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Corrigendum

Corrigendum to "Characterization of Geotomographic Studies with the EMRE System"

Arto Korpisalo

Geological Survey of Finland, P.O. Box 96, 02151 Espoo, Finland

Correspondence should be addressed to Arto Korpisalo; arto.korpisalo@gtk.fi

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In the article titled "Characterization of Geotomographic Studies with the EMRE System" [1], there were errors in the "Theory" section.

Paragraph three should be corrected as follows:

"The field depends on the distance $\bar{r}$ from the source. Certain characteristics of an electromagnetic field dominate at one particular distance from the antenna, while a completely different behaviour can dominate at another location. The wave number $\bar{k}$ multiplied by the distance $\bar{r}$ defines the behavior [10, 11, 13]. When $|\bar{k} \cdot \bar{r}| \ll 1$ or at a distance much shorter than the wavelength, the electric field resembles the static dipole field, being proportional to r^{-3} (static term), and anything in this region that couples with the antenna will disturb the antenna severely (reactive near field). The EMRE system operates in the near-field domain due to the wavelengths of hundreds of meters when the low frequency of 312.5 kHz and short distances ($r \ll 300$ m) are used with resistivities ~10000 Ωm. When $|\bar{k} \cdot \bar{r}| = 1$, the field is proportional to r^{-2} (induction term), and the static term ($\sim r^{-3}$) becomes negligible. The region is known as a radiating near-field or Fresnel zone. With the frequency of 2500 kHz and with resistivities 10000–1000 Ωm, the EMRE system operates in the Fresnel zone at distances of ~40–80 m. When $|\bar{k} \cdot \bar{r}| \gg 1$ or at a distance much greater than the wavelength, the electric field is inversely dependent on the distance r^{-1} (radiation term). The angular field distribution is independent of the distance from the antenna (far-field or Fraunhofer zone). When the frequencies $f > 1250$ kHz and distances $r \gg 200$ m are used with resistivities <10000 Ωm, the EMRE system operates in the far field. The inhomogeneous generalized time-domain wave equations for the time harmonic electric field E and magnetic field H ($e^{i\omega t}$ dependence) can be written as [16–18]"

Equation (4) should be corrected as follows:

$$Q = \frac{\omega\varepsilon' + \sigma''}{\sigma' - \omega\varepsilon''} = \frac{\omega\left(\varepsilon' + \sigma''/\omega\right)}{\sigma' - \omega\varepsilon''} = \tan\Theta^{-1} \approx \frac{\omega\varepsilon'}{\sigma'}. \quad (4)$$

Equation (9) for v_p should be corrected as follows:

$$\begin{aligned} v_p &= \frac{\omega}{\beta} = \frac{\omega}{\omega\sqrt{\mu\varepsilon/2}\left(\sqrt{1 + (\sigma/\omega\varepsilon)^2} + 1\right)^{1/2}} \\ &= \frac{1}{\sqrt{\mu\varepsilon/2}\left(\sqrt{1 + \tan^2\phi} + 1\right)^{1/2}}. \end{aligned} \quad (9)$$

"Figures 2(a) and 2(b) present the cut-off frequencies ($f = \sigma'/2\pi\omega$) for different materials ($\rho = 100, 1000, 10000$ Ωm and $\varepsilon_r = 10, 20$)" should be corrected to "Figures 2(a) and 2(b) present the cut-off frequencies ($f = \sigma'/2\pi\varepsilon'$) for different materials ($\rho = 100, 1000$, and 10000 Ωm and $\varepsilon_r = 10, 20$)"

"Increasing the relative permittivity of the medium, the cut-off frequencies decrease ($\varepsilon_r = 20$) and the quasi-static conditions are valid almost up to ~60 kHz" should be corrected to "Increasing the relative permittivity of the medium, the cut-off frequencies decrease ($\varepsilon_r = 20$) and the quasi-static conditions are valid almost up to ~600 kHz"

Figure 2(b) is corrected hereinafter.

In addition, in the "Rim Instrument" section, the legend of Figure 4 is corrected hereinafter.

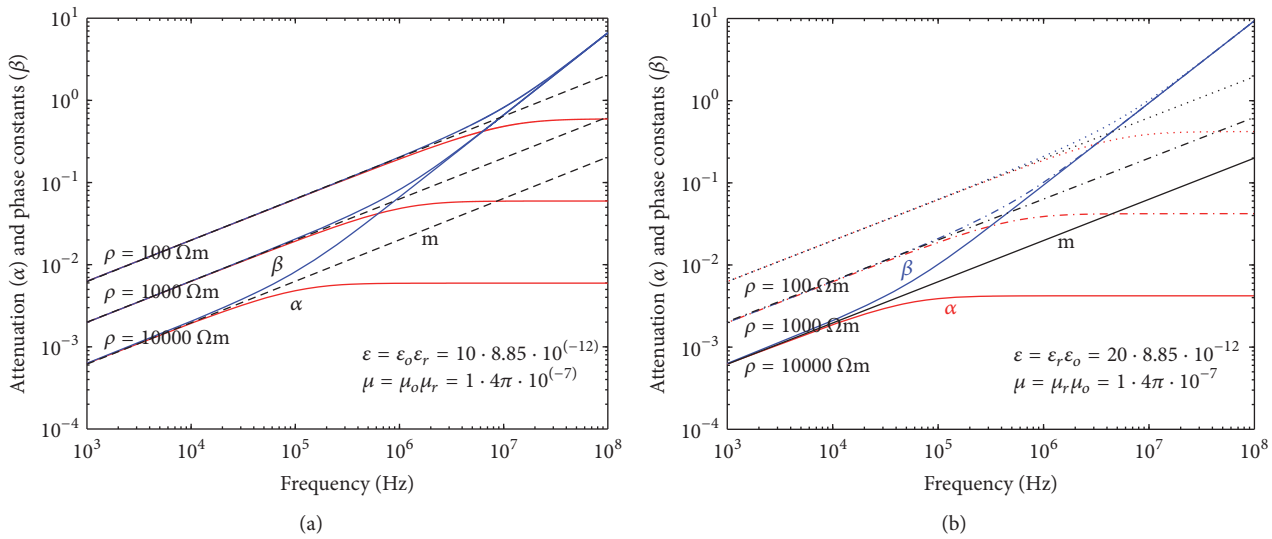

Figure 2: (a) The attenuation (α) and phase (β) constants in a dissipative medium with $\varepsilon_r = 10$ and $\rho = 100$, 1000, and 10000 Ωm. (b) The phase and attenuation constants in a dissipative medium with $\varepsilon_r = 20$. α is the attenuation (red lines) as Nepers/m and β is the phase constant (blue lines) as rad/m. The m-curve is valid when the attenuation constant equals the phase constant or $\alpha \approx \beta$ (black curves).

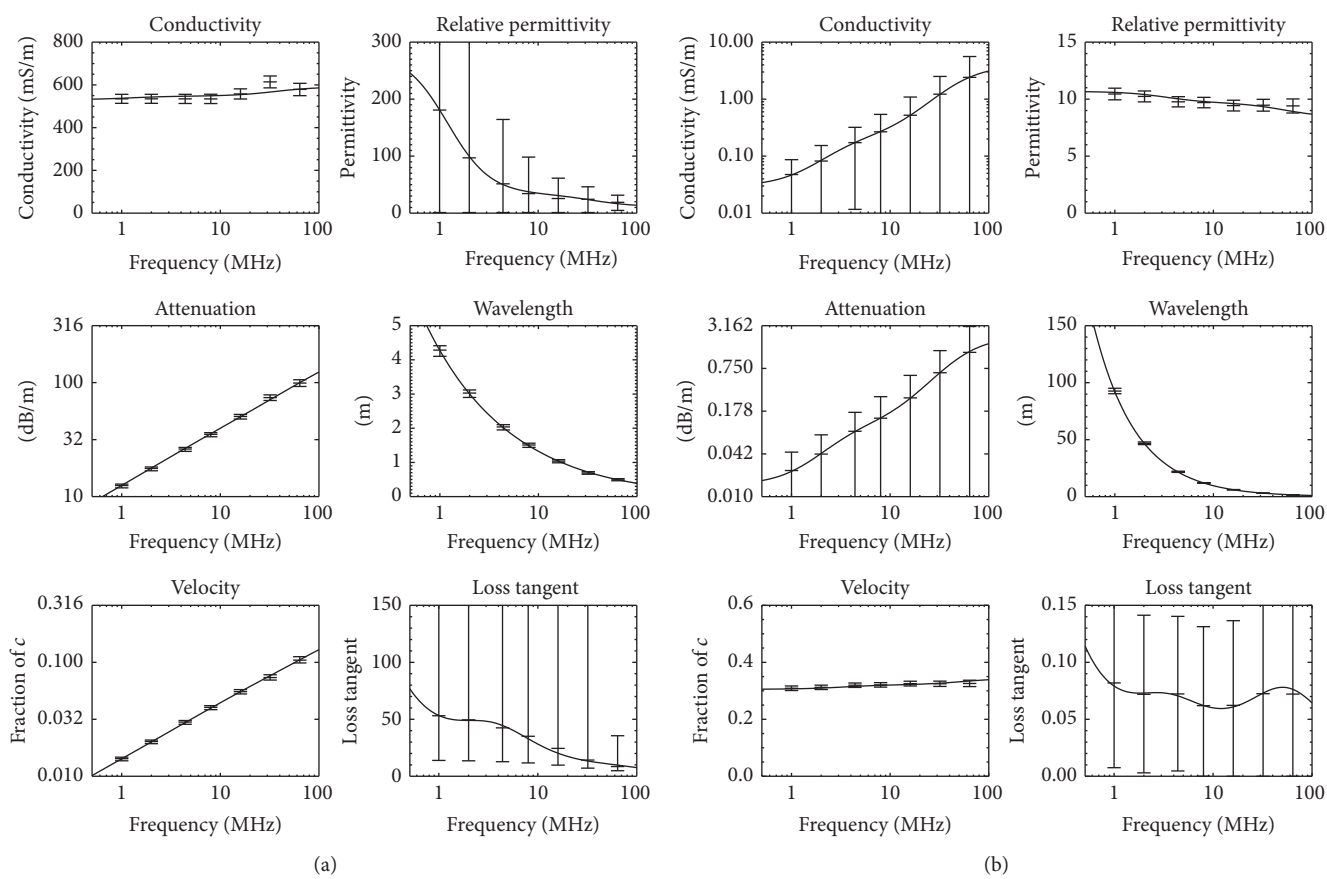

Figure 4: The electrical properties of a sulphide sample (a) and a granite sample (b) from Vogt [7].

References

[1] A. Korpisalo, "Characterization of geotomographic studies with the EMRE system," *International Journal of Geophysics*, vol. 2014, Article ID 401654, 18 pages, 2014.