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| **Table S1 Summary of Classifications Across Temporal Groups** | | | | | | | | | | |
|  | **Entity** | **Align** | **Resolution (Å)** | | **Modeled** | | **Soft missing** | | **Hard missing** | |
|  |  |  | Average | Std | Residues | (%) | Residues | (%) | Residues | (%) |
| **Legacy** | 9,857 | 7,360 | 4.51 | ± 3.31 | 1,836,642 | 77 | 72,681 | 3 | 474,476 | 20 |
| **Span** | 3,935 | 938 | 3.88 | ± 2.30 | 284,790 | 61 | 72,315 | 15 | 111,585 | 24 |
| **Recent** | 8,315 | 63,54 | 3.34 | ± 1.14 | 1,713,677 | 73 | 111,694 | 5 | 528,346 | 22 |
| **Total** | 22,107 | 14,652 | 3.89 | ± 2.45 | 3,835,109 | 74 | 256,690 | 5 | 1,114,407 | 21 |

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| **Table S2 Compositional summary of datasets** | | | | | | | | | |
|  | **Modeled** | | | **Soft Missing** | | | **Hard Missing** | | |
| **Residue** | **Legacy** | **Span** | **Recent** | **Legacy** | **Span** | **Recent** | **Legacy** | **Span** | **Recent** |
| R | 6.1 | 5.5 | 5.7 | 6.3 | 5.6 | 6.6 | 5.8 | 5.9 | 5.8 |
| H | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.3 | 1.9 | 1.9 | 2.0 |
| K | 6.5 | 6.0 | 6.1 | 7.2 | 7.1 | 7.5 | 7.4 | 7.3 | 7.1 |
| D | 4.9 | 5.0 | 4.9 | 5.7 | 5.7 | 5.5 | 5.9 | 5.9 | 6.0 |
| E | 6.2 | 6.3 | 6.2 | 8.4 | 8.0 | 8.6 | 8.2 | 8.7 | 8.4 |
| S | 6.1 | 6.2 | 6.2 | 6.3 | 6.8 | 6.1 | 9.0 | 9.8 | 9.2 |
| T | 5.3 | 5.3 | 5.2 | 5.0 | 5.1 | 5.1 | 5.5 | 5.4 | 5.4 |
| N | 4.1 | 4.1 | 4.2 | 4.3 | 4.5 | 4.3 | 4.2 | 4.1 | 4.3 |
| Q | 3.8 | 4.0 | 3.9 | 4.8 | 4.5 | 5.2 | 4.6 | 4.8 | 4.7 |
| C | 1.4 | 1.7 | 1.6 | 1.2 | 1.7 | 1.4 | 1.0 | 1.1 | 1.3 |
| G | 6.4 | 5.8 | 6.3 | 5.8 | 5.8 | 5.2 | 6.8 | 7.0 | 6.8 |
| P | 4.4 | 4.2 | 4.4 | 4.4 | 4.6 | 4.3 | 6.1 | 6.8 | 6.3 |
| A | 7.5 | 7.0 | 7.4 | 7.7 | 6.7 | 7.1 | 8.6 | 7.8 | 8.0 |
| V | 7.1 | 7.2 | 7.0 | 6.1 | 6.1 | 5.6 | 5.2 | 5.1 | 5.2 |
| I | 6.1 | 6.5 | 6.1 | 5.3 | 5.4 | 5.3 | 3.7 | 3.4 | 3.8 |
| L | 10.2 | 11 | 10.5 | 9.8 | 9.7 | 10 | 7.8 | 7.6 | 7.7 |
| M | 2.3 | 2.5 | 2.3 | 2.2 | 2.2 | 2.2 | 2.7 | 2.4 | 2.5 |
| F | 4.4 | 4.5 | 4.6 | 3.5 | 4.0 | 3.6 | 2.8 | 2.4 | 2.8 |
| Y | 3.5 | 3.6 | 3.5 | 2.8 | 3.0 | 3.0 | 1.9 | 1.8 | 2.0 |
| W | 1.4 | 1.4 | 1.5 | 1.0 | 1.1 | 1.1 | 0.7 | 0.8 | 0.8 |

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| **Table S3 Disorder Score Distributions Across Datasets** | | | | | | | | | | |
|  |  | **Modeled** | | | **Soft Missing** | | | **Hard Missing** | | |
|  |  | Legacy | Span | Recent | Legacy | Span | Recent | Legacy | Span | Recent |
| **pLDDT** | Average | 89.38 | 89.76 | 88.58 | 82.6 | 81.23 | 81.5 | 58.67 | 54.07 | 58.35 |
|  | Std | ± 11.16 | ± 9.12 | ± 12.19 | ± 14.98 | ± 15.71 | ± 15.45 | ± 22.87 | ± 22.98 | ± 23.85 |
| **flDPnn** | Average | 0.11 | 0.07 | 0.09 | 0.1 | 0.09 | 0.1 | 0.25 | 0.24 | 0.23 |
|  | Std | ± 0.14 | ± 0.11 | ± 0.13 | ± 0.14 | ± 0.13 | ± 0.14 | ± 0.22 | ± 0.23 | ± 0.23 |
| **IUPredS** | Average | 0.20 | 0.17 | 0.19 | 0.25 | 0.23 | 0.26 | 0.42 | 0.45 | 0.42 |
|  | Std | ± 0.17 | ± 0.16 | ± 0.17 | ± 0.18 | ± 0.18 | ± 0.18 | ± 0.25 | ± 0.24 | ± 0.25 |
| **IUPredL** | Average | 0.22 | 0.19 | 0.21 | 0.29 | 0.25 | 0.3 | 0.44 | 0.49 | 0.44 |
|  | Std | ± 0.17 | ± 0.16 | ± 0.17 | ± 0.19 | ± 0.19 | ± 0.19 | ± 0.26 | ± 0.26 | ± 0.26 |

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| **Table S4 Details of Logistic Regression for Disorder Predicted Scores** | | | | |
| **Models** | **Classes** | **Intercept** | **Coefficient** | **Boundary** |
| **LR\_pLDDT** | Modeled | -6.17 | 0.07 | 92.9 |
|  | Soft Missing | -2.32 | 0.02 | 112.19 |
|  | Hard Missing | 4.45 | -0.07 | 64.57 |
| **LR\_flDPnn** | Modeled | -0.36 | -2.45 | -0.15 |
|  | Soft Missing | -0.29 | -3.07 | -0.1 |
|  | Hard Missing | -1.42 | 4.59 | 0.31 |
| **LR\_IUPredS** | Modeled | 0.15 | -3.23 | 0.05 |
|  | Soft Missing | -0.36 | -1.2 | -0.3 |
|  | Hard Missing | -2 | 4.13 | 0.48 |
| **LR\_IUPredL** | Modeled | 0.24 | -3.25 | 0.07 |
|  | Soft Missing | -0.42 | -0.88 | -0.48 |
|  | Hard Missing | -1.98 | 3.81 | 0.52 |

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| **Table S5 Model Performance Summary on Dataset** | | | | | |
| **Dataset** | **Models** | **Precision** | **Recall** | **F1** | **AUC** |
| **Span** | LR\_pLDDT | 0.68 | 0.75 | 0.71 | 0.89 |
|  | LR\_fldpnn | 0.57 | 0.54 | 0.55 | 0.76 |
|  | LR\_IUPredS | 0.51 | 0.71 | 0.59 | 0.81 |
|  | LR\_IUPredL | 0.51 | 0.70 | 0.59 | 0.81 |
|  | CLTC | 0.74 | 0.67 | 0.71 | 0.88 |
|  | CLTC\_pLDDT | 0.82 | 0.71 | 0.76 | 0.91 |
| **Recent** | LR\_pLDDT | 0.62 | 0.68 | 0.65 | 0.85 |
|  | LR\_fldpnn | 0.46 | 0.51 | 0.49 | 0.71 |
|  | LR\_IUPredS | 0.45 | 0.63 | 0.52 | 0.76 |
|  | LR\_IUPredL | 0.44 | 0.62 | 0.51 | 0.76 |
|  | CLTC | 0.62 | 0.63 | 0.62 | 0.84 |
|  | CLTC\_pLDDT | 0.77 | 0.6 | 0.67 | 0.87 |
| **Recent\_LH** | LR\_pLDDT | 0.60 | 0.67 | 0.63 | 0.83 |
|  | LR\_fldpnn | 0.54 | 0.50 | 0.52 | 0.70 |
|  | LR\_IUPredS | 0.50 | 0.63 | 0.56 | 0.76 |
|  | LR\_IUPredL | 0.50 | 0.63 | 0.55 | 0.76 |
|  | CLTC | 0.63 | 0.63 | 0.63 | 0.82 |
|  | CLTC\_pLDDT | 0.74 | 0.59 | 0.66 | 0.85 |