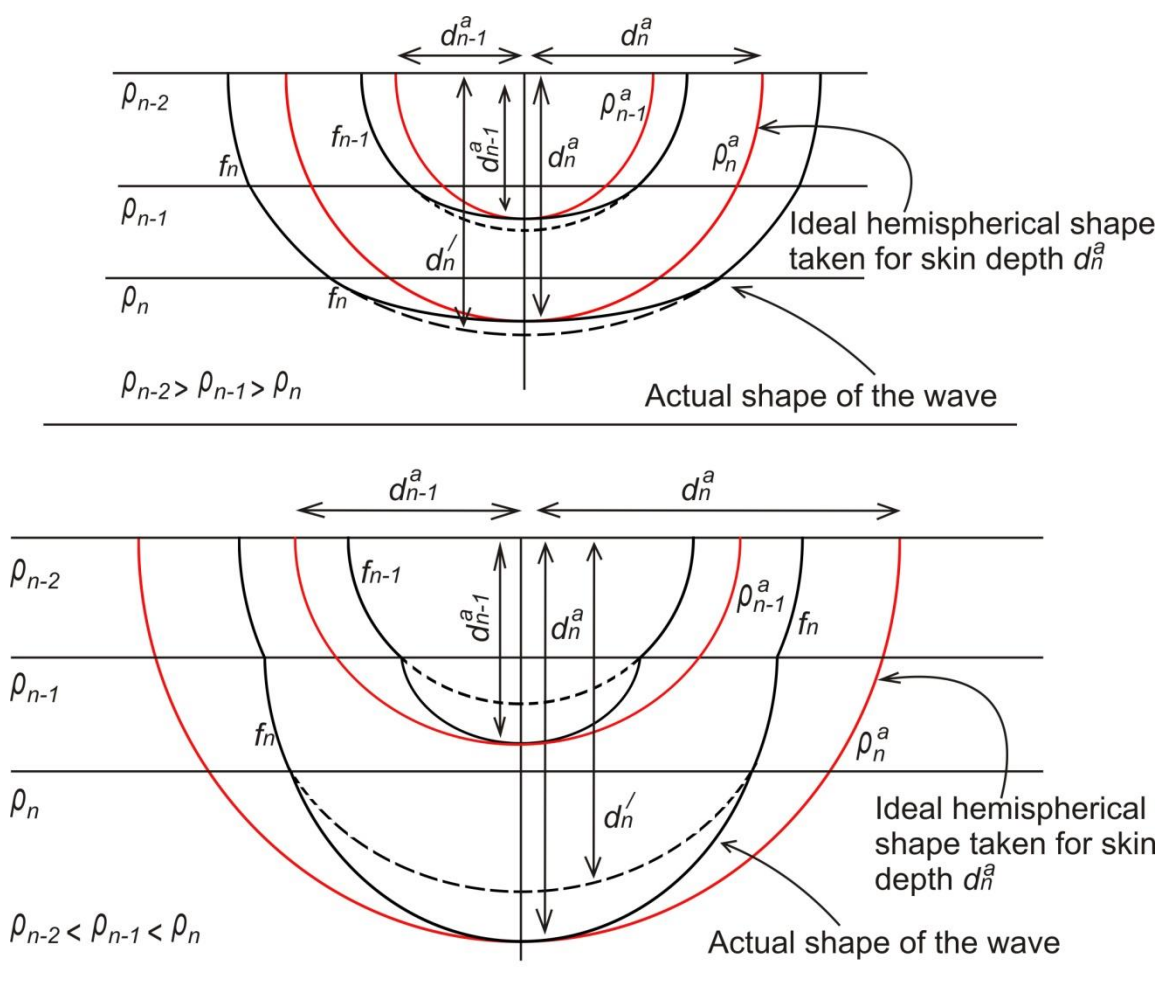
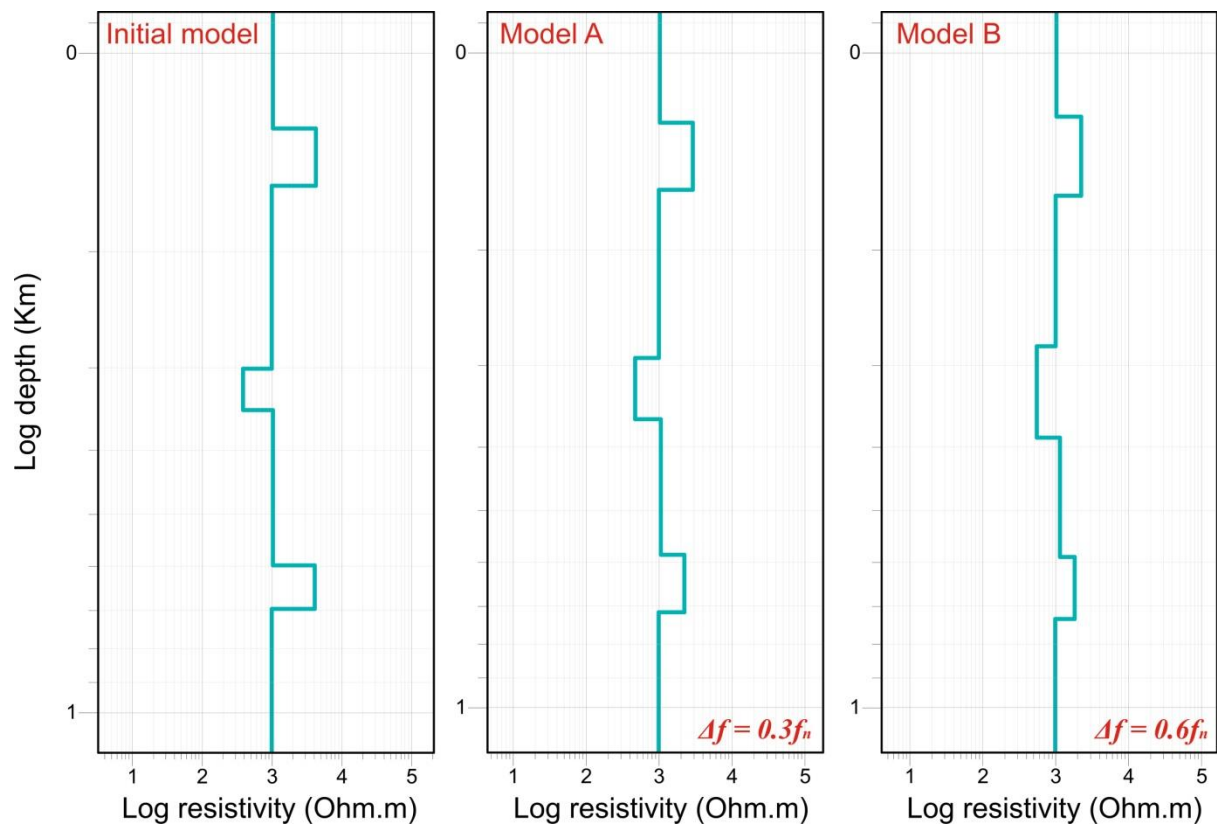


## A new approach for enhancement of Magnetotelluric resolution

This study has proposed the optimal evaluation (target) frequency separation criterion quantitatively for enhancement of Magnetotelluric (MT) resolution. The study is based on the propagation geometry of diffusive electromagnetic (EM) wave through the earth (figure 1). In a layered earth, this propagation geometry takes the shape of a distorted hemisphere (figure 1). Difference between two distorted hemispheres (corresponding to two different target frequencies) is taken to calculate the minimum resolvable layer thickness at a particular depth. This difference between two distorted hemispheres is calculated on the basis of skin depth principle. This difference expression is then converted to a function of frequency so that the concept of differentiation can be applied to get the maximum evaluation (target) frequency separation for resolution enhancement of that layer. Finally the study concludes that  $\Delta f \leq 0.414f_n$ ; where  $\Delta f$  is the maximum frequency separation and  $f_n$  is the minimum frequency taken for a particular MT study. While examining the effectiveness of the proposed criterion with synthetic data, it is observed that the new idea can improve the resolution of subsurface object (Figure 2).



**Figure 1:** The propagation geometry of diffused electromagnetic wave through layered earth and its distortion at the boundaries.



**Figure 2:** Synthetic test to examine the effectiveness of evaluation (target) frequency separation on magnetotelluric resolution.

For further details

Ujjal K. Borah and Prasanta K. Patro, 2017, Annals of Geophysics, vol 60 no3,  
<http://dx.doi.org/10.4401/ag-7056>

<http://www.annalsofgeophysics.eu/index.php/annals/issue/view/521>