Supplemental Material 2

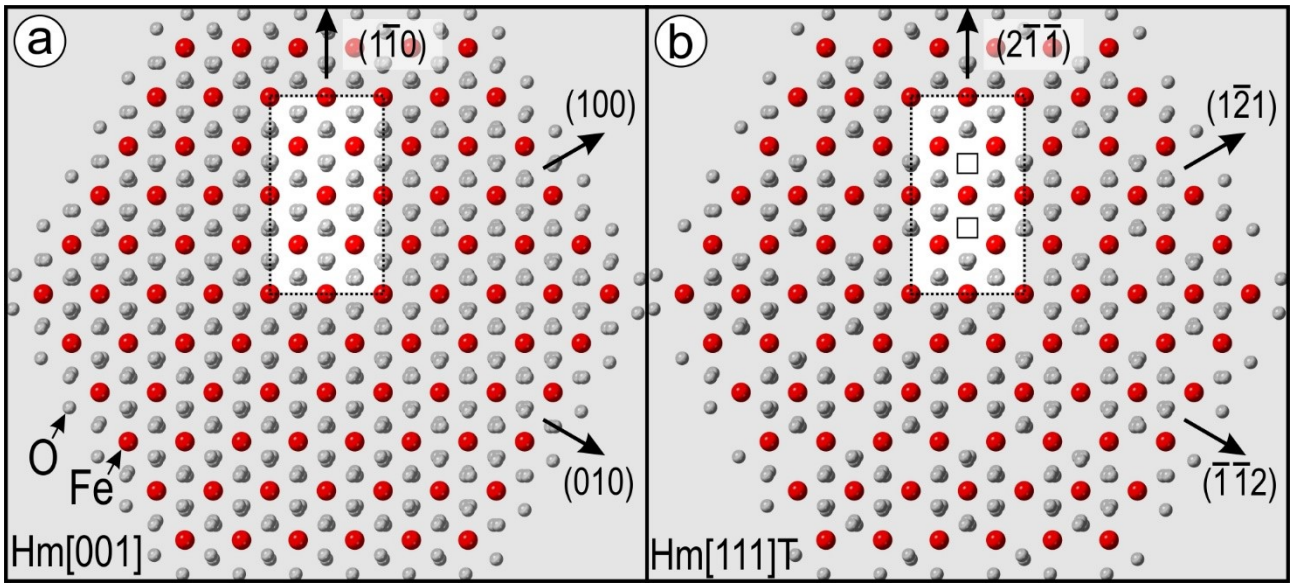

Fig. S1. Schematic showing (a) ideal distribution of Fe and O in hematite on the [001] zone axis (hexagonal setting) and (b) two-fold superstructure model on the $[111]T_{P1}$ zone axis (rhombohedral axes) showing location of proposed vacancies as empty squares along directions as marked.

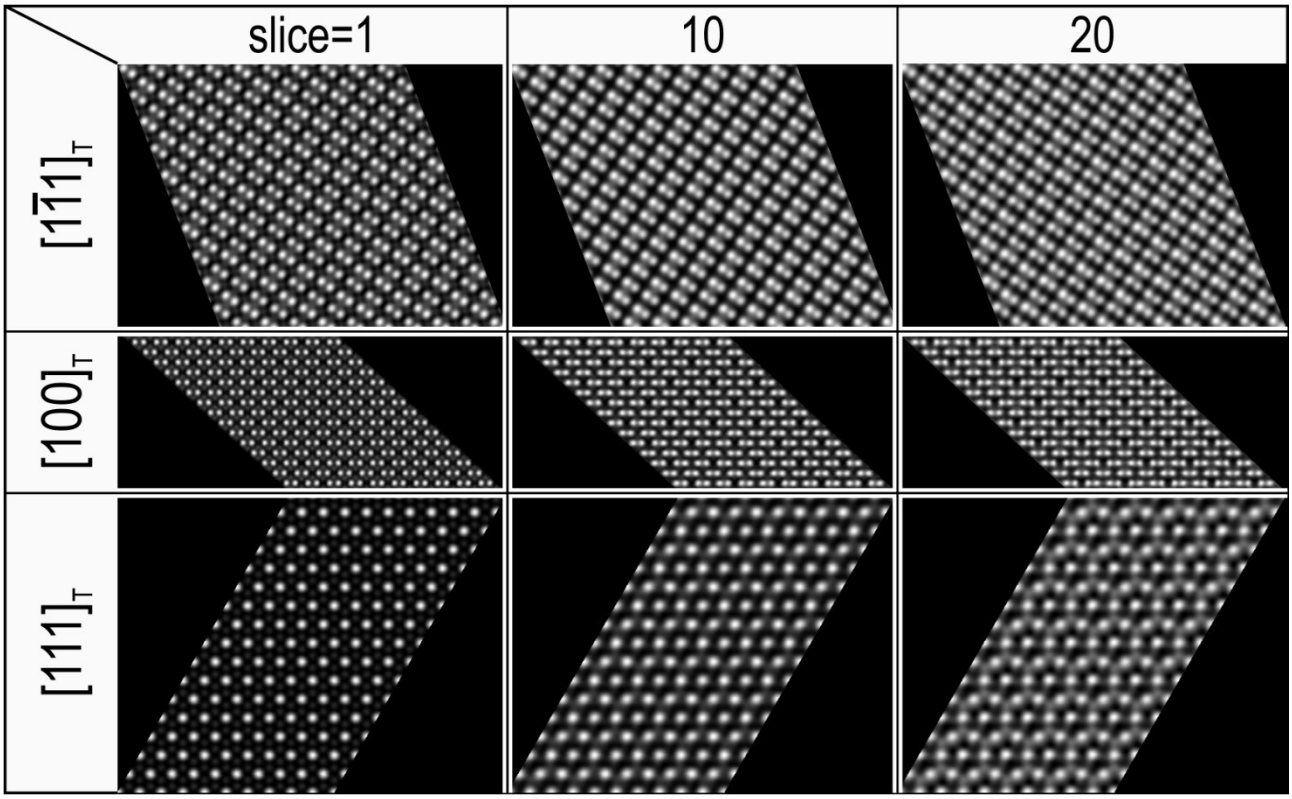

Fig. S2. STEM simulations for the two-fold superstructure with oxygen vacancies in hematite for three difference slices using probe = 1. Note enhanced 'phantom effects' in the higher-order slices for $[100]T$.

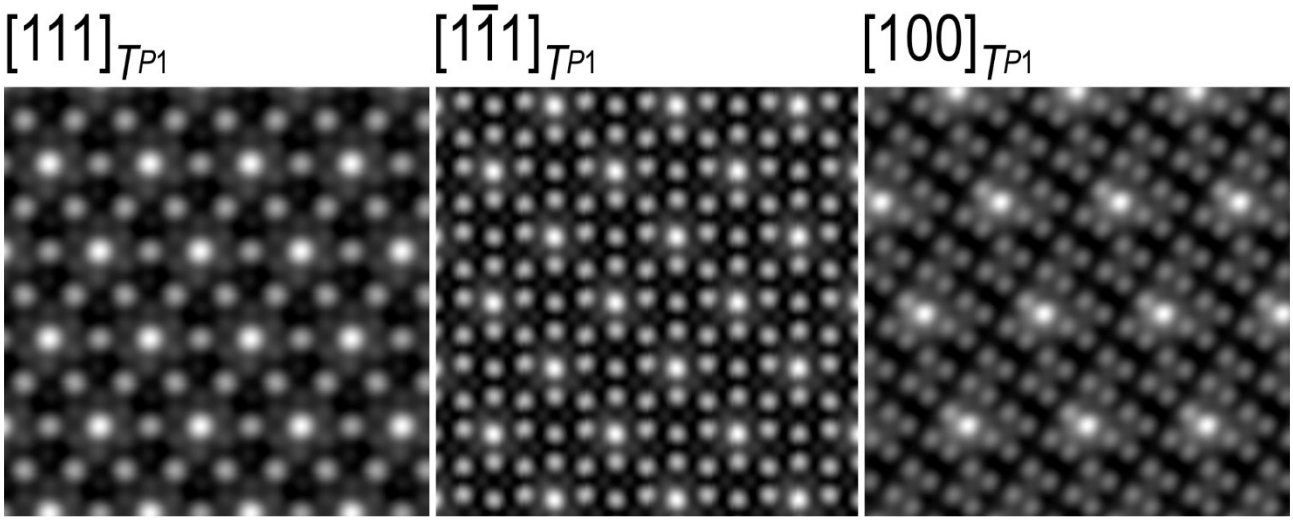

Fig. S3. STEM simulations for the 2-fold superstructure of U-bearing hematite using the model of McBriarty *et al*. (2018). The superstructure is well marked by strong increase in the intensity for the U. Note good match with models in Fig. 10, except for $[100]T$. In the latter case the rhombic motif is enhanced but the motif periodicity is four-fold rather than two-fold.