



STRUCTURAL
BIOLOGY

Volume 78 (2022)

Supporting information for article:

**CSSR: assignment of secondary structure to coarse-grained RNA
tertiary structures**

Chengxin Zhang and Anna Marie Pyle

S1. Evaluation metrics for rSS assignment

The accuracy of rSS assignment by CSSR can be measured by F1-score and Mathews Correlation Coefficient (MCC) for each target:

$$F1 = \frac{2 \cdot TP}{2 \cdot TP + FP + FN} \dots (S1)$$

$$MCC = \frac{TP \cdot TN - FP \cdot FN}{\sqrt{(TP + FP)(TP + FN)(TN + FP)(TN + FN)}} \dots (S2)$$

In the above equations, TP is the number of True Positive base pairs correctly assigned by CSSR; FP is the number of False Positive base pairs assigned by CSSR and not in the ground-truth DSSR assignment; FN is the number of False Negative base pairs in the ground-truth assignment that are missed by CSSR; TN is the number of True Negative nucleotide pairs that are neither assigned by CSSR nor by DSSR. Higher F1-score and higher MCC both correspond to better accuracy; both metrics equal to 1 for perfect assignment.

Table S1 Target-specific F1-score of all atom types supported by CSSR for 361 benchmark RNAs.

The RNA name consists of a 4-character PDB ID, followed by the chain ID. For example, 5g2xA means PDB ID 5g2x Chain A.

† “All” means using all supported atoms. CSSR supported any combination of its 10 types of atoms. Due to limitation of space, we only show two combinations: all atoms, and C1’C4’P atoms.

‡ “N” is atom N9 and N1 for purine and pyrimidine, respectively.

RNA#	All [†]	C1’C4’P	P	O5’	C5’	C4’	C3’	C2’	C1’	O4’	O3’	N [‡]
5g2xA	0.661	0.667	0.527	0.577	0.624	0.593	0.574	0.575	0.577	0.562	0.550	0.389
6c4hA	0.926	0.908	0.744	0.756	0.865	0.857	0.868	0.858	0.900	0.874	0.831	0.907
6hiwCA	0.902	0.881	0.630	0.617	0.671	0.759	0.648	0.676	0.855	0.800	0.600	0.832
6chrA	0.941	0.934	0.773	0.819	0.840	0.890	0.873	0.888	0.884	0.910	0.874	0.720
6hixAA	0.901	0.906	0.602	0.662	0.762	0.783	0.784	0.735	0.846	0.783	0.734	0.855
6n7rR	0.943	0.937	0.853	0.893	0.922	0.936	0.904	0.898	0.918	0.922	0.913	0.919
1fg0A	0.947	0.939	0.866	0.887	0.886	0.905	0.907	0.912	0.913	0.914	0.892	0.875
5wlcL0	0.965	0.960	0.891	0.935	0.961	0.953	0.960	0.953	0.933	0.946	0.961	0.778
5zwnP	0.911	0.905	0.868	0.862	0.895	0.894	0.877	0.880	0.886	0.894	0.850	0.845
6swe2	0.940	0.936	0.807	0.870	0.899	0.892	0.863	0.853	0.883	0.875	0.857	0.856
5j01A	0.958	0.954	0.891	0.916	0.923	0.931	0.908	0.894	0.939	0.930	0.895	0.921
6agbA	0.914	0.902	0.767	0.818	0.898	0.880	0.856	0.882	0.885	0.892	0.853	0.865
6q9a4	0.738	0.789	0.489	0.545	0.693	0.764	0.625	0.629	0.825	0.811	0.549	0.776
3bwpA	0.954	0.935	0.877	0.905	0.931	0.898	0.902	0.880	0.915	0.903	0.877	0.918
3q1qB	0.986	0.991	0.819	0.911	0.954	0.941	0.927	0.944	0.963	0.973	0.946	0.982
6ahuA	0.924	0.911	0.838	0.821	0.899	0.900	0.896	0.862	0.895	0.885	0.904	0.790
6w2s0	0.729	0.717	0.571	0.566	0.602	0.604	0.645	0.556	0.786	0.635	0.583	0.650
6q954	0.775	0.800	0.600	0.640	0.676	0.791	0.647	0.645	0.756	0.758	0.705	0.867
5u4ja	0.958	0.964	0.875	0.894	0.947	0.946	0.892	0.893	0.925	0.946	0.885	0.918
2a64A	0.952	0.979	0.856	0.898	0.969	0.958	0.925	0.915	0.941	0.963	0.942	0.946
6g901	0.895	0.906	0.889	0.851	0.871	0.877	0.871	0.884	0.872	0.883	0.890	0.846
6sxoL5	0.929	0.915	0.667	0.725	0.889	0.874	0.842	0.876	0.915	0.903	0.837	0.919
5flxz	0.962	0.948	0.865	0.850	0.930	0.929	0.903	0.899	0.941	0.935	0.930	0.967
6frk1	0.949	0.928	0.920	0.907	0.923	0.909	0.909	0.819	0.855	0.884	0.850	0.820
5a81A	0.849	0.857	0.571	0.611	0.693	0.831	0.687	0.733	0.677	0.839	0.758	0.741
1x8wB	0.964	0.957	0.847	0.898	0.906	0.920	0.906	0.897	0.918	0.934	0.884	0.892
5tc1R	0.711	0.697	0.602	0.667	0.619	0.677	0.687	0.661	0.650	0.672	0.702	0.456
5oql2	0.894	0.881	0.718	0.701	0.835	0.825	0.829	0.833	0.790	0.840	0.871	0.861
1y0qA	0.970	0.970	0.904	0.934	0.934	0.963	0.933	0.933	0.939	0.955	0.963	0.833
6j6qL	0.949	0.938	0.863	0.884	0.839	0.949	0.889	0.887	0.938	0.949	0.825	0.899
6p5n1	0.819	0.835	0.731	0.750	0.735	0.808	0.720	0.729	0.833	0.804	0.707	0.776
5zwmH	0.883	0.902	0.831	0.850	0.843	0.876	0.840	0.850	0.855	0.885	0.765	0.793
5jupEC	0.904	0.849	0.627	0.699	0.720	0.825	0.735	0.778	0.804	0.812	0.667	0.791
1u6bB	0.982	0.972	0.917	0.924	0.953	0.933	0.942	0.943	0.942	0.942	0.935	0.942
6d904	0.737	0.755	0.633	0.597	0.643	0.691	0.691	0.453	0.667	0.692	0.586	0.692
4gmaZ	0.906	0.887	0.756	0.810	0.835	0.836	0.821	0.850	0.883	0.850	0.857	0.779
6gyvA	0.992	0.983	0.911	0.933	0.975	0.967	0.942	0.942	0.959	0.951	0.959	0.966

5v3iA	0.992	1.000	0.975	0.959	0.943	0.992	0.924	0.941	0.992	0.975	0.967	0.919
3jcs3	0.897	0.812	0.641	0.853	0.785	0.771	0.759	0.704	0.716	0.829	0.691	0.618
6az34	0.940	0.929	0.891	0.876	0.941	0.922	0.900	0.889	0.949	0.922	0.874	0.876
6j6gD	0.936	0.946	0.851	0.905	0.911	0.935	0.870	0.921	0.889	0.935	0.884	0.814
3dilA	0.976	0.984	0.952	0.917	0.952	0.942	0.936	0.952	0.984	0.959	0.984	0.959
5lj3Z	0.989	0.989	0.894	0.918	0.943	0.977	0.944	0.955	0.955	0.977	0.929	0.966
5t2aE	0.989	0.977	0.876	0.876	0.933	0.944	0.955	0.861	0.943	0.954	0.944	0.878
3p49A	0.918	0.914	0.824	0.897	0.871	0.927	0.916	0.897	0.853	0.897	0.881	0.739
5wlcL2	0.894	0.875	0.708	0.783	0.840	0.875	0.824	0.863	0.870	0.857	0.778	0.556
6ufhA	0.978	0.978	0.882	0.925	0.957	0.935	0.913	0.933	0.955	0.956	0.909	0.966
6qx9l	0.952	0.964	0.843	0.941	0.927	0.964	0.914	0.878	0.900	0.964	0.940	0.937
6az37	0.980	1.000	0.863	0.873	0.923	0.980	0.917	0.889	0.936	0.939	0.863	0.913
6ft62	0.958	0.957	0.833	0.755	0.880	0.880	0.783	0.864	0.894	0.917	0.875	0.780
3pdrA	0.969	0.958	0.907	0.889	0.891	0.917	0.896	0.917	0.947	0.926	0.880	0.917
4gxyA	0.942	0.923	0.849	0.922	0.913	0.878	0.871	0.880	0.839	0.909	0.857	0.780
6oleD	0.977	0.977	0.844	0.870	0.894	0.977	0.857	0.905	0.976	0.955	0.930	0.976
5xxb4	0.952	0.952	0.818	0.708	0.889	0.884	0.829	0.850	0.905	0.905	0.905	0.865
1u9sA	0.958	0.969	0.898	0.918	0.959	0.959	0.926	0.903	0.949	0.958	0.926	0.958
5xy34	0.913	0.894	0.775	0.833	0.816	0.851	0.808	0.808	0.844	0.870	0.902	0.750
4v8pB2	0.950	0.950	0.809	0.711	0.809	0.900	0.821	0.895	0.895	0.923	0.857	0.865
3j79C	1.000	0.981	0.889	0.857	0.893	0.943	0.902	0.840	0.941	0.926	0.941	0.962
1nbsB	0.952	0.964	0.871	0.874	0.943	0.965	0.892	0.914	0.940	0.930	0.897	0.927
6jdvB	1.000	1.000	0.966	0.907	0.966	0.977	0.977	0.977	0.989	0.989	1.000	0.977
6id0H	0.889	0.889	0.821	0.821	0.889	0.842	0.800	0.800	0.842	0.865	0.821	0.857
3hhnC	0.966	0.954	0.897	0.930	0.977	0.954	0.943	0.943	0.944	0.966	0.943	0.966
3ndbM	0.957	0.897	0.854	0.854	0.897	0.828	0.844	0.874	0.847	0.881	0.848	0.835
6exn2	1.000	1.000	0.918	0.935	0.969	1.000	0.954	0.952	0.968	1.000	0.918	0.968
6ahdI	0.982	1.000	0.863	0.808	0.982	0.982	0.963	0.963	0.964	0.964	0.929	0.920
3l3cS	0.865	0.873	0.784	0.833	0.865	0.870	0.861	0.833	0.892	0.873	0.800	0.800
4uykR	0.989	1.000	0.935	0.957	0.946	0.989	0.966	0.977	1.000	0.989	0.978	1.000
2il9A	0.667	0.694	0.597	0.627	0.667	0.723	0.640	0.640	0.714	0.727	0.627	0.593
6n5qA	0.971	0.971	0.877	0.943	0.943	0.930	0.889	0.895	0.901	0.957	0.904	0.957
3v7eC	0.956	0.956	0.933	0.956	0.956	0.933	0.956	0.913	0.923	0.956	0.945	0.918
5ganV	0.923	0.947	0.923	0.895	0.750	0.947	0.919	0.778	0.895	0.900	0.809	0.947
2z75B	1.000	1.000	0.969	0.969	0.952	0.985	0.952	0.952	0.985	1.000	0.970	1.000
5zluX	0.958	0.943	0.800	0.845	0.901	0.866	0.912	0.866	0.862	0.927	0.927	0.724
1vq89	0.955	0.970	0.899	0.909	0.925	0.923	0.927	0.892	0.938	0.939	0.925	0.925
5dm6Y	0.986	0.986	0.943	0.986	0.971	0.971	0.955	0.923	0.923	0.957	0.986	0.939
6t4qC4	0.972	0.958	0.946	0.889	0.946	0.944	0.882	0.882	0.927	0.917	0.917	0.930
5mmiB	0.973	0.959	0.853	0.921	0.919	0.959	0.946	0.944	0.944	0.931	0.959	0.899
4ybbDB	0.986	0.971	0.919	0.986	0.972	0.971	0.941	0.909	0.909	0.957	0.958	0.941
6ek0L7	0.943	0.927	0.800	0.829	0.931	0.895	0.912	0.882	0.831	0.912	0.889	0.895
1nbsA	0.952	0.968	0.892	0.875	0.985	0.954	0.875	0.933	0.951	0.938	0.954	0.935
6qdv2	0.971	1.000	0.882	0.919	1.000	1.000	0.973	1.000	1.000	1.000	1.000	0.909
4v8pB3	0.943	0.927	0.822	0.882	0.866	0.901	0.899	0.895	0.895	0.912	0.873	0.895
3jcs8	0.836	0.821	0.800	0.712	0.815	0.815	0.815	0.739	0.830	0.720	0.821	0.667
4kqyA	0.975	0.975	0.897	0.963	0.950	0.949	0.949	0.935	0.937	0.962	0.950	0.889
6uesA	0.930	0.952	0.892	0.892	0.918	0.918	0.930	0.940	0.964	0.927	0.941	0.927

5xxb3	0.944	0.930	0.827	0.842	0.853	0.836	0.870	0.831	0.836	0.866	0.917	0.733
3j79B	0.986	0.957	0.914	0.912	0.944	0.943	0.912	0.882	0.925	0.941	0.930	0.941
5o60B	0.985	0.954	0.849	0.954	0.906	0.969	0.952	0.918	0.952	0.938	0.985	0.969
6rm3L70	0.927	0.927	0.746	0.829	0.886	0.912	0.895	0.866	0.895	0.927	0.886	0.912
6xyw3	0.840	0.816	0.750	0.741	0.741	0.769	0.833	0.766	0.826	0.826	0.840	0.826
4qlnA	0.987	0.987	0.959	0.973	0.931	0.987	0.987	0.901	0.959	0.987	0.987	0.973
5xy33	0.918	0.881	0.689	0.820	0.848	0.852	0.852	0.815	0.830	0.842	0.833	0.708
4qk9A	0.987	0.987	0.904	0.931	0.987	0.987	0.944	0.914	0.944	0.987	0.947	0.973
6s0xB	0.881	0.881	0.833	0.862	0.842	0.862	0.897	0.893	0.877	0.881	0.897	0.915
5wtiB	0.935	0.935	0.849	0.875	0.875	0.935	0.900	0.903	0.918	0.906	0.892	0.933
6v3aB	0.933	0.900	0.844	0.806	0.867	0.931	0.900	0.848	0.909	0.949	0.918	0.846
5f9rA	0.933	0.915	0.867	0.853	0.933	0.933	0.933	0.900	0.897	0.931	0.881	0.800
6ahdB	0.966	0.966	0.949	0.931	0.897	0.912	0.912	0.853	0.912	0.947	0.912	0.929
5t5hD	0.938	0.938	0.831	0.849	0.862	0.889	0.871	0.833	0.857	0.889	0.857	0.489
6ha1B	0.951	0.951	0.794	0.794	0.935	0.918	0.949	0.967	0.881	0.915	0.933	0.918
5vt0R	0.951	0.951	0.938	0.892	0.906	0.935	0.921	0.915	0.933	0.935	0.923	0.915
6ol3C	1.000	1.000	0.945	0.967	1.000	0.989	0.989	0.989	1.000	1.000	0.989	0.978
3jb9P	0.857	0.857	0.818	0.857	0.857	0.857	0.947	0.857	0.842	0.900	0.947	0.800
6ny2B	0.968	0.935	0.825	0.918	0.952	0.951	0.935	0.968	0.951	0.952	0.933	0.968
6ck5A	0.943	0.927	0.941	0.824	0.925	0.927	0.886	0.899	0.909	0.925	0.927	0.909
3f2qX	0.969	0.952	0.952	0.939	0.938	0.923	0.906	0.921	0.921	0.939	0.889	1.000
4y1mB	0.986	0.986	0.971	0.944	0.972	0.972	0.930	0.931	0.986	0.959	0.946	1.000
6dlrA	0.952	0.952	0.892	0.906	0.952	0.938	0.938	0.952	0.968	0.921	0.906	0.938
6eriAB	0.980	0.980	0.939	0.939	0.939	0.958	0.936	0.917	0.933	0.936	0.958	0.889
4wflA	1.000	0.986	0.912	0.914	0.986	0.986	0.971	0.971	1.000	1.000	0.957	0.986
3jb9C	0.947	0.947	0.929	0.929	0.929	0.929	0.912	0.949	0.983	0.947	0.912	0.947
6j6gE	0.970	0.970	0.941	0.941	0.938	0.970	0.938	0.938	0.938	0.914	0.944	0.938
4lckC	0.983	0.983	0.862	0.949	0.983	0.967	0.935	0.966	0.931	0.933	0.951	0.909
4frnA	0.967	0.949	0.915	0.918	0.915	0.949	0.931	0.931	0.912	0.951	0.848	0.912
2xxaF	0.986	1.000	0.986	0.972	0.930	0.986	0.943	0.943	0.986	0.986	0.972	0.941
6mj0A	0.949	0.931	0.933	0.867	0.862	0.877	0.807	0.807	0.877	0.931	0.871	0.947
4w90C	0.966	0.947	0.828	0.915	0.931	0.912	0.929	0.909	0.873	0.912	0.931	0.760
5u33B	0.964	0.964	0.889	0.846	0.946	0.926	0.885	0.885	0.902	0.926	0.946	0.833
6dmcA	0.984	0.984	0.933	0.968	0.968	0.984	0.968	0.968	0.984	0.984	0.969	0.968
4y1jA	0.985	0.985	0.985	0.970	0.970	0.985	0.969	0.954	0.969	0.969	0.985	1.000
3suhX	0.951	0.933	0.871	0.903	0.933	0.933	0.915	0.918	0.967	0.967	0.867	0.929
4rzdA	0.966	0.966	0.881	0.915	0.983	0.964	0.982	0.963	0.964	1.000	0.982	0.982
6n2vA	0.984	0.984	1.000	0.954	0.984	0.984	0.938	0.984	0.952	0.984	0.968	0.984
6az35	0.980	0.980	0.863	0.885	0.960	0.939	0.939	0.958	0.958	0.939	1.000	0.980
6id1F	0.923	0.917	0.960	0.929	0.923	0.917	0.880	0.880	0.917	0.880	1.000	0.870
4oquA	0.985	0.985	0.954	0.954	0.985	0.985	0.985	0.952	0.951	0.969	0.954	0.968
6jxmB	0.966	0.966	0.912	0.897	0.929	0.877	0.900	0.915	0.877	0.893	0.915	0.889
6jooB	0.941	0.962	0.962	0.962	0.962	0.923	0.962	0.960	0.962	0.962	0.962	0.939
3ktwC	0.967	0.967	0.889	0.951	0.949	0.949	0.933	0.903	0.951	0.967	0.885	0.784
6dvkH	0.984	1.000	0.984	0.969	0.968	0.967	0.984	0.967	0.967	0.967	0.938	0.915
2yghA	0.931	0.931	0.931	0.900	0.881	0.881	0.893	0.912	0.881	0.912	0.897	0.929
5ml7A	0.946	0.946	0.828	0.912	0.912	0.931	0.946	0.946	0.926	0.893	0.931	0.863
5b2oB	0.900	0.923	0.800	0.750	0.857	0.900	0.900	0.842	0.878	0.895	0.927	0.927

5x2hB	1.000	0.979	0.960	0.957	1.000	0.936	0.958	0.958	0.979	0.979	0.960	1.000
3iwnA	0.946	0.946	0.926	0.929	0.964	0.946	0.906	0.889	0.946	0.926	0.909	0.963
1m5oB	0.952	0.952	0.864	0.905	0.927	0.927	0.900	0.923	0.900	0.900	0.905	0.850
4rumA	1.000	1.000	0.964	0.983	0.983	1.000	1.000	0.947	1.000	1.000	1.000	0.983
3culD	1.000	0.983	0.931	0.900	0.966	0.983	0.983	0.983	0.983	0.966	0.983	0.926
6mwnA	0.983	0.983	0.967	0.949	0.983	0.966	0.947	0.915	0.947	0.931	0.968	0.929
5t83A	0.870	0.851	0.784	0.851	0.851	0.844	0.837	0.844	0.864	0.844	0.800	0.857
4lvwA	0.952	0.967	0.935	0.885	0.968	0.967	0.967	0.967	0.967	0.967	0.968	1.000
5osg2	0.909	0.909	0.857	0.865	0.909	0.882	0.882	0.909	0.909	0.800	0.914	0.786
1wz2C	0.958	0.958	0.898	0.898	0.939	0.917	0.840	0.917	0.936	0.917	0.846	0.939
3owiB	0.980	0.980	0.902	0.941	0.902	0.939	0.898	0.917	0.902	0.960	0.920	0.960
4v8bAB	0.889	0.889	0.844	0.826	0.909	0.909	0.864	0.851	0.909	0.833	0.773	0.688
3k0jE	1.000	1.000	0.826	0.875	0.898	0.936	0.957	0.957	0.955	0.933	0.875	1.000
6c0f6	0.971	0.971	0.778	0.882	0.914	0.914	0.889	0.882	0.909	0.941	0.971	0.800
5aoxF	0.967	0.967	0.949	0.933	0.949	0.967	0.931	0.912	0.949	0.967	0.933	0.966
3q1qC	0.980	0.980	0.824	0.943	0.941	0.941	0.941	0.863	0.960	0.902	0.906	0.980
4v8dAB	0.933	0.955	0.727	0.933	0.864	0.909	0.955	0.884	0.884	0.909	0.833	0.757
4mgnA	0.955	0.930	0.894	0.933	0.933	0.930	0.844	0.909	0.930	0.909	0.870	0.878
5u3gB	0.979	0.979	0.936	0.958	0.958	0.979	0.913	0.913	0.957	0.979	0.957	0.957
6b14R	0.936	0.913	0.816	0.840	0.863	0.913	0.898	0.844	0.894	0.889	0.875	0.913
4yazA	0.980	0.980	0.941	0.898	0.980	0.936	0.936	0.889	0.917	0.936	0.960	0.958
6jq5A	0.973	0.973	0.821	0.889	0.973	0.973	0.919	0.944	0.944	0.919	0.895	0.973
3w3sB	0.970	0.970	0.925	0.971	0.985	0.970	0.941	0.923	0.970	0.955	0.954	0.954
3am1B	0.983	0.983	0.933	0.949	0.983	0.967	0.983	0.929	0.966	0.951	0.915	0.912
5lzdy	0.985	0.985	0.925	0.970	0.985	0.985	0.941	0.970	0.985	0.971	0.955	0.985
3umyB	0.952	0.952	0.913	0.870	0.898	0.955	0.894	0.930	0.952	0.889	0.909	0.930
6ah3T	0.952	0.952	0.884	0.857	0.952	0.952	0.900	0.884	0.927	0.909	0.864	0.800
3adbC	0.985	0.985	0.954	0.954	0.985	0.985	0.969	0.938	0.985	0.970	0.955	0.970
6cu1A	0.982	0.963	0.963	0.929	0.964	0.964	0.946	0.912	0.963	0.982	0.929	0.963
5on2B	0.962	0.962	0.962	0.926	0.980	0.960	0.941	0.840	0.920	0.941	0.980	0.962
3amtB	0.977	0.952	0.930	0.909	0.952	0.952	0.930	0.930	0.930	0.952	0.909	0.927
6rjaD	0.927	0.950	0.884	0.829	0.930	0.950	0.950	0.950	0.950	0.927	0.952	0.865
4v8nAW	0.714	0.714	0.516	0.606	0.667	0.643	0.516	0.690	0.640	0.692	0.500	0.778
6v5bD	0.946	0.963	0.964	0.963	0.963	0.963	0.946	0.946	0.963	0.963	0.946	0.923
5vppQV	0.895	0.895	0.700	0.800	0.872	0.872	0.865	0.865	0.824	0.833	0.895	0.800
6uggA	0.977	0.977	0.909	0.930	0.955	0.977	0.977	0.870	0.955	0.933	0.955	0.977
3d2vA	0.974	0.974	0.950	0.974	0.900	0.974	0.895	0.895	0.950	0.923	0.872	0.974
5ccbN	0.978	0.955	0.791	0.930	0.930	0.913	0.930	0.909	0.909	0.930	0.889	0.930
6svsA	1.000	1.000	0.898	0.958	1.000	0.979	0.936	0.957	0.889	0.979	0.979	0.957
5j8bx	0.976	0.976	0.950	0.950	0.952	0.976	0.909	0.927	0.976	0.927	0.909	0.950
2zzmB	0.950	0.950	0.769	0.791	0.927	0.837	0.884	0.905	0.850	0.927	0.905	0.889
6ufmA	0.977	0.977	0.930	0.955	0.977	0.977	0.955	0.889	0.977	0.955	0.955	0.955
6v3av	1.000	1.000	0.878	0.950	1.000	1.000	1.000	0.974	0.976	1.000	0.952	1.000
1h3eB	0.980	0.980	0.923	0.960	0.980	0.941	0.980	0.902	0.960	0.980	0.923	0.958
6i0yV	0.952	0.952	0.829	0.878	0.857	0.780	0.800	0.811	0.737	0.842	0.850	0.667
1j2bC	0.947	0.947	0.829	0.923	0.950	0.947	0.947	0.923	0.947	0.947	0.900	0.919
5o2rx	1.000	1.000	0.909	0.930	0.976	0.976	1.000	0.930	1.000	0.976	0.977	0.895
3a2kC	0.977	0.977	0.744	0.844	0.930	0.955	0.930	0.909	0.977	0.955	0.955	0.977

6q977	0.947	0.947	0.800	0.889	0.743	0.919	0.919	0.800	0.974	0.833	0.829	0.923
5ah5D	0.978	0.978	0.957	0.913	0.957	0.978	0.978	0.870	0.955	0.957	0.917	0.978
4jf2A	0.960	0.958	0.920	0.939	0.960	0.958	0.939	0.958	0.979	0.980	0.960	0.960
6t4q6	0.976	0.976	0.905	0.905	0.927	0.930	0.923	0.927	0.976	0.976	0.884	0.976
6az12	0.833	0.800	0.737	0.789	0.743	0.800	0.743	0.722	0.812	0.765	0.811	0.560
1qf6B	0.976	0.976	0.878	0.930	0.976	0.976	0.909	0.905	0.952	0.930	0.884	0.976
6r5q2	0.824	0.824	0.727	0.824	0.800	0.800	0.800	0.722	0.667	0.733	0.778	0.476
2iy5T	0.977	0.927	0.718	0.809	0.878	0.905	0.952	0.952	0.955	0.905	0.800	0.952
4v51AY	0.977	0.977	0.955	0.818	0.955	0.933	0.952	0.884	0.955	0.955	0.870	0.872
5el63K	0.857	0.857	0.625	0.645	0.800	0.759	0.800	0.828	0.667	0.692	0.774	0.545
6t7t6	0.955	0.930	0.889	0.864	0.933	0.955	0.909	0.909	0.977	0.977	0.889	0.952
4wj4B	0.977	0.977	0.864	0.905	0.977	0.930	0.977	0.930	0.977	0.955	0.913	0.977
5lzsii	0.947	0.947	0.757	0.750	0.789	0.842	0.850	0.919	0.919	0.882	0.750	0.909
6r87B	0.895	0.895	0.850	0.842	0.842	0.923	0.850	0.842	0.833	0.865	0.750	0.800
4v5gAY	0.706	0.706	0.743	0.686	0.686	0.686	0.667	0.629	0.647	0.706	0.632	0.300
6q9a7	0.889	0.923	0.706	0.710	0.846	0.828	0.828	0.889	0.923	0.857	0.857	0.833
2zueB	0.977	0.977	0.933	0.933	0.809	0.955	0.930	0.909	0.955	0.977	0.913	0.977
1g59B	0.977	0.977	0.930	0.952	0.905	0.977	0.909	0.857	0.884	0.952	0.909	0.952
4rdxC	0.952	0.952	0.878	0.905	0.909	0.930	0.930	0.864	0.952	0.976	0.952	0.950
5x6bP	0.927	0.950	0.878	0.905	0.900	0.947	0.947	0.895	0.974	0.927	0.900	0.919
1il2C	0.952	0.952	0.884	0.930	0.952	0.884	0.930	0.844	0.837	0.930	0.884	0.927
6t4q7	0.974	0.974	0.895	0.842	0.974	0.905	0.950	0.900	0.950	0.905	0.878	0.919
2csxC	0.976	0.976	0.927	0.952	0.952	0.976	0.930	0.930	0.976	0.976	0.930	0.976
6tbvPTR1	1.000	1.000	1.000	0.952	1.000	0.977	0.977	0.930	0.952	0.977	0.955	1.000
6tb3n	0.977	0.977	0.909	0.955	0.955	0.955	0.955	0.930	0.977	0.955	0.930	0.977
6qdwv	0.615	0.667	0.133	0.333	0.500	0.364	0.545	0.222	0.600	0.444	0.375	0.000
1gaxC	0.977	0.977	0.952	0.864	0.930	0.977	0.955	0.955	0.977	0.955	0.889	0.977
6ek0S6	0.769	0.769	0.562	0.667	0.759	0.769	0.593	0.667	0.750	0.720	0.667	0.750
2dr2B	0.950	0.895	0.923	0.900	0.919	0.872	0.905	0.950	0.895	0.872	0.864	0.878
4v71AY	0.765	0.765	0.686	0.647	0.703	0.765	0.722	0.722	0.839	0.765	0.706	0.800
4lckB	0.977	0.977	0.930	0.977	0.955	0.977	0.952	0.864	0.955	0.955	0.955	0.977
3wqyC	0.957	0.978	0.884	0.909	0.957	0.978	0.936	0.957	0.978	0.978	0.917	0.957
4v9iAY	0.667	0.667	0.556	0.500	0.571	0.429	0.533	0.471	0.714	0.714	0.500	0.800
6ip5zu	0.927	0.950	0.900	0.837	0.927	0.905	0.884	0.927	0.950	0.905	0.864	0.950
1jl1uB	0.955	0.955	0.857	0.952	0.952	0.977	0.913	0.930	0.977	0.977	0.894	0.927
3rg5A	0.966	0.947	0.881	0.828	0.947	0.947	0.912	0.912	0.929	0.931	0.857	0.929
1u0bA	0.976	0.976	0.905	0.952	0.976	0.952	0.952	0.950	1.000	0.930	0.864	1.000
4yyeC	0.976	0.976	0.773	0.927	0.905	0.952	0.930	0.905	0.952	0.976	0.889	0.950
4prfB	1.000	1.000	0.884	0.977	1.000	1.000	1.000	0.933	1.000	1.000	1.000	1.000
3q3zA	0.958	0.936	0.870	0.833	0.917	0.894	0.870	0.875	0.913	0.913	0.898	0.936
5d8hA	0.941	0.882	0.800	0.800	0.857	0.882	0.833	0.849	0.882	0.857	0.941	0.938
3akzE	0.977	0.977	0.909	0.955	0.955	0.909	0.905	0.927	0.977	0.977	0.933	0.933
2d6fF	0.977	0.977	0.909	0.844	0.955	0.977	0.952	0.909	0.977	0.977	0.894	0.952
3j7a7	0.889	0.750	0.545	0.571	0.571	0.667	0.500	0.706	0.667	0.667	0.471	0.462
2dlcY	0.914	0.914	0.865	0.865	0.778	0.889	0.914	0.833	0.889	0.865	0.865	0.941
5czzB	1.000	1.000	0.938	0.938	1.000	0.970	1.000	0.968	1.000	1.000	1.000	1.000
6caely	0.952	0.952	0.878	0.884	0.930	0.927	0.950	0.878	0.923	0.952	0.905	0.865
5e6mC	0.976	0.976	0.878	0.829	0.976	0.930	0.905	0.884	0.952	0.909	0.837	0.976

4znpA	1.000	0.976	0.955	0.955	0.952	0.930	0.976	0.976	0.976	0.952	0.977	0.865
2derC	0.944	0.914	0.732	0.821	0.800	0.706	0.800	0.757	0.849	0.778	0.718	0.714
5wt3C	0.978	0.978	0.864	0.864	0.955	0.955	0.913	0.909	0.933	0.955	0.870	0.955
5ud5D	0.979	0.957	0.844	0.933	0.870	0.957	0.957	0.917	0.936	0.936	0.957	0.979
5wwrC	0.905	0.905	0.829	0.857	0.909	0.909	0.884	0.864	0.905	0.909	0.864	0.900
2zniC	0.927	0.927	0.905	0.900	0.872	0.878	0.927	0.905	0.927	0.927	0.857	0.872
6lxdD	0.826	0.826	0.723	0.766	0.936	0.851	0.851	0.844	0.773	0.800	0.833	0.667
3la5A	0.936	0.936	0.889	0.894	0.917	0.913	0.913	0.837	0.913	0.913	0.844	0.913
5kpyA	0.947	0.947	0.889	0.800	0.900	0.947	0.927	0.789	0.919	0.878	0.837	0.947
6az36	0.778	0.824	0.842	0.625	0.778	0.778	0.842	0.706	0.706	0.706	0.737	0.778
2du3D	0.927	0.927	0.878	0.829	0.905	0.927	0.878	0.809	0.895	0.950	0.809	0.919
2oiuP	0.978	0.978	0.933	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978
5tpyA	0.980	0.980	0.917	0.833	0.898	0.980	0.917	0.939	0.939	0.980	0.960	0.958
6gazAV	1.000	0.971	0.857	0.857	0.971	1.000	0.973	0.919	0.944	1.000	0.872	0.909
1kxkA	1.000	1.000	0.979	0.979	0.955	1.000	0.955	0.930	0.930	1.000	0.894	1.000
5ob3A	0.976	0.950	0.950	0.857	0.930	0.976	0.976	0.927	0.878	0.950	0.927	0.900
3ivnA	0.913	0.936	0.875	0.840	0.889	0.889	0.889	0.884	0.889	0.913	0.833	0.909
3ephE	0.842	0.842	0.683	0.821	0.780	0.821	0.821	0.821	0.865	0.800	0.634	0.865
6u8dA	1.000	0.981	0.962	0.906	0.943	0.981	1.000	0.962	1.000	0.981	1.000	1.000
2qusA	0.952	0.952	0.927	0.952	0.952	0.952	0.930	0.900	0.952	0.952	0.930	0.952
4pqvA	0.976	0.950	0.927	0.900	0.927	0.895	0.865	0.865	0.872	0.895	0.950	0.833
6p2hA	0.974	0.974	0.947	0.950	0.947	0.947	0.919	0.889	0.947	0.950	0.900	0.974
4wzjV	1.000	1.000	0.905	0.909	0.977	1.000	0.952	0.952	1.000	1.000	0.977	0.976
4fe5B	0.955	0.978	0.818	0.933	0.913	0.884	0.818	0.850	0.955	0.978	0.864	0.909
3skiB	0.958	0.936	0.833	0.917	0.894	0.894	0.917	0.913	0.958	0.936	0.913	0.958
6gawBB	1.000	1.000	0.811	0.882	0.971	0.973	0.973	0.973	0.923	0.973	0.971	0.944
5a8lB	0.737	0.909	0.571	0.571	0.783	0.909	0.857	0.800	0.857	0.818	0.778	0.667
1h4sT	0.974	0.974	0.923	0.974	0.895	0.829	0.900	0.950	0.947	0.923	0.974	0.974
3r4fA	1.000	1.000	0.933	1.000	0.978	0.978	0.978	0.978	0.978	0.957	0.957	1.000
3egzB	1.000	1.000	0.944	0.971	0.970	0.970	0.970	1.000	0.970	1.000	1.000	1.000
4xwfA	0.973	0.973	0.923	0.947	0.919	0.973	0.973	0.973	0.973	0.973	0.973	0.973
3nkbB	1.000	0.973	0.850	0.947	0.923	0.973	0.973	0.947	0.973	0.919	0.865	1.000
5b63D	0.941	0.941	0.824	0.857	0.914	0.857	0.889	0.882	0.875	0.824	0.889	0.759
6rflU	0.971	0.971	0.944	0.971	0.944	0.971	0.944	0.895	0.919	0.919	0.872	0.971
5t5aA	0.933	0.957	0.864	0.979	0.917	0.933	0.913	0.913	0.957	0.913	0.936	0.955
5btpA	1.000	0.974	0.842	1.000	0.950	0.950	0.974	0.974	0.974	0.927	0.976	0.974
2czjB	0.944	0.944	0.944	0.857	0.914	0.857	0.833	0.889	0.909	0.882	0.684	0.667
3icqD	0.933	0.933	0.688	0.875	0.903	0.839	0.903	0.867	0.933	0.933	0.938	0.897
2hvyE	1.000	1.000	0.938	1.000	0.970	1.000	0.970	0.941	1.000	0.970	1.000	1.000
5ddpA	0.970	0.970	0.938	0.941	0.970	0.970	0.938	0.938	0.938	0.970	0.970	0.970
1un6E	0.947	0.973	0.914	0.914	0.944	0.947	0.973	0.944	0.889	0.944	0.944	0.882
6db8R	0.944	0.944	0.842	0.889	0.944	0.944	0.914	0.914	0.944	0.944	0.944	0.914
3rw6F	1.000	1.000	0.947	0.950	0.974	0.947	0.973	0.973	0.947	1.000	0.974	0.973
6pmoA	0.950	0.950	0.923	0.923	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
4m4oB	0.919	0.919	0.919	0.865	0.865	0.865	0.889	0.889	0.889	0.919	0.821	0.857
3lwrD	1.000	1.000	0.938	1.000	1.000	1.000	1.000	0.968	0.968	1.000	0.970	1.000
4v2sQ	0.971	0.971	1.000	0.944	0.971	0.971	0.971	0.941	0.971	0.971	0.914	0.800
1dklB	0.973	0.944	0.889	0.973	0.919	0.944	0.919	0.889	0.944	0.919	0.919	0.919

3j7yB	0.971	0.971	0.944	0.971	1.000	0.971	0.941	0.971	0.944	1.000	0.944	0.941
4rgeA	0.974	0.947	0.923	0.905	0.895	0.889	0.923	0.974	0.919	0.919	0.895	0.974
1serT	0.947	0.974	0.927	0.923	0.974	0.974	0.950	0.878	0.950	0.974	0.927	0.947
2nreF	0.933	0.867	0.867	0.741	0.903	0.839	0.897	0.839	0.769	0.786	0.875	0.696
5lyuA	0.976	0.976	0.976	0.976	0.976	0.976	0.950	0.927	0.976	0.976	0.895	0.900
4k27U	1.000	1.000	0.970	0.971	1.000	1.000	1.000	1.000	1.000	1.000	0.909	1.000
1mzpB	0.923	0.923	0.929	0.897	0.867	0.929	0.857	0.923	0.923	0.889	0.867	0.880
6laxA	0.970	1.000	0.812	0.933	0.968	0.968	0.968	0.968	0.968	0.938	0.909	0.903
5uq8x	0.933	0.857	0.857	0.824	0.933	0.933	0.769	0.667	0.857	0.933	0.800	0.833
4pkdV	0.968	0.968	1.000	0.968	0.968	0.968	0.933	0.903	0.897	0.968	0.968	0.966
2fk6R	0.970	0.970	0.938	0.903	0.938	0.970	0.970	0.941	0.970	0.938	0.941	0.938
3e5cA	1.000	1.000	0.968	0.968	0.938	0.968	0.938	0.968	0.968	0.968	0.938	1.000
4encA	1.000	1.000	1.000	1.000	0.968	0.933	0.966	1.000	0.966	0.966	0.966	1.000
4ojiA	0.973	0.944	0.914	0.944	0.857	0.914	0.944	0.973	0.944	0.889	0.889	0.973
5tf6D	0.952	1.000	0.696	0.917	0.857	0.900	0.706	0.800	0.737	1.000	0.778	0.778
6aayB	1.000	1.000	0.762	0.909	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.947
2qwyA	0.960	0.917	0.889	0.846	0.880	0.917	0.846	0.750	0.833	0.870	0.923	0.818
6iv8B	0.889	0.941	0.824	0.941	0.889	0.889	0.889	0.889	0.941	0.941	0.941	0.875
3npqA	0.923	0.923	0.857	0.923	0.889	0.923	0.880	0.880	0.923	0.923	0.889	0.833
5y7mB	0.917	0.917	0.870	0.783	0.917	0.870	0.870	0.800	0.818	0.870	0.917	0.818
5xwyB	0.889	0.800	0.800	0.889	0.889	0.889	1.000	1.000	0.889	0.889	0.889	0.889
6e9eB	1.000	1.000	0.444	0.857	1.000	1.000	0.667	1.000	1.000	1.000	0.182	0.000
5y85B	1.000	1.000	0.952	0.900	0.952	0.947	0.857	0.909	1.000	0.900	0.909	0.952
6qn3A	1.000	1.000	0.909	0.957	1.000	1.000	1.000	0.957	1.000	1.000	1.000	0.857
6ufjA	0.952	0.952	1.000	0.957	0.818	0.900	0.900	0.900	0.900	0.952	0.909	0.952
6r47A	1.000	1.000	0.909	0.909	0.909	0.952	0.900	0.900	0.952	1.000	1.000	1.000
2pxdB	1.000	1.000	0.903	0.849	1.000	1.000	0.938	0.970	0.938	1.000	0.970	0.815
1u63B	1.000	1.000	0.914	0.971	0.971	1.000	1.000	1.000	1.000	1.000	0.971	1.000
6fz0A	0.960	0.960	0.692	0.786	0.960	0.960	0.960	0.833	0.957	0.923	0.880	1.000
4c7oE	0.974	0.974	0.895	0.923	0.974	0.947	0.974	0.974	0.947	0.974	0.974	0.857
5dqkA	0.909	0.909	0.833	0.833	0.909	0.909	0.909	0.833	0.909	0.833	0.769	0.909
5ztmC	1.000	1.000	0.914	0.971	1.000	1.000	1.000	1.000	1.000	1.000	0.971	1.000
5k7dA	0.957	0.957	0.889	0.923	0.857	0.909	0.909	0.909	0.857	0.957	0.957	0.909
1s03A	1.000	1.000	0.971	0.973	0.973	0.973	0.973	1.000	1.000	1.000	0.944	1.000
4o26E	1.000	1.000	0.849	0.909	1.000	0.970	0.909	0.867	0.938	0.970	0.867	0.938
4qjhB	0.923	0.833	0.923	0.769	0.667	0.833	0.769	0.909	0.833	0.833	0.714	0.667
5xtmB	0.889	0.889	0.800	0.800	0.778	0.778	0.824	0.706	0.824	0.778	0.778	0.824
1xjrA	0.929	0.966	0.897	0.839	0.929	0.929	0.889	0.800	0.846	0.966	0.929	0.929
3iabR	0.957	0.957	0.957	0.917	0.957	0.957	0.957	0.957	0.957	0.957	0.957	0.957
2nueC	1.000	1.000	0.976	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.923
4qjdB	1.000	1.000	1.000	0.857	0.923	0.923	0.923	0.833	0.857	0.923	0.933	1.000
6d3pA	0.941	0.941	1.000	0.842	0.941	0.941	0.889	0.889	0.941	0.842	0.889	0.941
1p6vB	1.000	1.000	1.000	0.960	0.917	1.000	0.960	0.960	1.000	1.000	0.923	1.000
4rmoB	1.000	1.000	1.000	1.000	1.000	0.952	0.900	0.947	1.000	1.000	0.909	1.000
3zp8A	0.889	0.889	0.750	0.889	0.889	0.727	0.727	0.800	0.889	0.889	0.727	0.889
5m0hA	1.000	1.000	0.933	0.968	0.966	0.929	0.966	0.966	0.966	0.966	0.903	0.846
5nwqA	0.957	0.957	0.870	0.870	0.957	0.909	0.909	0.909	0.957	0.957	0.957	0.957
4pmiA	1.000	1.000	0.880	1.000	0.960	0.960	0.870	0.870	0.917	0.960	1.000	0.963

5kk5B	1.000	1.000	0.889	0.800	1.000	1.000	1.000	1.000	1.000	1.000	0.909	1.000
3p22A	1.000	1.000	1.000	0.957	1.000	0.952	0.952	0.952	0.952	0.952	0.952	1.000
4kr6C	0.957	0.957	0.818	0.917	0.957	0.957	0.957	0.909	0.909	0.917	0.957	0.857
6d12C	0.960	0.960	0.880	0.880	0.960	0.923	0.960	0.960	0.960	0.917	0.923	0.917
6e8sA	1.000	1.000	0.933	0.941	0.889	1.000	0.875	0.941	1.000	1.000	1.000	1.000
1zhoB	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.963	1.000	1.000	1.000	0.963
4pdbI	0.966	0.966	0.857	0.966	0.929	0.966	0.966	0.929	0.933	1.000	0.897	0.929
1fltA	1.000	0.960	0.917	0.833	1.000	0.880	0.800	0.917	0.917	0.917	1.000	0.762
1ylsB	1.000	1.000	1.000	1.000	1.000	1.000	0.941	0.941	1.000	1.000	0.824	0.941
6dtdC	0.909	0.909	0.909	0.957	0.909	0.818	0.857	0.800	0.800	0.818	0.909	0.857
1i6uC	1.000	1.000	1.000	1.000	1.000	1.000	0.933	1.000	1.000	1.000	0.933	0.968
6sy4C	1.000	1.000	0.933	0.824	0.933	0.933	0.800	1.000	0.857	1.000	0.933	0.923
1kogI	0.960	0.960	0.960	0.923	0.960	0.960	0.960	0.960	0.960	0.960	1.000	0.917
5bjoE	0.769	0.769	0.500	0.714	0.714	0.769	0.714	0.714	0.714	0.769	0.800	0.769
3gs5C	0.857	0.952	0.870	0.870	0.957	0.909	0.952	0.952	0.909	0.952	0.917	0.818
6c65A	1.000	1.000	0.909	1.000	1.000	1.000	1.000	0.909	0.909	0.909	1.000	1.000
4x4pB	1.000	1.000	1.000	0.870	0.960	1.000	0.957	0.957	1.000	1.000	0.960	1.000
3ovbD	1.000	1.000	0.957	1.000	1.000	0.960	1.000	0.960	1.000	1.000	1.000	1.000
6debB	1.000	1.000	0.941	0.941	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.947
1et4A	0.857	0.857	0.667	0.588	0.857	0.857	0.667	0.667	0.769	0.857	0.769	0.769
2xdbG	0.933	0.933	0.875	0.875	0.933	0.875	0.933	1.000	0.933	0.933	0.875	1.000
5deaA	1.000	0.923	0.667	0.714	0.769	0.923	0.667	0.857	1.000	0.923	0.769	0.923
6cf2G	1.000	1.000	0.909	0.923	1.000	1.000	0.957	0.957	0.800	0.909	0.957	0.909
4v83AV	0.966	0.929	0.929	0.966	0.929	0.889	0.889	0.889	0.889	0.889	0.966	0.889
2zh3B	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.960	0.917	1.000
4oogD	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
4atoG	1.000	1.000	0.933	0.933	1.000	1.000	0.923	0.923	1.000	1.000	0.857	0.923
3gcaA	0.923	0.923	0.769	0.833	0.833	0.923	0.667	0.727	0.833	0.923	0.833	0.833
3fu2B	1.000	1.000	0.875	1.000	0.933	0.933	1.000	0.933	1.000	1.000	1.000	1.000
5v3fA	1.000	1.000	0.857	1.000	1.000	1.000	1.000	1.000	1.000	0.889	1.000	1.000
6h0rA	1.000	1.000	0.960	0.923	0.960	0.960	0.960	0.960	1.000	1.000	1.000	1.000
5voeA	1.000	1.000	0.923	0.923	0.909	0.909	0.909	0.909	0.909	0.909	1.000	0.909
1jbrD	0.933	0.933	0.857	0.933	0.933	0.933	0.875	0.933	0.933	0.933	0.941	0.933
2b63R	1.000	0.941	1.000	1.000	0.941	0.941	0.941	0.941	0.941	0.941	0.941	1.000
3snpC	0.957	0.909	0.909	0.909	0.957	0.957	0.909	0.909	0.909	0.909	0.870	0.909
5y58X	1.000	0.947	0.842	0.947	0.947	0.947	0.947	1.000	0.947	0.947	0.947	1.000
Average	0.948	0.944	0.863	0.881	0.912	0.919	0.900	0.891	0.916	0.921	0.892	0.891

Table S2 Target-specific F1-score of RNAstructure, RNAView, MC-Annotate and that of all atom types supported by pdb2ss (P, O5', C5', C4', C3' and O3')

RNA	RNAstructure	RNAView	MC-Annotate	P	O5'	C5'	C4'	C3'	O3'
5g2xA	0.480	0.696	0.741	0.047	0.327	0.437	0.451	0.420	0.340
6c4hA	0.258	0.980	0.946	0.291	0.466	0.663	0.710	0.657	0.554
6hiwCA	0.113	0.949	0.863	0.192	0.301	0.455	0.498	0.462	0.346
6chrA	0.830	0.930	0.896	0.349	0.485	0.670	0.748	0.631	0.568
6hixAA	0.000	0.977	0.894	0.193	0.338	0.546	0.588	0.487	0.394
6n7rR	0.823	0.981	0.937	0.240	0.275	0.789	0.870	0.771	0.614
1fg0A	0.610	0.972	0.943	0.438	0.584	0.718	0.772	0.723	0.643
5wlcL0	0.775	0.926	0.938	0.488	0.636	0.792	0.893	0.837	0.710
5zwnP	0.551	0.931	0.929	0.421	0.547	0.761	0.776	0.701	0.561
6swe2	0.465	0.957	0.947	0.339	0.513	0.680	0.745	0.692	0.547
5j01A	0.740	0.993	0.989	0.397	0.558	0.758	0.802	0.708	0.614
6agbA	0.603	0.878	0.924	0.392	0.510	0.753	0.702	0.657	0.597
6q9a4	0.403	0.851	0.757	0.260	0.349	0.599	0.540	0.432	0.304
3bwpA	0.495	0.987	0.974	0.426	0.569	0.774	0.802	0.720	0.595
3q1qB	0.581	0.986	0.982	0.399	0.547	0.790	0.853	0.769	0.623
6ahuA	0.641	0.907	0.932	0.384	0.515	0.735	0.794	0.703	0.593
6w2s0	0.352	0.835	0.835	0.294	0.364	0.488	0.512	0.550	0.415
6q954	0.239	0.883	0.879	0.309	0.421	0.614	0.717	0.480	0.452
5u4ja	0.525	0.982	0.949	0.361	0.571	0.735	0.856	0.667	0.580
2a64A	0.541	0.957	0.990	0.000	0.643	0.802	0.851	0.768	0.677
6g901	0.135	0.916	0.917	0.428	0.539	0.754	0.817	0.672	0.632
6sxoL5	0.663	0.962	0.975	0.386	0.488	0.712	0.781	0.634	0.607
5flxz	0.519	0.987	0.956	0.465	0.622	0.800	0.854	0.802	0.679
6frk1	0.709	0.955	0.938	0.518	0.610	0.767	0.819	0.725	0.714
5a81A	0.000	1.000	0.868	0.277	0.504	0.471	0.561	0.562	0.500
1x8wB	0.676	0.971	0.973	0.013	0.540	0.737	0.838	0.732	0.724
5tc1R	0.309	0.659	0.784	0.525	0.605	0.553	0.720	0.628	0.582
5oql2	0.436	0.930	0.918	0.441	0.541	0.757	0.848	0.736	0.645
1y0qA	0.810	0.946	0.927	0.029	0.587	0.833	0.861	0.743	0.703
6j6qL	0.622	0.959	0.959	0.455	0.547	0.758	0.881	0.706	0.640
6p5n1	0.655	0.800	0.901	0.379	0.462	0.623	0.661	0.632	0.555
5zwmH	0.714	0.919	0.928	0.421	0.570	0.817	0.704	0.586	0.587
5jupEC	0.687	0.971	0.981	0.410	0.544	0.758	0.782	0.599	0.565
1u6bB	0.832	0.991	0.965	0.500	0.646	0.800	0.881	0.717	0.693
6d904	0.520	0.894	0.807	0.294	0.412	0.526	0.625	0.530	0.472
4gmaZ	0.339	0.917	0.946	0.426	0.522	0.596	0.806	0.715	0.611
6gyvA	0.505	0.992	0.952	0.016	0.659	0.789	0.909	0.851	0.659
5v3iA	0.793	0.974	0.927	0.588	0.694	0.868	0.916	0.759	0.769
3jcs3	0.391	0.921	0.837	0.323	0.566	0.646	0.750	0.646	0.511
6az34	0.878	0.958	0.950	0.497	0.573	0.783	0.922	0.736	0.686
6j6gD	0.866	0.947	0.979	0.000	0.720	0.882	0.849	0.769	0.756
3dilA	0.763	1.000	0.954	0.438	0.574	0.803	0.837	0.631	0.611
5lj3Z	0.713	0.989	0.989	0.560	0.710	0.936	0.936	0.838	0.746
5t2aE	0.467	0.941	0.933	0.467	0.577	0.819	0.857	0.785	0.603

3p49A	0.833	0.907	0.816	0.398	0.605	0.750	0.826	0.734	0.605
5wlcL2	0.294	0.933	0.875	0.314	0.500	0.712	0.712	0.689	0.550
6ufhA	0.667	0.978	0.957	0.494	0.591	0.871	0.871	0.662	0.642
6qx91	0.899	1.000	0.941	0.388	0.507	0.726	0.857	0.784	0.667
6az37	0.167	1.000	0.862	0.000	0.421	0.648	0.868	0.754	0.667
6ft62	0.375	0.979	0.868	0.474	0.468	0.721	0.746	0.579	0.564
3pdrA	0.898	0.990	0.970	0.453	0.612	0.764	0.817	0.716	0.639
4gxyA	0.723	0.958	0.942	0.443	0.584	0.189	0.220	0.226	0.269
6oleD	0.281	0.952	0.933	0.388	0.563	0.816	0.784	0.702	0.580
5xxb4	0.174	0.930	0.826	0.400	0.507	0.692	0.655	0.731	0.585
1u9sA	0.787	0.980	0.970	0.511	0.653	0.807	0.951	0.817	0.733
5xy34	0.271	0.889	0.906	0.479	0.587	0.688	0.800	0.772	0.750
4v8pB2	0.161	1.000	0.952	0.396	0.460	0.750	0.837	0.735	0.632
3j79C	0.320	1.000	0.912	0.495	0.633	0.812	0.881	0.853	0.776
1nbsB	0.767	0.988	0.977	0.503	0.667	0.882	0.911	0.804	0.695
6jdvB	0.977	1.000	0.968	0.533	0.615	0.815	0.889	0.786	0.698
6id0H	0.516	0.933	0.889	0.432	0.667	0.865	0.727	0.653	0.653
3hhnC	0.765	0.989	0.978	0.000	0.723	0.811	0.915	0.843	0.718
3ndbM	0.903	0.966	0.936	0.011	0.651	0.772	0.705	0.583	0.562
6exn2	0.743	1.000	0.985	0.529	0.667	0.927	0.901	0.821	0.727
6ahdI	0.710	1.000	0.982	0.593	0.620	0.915	0.947	0.900	0.761
3l3cS	0.000	0.952	0.906	0.419	0.491	0.674	0.716	0.660	0.492
4uykR	0.837	1.000	0.947	0.419	0.579	0.776	0.874	0.763	0.682
2il9A	0.197	0.750	0.649	0.000	0.323	0.600	0.577	0.416	0.395
6n5qA	0.592	1.000	0.923	0.368	0.520	0.725	0.868	0.611	0.647
3v7eC	0.932	0.978	0.968	0.000	0.705	0.871	0.905	0.775	0.733
5ganV	0.267	0.882	0.974	0.487	0.655	0.723	0.923	0.694	0.597
2z75B	0.762	1.000	1.000	0.525	0.667	0.000	0.000	0.000	0.646
5zluX	0.667	0.892	0.925	0.441	0.577	0.763	0.806	0.895	0.621
1vq89	0.886	1.000	0.944	0.000	0.680	0.857	0.805	0.767	0.719
5dm6Y	0.754	0.986	0.914	0.531	0.648	0.907	0.907	0.931	0.809
6t4qC4	0.831	1.000	0.937	0.576	0.687	0.864	0.843	0.875	0.783
5mmiB	0.817	0.987	0.961	0.541	0.686	0.800	0.847	0.809	0.667
4ybbDB	0.270	1.000	0.960	0.534	0.660	0.805	0.875	0.824	0.714
6ek0L7	0.857	0.986	0.947	0.000	0.707	0.795	0.854	0.778	0.795
1nbsA	0.552	0.984	0.968	0.588	0.747	0.886	0.899	0.775	0.674
6qdv2	0.627	0.971	0.944	0.632	0.681	0.900	1.000	0.872	0.766
4v8pB3	0.778	0.986	0.973	0.511	0.747	0.875	0.875	0.722	0.700
3jcs8	0.333	0.979	0.778	0.455	0.568	0.733	0.746	0.597	0.590
4kqyA	0.763	0.974	0.923	0.015	0.712	0.907	0.839	0.804	0.750
6uesA	0.300	0.952	0.966	0.537	0.612	0.752	0.812	0.796	0.707
5xxb3	0.880	0.928	0.972	0.500	0.620	0.750	0.872	0.778	0.695
3j79B	0.327	0.986	0.973	0.538	0.680	0.786	0.843	0.814	0.824
5o60B	0.909	0.969	0.971	0.561	0.681	0.775	0.927	0.901	0.800
6rm3L70	0.833	0.941	0.901	0.571	0.645	0.846	0.831	0.805	0.773
6xyw3	0.467	0.960	0.852	0.000	0.505	0.724	0.840	0.648	0.667
4qlnA	0.361	1.000	0.974	0.398	0.518	0.758	0.923	0.774	0.713
5xy33	0.000	0.929	0.897	0.403	0.549	0.754	0.839	0.725	0.651

4qk9A	0.254	1.000	0.950	0.380	0.567	0.758	0.774	0.692	0.654
6s0xB	0.500	1.000	0.949	0.000	0.602	0.761	0.761	0.750	0.649
5wtiB	0.557	1.000	0.968	0.462	0.682	0.811	0.829	0.699	0.667
6v3aB	0.636	0.966	0.921	0.491	0.659	0.712	0.871	0.691	0.683
5f9rA	0.754	0.964	0.912	0.487	0.658	0.862	0.875	0.806	0.757
6ahdB	0.862	0.966	0.951	0.455	0.515	0.750	0.931	0.818	0.607
5t5hD	0.000	0.985	0.877	0.522	0.632	0.698	0.909	0.734	0.706
6ha1B	0.657	0.984	0.925	0.000	0.622	0.882	0.845	0.800	0.638
5vt0R	0.841	0.984	0.912	0.554	0.619	0.800	0.892	0.824	0.732
6ol3C	0.966	1.000	0.989	0.536	0.634	0.885	0.911	0.829	0.829
3jb9P	0.444	1.000	1.000	0.271	0.311	0.593	0.667	0.667	0.762
6ny2B	0.780	0.933	0.969	0.571	0.698	0.785	0.892	0.734	0.675
6ck5A	0.824	0.986	0.919	0.194	0.261	0.427	0.795	0.782	0.703
3f2qX	0.632	1.000	0.969	0.481	0.627	0.747	0.861	0.810	0.703
4y1mB	0.861	1.000	0.973	0.493	0.595	0.791	0.900	0.783	0.654
6dlrA	0.787	1.000	0.955	0.457	0.531	0.870	0.870	0.800	0.714
6eriAB	0.851	1.000	0.980	0.485	0.657	0.739	0.923	0.762	0.800
4wflA	0.358	1.000	0.972	0.424	0.567	0.814	0.875	0.814	0.737
3jb9C	0.915	0.983	0.984	0.558	0.644	0.839	0.931	0.794	0.711
6j6gE	0.727	0.970	1.000	0.485	0.711	0.865	0.970	0.970	0.744
4lckC	0.842	0.947	0.912	0.542	0.707	0.915	0.831	0.711	0.750
4frnA	0.622	0.949	0.968	0.474	0.643	0.754	0.912	0.818	0.692
2xxaF	0.400	0.971	0.986	0.574	0.700	0.833	0.854	0.713	0.786
6mj0A	0.419	0.983	0.951	0.538	0.635	0.767	0.836	0.778	0.709
4w90C	0.612	0.929	0.871	0.015	0.551	0.740	0.806	0.750	0.667
5u33B	0.490	0.982	0.929	0.551	0.617	0.750	0.915	0.776	0.853
6dmcA	0.848	1.000	0.939	0.530	0.645	0.912	0.873	0.816	0.827
4y1jA	0.831	1.000	1.000	0.455	0.653	0.733	0.868	0.710	0.695
3suhX	0.656	0.983	0.936	0.452	0.583	0.853	0.829	0.817	0.611
4rzdA	0.820	0.982	0.966	0.134	0.622	0.849	0.849	0.849	0.727
6n2vA	0.969	1.000	0.985	0.504	0.711	0.853	0.821	0.821	0.744
6az35	0.263	0.958	0.941	0.444	0.686	0.828	0.873	0.774	0.739
6id1F	0.774	1.000	0.963	0.545	0.774	0.960	0.960	0.857	0.800
4oquA	0.712	1.000	0.970	0.566	0.719	0.865	0.927	0.877	0.736
6jxmB	0.947	0.947	0.951	0.538	0.609	0.765	0.771	0.767	0.747
6jooB	0.643	1.000	0.981	0.549	0.608	0.794	0.862	0.781	0.714
3ktwC	0.667	0.926	0.853	0.029	0.611	0.730	0.879	0.720	0.562
6dvkH	0.939	0.984	0.968	0.559	0.689	0.849	0.954	0.833	0.729
2yghA	0.893	0.983	0.951	0.557	0.635	0.794	0.740	0.761	0.789
5ml7A	0.814	0.983	0.947	0.596	0.596	0.849	0.778	0.761	0.757
5b2oB	0.625	1.000	0.933	0.494	0.679	0.449	0.537	0.471	0.714
5x2hB	0.732	1.000	0.960	0.480	0.667	0.923	0.889	0.960	0.750
3iwnA	0.815	1.000	0.983	0.021	0.651	0.794	0.871	0.831	0.781
1m5oB	0.864	0.974	0.952	0.000	0.667	0.816	0.833	0.704	0.576
4rumA	0.862	1.000	0.967	0.691	0.767	0.849	0.889	0.767	0.767
3culD	0.966	0.983	0.933	0.552	0.586	0.800	0.918	0.889	0.707
6mwnA	0.806	0.983	0.906	0.476	0.594	0.845	0.844	0.727	0.683
5t83A	0.210	1.000	0.939	0.500	0.556	0.035	0.033	0.028	0.033

4lvwA	0.702	0.983	0.952	0.435	0.514	0.759	0.909	0.732	0.659
5osg2	0.098	0.828	0.788	0.000	0.640	0.780	0.732	0.711	0.525
1wz2C	0.526	0.958	0.980	0.326	0.442	0.719	0.793	0.639	0.535
3owiB	0.941	1.000	1.000	0.650	0.694	0.781	0.889	0.926	0.781
4v8bAB	0.542	0.878	0.884	0.412	0.526	0.731	0.800	0.655	0.583
3k0jE	0.522	0.978	0.920	0.000	0.730	0.836	0.807	0.821	0.807
6c0f6	0.744	0.971	0.947	0.395	0.615	0.809	0.895	0.773	0.586
5aoxF	0.877	1.000	0.984	0.446	0.607	0.411	0.484	0.421	0.636
3q1qC	0.846	0.980	1.000	0.435	0.558	0.794	0.746	0.806	0.735
4v8dAB	0.913	0.872	0.850	0.462	0.575	0.737	0.714	0.508	0.613
4mgnA	0.342	0.978	0.978	0.560	0.609	0.894	0.913	0.750	0.645
5u3gB	0.833	0.958	0.906	0.500	0.553	0.786	0.772	0.746	0.721
6b14R	0.696	1.000	0.943	0.469	0.556	0.755	0.746	0.702	0.635
4yazA	0.682	1.000	1.000	0.516	0.716	0.828	0.960	0.906	0.814
6jq5A	0.829	1.000	0.950	0.000	0.643	0.818	0.800	0.679	0.571
3w3sB	0.349	0.985	0.985	0.388	0.464	0.736	0.914	0.727	0.598
3am1B	0.848	0.983	1.000	0.433	0.592	0.763	0.817	0.763	0.598
5lzdY	0.386	1.000	1.000	0.466	0.582	0.759	0.846	0.795	0.710
3umyB	0.684	1.000	0.978	0.350	0.447	0.778	0.913	0.712	0.597
6ah3T	0.400	0.976	0.952	0.449	0.603	0.870	0.870	0.800	0.615
3adbC	0.000	1.000	1.000	0.460	0.556	0.842	0.821	0.762	0.688
6cu1A	0.800	1.000	0.983	0.540	0.600	0.831	0.844	0.750	0.711
5on2B	0.231	0.939	0.981	0.439	0.714	0.758	0.848	0.781	0.694
3amtB	0.723	0.900	0.955	0.512	0.636	0.741	0.800	0.727	0.585
6rjaD	0.514	0.950	0.976	0.482	0.571	0.833	0.976	0.769	0.702
4v8nAW	0.154	0.737	0.692	0.000	0.340	0.593	0.457	0.474	0.489
6v5bD	0.943	0.982	0.915	0.529	0.614	0.839	0.963	0.754	0.658
5vppQV	0.821	0.839	0.941	0.360	0.486	0.640	0.549	0.557	0.607
6uggA	0.652	1.000	0.978	0.452	0.526	0.737	0.857	0.712	0.609
3d2vA	0.632	1.000	0.976	0.372	0.493	0.792	0.884	0.760	0.691
5ccbN	0.652	0.978	0.958	0.500	0.656	0.724	0.778	0.840	0.646
6svsA	0.864	1.000	1.000	0.361	0.511	0.800	0.814	0.686	0.605
5j8bx	0.976	0.976	0.977	0.417	0.548	0.833	0.816	0.816	0.714
2zzmB	0.000	0.857	0.952	0.379	0.471	0.632	0.792	0.717	0.537
6ufmA	0.952	1.000	0.978	0.429	0.583	0.894	0.778	0.646	0.600
6v3av	0.842	1.000	0.930	0.029	0.833	1.000	0.833	0.800	0.741
1h3eB	0.000	1.000	1.000	0.485	0.632	0.787	0.828	0.774	0.649
6i0yV	0.927	0.950	0.923	0.444	0.533	0.696	0.588	0.679	0.582
1j2bC	0.778	1.000	0.974	0.463	0.633	0.808	0.974	0.927	0.643
5o2rx	0.304	0.976	0.952	0.518	0.677	0.875	0.955	0.875	0.677
3a2kC	0.478	1.000	1.000	0.525	0.690	0.769	0.857	0.764	0.689
6q977	0.857	0.947	0.950	0.361	0.597	0.425	0.857	0.878	0.653
5ah5D	0.160	1.000	0.939	0.500	0.688	0.772	0.898	0.772	0.733
4jf2A	0.884	1.000	0.960	0.552	0.727	0.873	0.889	0.762	0.828
6t4q6	0.486	1.000	0.955	0.449	0.506	0.755	0.755	0.755	0.597
6az12	0.789	0.786	0.938	0.000	0.378	0.556	0.833	0.578	0.509
1qf6B	0.698	1.000	0.955	0.556	0.656	0.800	0.784	0.714	0.833
6r5q2	0.621	0.800	0.824	0.000	0.528	0.757	0.683	0.609	0.528

2iy5T	0.977	0.927	1.000	0.053	0.654	0.756	0.720	0.870	0.481
4v51AY	0.977	0.977	0.930	0.423	0.553	0.824	0.824	0.746	0.556
5el63K	0.485	0.750	0.833	0.000	0.324	0.431	0.564	0.512	0.478
6t7t6	0.714	1.000	1.000	0.433	0.571	0.824	0.894	0.894	0.737
4wj4B	0.500	1.000	0.936	0.462	0.636	0.857	0.894	0.808	0.737
5lzsii	0.529	0.971	0.895	0.000	0.479	0.766	0.692	0.735	0.590
6r87B	0.270	0.950	0.950	0.358	0.464	0.630	0.809	0.618	0.471
4v5gAY	0.667	0.783	0.889	0.317	0.414	0.688	0.611	0.542	0.415
6q9a7	0.545	0.929	0.867	0.316	0.381	0.615	0.706	0.585	0.387
2zueB	0.651	0.977	0.978	0.447	0.600	0.677	0.840	0.764	0.792
1g59B	0.727	1.000	0.936	0.452	0.525	0.909	0.857	0.750	0.609
4rdxC	0.000	0.976	1.000	0.526	0.691	0.816	0.833	0.702	0.714
5x6bP	0.884	0.947	0.950	0.396	0.507	0.691	0.857	0.720	0.581
1il2C	0.368	0.955	0.955	0.421	0.500	0.870	0.870	0.714	0.656
6t4q7	0.800	1.000	1.000	0.479	0.567	0.791	0.708	0.739	0.576
2csxC	0.976	0.976	0.952	0.469	0.506	0.800	0.851	0.667	0.690
6tbvPTR	0.977	1.000	0.955	0.560	0.778	0.778	0.824	0.840	0.808
6tb3n	0.977	1.000	0.978	0.538	0.609	0.826	0.824	0.792	0.627
6qdwv	0.400	0.800	0.429	0.119	0.130	0.174	0.167	0.500	0.286
1gaxC	0.615	0.952	0.930	0.519	0.625	0.737	0.764	0.724	0.764
6ek0S6	0.540	0.636	0.714	0.028	0.449	0.667	0.690	0.529	0.513
2dr2B	0.950	0.973	0.950	0.520	0.667	1.000	0.760	0.679	0.603
4v71AY	0.727	0.963	0.857	0.000	0.433	0.605	0.533	0.578	0.481
4lckB	0.578	1.000	0.978	0.447	0.635	0.792	0.857	0.792	0.840
3wqyC	0.304	1.000	0.958	0.543	0.595	0.759	0.880	0.830	0.759
4v9iAY	0.000	0.833	0.588	0.000	0.308	0.500	0.364	0.444	0.308
6ip5zu	0.429	0.952	0.930	0.000	0.486	0.745	0.717	0.679	0.691
1jluB	0.977	1.000	0.978	0.000	0.576	0.778	0.778	0.764	0.724
3rg5A	0.000	1.000	0.968	0.475	0.602	0.862	0.778	0.667	0.737
1u0bA	0.711	1.000	0.952	0.444	0.613	0.889	0.816	0.784	0.635
4yyeC	0.595	1.000	0.955	0.392	0.540	0.714	0.851	0.816	0.513
4prfB	0.000	1.000	0.978	0.500	0.764	0.772	0.898	0.880	0.786
3q3zA	0.545	1.000	0.960	0.495	0.730	0.754	0.821	0.807	0.767
5d8hA	0.718	1.000	0.895	0.471	0.653	0.800	0.762	0.696	0.582
3akzE	0.977	0.952	0.977	0.408	0.494	0.689	0.824	0.609	0.585
2d6fF	0.900	0.977	0.936	0.442	0.519	0.778	0.833	0.714	0.635
3j7a7	0.000	0.750	0.600	0.037	0.235	0.518	0.387	0.293	0.378
2dlcY	0.865	0.970	0.971	0.395	0.542	0.000	0.125	0.000	0.082
5czzB	0.722	1.000	0.970	0.508	0.638	0.865	0.941	0.889	0.711
6cae1y	0.286	0.923	0.952	0.374	0.500	0.800	0.857	0.706	0.545
5e6mC	0.778	0.977	0.933	0.412	0.519	0.800	0.755	0.741	0.606
4znpA	0.833	1.000	0.952	0.556	0.632	0.816	0.816	0.851	0.755
2derC	0.000	0.875	1.000	0.430	0.500	0.651	0.714	0.566	0.582
5wt3C	0.744	1.000	0.979	0.389	0.500	0.750	0.840	0.746	0.579
5ud5D	0.979	1.000	0.980	0.469	0.575	0.708	0.958	0.868	0.719
5wwrC	0.529	0.952	1.000	0.460	0.576	0.741	0.690	0.784	0.702
2zniC	0.927	0.927	0.927	0.396	0.556	0.731	0.851	0.741	0.645
6lxdD	0.756	0.884	0.875	0.458	0.609	0.786	0.737	0.724	0.647

3la5A	0.889	0.980	0.923	0.506	0.579	0.759	0.898	0.772	0.588
5kpyA	0.800	1.000	1.000	0.436	0.571	0.923	0.900	0.818	0.654
6az36	0.000	0.947	0.952	0.518	0.286	0.667	0.778	0.857	0.762
2du3D	0.533	0.947	0.950	0.388	0.613	0.775	0.927	0.792	0.623
2oiuP	0.930	1.000	1.000	0.541	0.830	0.978	0.898	0.936	0.863
5tpyA	0.640	1.000	1.000	0.476	0.686	0.787	0.941	0.842	0.686
6gazAV	0.545	1.000	0.947	0.000	0.588	0.872	0.971	0.829	0.829
1kxkA	0.808	1.000	1.000	0.000	0.623	0.846	0.939	0.868	0.742
5ob3A	0.465	1.000	0.955	0.425	0.581	0.800	0.826	0.755	0.667
3ivnA	0.884	0.979	0.960	0.000	0.571	0.746	0.917	0.764	0.603
3ephE	0.650	0.895	0.900	0.370	0.607	0.654	0.607	0.708	0.548
6u8dA	0.962	1.000	1.000	0.565	0.732	0.812	0.946	0.900	0.750
2qusA	0.952	1.000	0.978	0.560	0.714	0.833	0.870	0.870	0.755
4pqvA	0.312	0.976	1.000	0.538	0.727	0.837	0.976	0.930	0.816
6p2hA	0.667	1.000	1.000	0.432	0.644	0.905	0.905	0.760	0.576
4wzjV	0.818	0.952	0.955	0.000	0.667	0.889	0.930	0.933	0.678
4fe5B	0.878	0.978	0.917	0.048	0.636	0.678	0.870	0.741	0.640
3skiB	0.889	0.980	0.980	0.489	0.697	0.852	0.807	0.793	0.697
6gawBB	0.973	0.971	0.923	0.590	0.727	0.821	0.900	0.947	0.818
5a8lB	0.000	0.900	0.870	0.457	0.552	0.750	0.727	0.857	0.643
1h4sT	0.000	1.000	0.976	0.469	0.655	0.864	0.905	0.844	0.775
3r4fA	1.000	0.978	0.958	0.000	0.676	0.780	0.920	0.836	0.767
3egzB	0.970	0.971	0.919	0.607	0.723	0.882	0.850	0.773	0.895
4xwfA	0.722	1.000	1.000	0.513	0.706	0.905	0.950	0.950	0.808
3nkbB	0.778	1.000	0.974	0.543	0.643	0.844	0.950	0.905	0.760
5b63D	0.909	0.875	1.000	0.416	0.456	0.667	0.636	0.941	0.593
6rflU	0.849	1.000	0.947	0.479	0.667	0.829	0.919	0.773	0.791
5t5aA	0.256	0.979	0.979	0.000	0.667	0.846	0.957	0.880	0.721
5btpA	0.333	1.000	0.976	0.067	0.679	0.745	0.844	0.884	0.633
2czjB	0.800	0.941	1.000	0.415	0.557	0.667	0.769	0.708	0.567
3icqD	0.333	0.897	0.897	0.394	0.605	0.718	0.700	0.700	0.549
2hvyE	0.889	1.000	0.970	0.508	0.000	0.000	0.000	0.100	0.000
5ddpA	0.970	1.000	1.000	0.000	0.821	0.914	0.970	0.970	0.711
1un6E	0.839	0.941	0.944	0.000	0.818	0.923	0.923	0.878	0.735
6db8R	0.857	1.000	0.950	0.576	0.654	0.723	0.895	0.773	0.809
3rw6F	1.000	1.000	0.974	0.551	0.704	0.884	0.864	0.760	0.633
6pmoA	0.950	0.950	0.952	0.148	0.585	0.792	0.905	0.826	0.760
4m4oB	0.833	1.000	0.930	0.434	0.597	0.829	0.818	0.694	0.667
3lwrD	0.941	1.000	1.000	0.000	0.627	0.842	0.727	0.604	0.627
4v2sQ	0.667	0.971	0.971	0.000	0.000	0.046	0.054	0.000	0.136
1dk1B	0.857	1.000	0.974	0.000	0.667	0.900	0.900	0.818	0.735
3j7yB	0.690	1.000	0.919	0.643	0.750	0.971	1.000	1.000	0.783
4rgeA	0.125	1.000	1.000	0.000	0.597	0.717	0.974	0.889	0.136
1serT	0.000	1.000	1.000	0.336	0.469	0.760	0.844	0.111	0.258
2nreF	0.370	0.750	0.857	0.390	0.564	0.700	0.757	0.686	0.619
5lyuA	0.000	1.000	1.000	0.538	0.714	0.913	0.857	0.894	0.933
4k27U	1.000	1.000	0.850	0.486	0.708	0.895	1.000	0.756	0.694
1mzpB	0.385	1.000	0.966	0.394	0.491	0.867	0.867	0.750	0.578

6laxA	0.970	1.000	0.970	0.500	0.615	0.821	0.889	0.889	0.762
5uq8x	0.778	0.923	0.857	0.000	0.609	0.933	0.778	1.000	0.625
4pkdV	0.968	1.000	0.968	0.462	0.625	0.750	0.789	0.732	0.789
2fk6R	0.938	0.970	0.971	0.066	0.696	0.865	0.744	0.889	0.682
3e5cA	0.769	1.000	0.970	0.571	0.744	0.842	0.941	0.842	0.800
4encA	0.370	1.000	1.000	0.508	0.789	0.909	0.938	0.938	0.682
4ojiA	0.788	1.000	1.000	0.000	0.766	0.850	0.944	0.878	0.766
5tf6D	0.000	0.900	0.900	0.500	0.786	0.720	0.900	0.583	0.560
6aayB	0.870	1.000	0.952	0.500	0.588	0.952	1.000	0.909	0.909
2qwyA	0.444	1.000	0.929	0.429	0.615	0.774	0.960	0.800	0.750
6iv8B	0.889	1.000	0.941	0.762	0.667	0.889	0.889	0.800	0.842
3npqA	0.429	0.880	0.929	0.585	0.727	0.727	0.800	0.923	0.727
5y7mB	0.762	1.000	0.960	0.489	0.688	0.759	0.880	0.846	0.688
5xwyB	0.889	1.000	0.769	0.381	0.889	0.889	0.889	0.889	0.889
6e9eB	0.000	0.800	0.667	0.261	0.545	1.000	1.000	0.500	0.429
5y85B	0.833	1.000	1.000	0.540	0.667	0.833	0.909	0.769	0.667
6qn3A	0.833	0.952	0.917	0.000	0.579	1.000	0.917	0.846	0.688
6ufjA	0.471	1.000	0.957	0.000	0.571	0.625	0.870	0.870	0.800
6r47A	0.381	1.000	0.957	0.000	0.000	0.667	0.917	0.917	0.846
2pxdB	1.000	1.000	0.970	0.000	0.667	0.780	0.941	0.889	0.681
1u63B	0.941	0.970	1.000	0.500	0.694	0.791	0.971	0.872	0.739
6fz0A	0.375	1.000	1.000	0.043	0.727	0.960	0.960	0.800	0.706
4c7oE	0.895	0.974	1.000	0.528	0.667	0.844	0.927	0.844	0.844
5dqkA	0.667	1.000	0.923	0.476	0.526	0.909	0.769	0.667	0.556
5ztmC	0.919	1.000	0.944	0.523	0.708	0.944	1.000	1.000	0.694
5k7dA	0.600	1.000	0.917	0.585	0.611	0.815	0.957	0.880	0.733
1s03A	0.889	1.000	1.000	0.562	0.735	0.837	0.923	0.818	0.720
4o26E	0.914	1.000	1.000	0.479	0.667	0.872	1.000	0.791	0.696
4qjhB	0.571	0.909	1.000	0.706	0.833	0.625	0.833	0.714	0.750
5xtmB	0.316	1.000	0.952	0.488	0.645	0.909	0.909	0.769	0.714
1xjrA	0.929	1.000	0.968	0.667	0.800	0.903	0.903	0.849	0.828
3iabR	1.000	1.000	1.000	0.686	0.815	1.000	0.889	0.923	0.800
2nueC	1.000	1.000	1.000	0.000	0.700	0.824	0.933	0.857	0.656
4qjdB	0.000	1.000	1.000	0.560	0.737	0.875	1.000	0.875	0.875
6d3pA	0.941	1.000	1.000	0.593	0.615	0.727	0.941	0.800	0.667
1p6vB	1.000	1.000	1.000	0.000	0.857	0.800	1.000	0.857	0.727
4rmoB	0.000	1.000	0.952	0.049	0.769	1.000	1.000	0.690	0.588
3zp8A	0.727	1.000	0.909	0.381	0.533	0.889	0.615	0.533	0.500
5m0hA	1.000	0.889	0.966	0.000	0.698	0.788	0.903	1.000	0.788
5nwqA	0.609	1.000	1.000	0.000	0.710	0.815	0.960	0.846	0.710
4pmiA	0.870	1.000	0.929	0.491	0.650	1.000	1.000	0.929	0.897
5kk5B	0.000	1.000	0.909	0.000	0.444	1.000	1.000	0.833	1.000
3p22A	1.000	1.000	1.000	0.468	0.564	0.815	0.846	0.611	0.579
4kr6C	0.917	0.909	0.957	0.000	0.750	0.889	0.846	0.733	0.846
6d12C	0.923	0.923	0.923	0.558	0.585	0.774	0.857	0.857	0.774
6e8sA	0.889	1.000	1.000	0.046	0.421	0.571	0.696	0.727	0.667
1zhoB	1.000	1.000	1.000	0.441	0.615	0.722	1.000	0.929	0.743
4pdbI	0.889	1.000	0.966	0.431	0.667	0.875	0.875	0.800	0.778

1fl1A	1.000	1.000	1.000	0.000	0.929	1.000	0.929	0.929	0.929
1ylsB	0.421	1.000	0.941	0.000	0.889	1.000	0.800	0.667	0.615
6dtdC	0.870	0.957	0.923	0.550	0.815	0.714	0.857	0.720	0.643
1i6uC	0.867	1.000	1.000	0.556	0.698	0.909	0.857	0.833	0.789
6sy4C	1.000	0.923	0.875	0.000	0.778	0.000	0.000	0.000	0.000
1kogI	1.000	1.000	1.000	0.650	0.703	0.929	0.929	0.867	0.743
5bjoE	0.625	0.933	1.000	0.000	0.632	0.667	0.769	0.632	0.500
3gs5C	0.696	0.952	0.917	0.077	0.769	0.870	0.952	0.800	0.741
6c65A	1.000	1.000	1.000	0.000	0.750	0.857	1.000	1.000	0.857
4x4pB	1.000	1.000	0.957	0.750	0.686	0.828	0.857	0.857	0.815
3ovbD	1.000	0.957	0.957	0.000	0.564	0.857	0.923	0.889	0.774
6dcbB	0.737	1.000	1.000	0.750	0.900	0.857	1.000	1.000	0.818
1et4A	0.133	1.000	0.889	0.414	0.556	0.625	0.769	0.769	0.526
2xdbG	0.667	1.000	0.933	0.000	0.636	0.933	0.824	0.824	0.667
5deaA	0.667	1.000	1.000	0.000	0.476	0.875	0.778	0.778	0.824
6cf2G	1.000	0.957	0.917	0.857	0.923	0.923	0.923	1.000	0.889
4v83AV	0.692	0.966	1.000	0.000	0.698	0.849	0.737	0.667	0.688
2zh3B	1.000	1.000	1.000	0.468	0.606	0.857	1.000	0.889	0.649
4oogD	1.000	1.000	1.000	0.596	0.757	0.933	1.000	1.000	0.849
4atoG	0.000	1.000	0.933	0.000	0.636	1.000	1.000	1.000	0.667
3gcaA	0.833	1.000	1.000	0.000	0.833	0.833	0.714	0.833	0.625
3fu2B	0.714	1.000	0.941	0.000	0.889	0.000	0.000	0.000	0.167
5v3fA	0.000	1.000	1.000	0.000	0.800	1.000	1.000	1.000	1.000
6h0rA	1.000	1.000	1.000	0.160	0.531	0.634	0.812	0.565	0.765
5voeA	0.500	1.000	0.923	0.000	0.833	0.833	0.833	0.769	0.625
1jbrD	0.933	1.000	1.000	0.000	0.824	0.933	0.933	0.737	0.667
2b63R	1.000	1.000	1.000	0.000	1.000	1.000	1.000	0.900	0.750
3snpC	0.957	1.000	1.000	0.524	0.556	0.000	0.000	0.000	0.846
5y58X	1.000	1.000	1.000	0.667	0.909	0.769	0.870	0.870	0.692
Average	0.644	0.965	0.942	0.362	0.607	0.768	0.816	0.744	0.662

Table S3 F1-score of different base pair types for all atom types supported by CSSR for 361 benchmark RNAs.

† “All” means using all supported atoms. CSSR supported any combination of its 10 types of atoms. Due to limitation of space, we only show two combinations: all atoms, and C1’C4’P atoms.

‡ “N” is atom N9 and N1 for purine and pyrimidine, respectively.

Base pair type	All†	C1’C4’P	P	O5’	C5’	C4’	C3’	C2’	C1’	O4’	O3’	N‡
Watson-Crick (A:U)	0.925	0.919	0.832	0.854	0.884	0.889	0.874	0.857	0.883	0.892	0.848	0.875
Watson-Crick (G:C)	0.956	0.953	0.887	0.907	0.930	0.935	0.919	0.913	0.929	0.936	0.920	0.897
Wobble (G:U)	0.664	0.662	0.562	0.569	0.612	0.620	0.586	0.584	0.619	0.620	0.588	0.613

Table S4 Target-specific F1-score of all atom types supported by CSSR for 21 RNA-puzzle targets.

The data for RNA-puzzle problems 7, 16, 22, 23 are not yet publicly available. Problem 14 correspond to 2 RNA structures, one with ligand bound and the other in apo form.

† “All” means using all supported atoms. CSSR supported any combination of its 10 types of atoms. Due to limitation of space, we only show two combinations: all atoms, and C1’C4’P atoms.

‡ “N” is atom N9 and N1 for purine and pyrimidine, respectively.

RNA-puzzle problem [#]	All	C1’C4’P	P	O5’	C5’	C4’	C3’	C2’	C1’	O4’	O3’	N’
1. Regulatory element from human thymidylate synthase mRNA	0.919	0.947	0.872	0.895	0.947	0.947	0.895	0.947	0.947	0.947	0.923	0.857
2. Self-assembling RNA square	0.931	0.946	0.424	0.765	0.873	0.960	0.944	0.944	0.973	0.960	0.946	0.836
3. Glycine riboswitch	0.917	0.917	0.894	0.894	0.917	0.917	0.894	0.894	0.894	0.917	0.898	0.917
4. SAM-I riboswitch aptamer	0.956	0.944	0.923	0.956	0.933	0.923	0.921	0.935	0.923	0.956	0.956	0.966
5. Lariat capping ribozyme.	0.928	0.935	0.803	0.903	0.912	0.919	0.885	0.869	0.911	0.919	0.874	0.879
6. Adenosylcobalamin riboswitch	0.895	0.895	0.857	0.885	0.835	0.885	0.885	0.874	0.885	0.887	0.876	0.891
8. SAM riboswitch	0.969	0.969	0.984	0.951	0.935	0.952	0.918	0.900	0.951	0.952	0.984	0.984
9. 5-hydroxytryptophan aptamer	0.947	0.947	0.769	0.850	0.837	0.947	0.872	0.889	0.923	0.923	0.857	0.947
10. T-box riboswitch and tRNA	0.968	0.968	0.875	0.866	0.925	0.923	0.878	0.913	0.945	0.957	0.938	0.957
11. 5'-terminal hairpin of the 7SK snRNA	0.878	0.878	0.780	0.750	0.905	0.850	0.750	0.800	0.829	0.857	0.632	0.629
12. YdaO riboswitch	0.935	0.909	0.872	0.886	0.895	0.907	0.935	0.919	0.919	0.904	0.921	0.866
13. ZMP riboswitch	0.950	0.950	0.878	0.923	0.923	0.923	0.923	0.923	0.923	0.923	0.950	0.950
14. L-glutamine riboswitch (Bound)	0.909	0.938	0.882	0.909	0.938	0.938	0.938	0.938	0.938	0.938	0.909	0.938
14. L-glutamine riboswitch (Free)	1.000	1.000	0.944	0.941	0.970	0.970	0.941	0.970	0.970	0.970	1.000	1.000
15. Hammerhead	0.800	0.821	0.769	0.821	0.821	0.821	0.800	0.780	0.821	0.800	0.750	0.769
17. Pistol ribozyme	0.947	0.923	0.878	0.900	0.923	0.923	0.923	0.923	0.923	0.923	0.895	0.947
18. Exonuclease resistant RNA from Zika virus	0.941	0.920	0.694	0.902	0.960	0.920	0.870	0.857	0.920	0.920	0.917	0.898
19. Twister sister	0.933	0.933	0.773	0.936	0.889	0.889	0.682	0.864	0.933	0.936	0.476	0.933
20. Twister sister	0.936	0.958	0.894	0.875	0.870	0.936	0.936	0.913	0.917	0.894	0.917	0.939
21. Guanidine III riboswitch	0.870	0.870	0.957	0.957	0.870	0.870	0.909	0.909	0.870	0.870	0.870	0.909
24. Adenovirus Virus-Associated (VA) RNA I apical and central domains	0.909	0.919	0.944	0.911	0.919	0.909	0.919	0.919	0.919	0.932	0.932	0.943
Average	0.926	0.928	0.841	0.889	0.905	0.916	0.886	0.899	0.916	0.918	0.877	0.903

Table S5 Target-specific F1-score of RNAstructure, DSSR, ClaRNA, RNAView, MC-annotate and that of all atom types supported by pdb2ss (P, O6', C5', C4', C3' and O3') for 21 RNA-puzzle targets.

† Since the ground-truth secondary structure assignment is derived from experimental structures while the assessed assignment is derived from computational structure models, the “DSSR” column does not always achieve a perfect F1-score of 1.000 even though both the ground-truth and the assessed assignment are from the same secondary structure assignment program.

‡ The $TM\text{-score}_{RNA}$ and RMSD between the selected RNA-puzzle structure model and the experimental structure are shown in the last two columns.

RNA-puzzle problem	RNAstructure	DSSR †	ClaRNA	RNAView	MC-annotate	P	O6'	C5'	C4'	C3'	O3'	TM-score	RMSD ‡
1. Regulatory element from human thymidylate synthase mRNA	0.000	0.923	0.923	0.923	0.900	0.468	0.610	0.947	0.947	0.692	0.750	0.369	4.1
2. Self-assembling RNA square	0.000	0.946	0.916	0.901	0.919	0.659	0.681	0.840	0.935	0.911	0.819	0.866	1.7
3. Glycine riboswitch	0.939	0.917	0.916	0.917	0.846	0.581	0.754	0.939	0.786	0.667	0.620	0.336	18.3
4. SAM-I riboswitch aptamer	0.932	0.989	0.989	0.989	0.968	0.581	0.688	0.796	0.782	0.811	0.765	0.768	3.4
5. Lariat capping ribozyme.	0.538	0.927	0.918	0.918	0.889	0.436	0.618	0.704	0.767	0.753	0.651	0.532	9.1
6. Adenosylcobalamin riboswitch	0.562	0.914	0.914	0.914	0.895	0.469	0.559	0.671	0.862	0.780	0.653	0.426	14.3
8. SAM riboswitch	0.881	0.968	0.984	0.984	0.954	0.554	0.667	0.827	0.886	0.838	0.775	0.580	4.5
9. 5-hydroxytryptophan aptamer	0.800	0.947	0.895	0.923	0.829	0.387	0.576	0.706	0.818	0.632	0.526	0.459	6.2
10. T-box riboswitch and tRNA	0.747	0.947	0.948	0.968	0.939	0.443	0.652	0.759	0.882	0.711	0.610	0.608	10.3
11. 5'-terminal hairpin of the 7SK snRNA	0.927	0.850	0.850	0.811	0.820	0.493	0.513	0.741	0.930	0.633	0.491	0.341	5.5
12. YdaO riboswitch	0.361	0.883	0.909	0.883	0.886	0.432	0.496	0.783	0.857	0.758	0.649	0.335	12.8
13. ZMP riboswitch	0.684	0.950	0.950	0.950	0.927	0.528	0.603	0.905	0.905	0.792	0.760	0.393	5.3
14. L-glutamine riboswitch (Bound)	0.970	0.909	0.909	0.909	0.909	0.561	0.683	0.938	0.857	0.882	0.600	0.364	16.5
14. L-glutamine riboswitch (Free)	1.000	1.000	1.000	1.000	0.944	0.567	0.850	0.944	0.850	0.944	0.654	0.370	7.2
15. Hammerhead	0.769	0.850	0.850	0.850	0.829	0.438	0.525	0.744	0.821	0.627	0.653	0.898	6.3
17. Pistol ribozyme	0.400	0.900	0.923	0.900	0.900	0.474	0.735	0.800	0.837	0.783	0.735	0.360	9.0
18. Exonuclease resistant RNA from Zika virus	0.640	0.962	0.941	0.898	0.962	0.459	0.581	0.800	0.941	0.772	0.633	0.501	3.2
19. Twister sister	0.256	0.978	0.956	0.956	0.978	0.473	0.579	0.783	0.875	0.688	0.361	0.423	5.5
20. Twister sister	0.609	0.979	0.979	0.958	0.920	0.483	0.583	0.808	0.821	0.917	0.815	0.450	5.1
21. Guanidine III riboswitch	0.609	0.956	0.956	0.956	0.846	0.629	0.647	0.880	0.714	0.769	0.880	0.319	3.5
24. Adenovirus Virus-Associated (VA) RNA I apical and central domains	0.966	0.921	0.921	0.921	0.863	0.608	0.641	0.796	0.766	0.706	0.626	0.520	4.8
Average	0.647	0.934	0.931	0.925	0.901	0.511	0.631	0.815	0.850	0.765	0.668	0.487	7.4

Table S6 Target-specific F1-score of CSSR, pdb2ss and RNAstructure for rSS assignment of low-resolution experimental RNA structures with only P atoms, where a high-resolution full-atomic experimental structures is also available for the same RNAs.

† The $TM\text{-score}_{RNA}$, RMSD and sequence identity between the low- and high-resolution RNA structures are shown in the last two columns. The ground-truth rSS assignment is from running DSSR on the high-resolution structures. The nucleotide-level correspondence between the low- and high-resolution structure is derived from the pairwise structure alignment by RNA-align.

Low-resolution structure	High-resolution structure	CSSR	pdb2ss	RNAstructure	TM-score †	RMSD †	Sequence identity †
4v48BA	4v4vAA	0.850	0.356	0.426	0.995	1.49	0.987
1jgqA	2e51A	0.836	0.364	0.566	0.978	3.04	0.988
4adx9	1yhq9	0.909	0.467	0.451	0.999	0.15	1.000
1zc8Z	2om7C	0.918	0.509	0.912	0.807	1.58	0.948
1qzbB	1ob5B	0.850	0.469	0.238	0.821	1.39	0.961
1eg0O	7chdI	0.900	0.408	0.976	0.776	2.21	0.947
2agnC	1p5oA	0.884	0.538	0.511	0.708	2.15	1.000
1gsgT	1qtqB	0.950	0.437	0.974	0.931	0.59	0.973
1pn8D	1jgqD	0.950	0.514	0.889	0.919	0.00	0.919
1r2wC	1mmsC	0.786	0.449	0.733	0.797	1.13	1.000
3ep2B	3j0dA	0.889	0.643	0.818	0.911	0.56	0.940
2r1gB	2noqB	0.929	0.546	0.774	0.922	0.24	0.938
2agnA	1f84A	0.667	0.333	1.000	1.000	0.00	1.000
3ep2D	3degI	0.923	0.480	0.714	0.591	0.63	0.966
1qzcC	2x7nA	0.909	0.909	0.667	0.929	0.00	0.929
1eg0M	5mrxA	1.000	0.500	0.500	0.833	0.30	0.962
Average		0.884	0.495	0.697	0.870	0.97	0.966

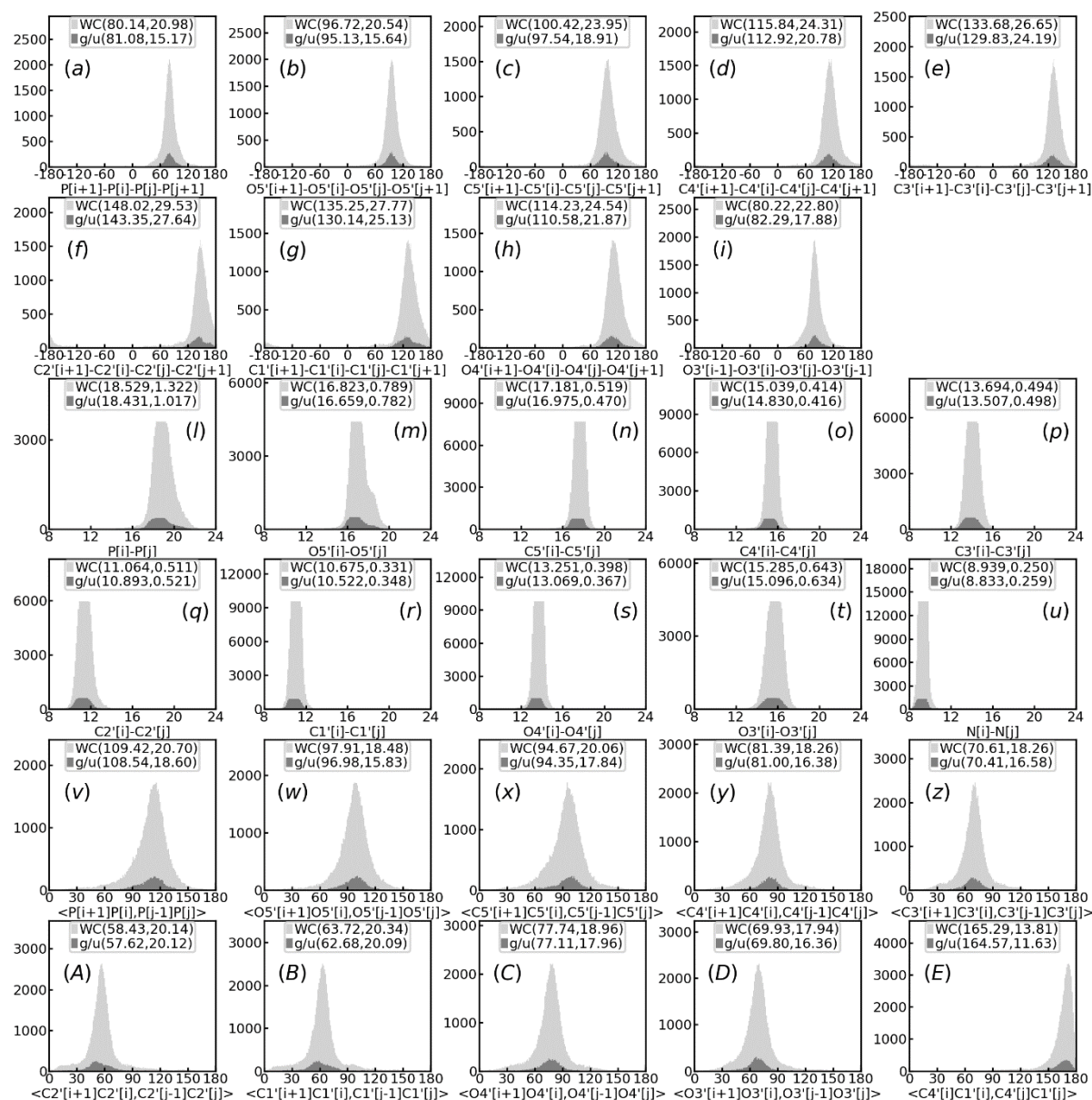


Figure S1 Histogram for the distributions of dihedral angles (*a-i*), distances (*l-u*) and angles (*v-E*) formed by atoms across two nucleotides in canonical base pairs. Watson-Crick (WC) and G:U Wobble (g/u) base pairs are shown in light and dark grey, respectively. The statistics are obtained from 3724 non-redundant full atomic RNA chains. The mean and standard deviation for each distribution are listed within the parentheses. Since dihedral angles are periodic (e.g., a dihedral angle of 0 is the same as a dihedral angle of 360°), the mean and standard deviations are calculated twice, once in the range of 0 to 360° and another time in the range of -180° to 180°. Among these two sets of mean/standard deviation, the set with smaller standard deviation is chosen. Atoms used in the calculation are shown as x-axis labels. For example, “P[i]-P[j]” in (*l*) is the distance between P atoms of paired nucleotides *i* and *j* (*i*<*j*). “P[i+1]-P[i]-P[j]-P[j+1]” in (*a*) is the dihedral angle between the plane formed by P atoms from nucleotides *i*+1, *i* and *j*, and another plane formed by P atoms from

nucleotides i, j and $j+1$. “ $\langle P[i-1]P[i], P[j-1]P[j] \rangle$ ” in (**v**) is the angle between the vector pointing from P atoms of nucleotide $i-1$ to i and the vector pointing from P atoms of nucleotide $j-1$ to j .

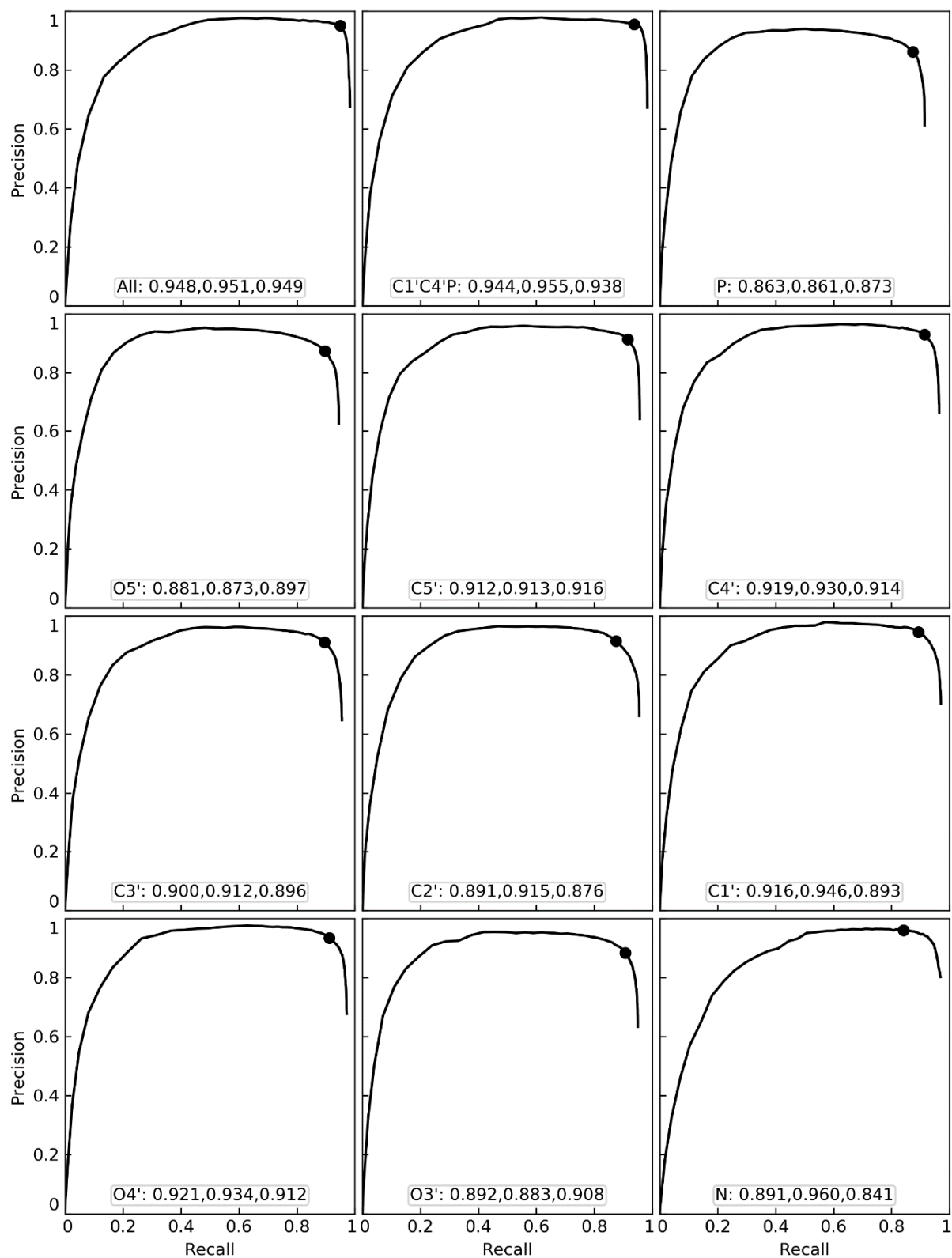


Figure S2 Precision-recall curves for CSSR assignment for 361 benchmark RNAs. Different panels show different atom types used for assignment. The boxes at lower part of each plot shows the atom type, and the F1-score, precision and recall at CSSR score ≥ 0.5 (black dots).

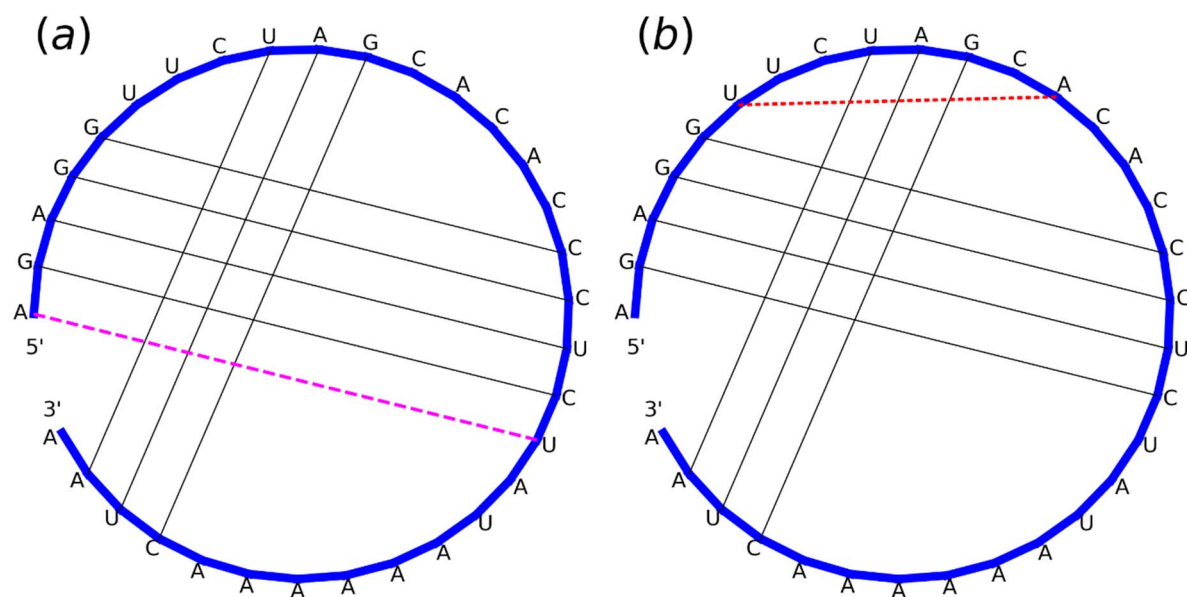


Figure S3 Assignment of rSS with pseudoknots for PDB ID 3fu2 chain B. **(a)** DSSR assignment. **(b)** CSSR assignment using P atoms only (F1-score=0.875 to DSSR). Base pairs in DSSR but not in final CSSR assignment are shown by magenta dash lines in **(a)**. Base pairs in CSSR but not in DSSR are shown by a red dotted line in **(b)**. Base pairs common between CSSR and DSSR are shown by black solid lines.