

DAFTAR PUSTAKA

- Ahmad, W. (2005). *Mine geology at P.T. INCO: Mine geology, exploration methods, ore processing, resource estimation, and project development*. Indonesia.
- Ahmad, W. (2006). *Nickel laterites: Fundamentals of chemistry, mineralogy, weathering processes, and laterite formation*. Property of PT. INCO.
- Ahmad, W. (2008). *Nikel laterit*. PT. INCO Indonesia.
- Bernard, J. (2003). Short note on the depth of investigation of electrical methods. Retrieved from Google Search.
- Dahlin, T., & Zhou, B. (2004). A numerical comparison of 2D resistivity imaging with 10 electrode array. *European Association of Geoscientists & Engineers (EAGE)*.
- Dahlin, T., & Zhou, B. (2006). Multiple-gradient array measurements for multichannel 2D resistivity imaging. *Near Surface Geophysics*, 4(2), 113–123. <https://doi.org/10.3997/1873-0604.2005037>
- Dentith, M., & Mudge, S. (2014). *Geophysics for the mineral exploration geoscientist*. Cambridge University Press.
- Fitrian, E. B. (2021). Identifikasi sebaran nikel laterit dan volume bijih nikel menggunakan korelasi data bor. *Paulus Civil Engineering Journal*, 3*(1), 113-119.
- Golightly, J. P. (1979). Geology of Soroako nickeliferous laterite deposits. In *International Laterite Symposium*.
- Golightly, J. P. (1981). Nickeliferous laterite deposits. In B. J. Skinner (Ed.), *Seventy-fifth anniversary volume* (pp. 105-121).
- Hurun, N. (2016). *Analisis data geolistrik resistivitas untuk skripsi* (Undergraduate thesis). Retrieved from [repository URL].
- König, U. (2021). Nickel laterites—Mineralogical monitoring for grade definition and process optimization. *Minerals*, 11(11), 1178. <https://doi.org/10.3390/min11111178>
- Kurniadi, A., Rosana, M. F., & Yuningsih, E. T. (2017). Karakteristik batuan asal pembentukan endapan nikel laterit di daerah Madang dan Serakaman Tengah. *Geoscience Journal*, 2(3), 221-234.
- Kumarawarman Budhi, Wanni. (2015). *ERT Survey: Sorowako & Petea*
- Lowrie, W. (2007). *Fundamentals of geophysics* (2nd ed.). Cambridge University Press.
- Maulana, A., Christy, A. G., Ellis, D. J., Imai, A., & Watanabe, K. (2013). Geochemistry of eclogite- and blueschist-facies rocks from the Bantimala

- Complex, South Sulawesi, Indonesia: Protolith origin and tectonic setting. *Island Arc*, 22(4), 427–452. <https://doi.org/10.1111/iar.12037>
- Møller, I., Sørensen, K. I., & Auken, E. (2006). Geoelectrical methods. In R. Kirsch, H.-M. Rumpel, W. Scheer, & H. Wiederhold (Eds.), *Groundwater resources in buried valleys: A challenge for geosciences* (pp. 77-87). Leibniz Institute for Applied Geosciences.
- Osborne, R. C., & Waraspati, D. (1986). Applied mine geology at PT Inco Soroako South Sulawesi, Indonesia. Paper presented at the XV Annual Convention of the Association of Indonesian Geologists, Yogyakarta: Ikatan Ahli Geologi Indonesia.
- Savin, S., et al. (2003). Electrical resistivity tomography for investigating subsurface structures. *Vadose Zone Journal*, 2(4), 416-423. <https://doi.org/10.2136/vzj2003.0416>
- Simanjuntak, T. O. (1986). The geology and tectonics of East Indonesia. *Bulletin of the Geological Research and Development Centre*, 12, 45-63.
- Siregar, J. P., 2006. *Pendugaan Geolistrik Resistivitas Sounding Dalam Penyelidikan Lapisan Akuifer Air Tanah di Kabupaten Sragen*. Surakarta. Universitas Surakarta.
- Sukanto, R. (1975). The structure of Sulawesi in the light of plate tectonics. Paper presented at the Regional Conference on the Geology and Mineral Resources of Southeast Asia, Jakarta, August 4-7, 1975.
- Sukanto, R. (1982). Geology of the Indonesian region. *Bulletin of the Geological Society of Malaysia*, 15, 131-143.
- Telford, W. M., Geldart, L. P., & Sheriff, R. E. (1990). *Applied geophysics* (2nd ed.). Cambridge University Press.
- Vale Indonesia. (2023). *PT Vale Indonesia Tbk briefing book*.
- Van Leeuwen, T. M. (1994). On the tectonic and metallogenic history of Southeast Asia and Australasia. *Journal of Southeast Asian Earth Sciences*, 9(3-4), 147-167. [https://doi.org/10.1016/0743-9547\(94\)90055-8](https://doi.org/10.1016/0743-9547(94)90055-8)

LAMPIRAN

LAMPIRAN

Lampiran 1 Rumus Konfigurasi Gradient

$r_1 = na$ $r_2 = (s+2)a - na$ $r_3 = na + a$ $r_4 = (s+2)a - (na+a) \rightarrow (s+1)a - na \rightarrow (s+1-n)a$	$\left. \begin{array}{l} \rightarrow n \\ \rightarrow s+2-n \\ \rightarrow n+1 \\ \rightarrow s+1-n \end{array} \right\}$	Nilai a dikeluarkan
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$$K = \frac{2\pi}{r_{p1} - r_{p2}}$$

$$= \left[\frac{1}{r_1} - \frac{1}{r_2} - \frac{1}{r_3} - \frac{1}{r_4} \right]$$

$$K = 2\pi a \left[\frac{1}{n} - \frac{1}{s+2-n} - \frac{1}{n+1} + \frac{1}{s+1-n} \right]$$

Karena pada r_1 dan r_3 sama-sama ada variabel n atau sebaliknya (mengelompokkan sesuai variabel yang sama)

$$\begin{aligned}
 &= \left(\frac{1}{n} - \frac{1}{n+1} \right) - \left(\frac{1}{s+2-n} - \frac{1}{s+1-n} \right) \\
 &= \left(\frac{(n+1)-n}{n(n+1)} - \frac{(s+1-n)-(s+2-n)}{(s+2-n)(s+1-n)} \right) \\
 &= \left(\frac{n+1-n}{n^2+n} \right) - \left(\frac{s+1-n-s-2+n}{(s+2-n)(s+1-n)} \right) \\
 &= \left(\frac{1}{n^2+n} \right) + \left(\frac{1}{(s+2-n)(s+1-n)} \right) \\
 &= \frac{[(s+2-n)(s+1-n)] + n^2 + n}{(n^2+n)[(s+2-n)(s+1-n)]} \\
 &= \frac{(s^2+3s-2sn-3n+2+n^2)+n^2+n}{(n^2+n)[(s+2-n)(s+1-n)]} \\
 &= \frac{s^2+3s-2sn-2n+2-2n^2}{(n^2+n)[(s+2-n)(s+1-n)]} \\
 &= \frac{(s^2+3s+2)+2sn-2n+2n^2}{(s+2)(s+1)+2n(s-1+n)}
 \end{aligned}$$

$$\begin{aligned}
 &= [(s+2-n)(s+1-n)] \\
 &= s^2 + s - sn + 2s + 2 - 2n - sn - n + n^2 \\
 &= s^2 + 3s - 2sn - 3n + 2 + n^2
 \end{aligned}$$

Maka faktor geometri konfigurasi gradient array

$$K = \frac{2\pi a(n^2+n)(s+2-n)(s+1-n)}{[(s+2)(s+1)]+(s-1+n)2n}$$

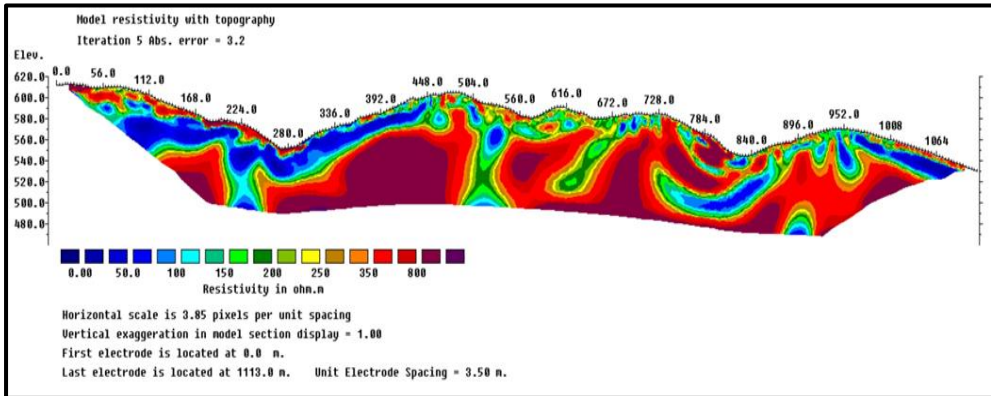
Dimana:

a = spasi antar elektroda

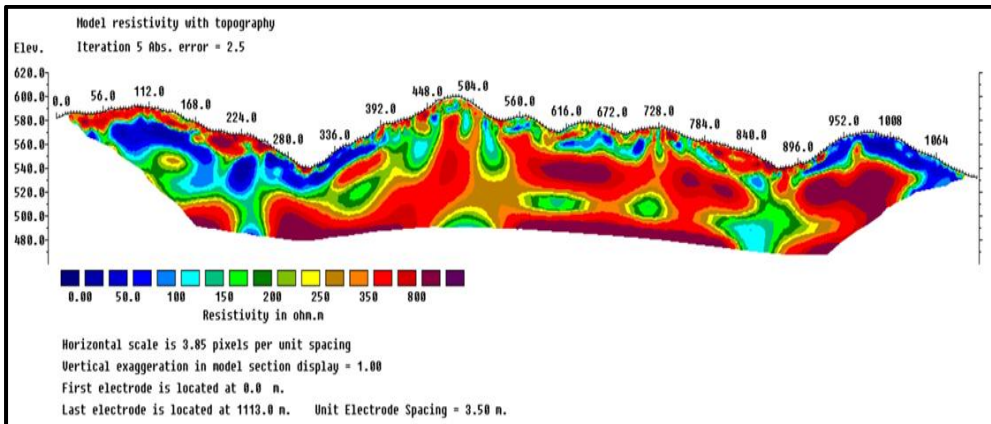
s = faktor pemisaah atau jumlah perpindahan elektroda potensial

Lampiran 2 Hasil Inversi

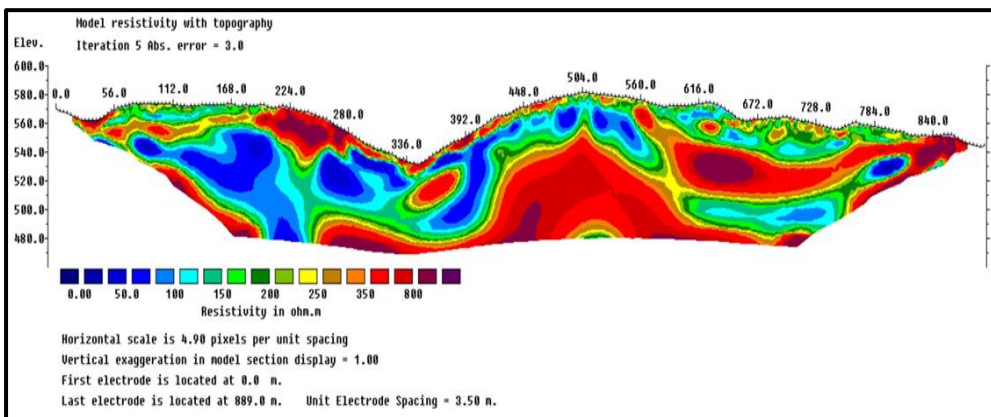
1. Lintasan E01



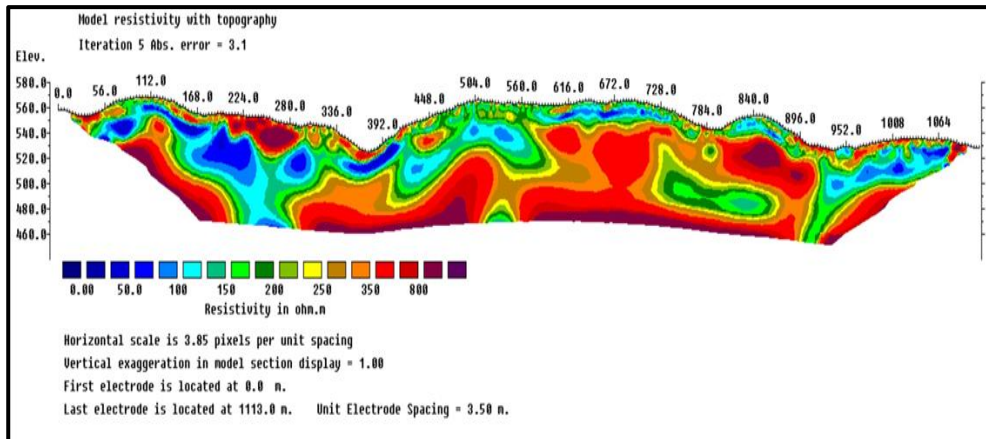
2. Lintasan E02



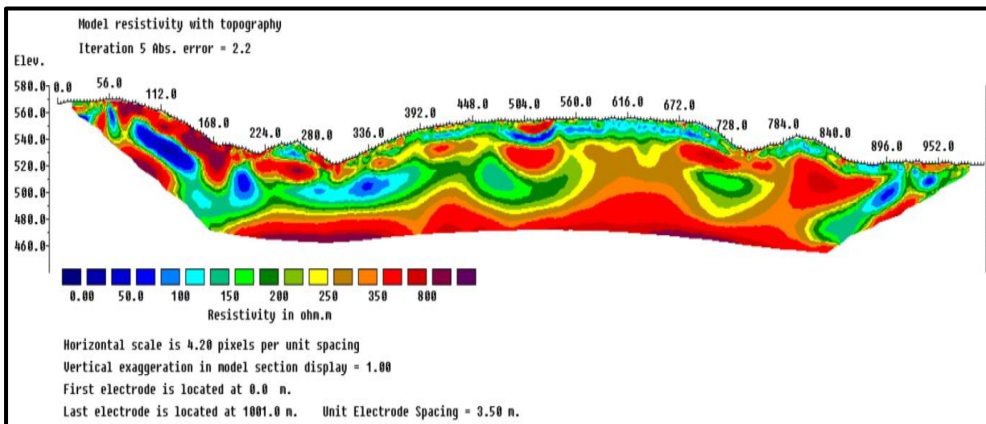
2. Lintasan E03



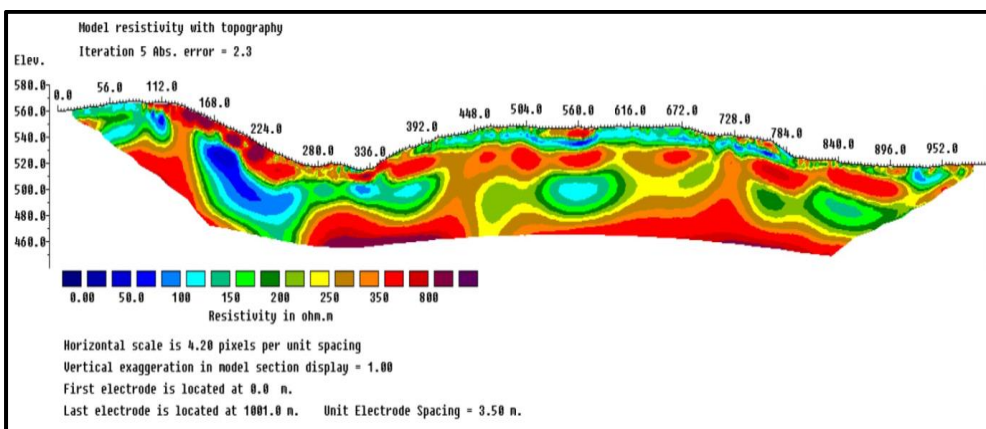
3. Lintasan E04



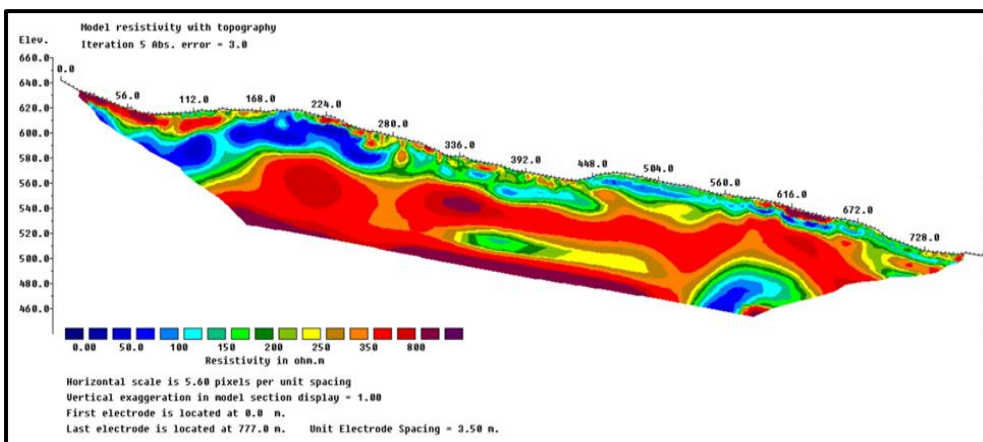
4. Lintasan E05



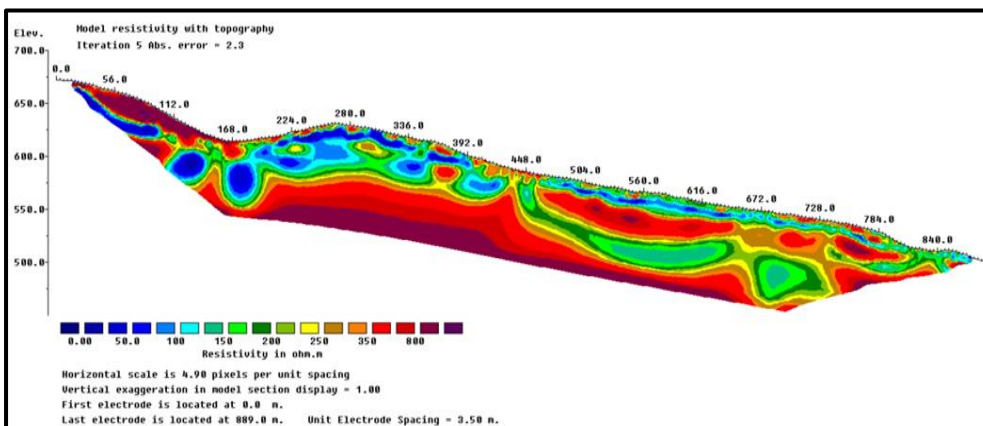
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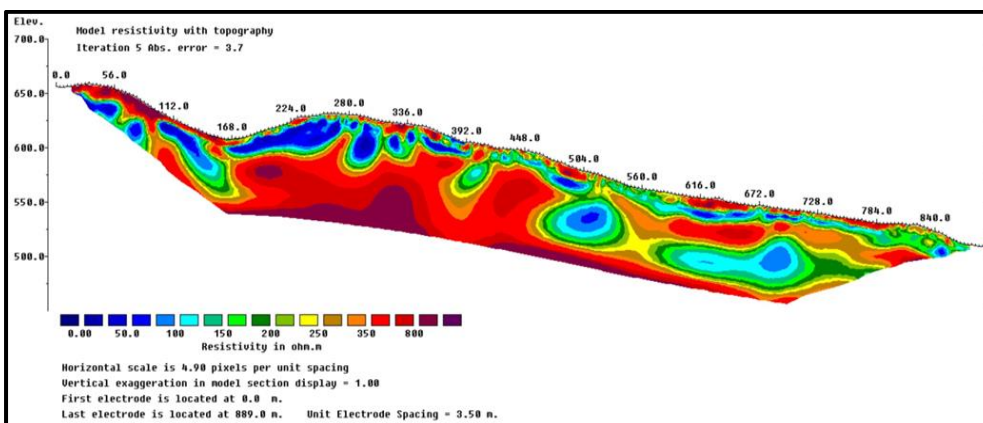
6. Lintasan N01



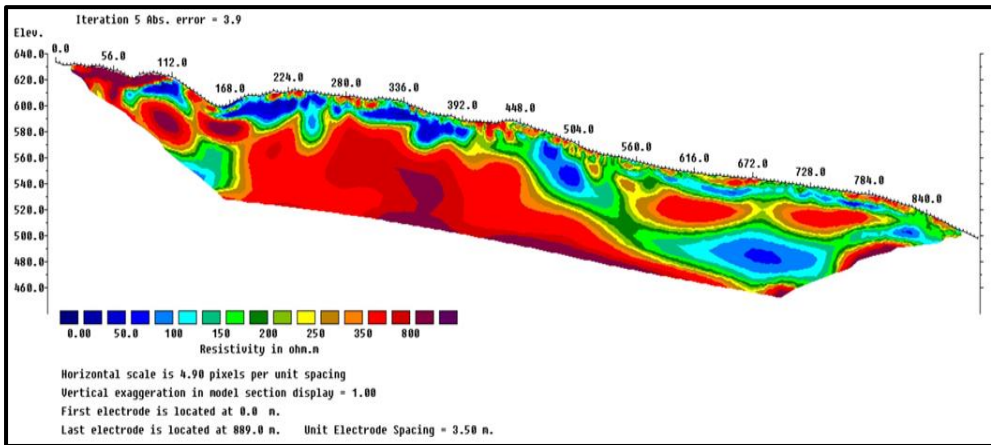
7. Lintasan N02



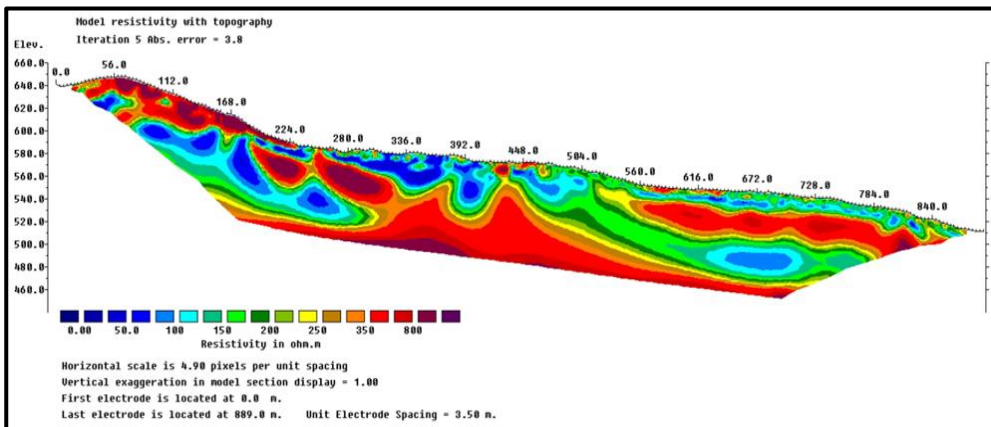
8. Lintasan N03



9. Lintasan N04



11. Lintasan N05



Lampiran 3 Resistivitas dan Nilai Silika Pada Lintasan E01

1. Lintasan E01

Nama Core	Kedalaman (m)	Resistivitas (Ω m)	Silika (%)	Layer
C3464908	4	170	55.03	SAPROLIT
C365033	1	300	31.38	LIMONIT
C365033	8	300	68.11	SAPROLIT
C365033	9	305	89.66	SAPROLIT
C365033	10	300	65.63	SAPROLIT
C365033	12	270	73.21	SAPROLIT
C365033	13	245	53.64	SAPROLIT
C365033	14	230	93.27	SAPROLIT
C365033	15	215	68.18	SAPROLIT
C365033	16	205	81.97	SAPROLIT
C365033	17	190	66.54	SAPROLIT
C365033	18	185	72.23	SAPROLIT
C365033	19	175	81.21	SAPROLIT
C365033	20	170	84.28	SAPROLIT
C365033	21	170	86.7	SAPROLIT
C365033	22	170	79.02	SAPROLIT
C365033	23	170	79.61	SAPROLIT
C365033	24	170	71.21	SAPROLIT
C365033	25	170	51.05	SAPROLIT
C365033	26	170	60.42	SAPROLIT
C364915	4	245	39.25	LIMONIT
C364915	5	315	31.45	LIMONIT
C364915	6	395	38.96	LIMONIT
C364915	7	475	37.65	LIMONIT
C364915	9	610	35.06	LIMONIT
C364915	15	520	33.65	SAPROLIT
C364915	17	375	75.28	SAPROLIT
C364915	19	300	59.16	SAPROLIT
C365056	1	205	26.4	LIMONIT
C365115	5	115	50.5	LIMONIT
C365115	7	100	56.44	LIMONIT
C365152	16	240	53.25	SAPROLIT

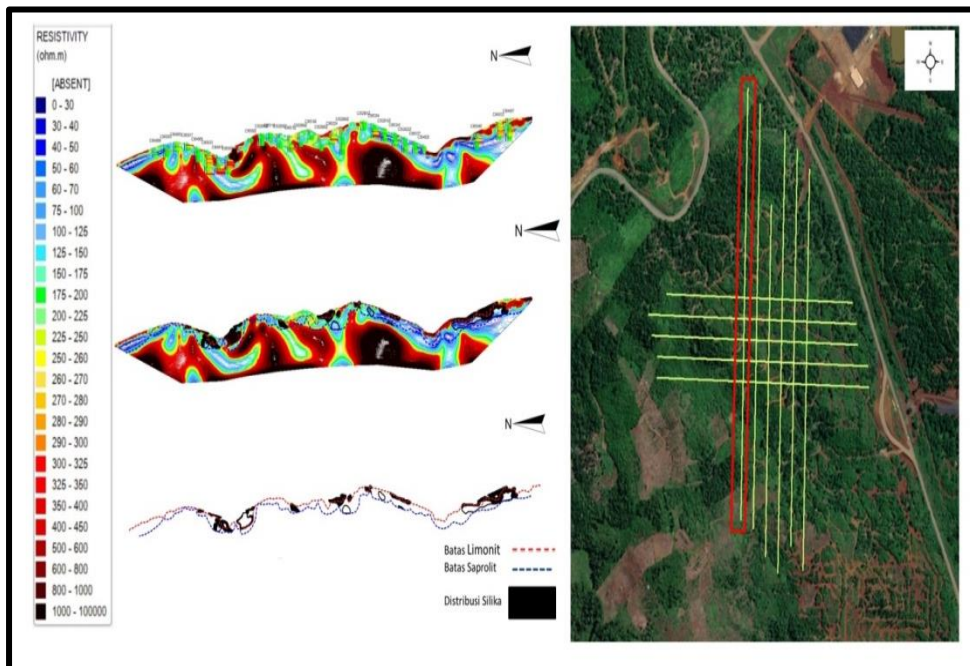
C365152	17	225	59.76	SAPROLIT
C365152	18	210	50.38	SAPROLIT
C365152	19	200	56.79	SAPROLIT
C365224	4	295	29.33	LIMONIT
C365224	6	295	37.07	LIMONIT
C365224	7	305	42.56	LIMONIT
C365224	8	315	53.98	LIMONIT
C365224	9	310	67.26	SAPROLIT
C365224	10	295	68.35	SAPROLIT
C365224	11	280	62.37	SAPROLIT
C365224	12	260	78.13	SAPROLIT
C365224	13	240	91.31	SAPROLIT
C365224	14	220	76.71	SAPROLIT
C365224	15	210	87.98	SAPROLIT
C365224	16	195	73.5	SAPROLIT
C365224	18	185	73.47	SAPROLIT
C352890Z	7	225	29.83	LIMONIT
C352890Z	9	225	54.52	LIMONIT
C352890Z	10	225	41.43	LIMONIT
C352890Z	11	225	31.84	LIMONIT
C352890Z	12	225	33.19	LIMONIT
C352890Z	13	225	35.77	LIMONIT
C352890Z	26	95	51.24	SAPROLIT
C352890Z	30	75	54.27	SAPROLIT
C352890Z	32	70	50.21	SAPROLIT
C352890Z	33	70	57.67	SAPROLIT
C352890Z	35	70	54.72	SAPROLIT
C352890Z	36	70	52.47	SAPROLIT
C352901Z	2	190	59.4	LIMONIT
C352901Z	3	185	53.45	LIMONIT
C352901Z	4	185	50.78	LIMONIT
C352901Z	7.5	225	52.21	LIMONIT
C352901Z	8	235	57.47	LIMONIT
C352901Z	9	250	59.37	LIMONIT
C365304	11	50	55.01	SAPROLIT
C355304	12	50	57.32	SAPROLIT

C365304	13	60	72.32	SAPROLIT
C365304	14	70	88.84	SAPROLIT
C365304	15	80	61.25	SAPROLIT
C365304	17	100	73.76	SAPROLIT
C365304	18	110	64.37	SAPROLIT
C352910Z	1	90	24.94	LIMONIT
C352910Z	5	120	71.29	SAPROLIT
C365343	1	205	35.1	LIMONIT
C365344	2	185	26.79	LIMONIT
C365345	6	95	25.63	SAPROLIT
C365346	14.5	55	59.94	SAPROLIT
C365347	16	80	52.1	SAPROLIT
C365348	17	95	50.58	SAPROLIT
C352922Z	3	100	32.37	SAPROLIT
C352922Z	4	95	33.38	SAPROLIT
C365533	1	275	59.75	LIMONIT
C365533	2	265	51.59	SAPROLIT
C365533	3	290	58.48	SAPROLIT
C365533	4	370	76.29	SAPROLIT
C365533	5	455	65.21	SAPROLIT
C365533	6	460	35.04	SAPROLIT
C365533	7	380	61.19	SAPROLIT
C365533	8	275	62.8	SAPROLIT
C365533	9	200	77.18	SAPROLIT
C365533	10	140	64.99	SAPROLIT
C365533	11	90	57.84	SAPROLIT
C365533	12	80	65.41	SAPROLIT
C365533	13	80	88.52	SAPROLIT
C365533	14	80	53.31	SAPROLIT
C365533	15	85	78.58	SAPROLIT
C365533	16	85	84.8	SAPROLIT
C365533	17	85	66.97	SAPROLIT
C365533	18	85	82.24	SAPROLIT
C365533	19	75	72.89	SAPROLIT
C365533	20	65	87.02	SAPROLIT
C365533	21	60	70.44	SAPROLIT

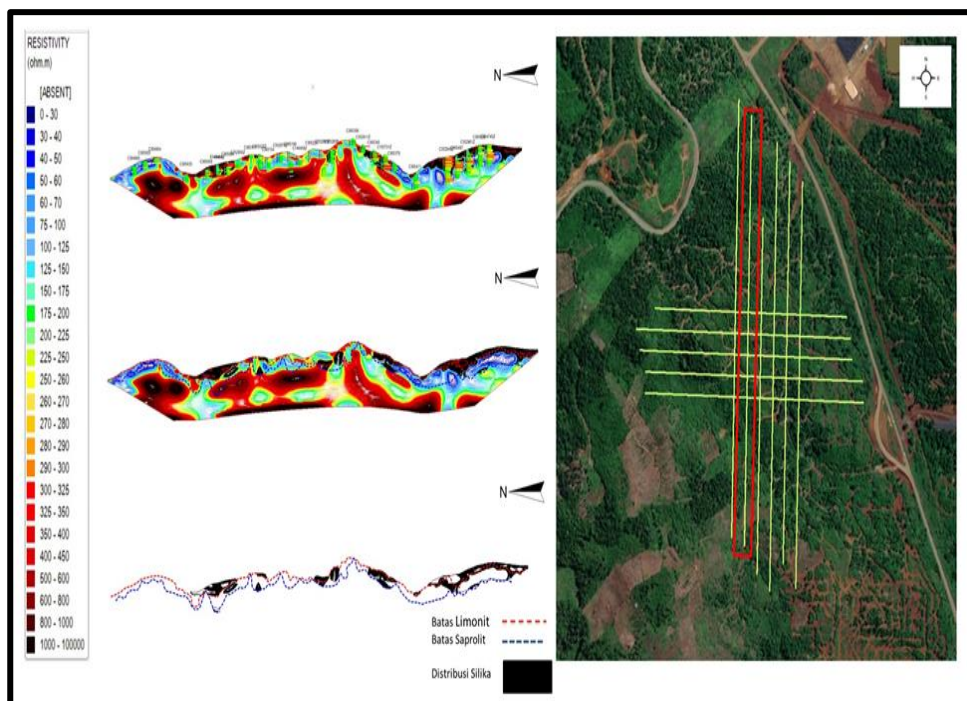
C365533	22	50	57.4	SAPROLIT
C364957	13	110	54.83	SAPROLIT
C364957	18	160	98.24	SAPROLIT
C364957	19	160	70.56	SAPROLIT
C364957	20	160	75.14	SAPROLIT
C364957	22	140	85.62	SAPROLIT
C364957	23	135	62.03	SAPROLIT
C364957	24	120	60.9	SAPROLIT

Lampiran 4 Distribusi Silika Setiap Penampang

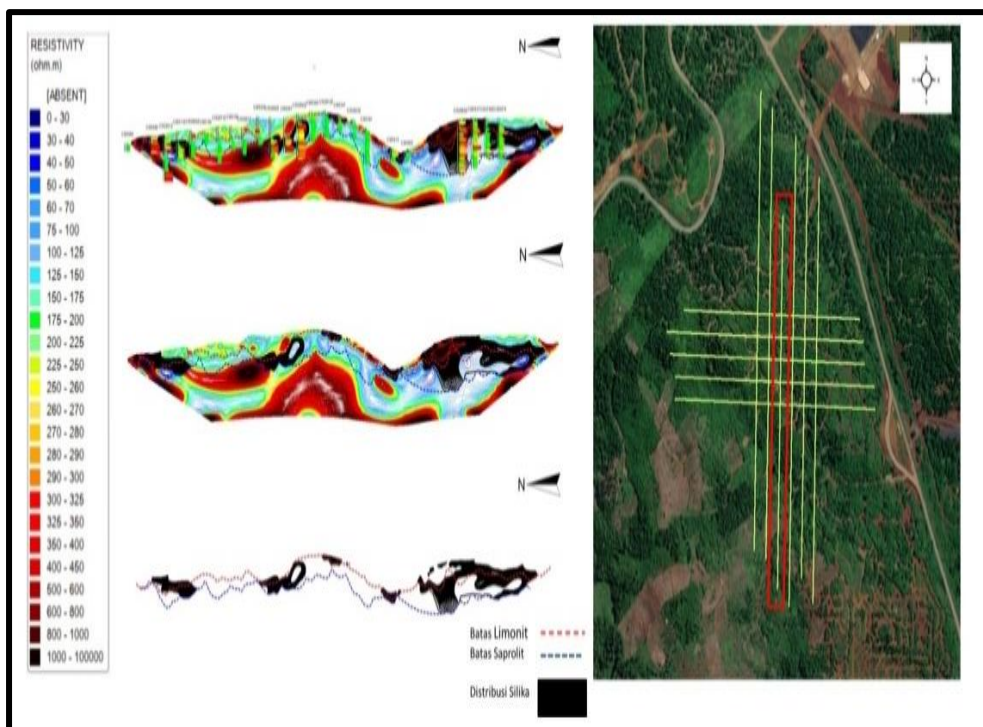
1. Lintasan E01



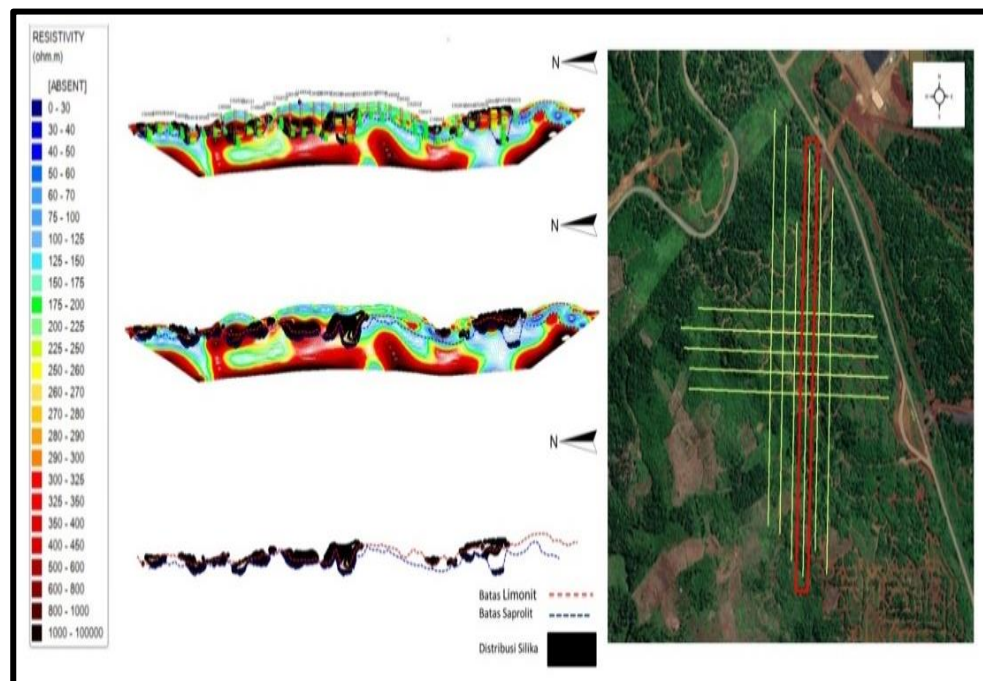
2. Lintasan E02



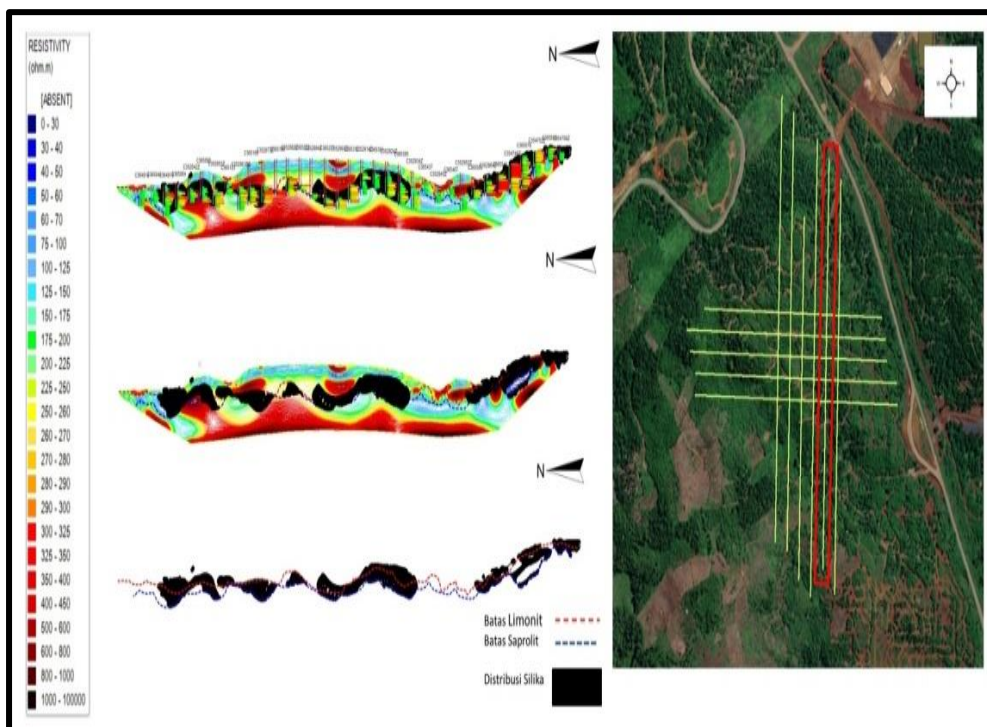
3. Lintasan E03



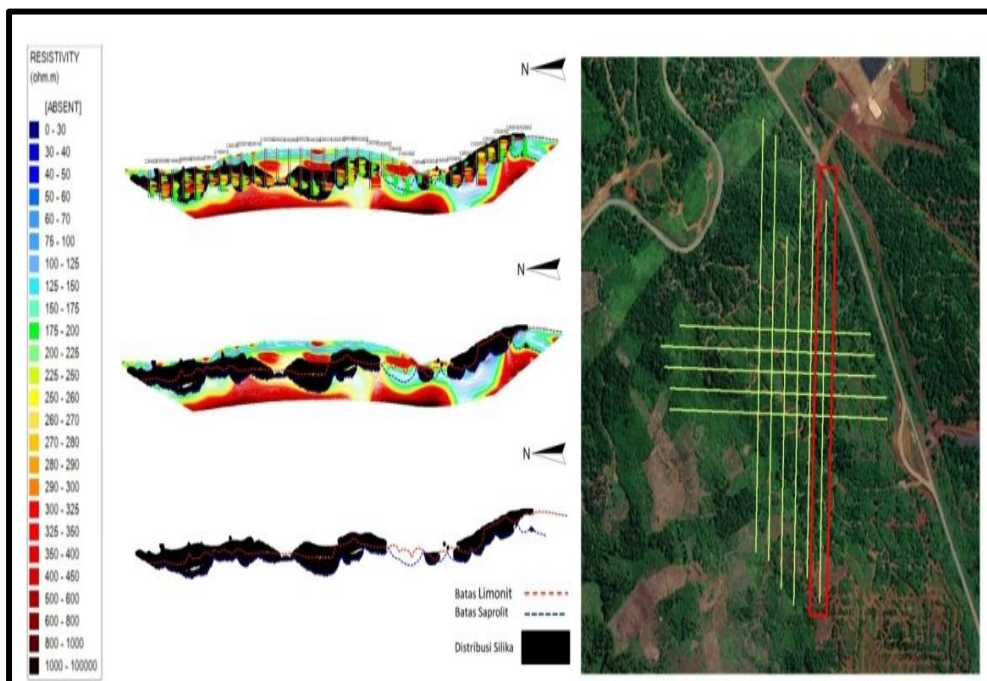
4. Lintasan E04



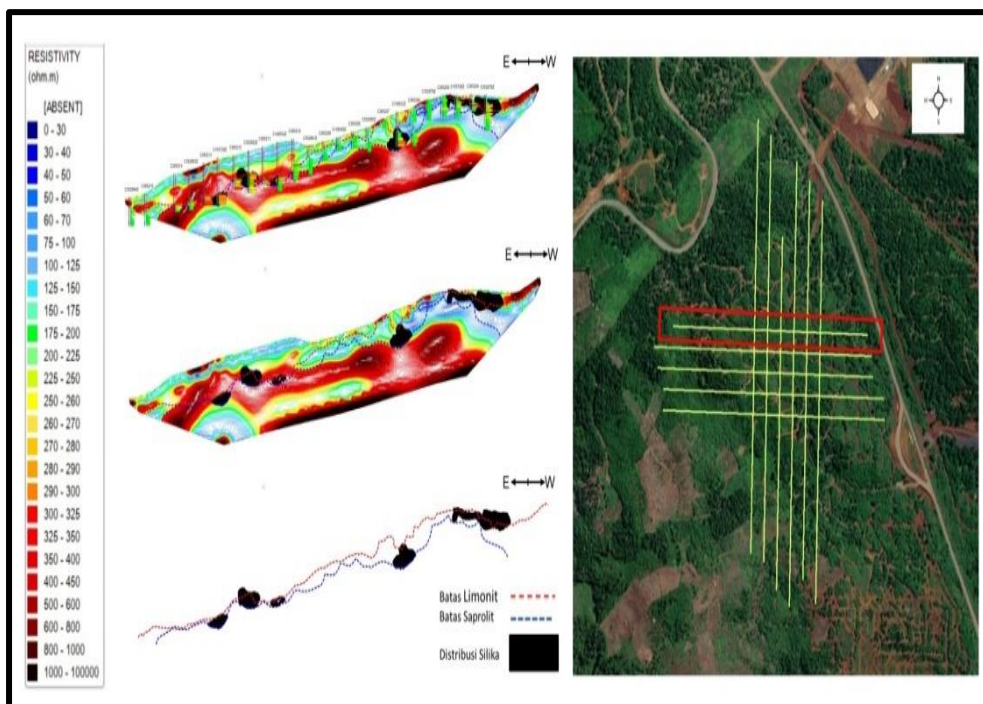
5. Lintasan E05



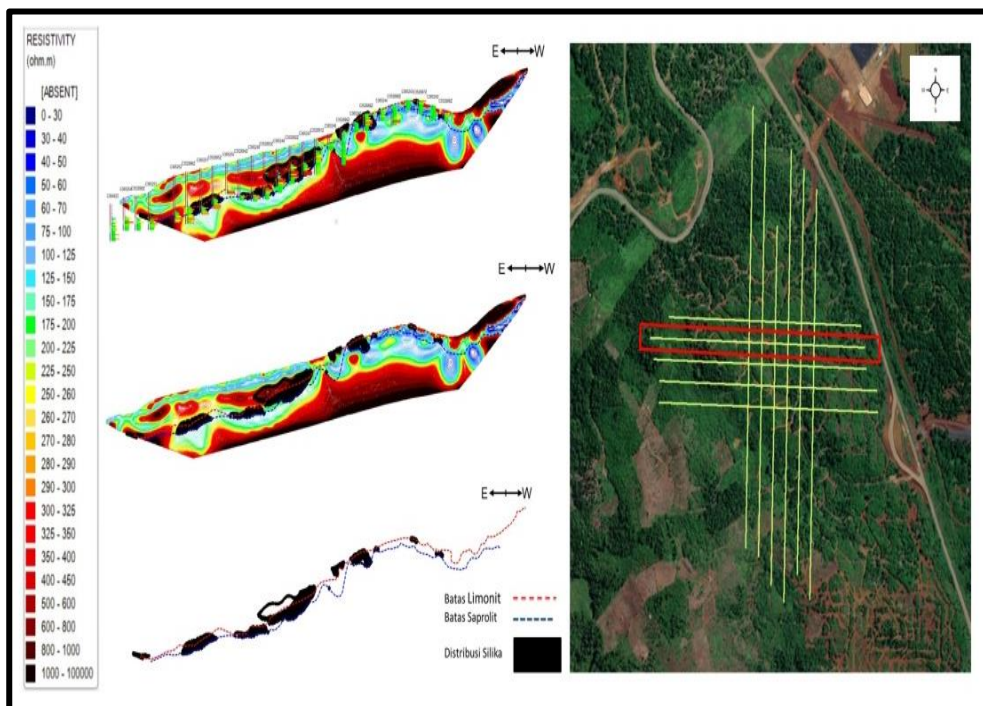
6. Lintasan E06



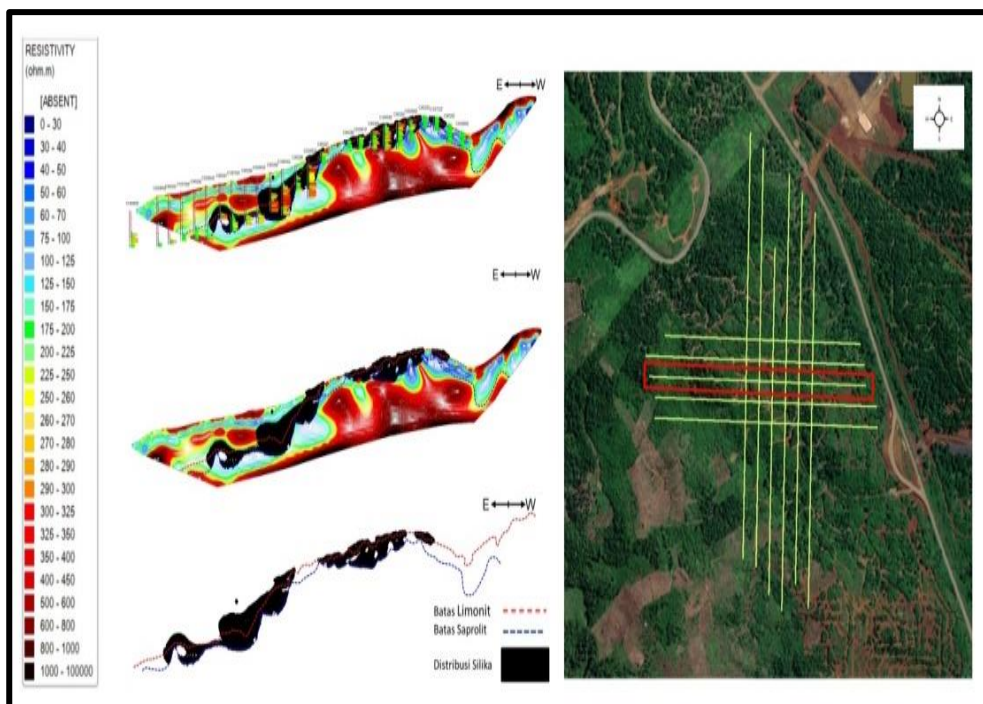
7. Lintasan N01



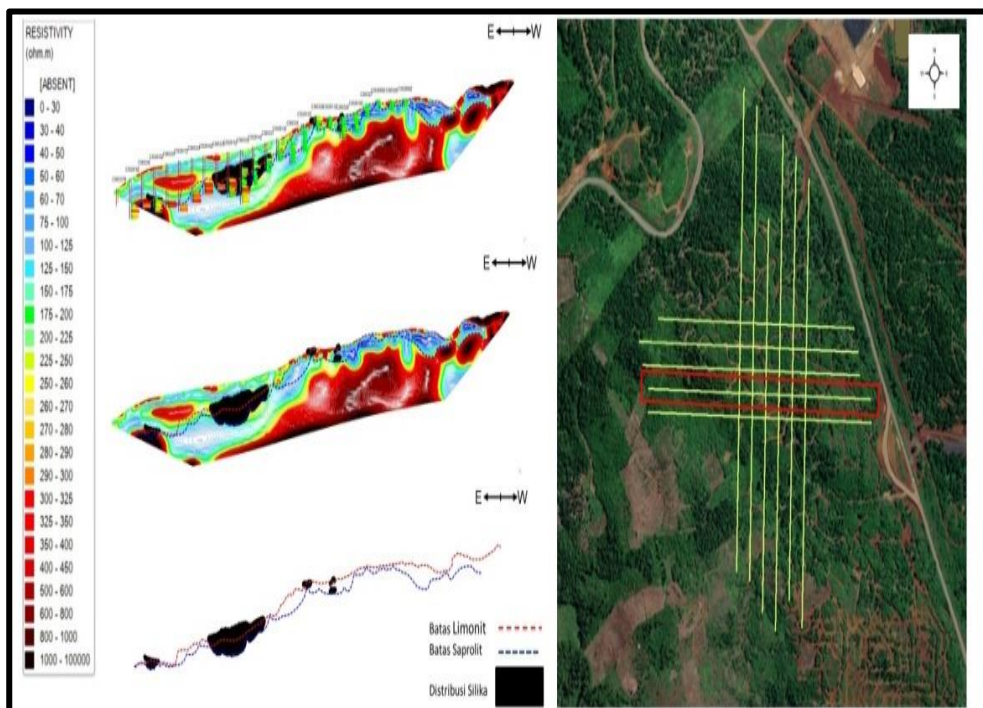
8. Lintasan N02



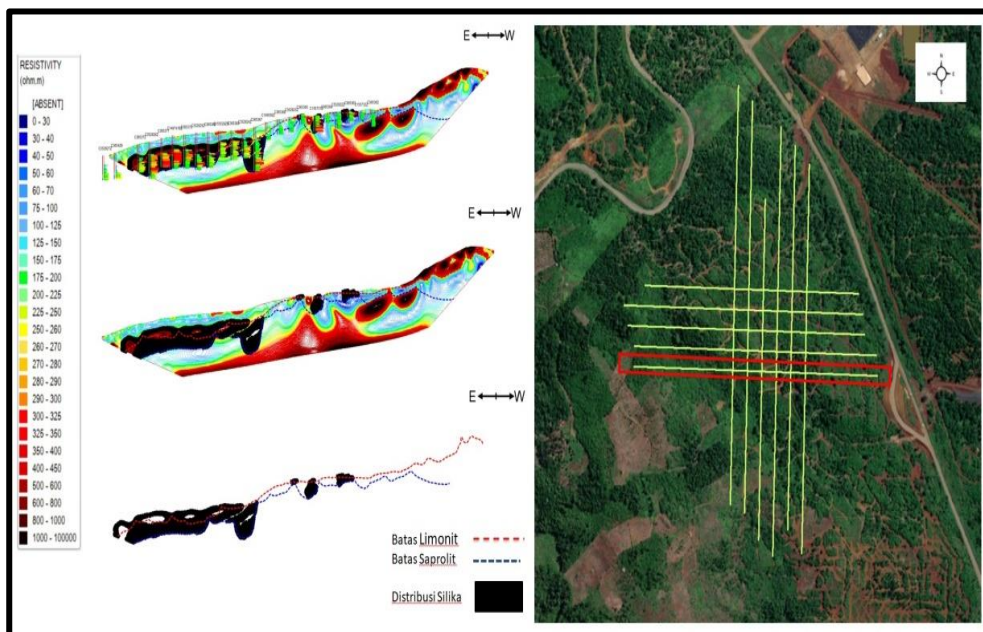
9. Lintasan N03



10. Lintasan N04

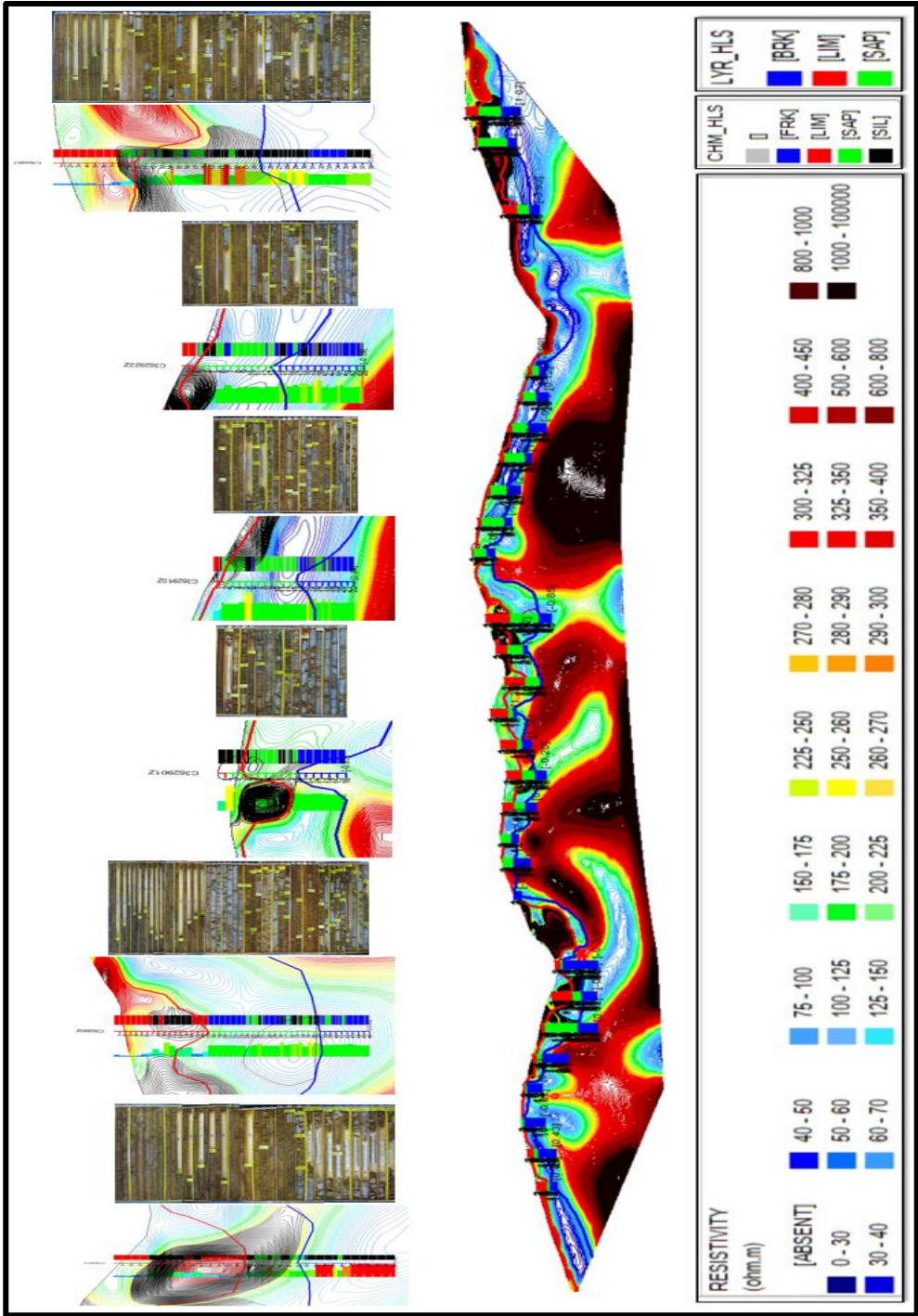


11. Lintasan N05

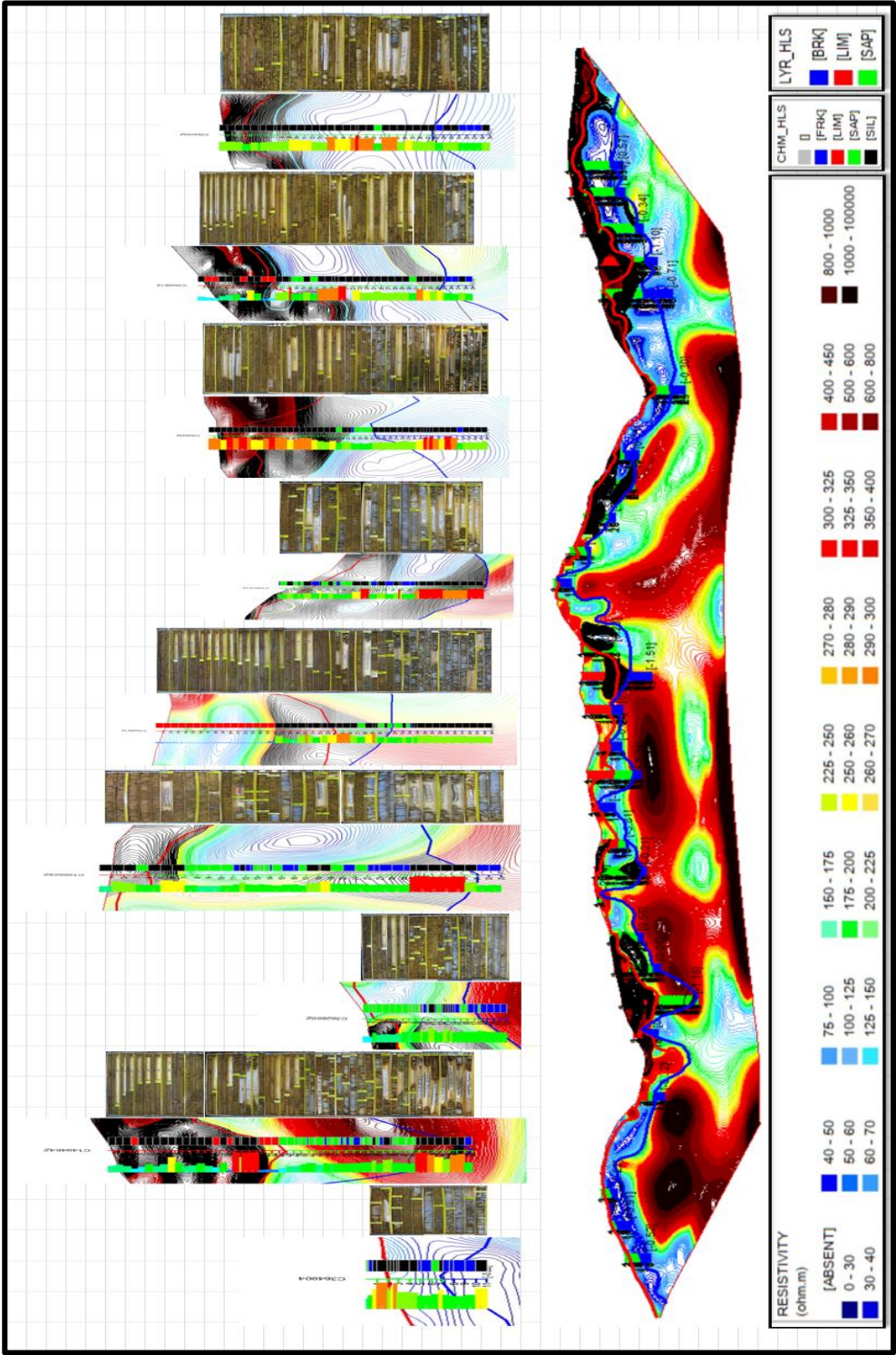


Lampiran 5 Ditribusi Silika dan Foto Core

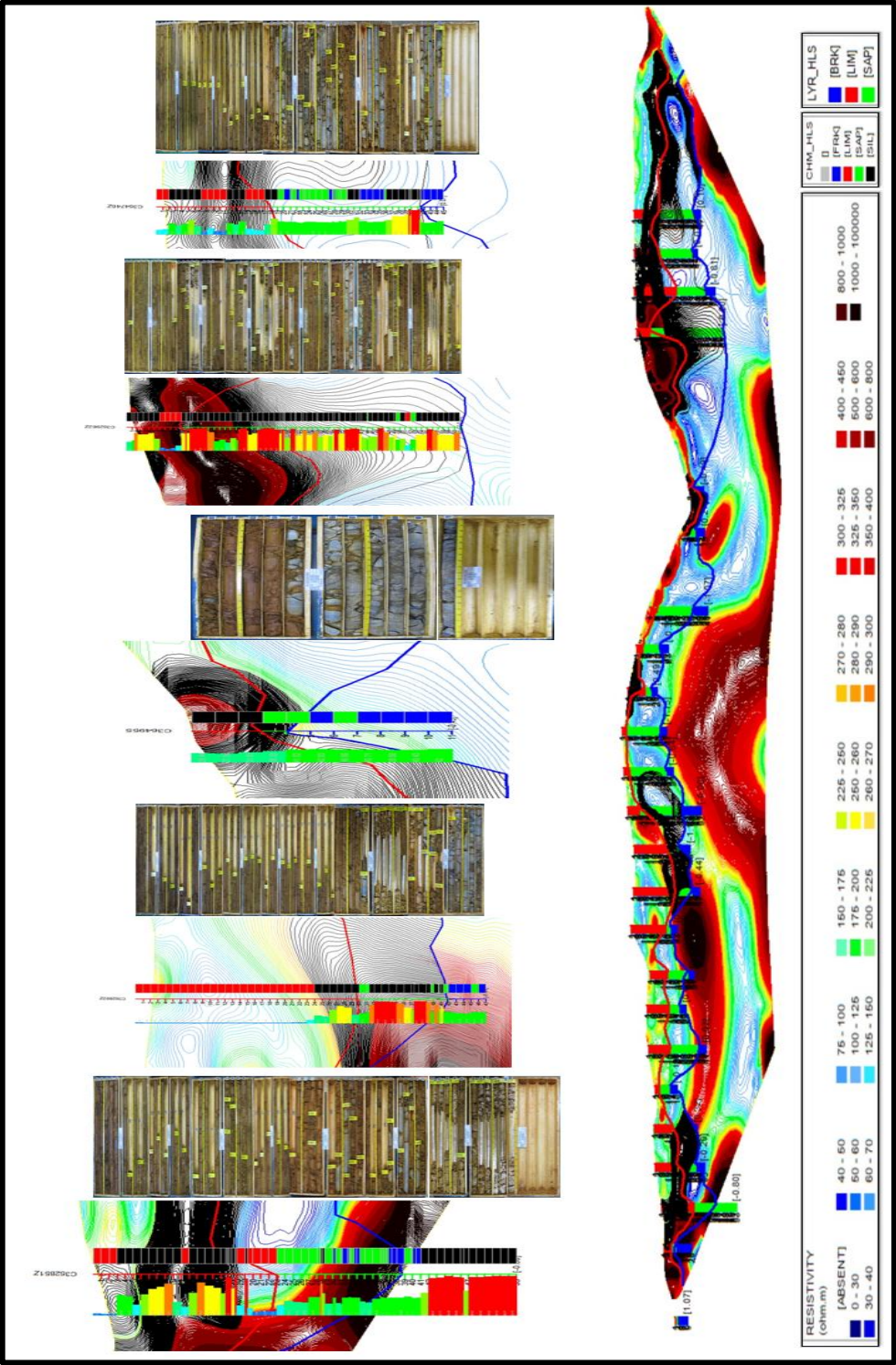
1. Lintasan E01



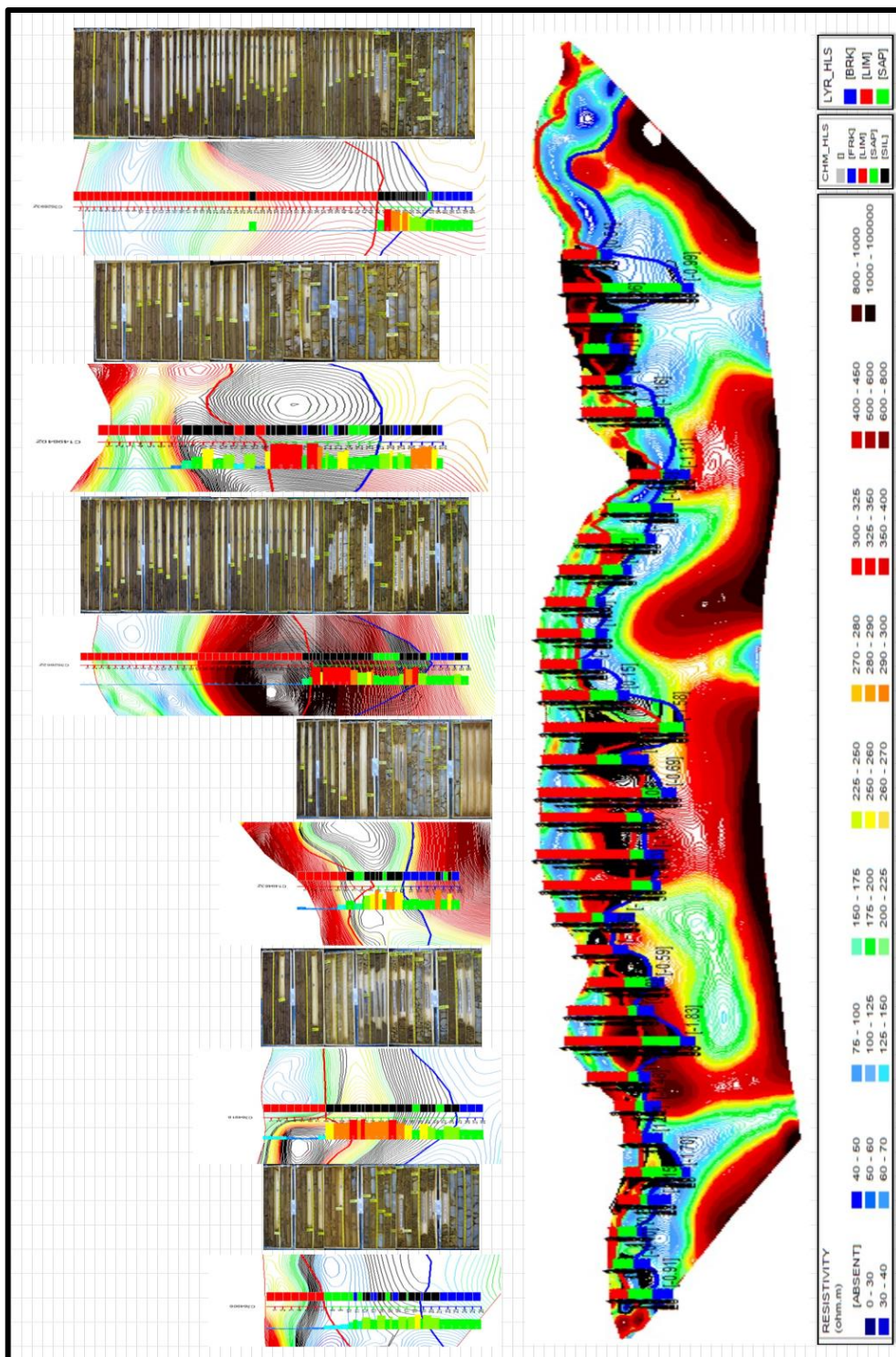
2. Lintasan E02



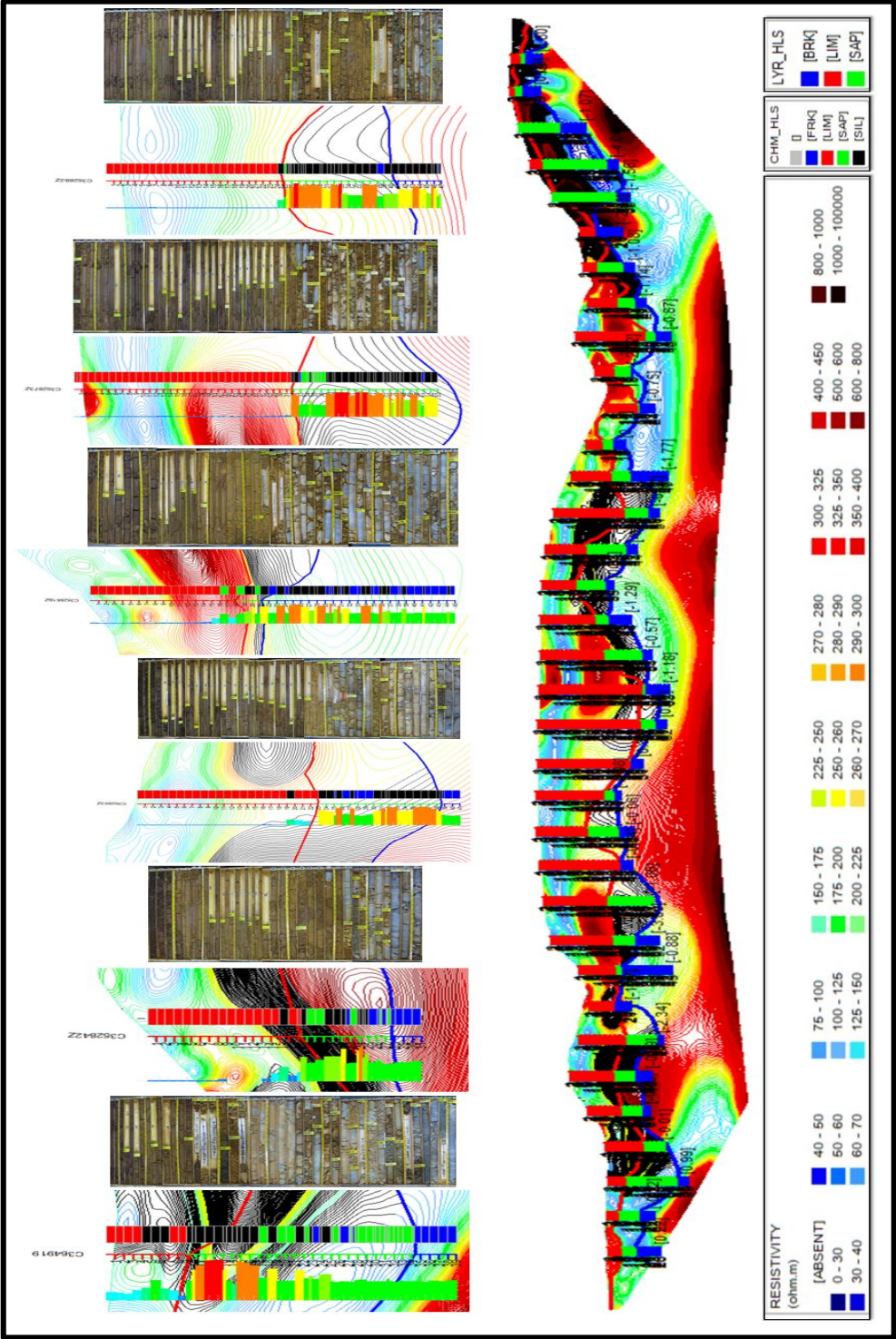
3. Lintasan E03



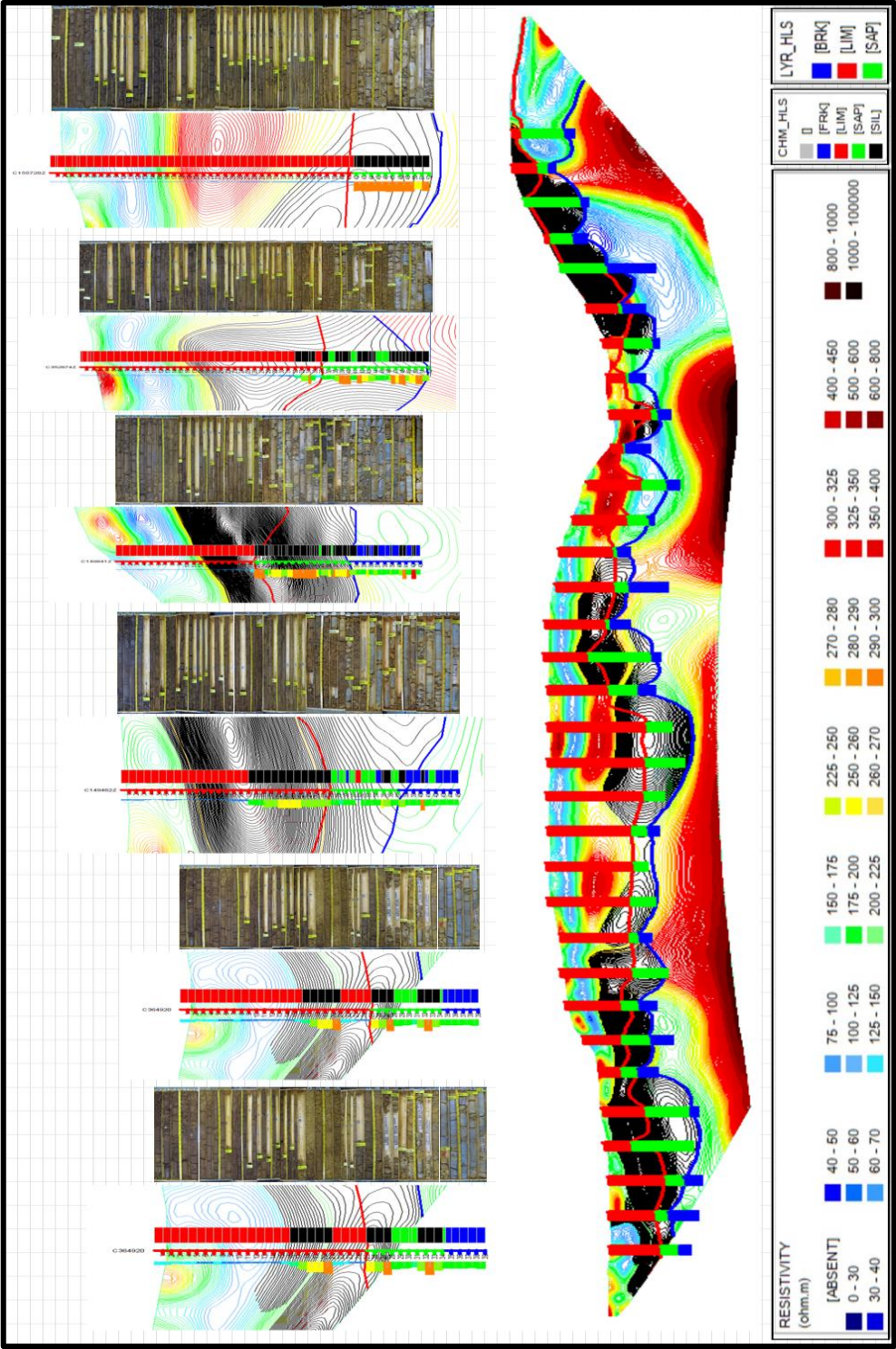
4. Lintasan E04



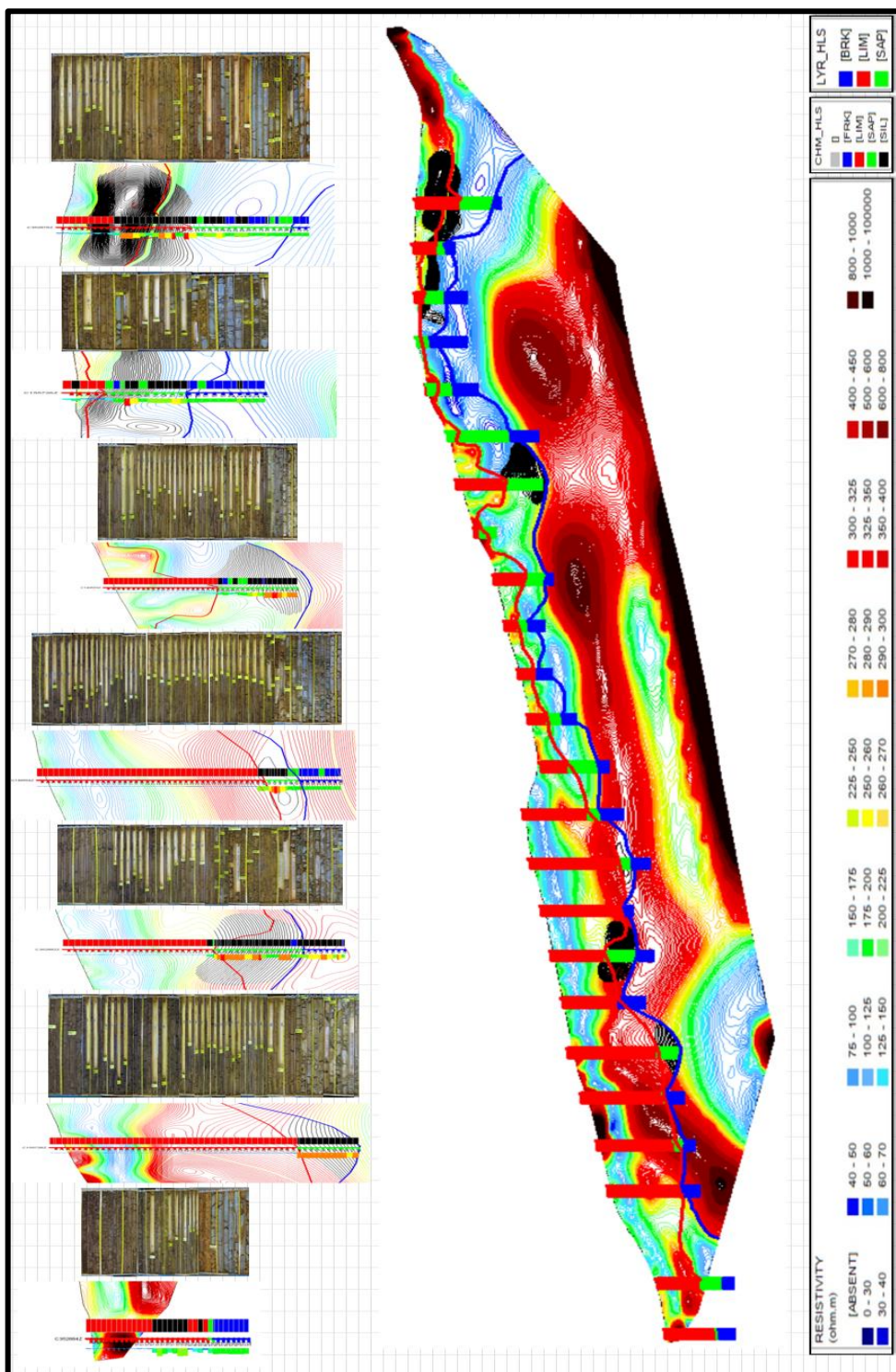
5. Lintasan E05



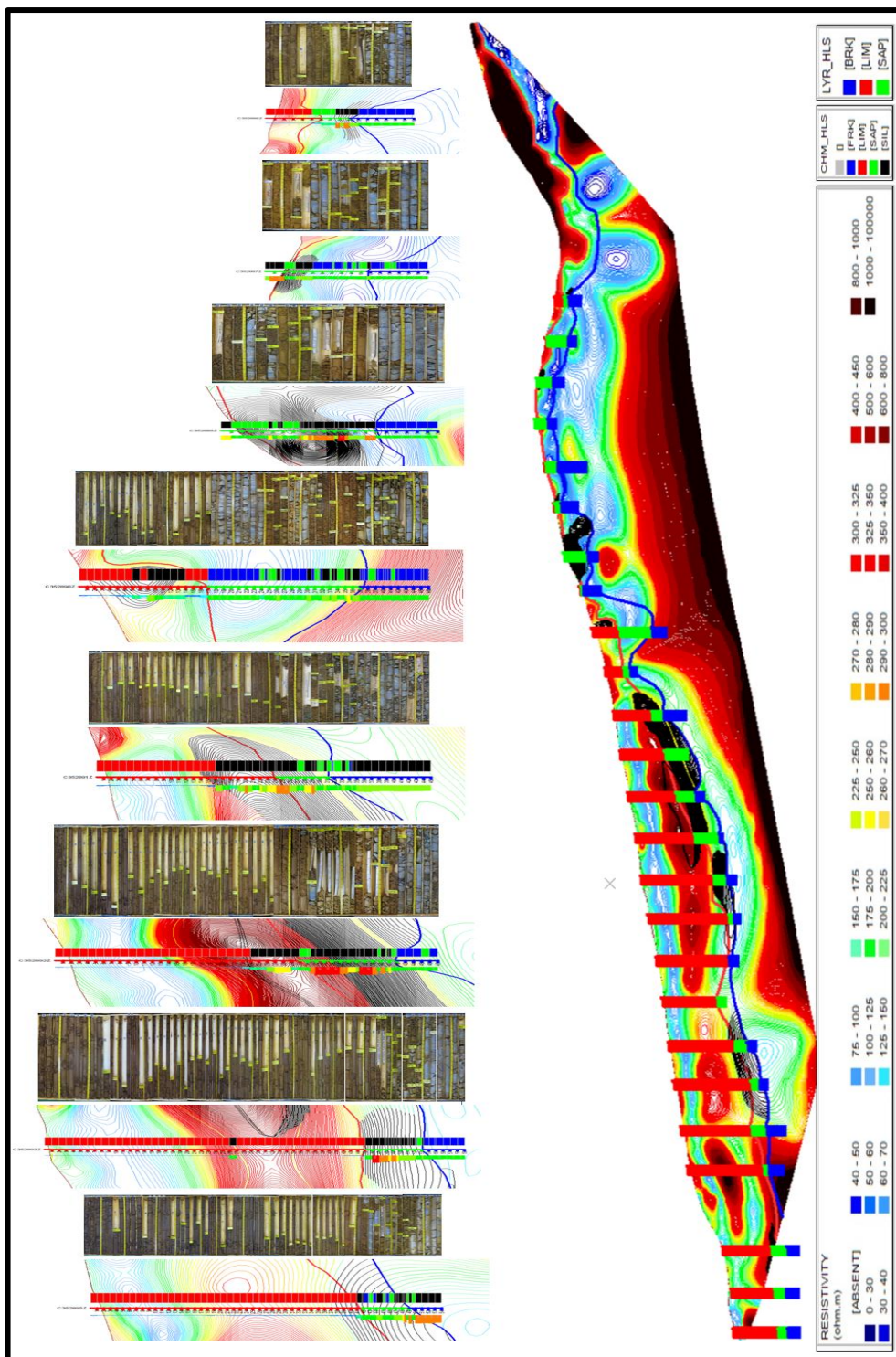
6. Lintasan E06



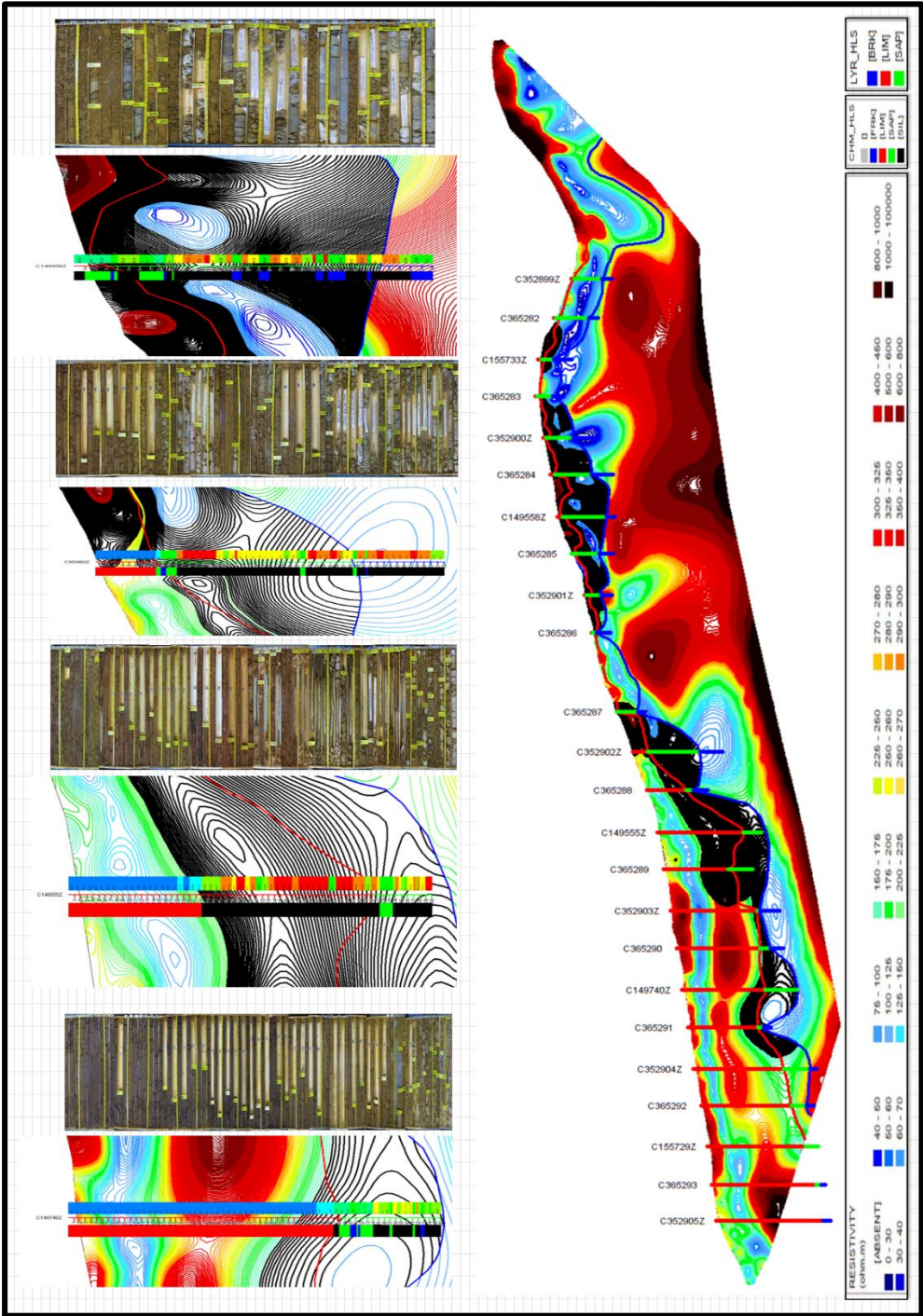
7. Lintasan N01



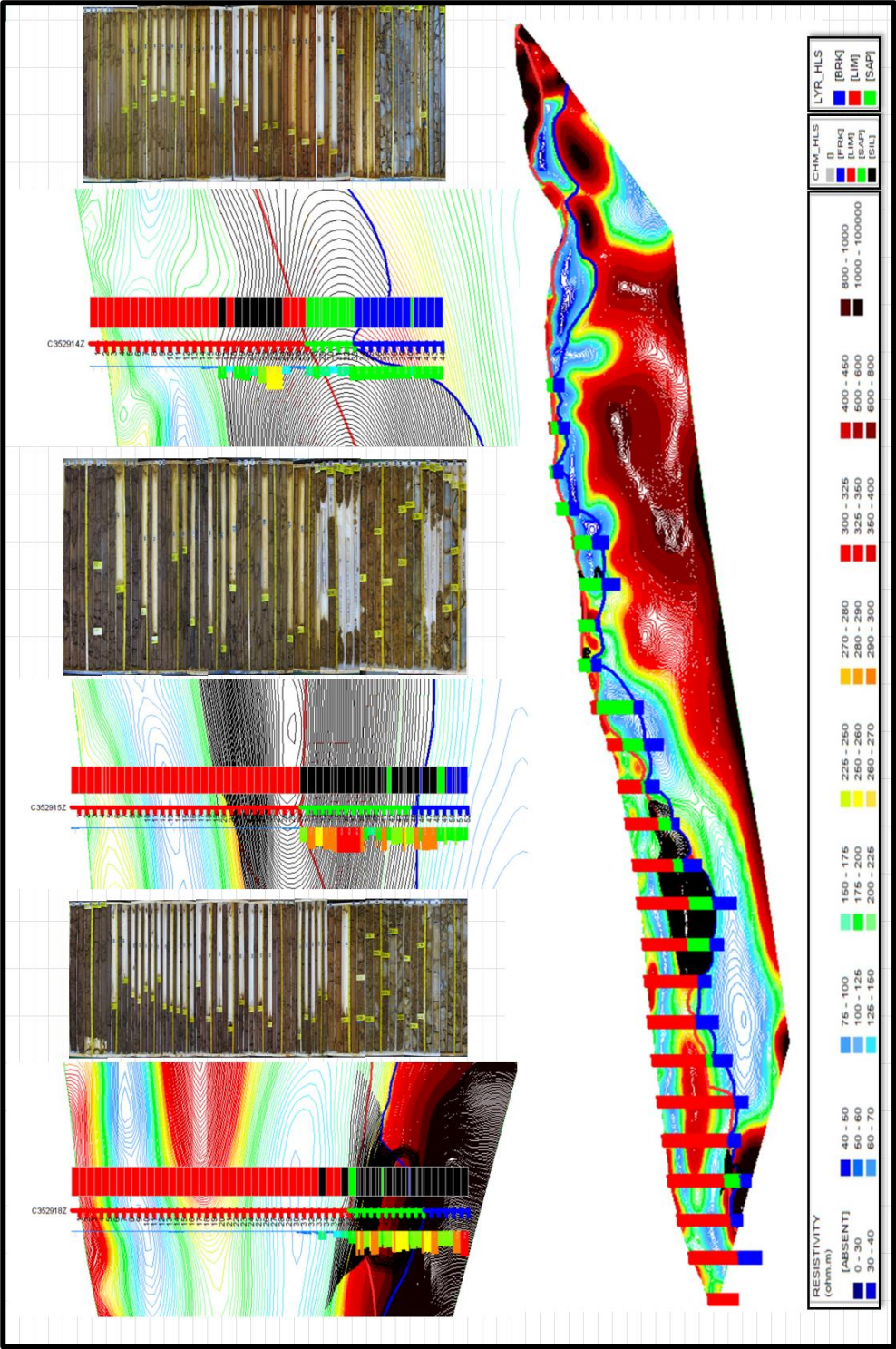
8. Lintasan N02



9. Lintasan N03



10. Lintasan N04



11. Lintasan N05

