Supplementary Material

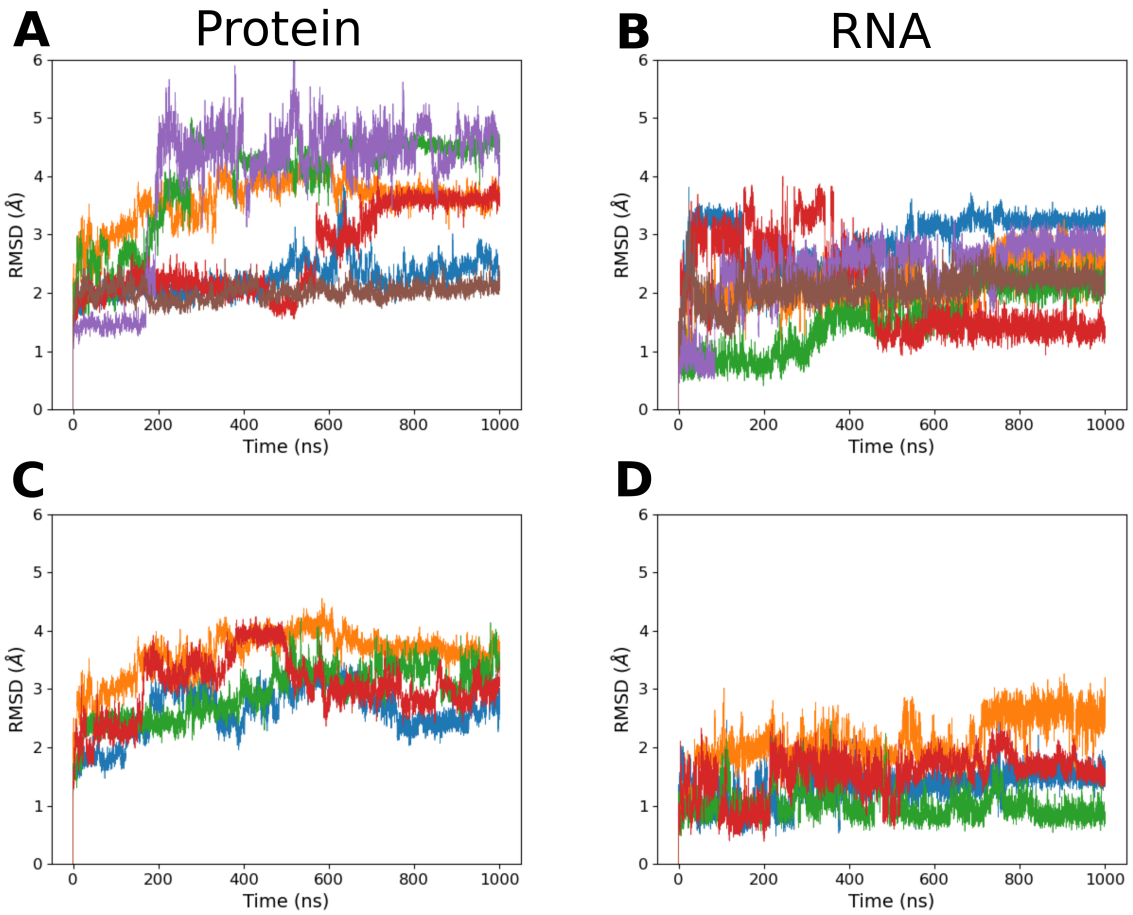

Figure S1. RMSD time evolution for protein (**A** and **C**) and 9-15 RNA sequence (**B** and **D**) along the 1 μs trajectory for the RNA sequences (**A** and **B**): control (blue), °GCCCUG°G (orange), GCCCU°GG (green), °GCCCUGG (red), GCCCUG°G (violet), °GCCC°GGG (brown); or the protein variant in presence of °GCCCUG°G RNA sequence: WT (orange), K23Q (blue), K23M (green), K31D (red). Structures where align on the first protein position.

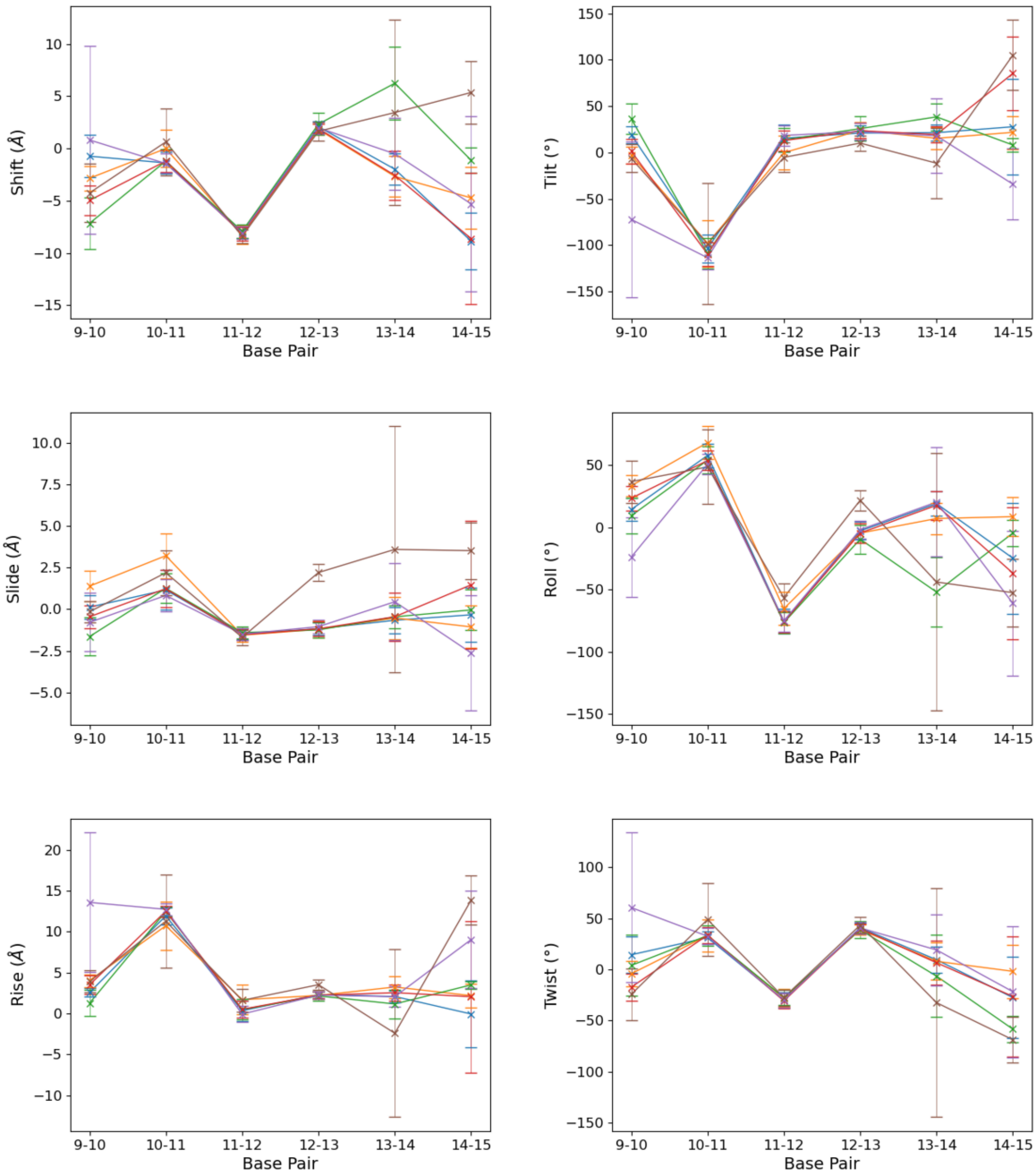

Figure S2. Mean RNA inter bases parameters for the different RNA sequences: control (blue), °GCCCUG°G (orange), GCCCU°GG (green), °GCCCUGG (red), GCCCUG°G (violet), °GCCC°GGG (brown). Errors bars correspond to standard deviations.

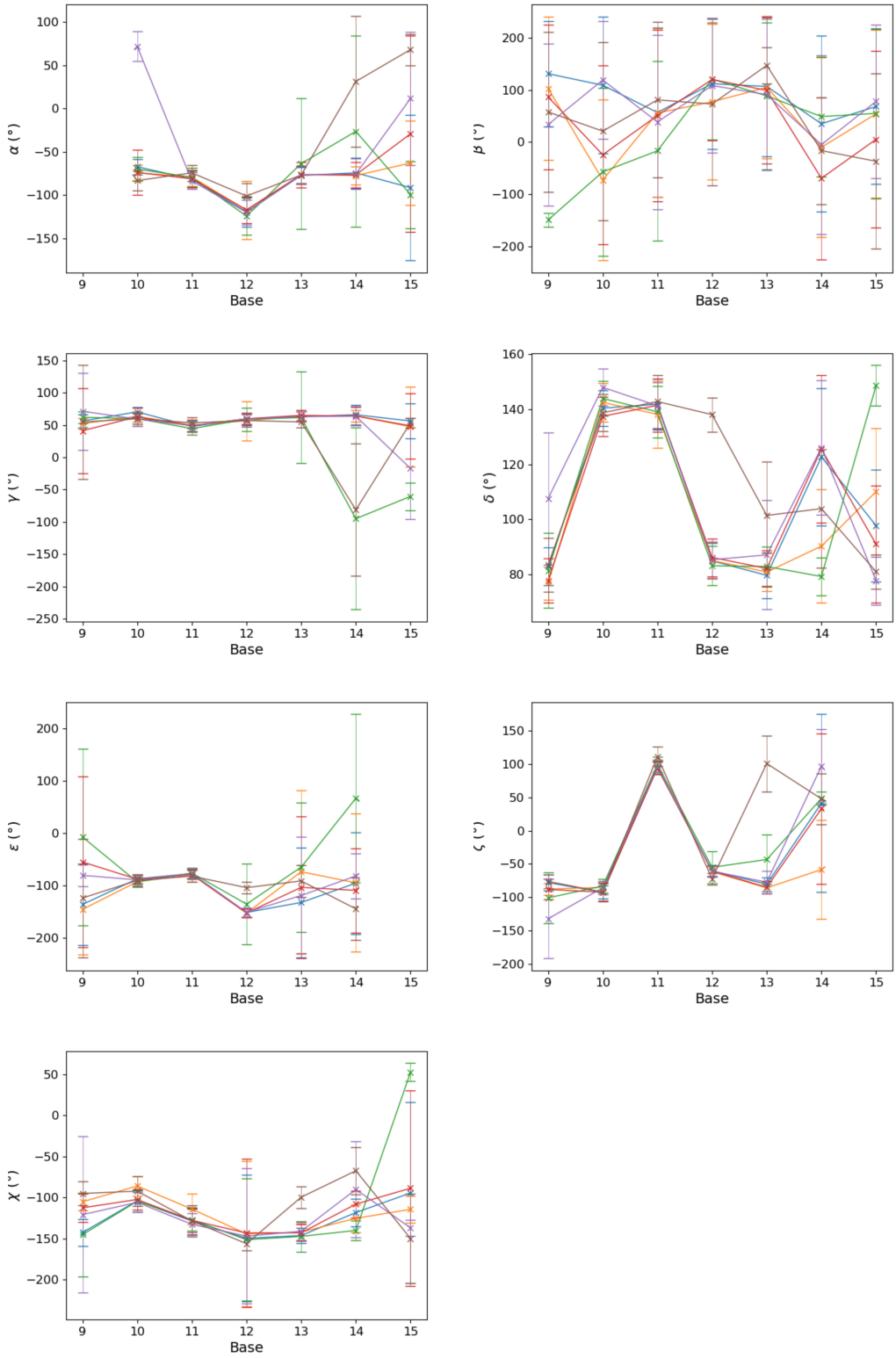

Figure S3. Mean RNA backbone dihedral angles for the different RNA sequences: control (blue), °GCCCUG°G (orange), GCCCU°GG (green), °GCCCUGG (red), GCCCUG°G (violet), °GCCC°GGG (brown). Errors bars correspond to standard deviations.

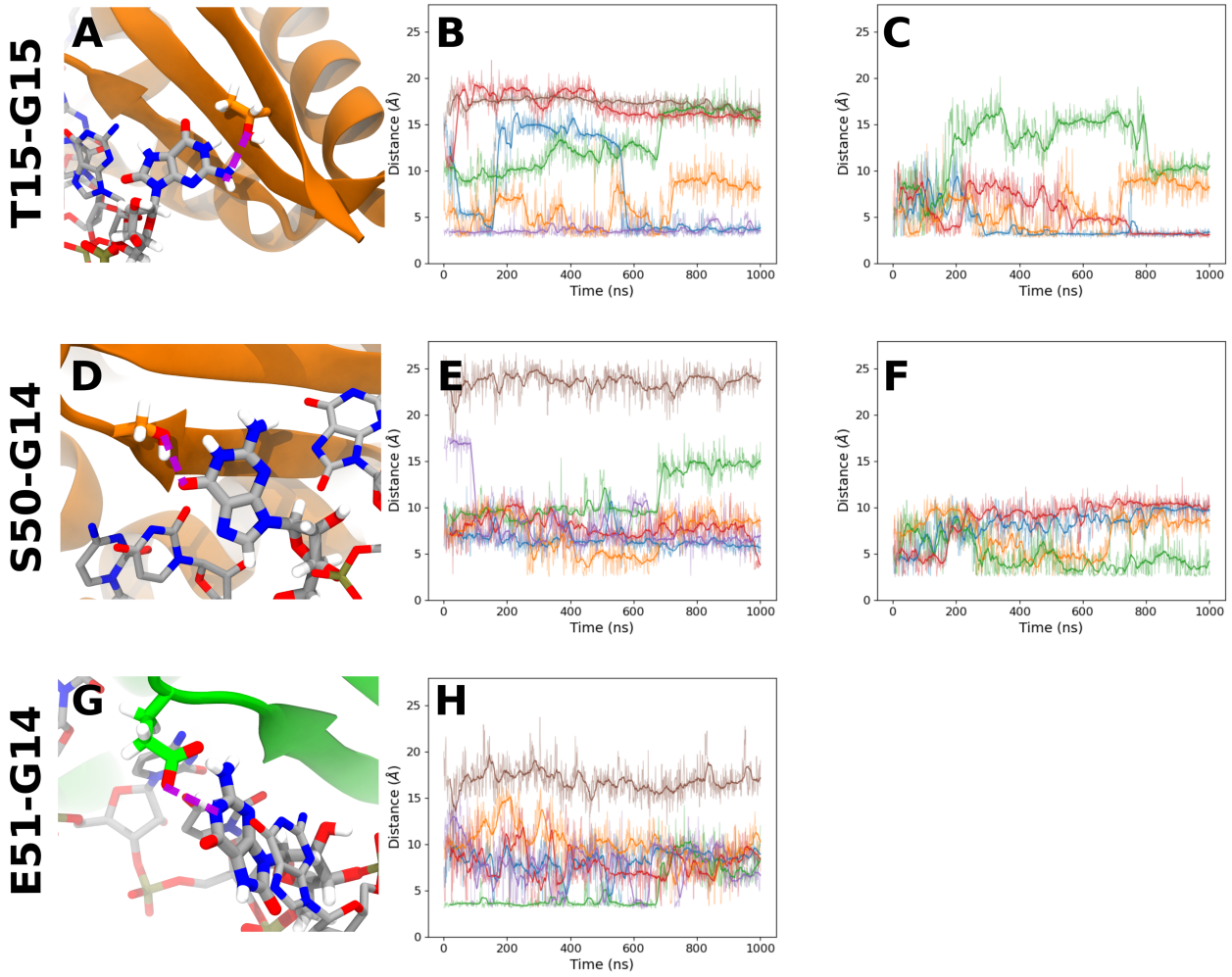

Figure S4. Representation (**A**, **D**, **G**) and time evolution of the different distances for interaction involving atom T15 Oγ and G15 (or °G15) N2 (**A**, **B** and **C**), S50 Oγ and G14 (or °G14) O6 (**D**, **E** and **F**) and E51 Cδ and G14 (or °G14) N1 (**G** and **H**). **B**, **E** and **H** report the data for the different RNA sequences: control (blue), °GCCCUG°G (orange), GCCCU°GG (green), °GCCCUGG (red), GCCCUG°G (violet), °GCCC°GGG (brown); and **C** and **F** for the different protein mutants WT (orange), K23Q (blue), K23M (green), K31D (red).

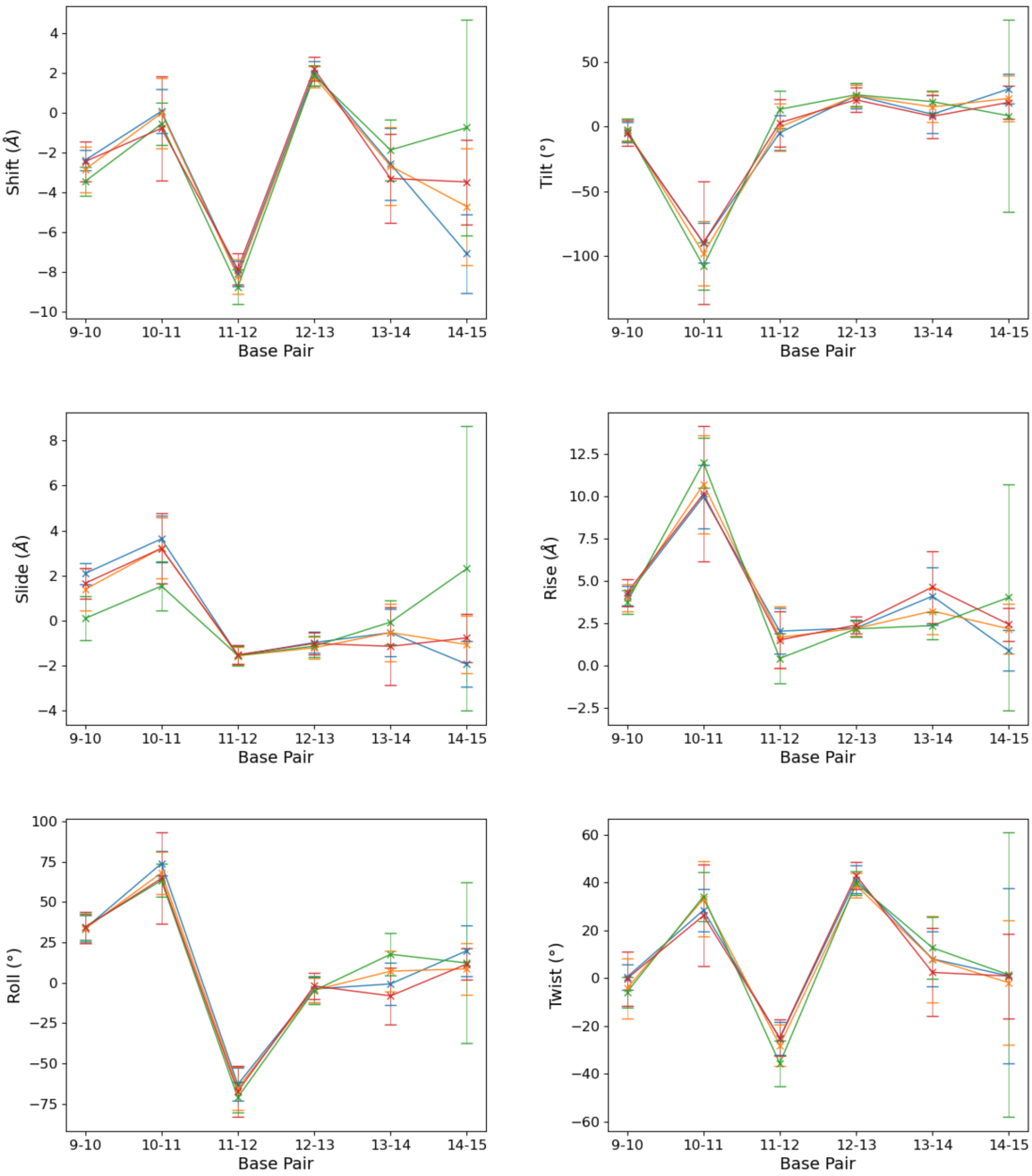

Figure S5. Mean RNA inter bases parameters for the different PCBP1 mutant in the presence of the °GCCCUG°G RNA sequence: WT (orange), K23Q (blue), K23M (green), K31D (red). Errors bars correspond to standard deviations.

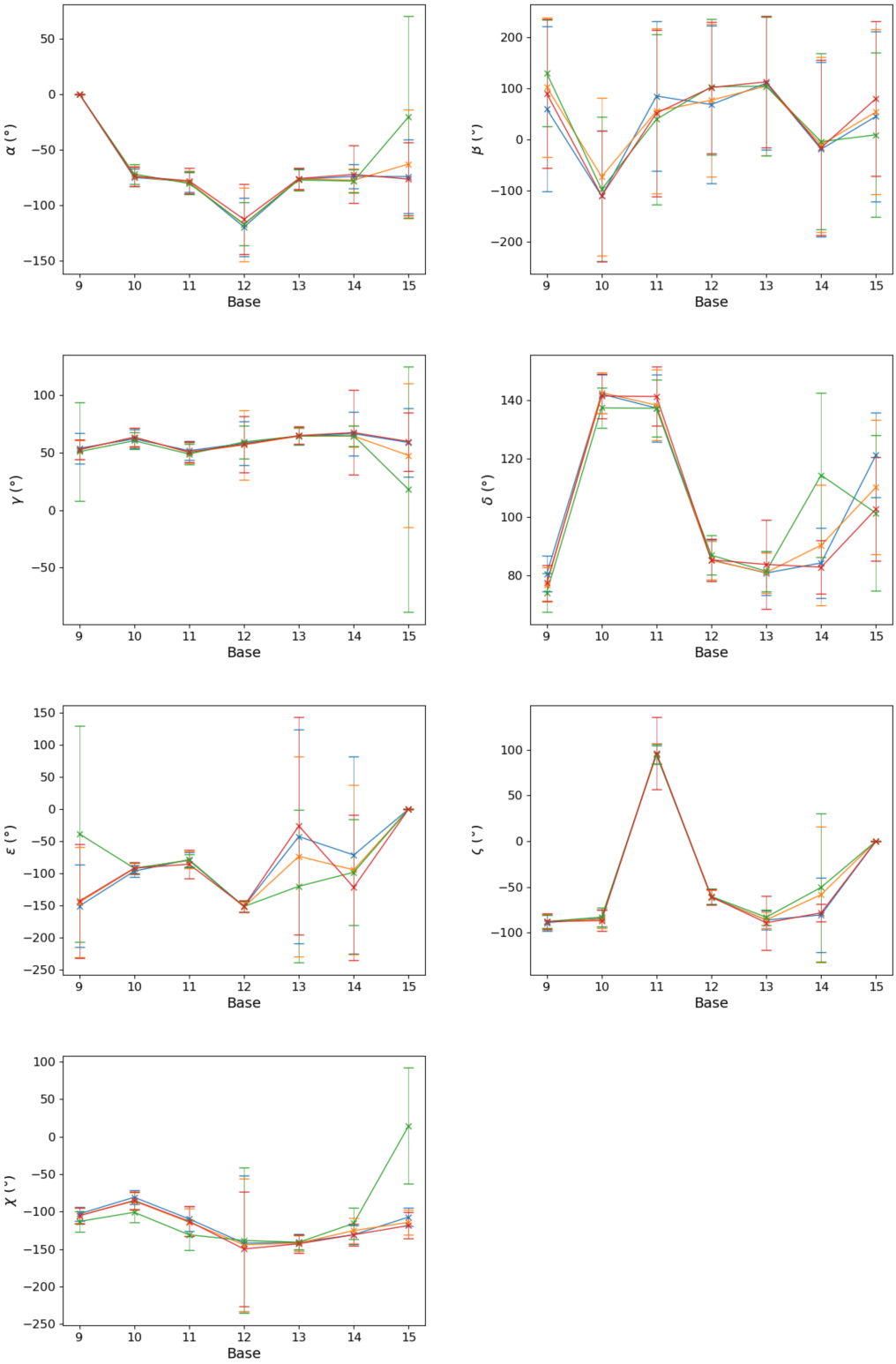

Figure S6. Mean RNA backbone dihedral angles for the different PCBP1 mutant in the presence of the °GCCCUG°G RNA sequence: WT (orange), K23Q (blue), K23M (green), K31D (red). Errors bars correspond to standard deviations.

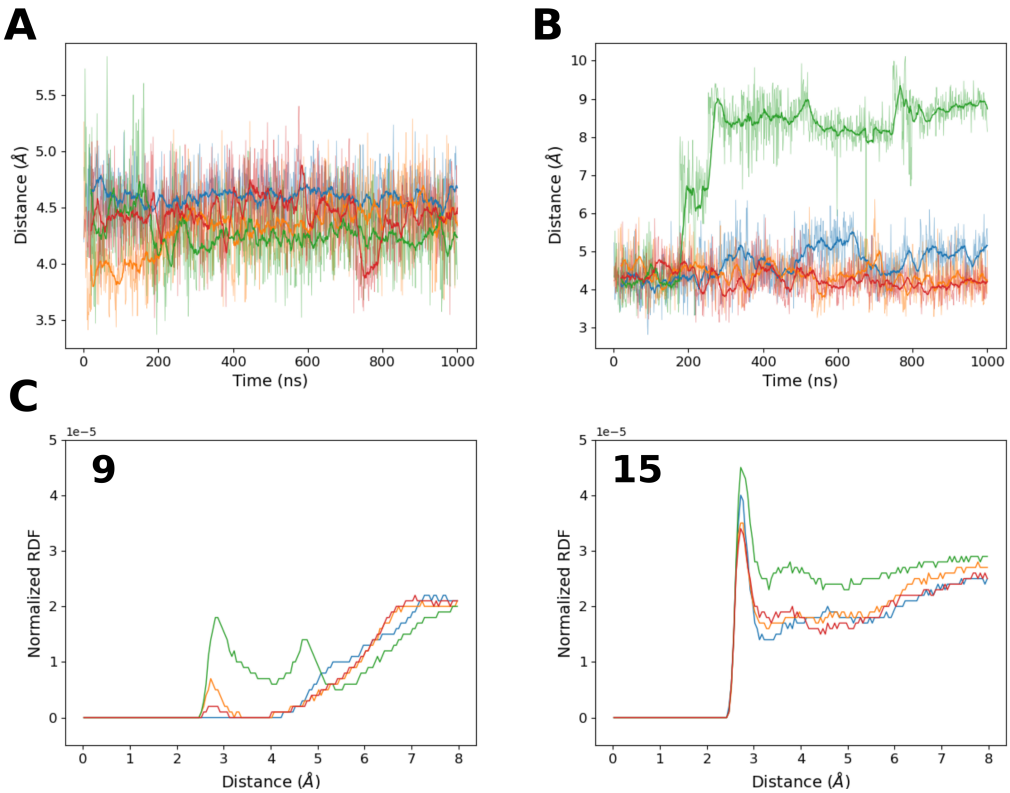

Figure S7. **A**. Time evolution of the distance between 8-oxoG9 O8 and the closest 8-oxoG9 phosphate oxygen atom for the RNA °GCCCUG°G sequences with different protein mutants.**B** Time evolution of the distance between 8-oxoG O8 and the closest 8-oxoG phosphate oxygen atom for damage at the 15th position for the RNA °GCCCUG°G sequences with different protein mutants. **C**. Radial distribution function of water oxygen atom around the O8 atom of the different 8-oxoG in position 9 and 15 for the RNA °GCCCUG°G sequences with different protein mutants. For all graphs, the colors are: WT (orange), K23Q (blue), K23M (green), K31D (red).