakes*. Tsukuba, Japan: International Institute of Seismology and Earthquake Engineering (IISEE).
- Jaffe, L. A., Hilton, D. R., Fischer, T. P., & Hartono, U. (2004). *Tracing Magma Sources In An Arc-Arc Collisionzone: Helium And Carbon Isotope And Relative Abundance Systematics Of The Sangihe Arc, Indonesia*. *Geochemistry, Geophysics, Geosystems*.
- Jones, I. (2010). *Tutorial: Velocity Estimation Via Ray-Based Tomography*. EAGE first break, 45 - 52.
- Kavalieris, I., & van Leeuwen, T. M. (1992). *Geological Setting And Styles Of Mineralisation, North Arm Of Sulawesi*. *Journal of Southeast Asian Earth Sciences*, 113 - 129.
- Kennett. (1997). *AK135 Travel Time Tables*. Retrieved from Model AK135-F: <http://rses.anu.edu.au/seismology/ak135/ak135f.html>
- Kertapati, E. (2006). *Aktivitas Gempabumi di Indonesia*. Bandung: Pusat Survey Geologi.
- Koperberg, R. (1928). *Bouwstoffen Voor de Geologie Van de Residentie Menado and Atlas* (1st Ged ed.). Minjwezen in Ned: Indie.
- Leeuwen, V. (1994). *25 Years of Mineral Exploration and Discovery in Indonesia*. *Journal of Geochemical Exploration*, 13 - 90.
- Novotny, O. (1999). *Seismic Surface Waves*. Salvador: Instituto de Geociencias.
- Nugraha. (2017). *Tomografi Seismik*. Bandung: ITB Press.
- Nugraha, A. D., & Mori, J. (2006). *Three-dimensional velocity structure in the Bungo Channel and Shikoku Area, Japan, and its Relationship to Low-Frequency Earthquakes*. *Geophys. Res. Lett.*
- Palupi, I., Raharjo, W., & Alfiani, O. (2020). *Subduction modelling by Tomography inversion*. 4th-Padjadjaran International Physics Symposium (pp. 1 - 7). *Journal of Physics: Conference Series*.
- Palupi, I., Raharjo, W., & Yulianto, G. (2020). *Study Of Passive Seismic Tomography With Various Grid By Using Matlab*. *Journal of Physics: Conference Series*, 1 - 7.
- Ratman, N. (1976). *Peta Geologi Lembar Tolitoli*. Bandung: Direktorat Geologi.
- Satyana. (2006). *Docking and Post-docking Tectonic Escapes of Eastern Sulawesi: Collisional Convergence and Their Implications to Petroleum Habitat*. Jakarta International Geoscience Conference and Exhibition. Jakarta: BPMIGA.

- Satyana, Faulin, & Mulyati. (2011). *Tectonic Evolution Of Sulawesi Area: Implications For Proven And Prospective Petroleum Plays*. The 36th HAGI and 40th IAGI Annual Convention and Exhibition, (pp. 1 - 31). Makassar.
- Shearer, P. (2009). *Introduction to Seismology* (2nd ed.). New York: Cambridge University Press.
- Sheriff, R., & Geldart, L. (1995). *Exploration Seismology*. New York: Cambridge University Press.
- Siever, R., & Press, F. (1974). *Earth* (2nd ed.). San Francisco: Freeman & Company, W. H.
- Silver, E., McCaffrey, R., Joyodiwiryo, Y., & Stevens, S. (1983). *Ophiolite Emplacement And Collision Between The Sula Platform And The Sulawesi Island Arc, Indonesia*. J. Geophys. Res, 9419–9435.
- Simandjuntak, T. (1986). *Struktur Duplek (Dwi Unsur) Sesar Sungkup Sesar Jurus Mendatar di Lengan Timur Sulawesi*. PIT XV IAGI.
- Sompotan, A. (2012). *Struktur Geologi Sulawesi*. Bandung: Institut Teknologi Bandung.
- Song, T., Hao, T., Zhang, J., Cao, L., & Dong, M. (2022). *Numerical Modeling Of North Sulawesi Subduction Zone: Implications For the East–West Differential Evolution*. Tectonophysics, 1 - 11.
- Sukamto, R., & Simandjuntak, T. (1981). *Tectonic Relationship Between Geologic Aspect of Western Sulawesi, Eastern Sulawesi dan Banggai – Sula In The Light Of Sedimentological Aspects*. Bandung: GRDC.
- Sunarjo, Gunawan, M., & Priadi, S. (2012). *Gempabumi Edisi Populer*. Jakarta: BMKG.
- Surmont, J., Laj, C., Kissel, C., Rangin, C., Bellon, H., & Priadi, B. (1994). *New Paleomagnetic Constraints On The Cenozoic Tectonic Evolution Of The North Arm Of Sulawesi, Indonesia*. Elsevier, 629 - 638.
- Surono. (1995). *Sedimentology of the Tolitoli Conglomerate Member of the Langkowala Formation, Southeast Sulawesi, Indonesia*. Journal of Geology and Mineral Resources, 1 - 7.
- Tatsumi, Y., Murasaki, M., Arsadi, E., & Nohda, S. (1991). *Geochemistry Of Quaternary Lavas From NE Sulawesi: Transfer Of Subduction Components Into The Mantle Wedge*. Contrib. Mineral. Petrol, 137 - 149.
- Thurber, & D.E, P. (1999). *Local Earthquake Tomography With Flexible Gridding*. Computers & Geosciences , 809 - 818.
- Thurber, C. (1993). *Local Earthquake Tomography Velocities and Vp/Vs Theory, in Seismic Tomography: Theory and Practice*. Boca Raton: CRC Press.

- Trail dkk. (1974). *The general geological survey of Block II, Sulawesi Utara, Indonesia*. PT. Tropic Endeavor.
- USGS. (2021). *Search Earthquake Catalog*. Retrieved from USGS Earthquake Hazard Program: <https://earthquake.usgs.gov/earthquakes/search/>
- Widiyantoro. (2007). *Fisika dan Struktur Interior Bumi*. Jakarta: BMG.
- Widiyantoro, S., & Hilst, R. V. (1997). *Mantle Structure beneath Indonesia inferred from High-Resolution Tomographic Imaging*. *Gephys. J. Int*, 167 - 182.
- Zhang, J. J. (2019). *Rock physical and mechanical properties*. In J. J. Zhang, *Applied Petroleum Geomechanics* (pp. 29 - 83). Elsevier.
- Zhang, J., Hao, T., Dong, M., Xu, Y., Wang, B., Ai, Y., & G, F. (2020). *Investigation Of Geothermal Structure Of The Sulawesi, Using Gravity And Magnetic Method*. Science China Press and Springer-Verlag, 1 - 16.
- Zhao, D. (1991). *A Tomographic Study Of Seismic Velocity Structure In The Japan Islands*. Tohoku University.
- Zhao, D. (2015). *Multiscale Seismic Tomography*. Tokyo: Springer.
- Zhao, D., Hasegawa, A., & Horiuchi, S. (1992). *Tomographic imaging of P and S wave velocity structure beneath northeastern Japan*. *J. Geophys. Res*, 19909–19928.

LAMPIRAN A
TABEL KECEPATAN AK135

Model ak135-f

Velocity model for travel times (continental structure)

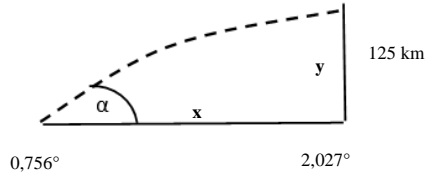
Depth (km)	P velocity (km/s)	S velocity (km/s)
0	5,8	3,46
20	5,8	3,46
20	6,5	3,85
35	6,5	3,85
35	8,04	4,48
77,5	8,045	4,49
120	8,05	4,5

LAMPIRAN B

PERHITUNGAN SUDUT PENUNJAMAN

1. Sayatan 1

Sulawesi



Diketahui:

$$y = 125 \text{ km}$$
$$x = 1,271^\circ$$

$$2,027 - 0,756 = 1,271$$

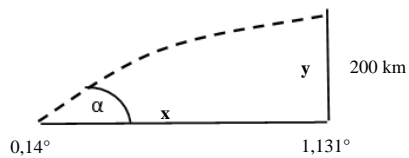
$$1,271 \times 111,23 = 141,37333 \text{ km}$$

$$\frac{125}{141,37333} = 0,88418$$

$$\text{Arctan } 0,88418 = 41,48^\circ$$

2. Sayatan 2

- Sulawesi



Diketahui:

$$y = 200 \text{ km}$$
$$x = 1,017^\circ$$

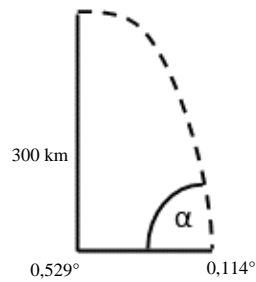
$$1,131 - 0,14 = 1,017$$

$$1,017 \times 111,23 = 113,12091 \text{ km}$$

$$\frac{200}{113,12091} = 1,768$$

$$\text{Arctan } 1,768 = 60,5^\circ$$

- Sula



Diketahui :

$$y = 300 \text{ km}$$

$$x = 0,6225^\circ$$

$$0,529 - 0,114 = 0,415$$

$$\frac{0,415}{2} = 0,2075$$

$$0,2075 + 0,415 = 0,6225$$

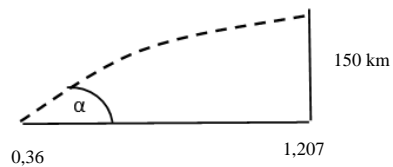
$$0,6225 \times 111,23 = 69,240675 \text{ km}$$

$$\frac{300}{69,240675} = 4,3327$$

$$\text{Arctan } 4,3327 = 77^\circ$$

3. Sayatan 3

- Sulawesi



Diketahui :

$$y = 150 \text{ km}$$

$$x = 0,9955^\circ$$

$$1,207 - 0,36 = 0,847$$

$$\frac{0,847}{2} = 0,4235$$

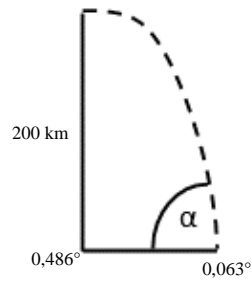
$$0,4235 + 0,847 = 1,2705$$

$$1,2705 \times 111,23 = 141,317715 \text{ km}$$

$$\frac{150}{141,317715} = 1,06$$

$$\text{Arctan } 1,06 = 46,67^\circ$$

- Sula



Diketahui :

$$y = 200 \text{ km}$$

$$x = 0,423^\circ$$

$$0,486 - 0,063 = 0,423$$

$$0,423 \times 111,23 = 47,05029 \text{ km}$$

$$\frac{200}{47,05029} = 4,25$$

$$\text{Arctan } 4,25 = 76,75^\circ$$