

Movie S1: Diversified B-cell/Ab epitope (Caton Sa) highlighted on 3D HA trimer structure. Amino acid positions are highlighted on the A/California/04/2009 HA protein structure (PDB ID: 3UBQ) based on the A/California/04/2009 full length HA numbering. Non-overlapping Caton Sa B-cell/Ab epitope positions are highlighted in blue, non-overlapping positions found to be experiencing diversifying selection in the evolution of the pre-pandemic H1N1 strains are highlighted in red, non-overlapping positions that have mutated between the early and late pandemic H1N1 strains are highlighted in yellow, pre-pandemic diversified sites that are located in the Caton Sa B-cell/Ab epitope are highlighted in purple, mutated pandemic sites that are located in the Caton Sa B-cell/Ab epitope are highlighted in green, sites found to be under diversifying selection in the evolution of the pre-pandemic strains and mutated in the pandemic lineage are highlighted in orange.

Movie S2: Diversified B-cell/Ab epitope (IEDB ID: 159269) highlighted on 3D HA trimer structure. Amino acid positions are highlighted on the A/California/04/2009 HA protein structure (PDB ID: 3UBQ) based on the A/California/04/2009 full length HA numbering. Non-overlapping IEDB ID: 159269 B-cell/Ab epitope positions are highlighted in blue, non-overlapping positions found to be experiencing diversifying selection in the evolution of the pre-pandemic H1N1 strains are highlighted in red, non-overlapping positions that have mutated between the early and late pandemic H1N1 strains are highlighted in yellow, pre-pandemic diversified sites that are located in the IEDB ID: 159269 B-cell/Ab epitope are highlighted in purple, mutated pandemic sites that are located in the IEDB ID: 159269 B-cell/Ab epitope are highlighted in green, sites found to be under diversifying selection in the evolution of the pre-pandemic strains and mutated in the pandemic lineage are highlighted in orange.

Movie S3: Diversified B-cell/Ab epitope (Caton Sb) highlighted on 3D HA trimer structure. Amino acid positions are highlighted on the A/California/04/2009 HA protein structure (PDB ID: 3UBQ) based on the A/California/04/2009 full length HA numbering. Non-overlapping Caton Sb B-cell/Ab epitope positions are highlighted in blue, non-overlapping positions found to be experiencing diversifying selection in the evolution of the pre-pandemic H1N1 strains are highlighted in red, non-overlapping positions that have mutated between the early and late pandemic H1N1 strains are highlighted in yellow, pre-pandemic diversified sites that are located in the Caton Sb B-cell/Ab epitope are highlighted in purple, mutated pandemic sites that are located in the Caton Sb B-cell/Ab epitope are highlighted in green, sites found to be under diversifying selection in the evolution of the pre-pandemic strains and mutated in the pandemic lineage are highlighted in orange.