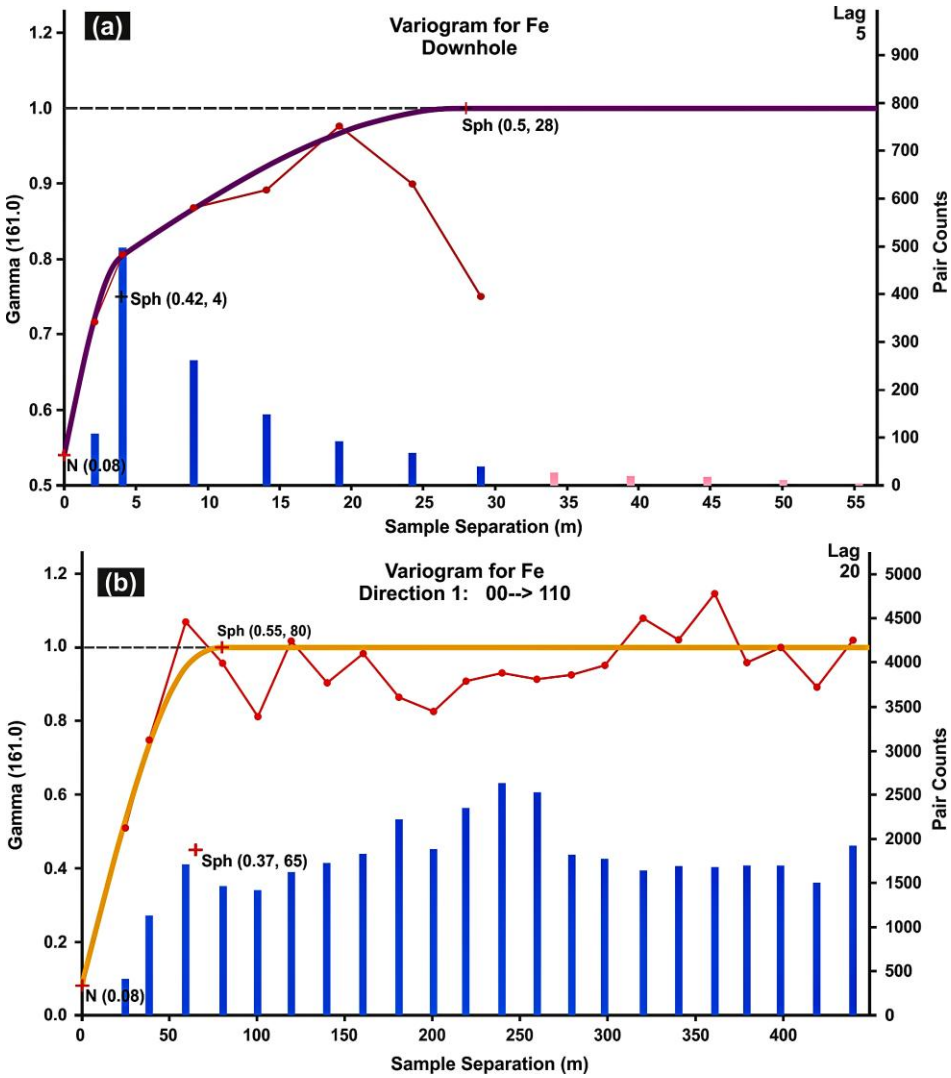
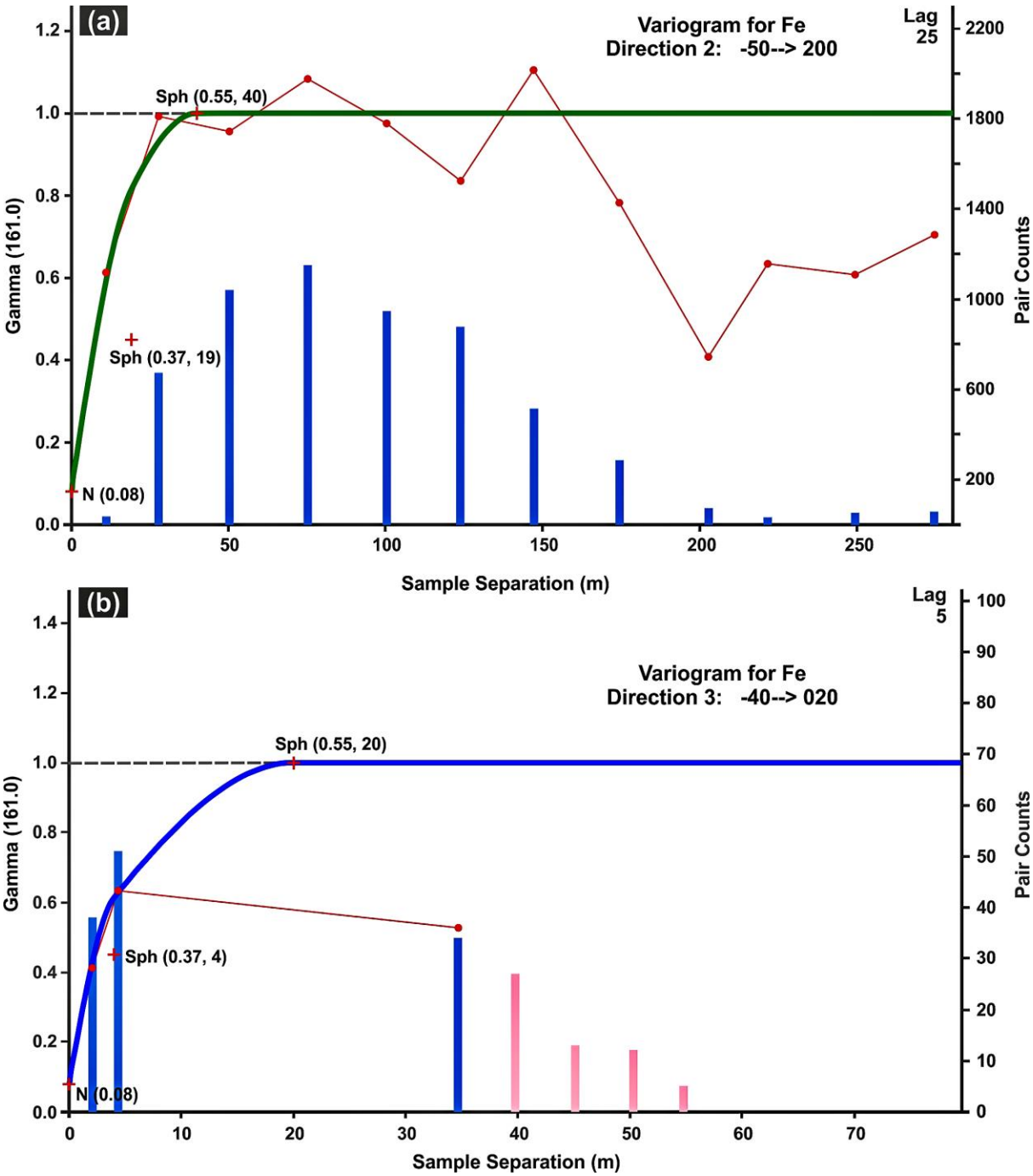
Electronic Supplementary Material ESM3: Vertical and Directional Empirical Variogram Analyses

This supplementary material contains variogram analyses generated to determine the anisotropic feature and spatial dependence of Fe (iron) concentration in the study area. The figures presented in the document include empirical variogram models representing the continuity in the vertical direction along the boreholes (S. Fig. 4a) and the structural variability in different geometric directions (S. Figs. 4b, 5a, and 5b).



S. Fig. 4a – Empirical variogram showing the spatial continuity of Fe (Iron) concentration in the vertical direction in a specific downhole. The downhole variogram reveals the relationship and structure of the values measured along the downhole with depth. **b –** Direction-1 variogram (Dip: 00°, Dip Direction: 110°). (The Sph point/points, which are called Structure, are defined as the spatial continuity component at different scales).



S. Fig. 5a – Direction-2 variogram (Dip: -50^{o}, Dip Direction: 200^{o}). **b** – Direction-3 variogram (Dip: -40^{o}, Dip Direction: 20^{o}).