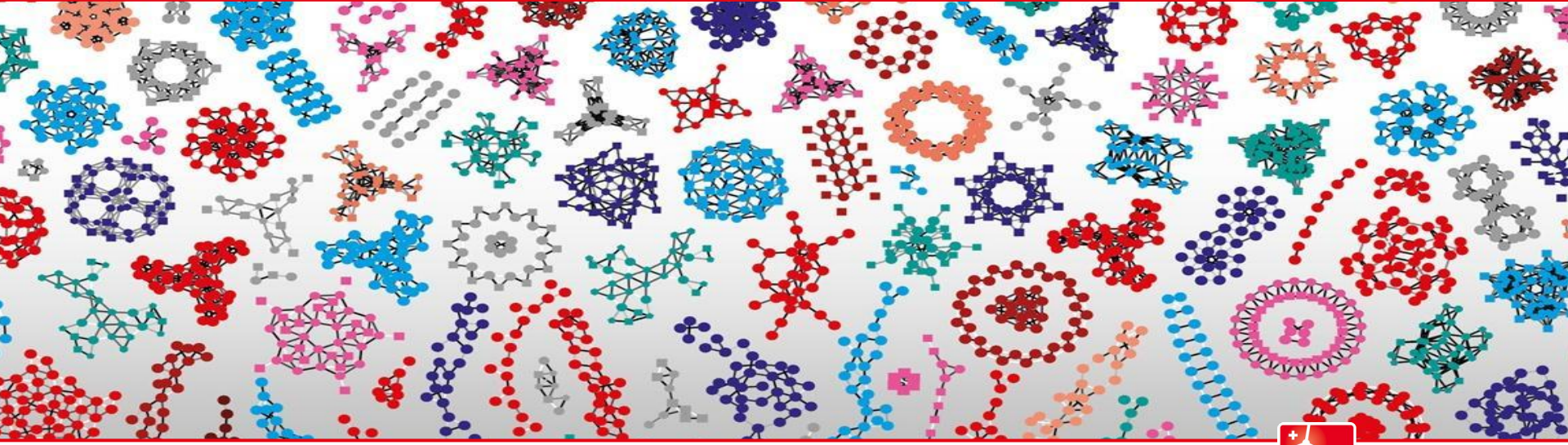


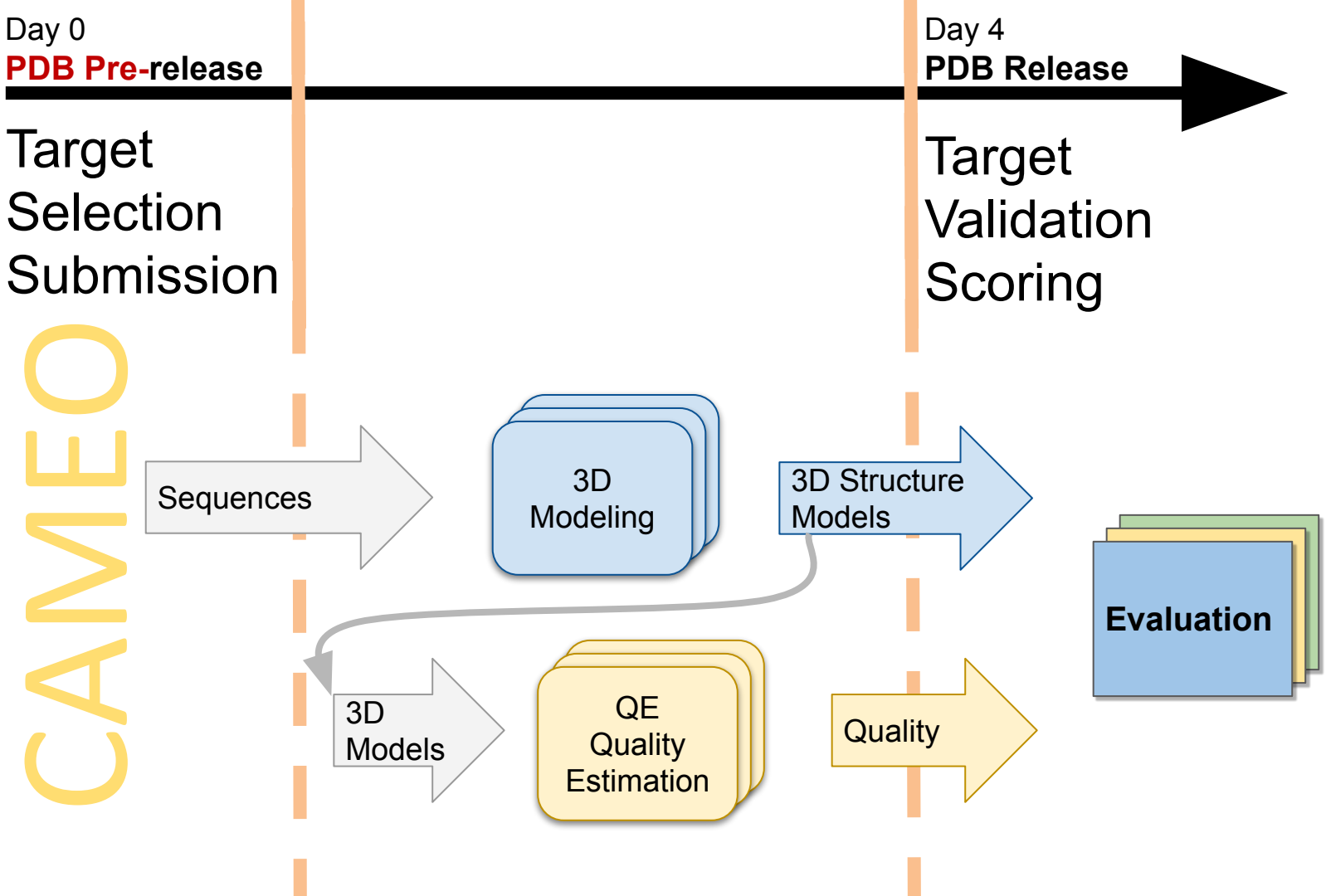
Swiss Institute of Bioinformatics

CAMEO - Beyond Single Protein Chains

Xavier Robin

CASP14
December 2020

elixir SWITZERLAND | BIOZENTRUM Universität Basel The Center for Molecular Life Sciences | Universität Basel


Day 0
PDB Pre-release
Day 4
PDB Release
Target
Selection
Submission
Target
Validation
Scoring
CAMEO
Sequences
3D
Modeling
3D Structure
Models
Evaluation
3D
Models
QE
Quality
Estimation
Quality

CAMEO is complementing CASP

CASP

- Blind predictions

CAMEO

- Blind predictions

CAMEO is complementing CASP

CASP

- Blind predictions
- Every 2 years

CAMEO

- Blind predictions
- Weekly

CAMEO is complementing CASP

CASP

- Blind predictions
- Every 2 years
- Human curation

CAMEO

- Blind predictions
- Weekly
- Fully automated

CAMEO is complementing CASP

CASP

- Blind predictions
- Every 2 years
- Human curation
- Human & Server predictors

CAMEO

- Blind predictions
- Weekly
- Fully automated
- Only servers

CAMEO is complementing CASP

CASP

- Blind predictions
- Every 2 years
- Human curation
- Human & Server predictors
- Hand-picked targets
  - Obtained from crystallographers
  - Hard folding targets

CAMEO

- Blind predictions
- Weekly
- Fully automated
- Only servers
- Targets from PDB pre-release
  - Selection based on BLAST
  - Typically easier targets

CAMEO is complementing CASP

CASP

- Blind predictions
- Every 2 years
- Human curation
- Human & Server predictors
- Hand-picked targets
  - Obtained from crystallographers
  - Hard folding targets
- Experts assessment

CAMEO

- Blind predictions
- Weekly
- Fully automated
- Only servers
- Targets from PDB pre-release
  - Remove sequence redundancy
  - Typically easier targets
- Automated evaluation

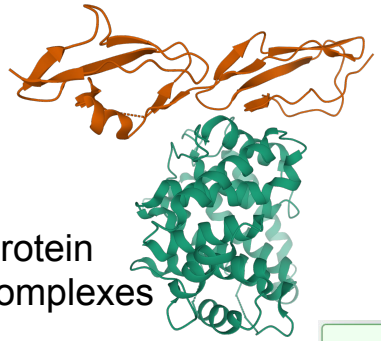
Major news of the past 2 years

- Refactoring & workflow updates
- Discontinued the Contact Prediction category (CP)
- Jürgen Haas moved to AstraZeneca
- New CAMEO 3D beta version

Jürgen Haas

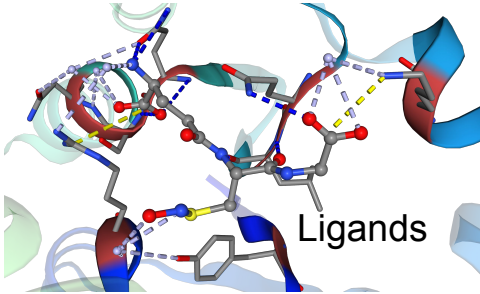
Rafal Gumienny

CAMEO - Beyond Single Protein Chains



Protein complexes

Introducing the new 3D category:

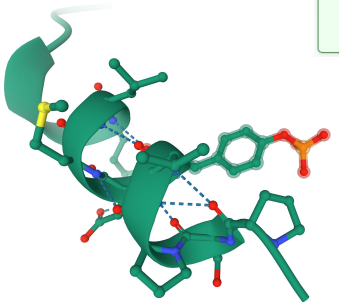


Ligands

3D - Structures & Complexes

Registrations now open!

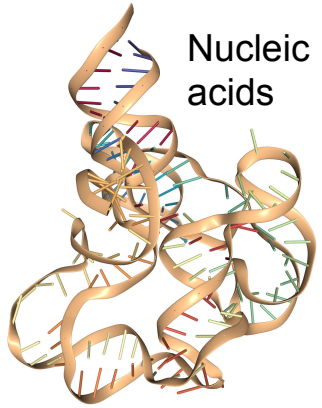
BETA



Non-canonical residues

https://beta.cameo3d.org/

help-cameo3d@unibas.ch



Nucleic acids

Xavier Robin, Juergen Haas, Rafal Gumienny, Anna Smolinski, Flavio Ackermann, Gerardo Tauriello, Torsten Schwede

SIB Swiss Institute of Bioinformatics

Universität Basel

Summary of the past 2 years

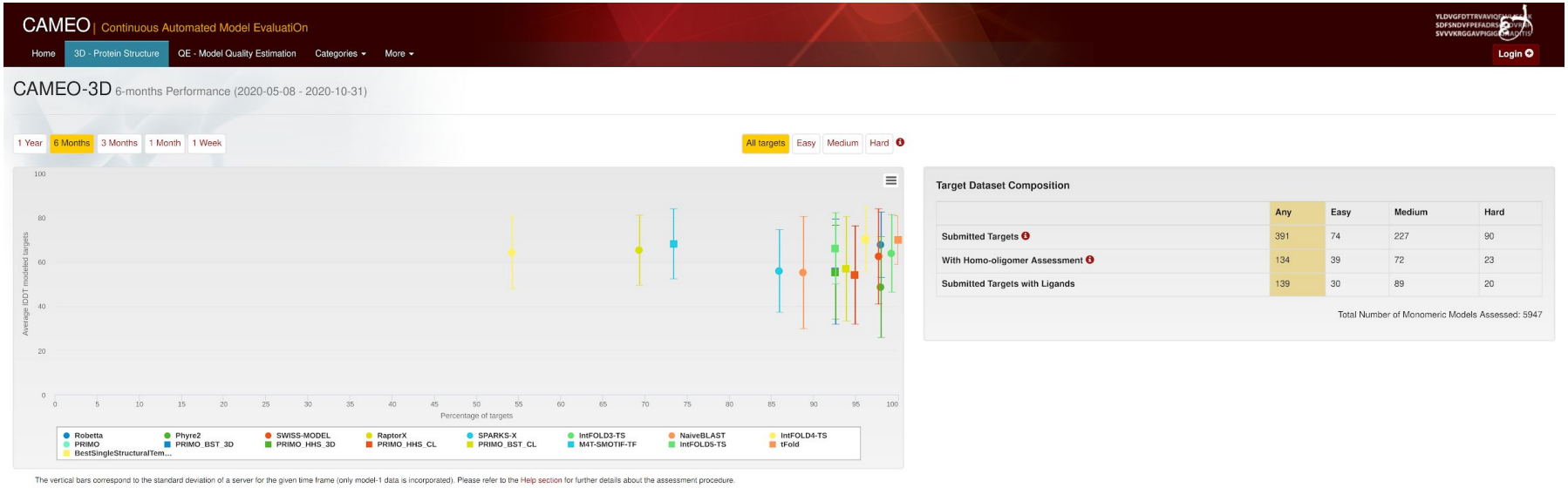
3D

- 1795 targets
  - 117 513 predictions
- 15 active public servers
  - 25 development servers
- 9 (18) groups

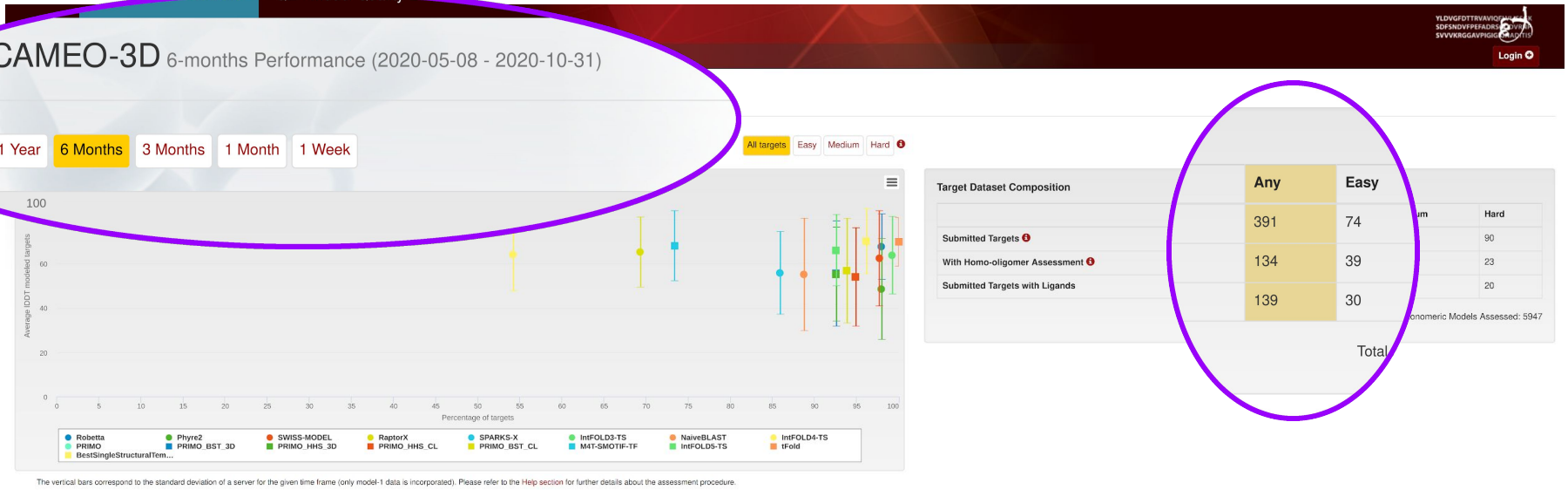
QE

- 19 159 targets
  - 244 992 predictions
- 12 active public servers
  - 5 development servers
- 5 (6) groups

Results - Overview



Results - Overview



Server Name	Common Subset - Start Comparison	Avg. response time (hh:mm:ss)	Targets				Average lDDT		Average CAD-score		Average Model Confidence (lDDT)		Average lDDT-BS		Average QS-score		Average MM-align	
			#Submitted	#Modeled	#Submitted Oligo	#Modeled Oligo	All	Modeled	All	Modeled	All	Modeled	All	Modeled	All	Modeled	All	Modeled
tFold		63:25:59	391	391	134	0	69.9	69.9	68.8	68.8	0.52	0.52	66.3	66.3	-	-	-	-
BestSingleStructuralTemplate		04:05:11	391	376	134	0	67.4	70.1	66.1	68.7	0.64	0.67	66.5	69.0	-	-	-	-
Robetta		27:13:19	391	383	134	79	66.3	67.7	66.1	67.5	0.81	0.83	66.1	66.6	32.6	55.3	49.9	84.6
IntFOLD3-TS		35:32:44	391	388	134	0	63.3	63.8	63.2	63.7	0.84	0.85	68.8	68.8	-	-	-	-

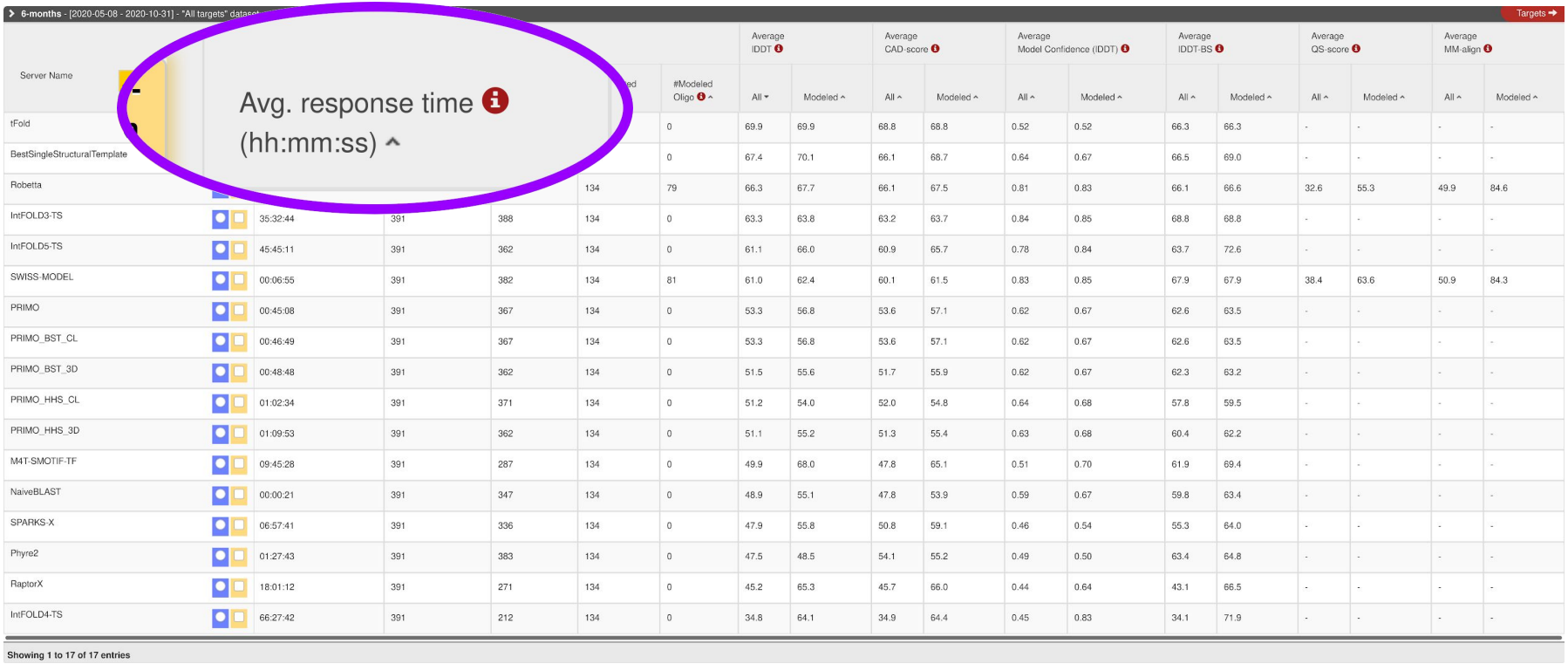
Results - Scores

6-months - [2020-05-08 - 2020-10-31] - "All targets" dataset — Targets

Server Name (Common Subset - Start Comparison)	Avg. response time (hh:mm:ss)	Targets				Average IDDT		Average CAD-score		Average Model Confidence (IDDT)		Average IDDT-BS		Average QS-score		Average MM-align	
		#Submitted	#Modeled	#Submitted Oligo	#Modeled Oligo	All	Modeled	All	Modeled	All	Modeled	All	Modeled	All	Modeled	All	Modeled
tFold	63:25:59	391	391	134	0	69.9	69.9	68.8	68.8	0.52	0.52	66.3	66.3	-	-	-	-
BestSingleStructuralTemplate	04:05:11	391	376	134	0	67.4	70.1	66.1	68.7	0.64	0.67	66.5	69.0	-	-	-	-
Robetta	27:13:19	391	383	134	79	66.3	67.7	66.1	67.5	0.81	0.83	66.1	66.6	32.6	55.3	49.9	84.6
IntFOLD3-TS	35:32:44	391	388	134	0	63.3	63.8	63.2	63.7	0.84	0.85	68.8	68.8	-	-	-	-
IntFOLD5-TS	45:45:11	391	362	134	0	61.1	66.0	60.9	65.7	0.78	0.84	63.7	72.6	-	-	-	-
SWISS-MODEL	00:06:55	391	382	134	81	61.0	62.4	60.1	61.5	0.83	0.85	67.9	67.9	38.4	63.6	50.9	84.3
PRIMO	00:45:08	391	367	134	0	53.3	56.8	53.6	57.1	0.62	0.67	62.6	63.5	-	-	-	-
PRIMO_BST_CL	00:46:49	391	367	134	0	53.3	56.8	53.6	57.1	0.62	0.67	62.6	63.5	-	-	-	-
PRIMO_BST_3D	00:48:48	391	362	134	0	51.5	55.6	51.7	55.9	0.62	0.67	62.3	63.2	-	-	-	-
PRIMO_HHS_CL	01:02:34	391	371	134	0	51.2	54.0	52.0	54.8	0.64	0.68	57.8	59.5	-	-	-	-
PRIMO_HHS_3D	01:09:53	391	362	134	0	51.1	55.2	51.3	55.4	0.63	0.68	60.4	62.2	-	-	-	-
M4T-SMOTIF-TF	09:45:28	391	287	134	0	49.9	68.0	47.8	65.1	0.51	0.70	61.9	69.4	-	-	-	-
NaiveBLAST	00:00:21	391	347	134	0	48.9	55.1	47.8	53.9	0.59	0.67	59.8	63.4	-	-	-	-
SPARKS-X	06:57:41	391	336	134	0	47.9	55.8	50.8	59.1	0.46	0.54	55.3	64.0	-	-	-	-
Phyre2	01:27:43	391	383	134	0	47.5	48.5	54.1	55.2	0.49	0.50	63.4	64.8	-	-	-	-
RaptorX	18:01:12	391	271	134	0	45.2	65.3	45.7	66.0	0.44	0.64	43.1	66.5	-	-	-	-
IntFOLD4-TS	66:27:42	391	212	134	0	34.8	64.1	34.9	64.4	0.45	0.83	34.1	71.9	-	-	-	-

Showing 1 to 17 of 17 entries

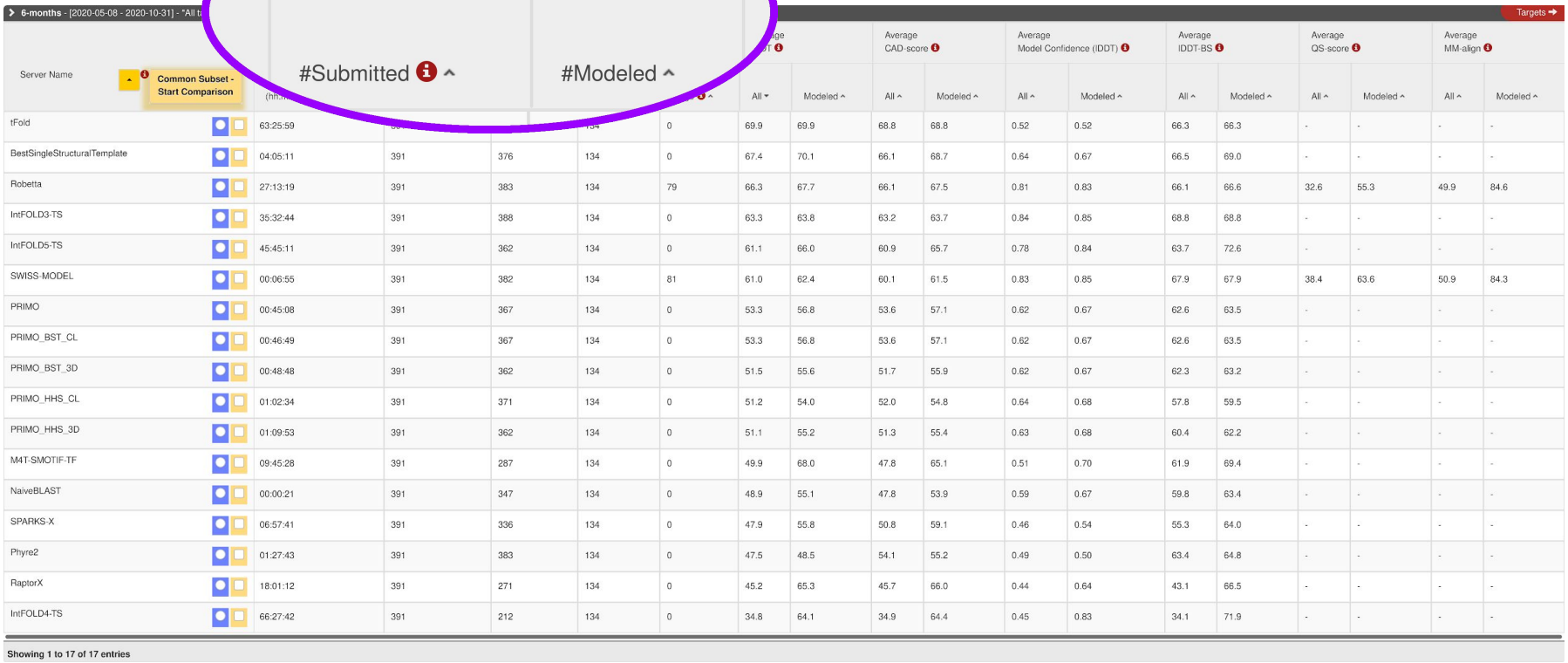
Results - Scores



Server Name	Avg. response time (hh:mm:ss)				#Modeled Oligo	Average IDDT All	Average IDDT Modeled	Average CAD-score All	Average CAD-score Modeled	Average Model Confidence (IDDT) All	Average Model Confidence (IDDT) Modeled	Average IDDT-BS All	Average IDDT-BS Modeled	Average QS-score All	Average QS-score Modeled	Average MM-align All	Average MM-align Modeled
tFold					0	69.9	69.9	68.8	68.8	0.52	0.52	66.3	66.3	-	-	-	-
BestSingleStructuralTemplate					0	67.4	70.1	66.1	68.7	0.64	0.67	66.5	69.0	-	-	-	-
Robetta				134	79	66.3	67.7	66.1	67.5	0.81	0.83	66.1	66.6	32.6	55.3	49.9	84.6
IntFOLD3-TS	35:32:44	391	388	134	0	63.3	63.8	63.2	63.7	0.84	0.85	68.8	68.8	-	-	-	-
IntFOLD5-TS	45:45:11	391	362	134	0	61.1	66.0	60.9	65.7	0.78	0.84	63.7	72.6	-	-	-	-
SWISS-MODEL	00:06:55	391	382	134	81	61.0	62.4	60.1	61.5	0.83	0.85	67.9	67.9	38.4	63.6	50.9	84.3
PRIMO	00:45:08	391	367	134	0	53.3	56.8	53.6	57.1	0.62	0.67	62.6	63.5	-	-	-	-
PRIMO_BST_CL	00:46:49	391	367	134	0	53.3	56.8	53.6	57.1	0.62	0.67	62.6	63.5	-	-	-	-
PRIMO_BST_3D	00:48:48	391	362	134	0	51.5	55.6	51.7	55.9	0.62	0.67	62.3	63.2	-	-	-	-
PRIMO_HHS_CL	01:02:34	391	371	134	0	51.2	54.0	52.0	54.8	0.64	0.68	57.8	59.5	-	-	-	-
PRIMO_HHS_3D	01:09:53	391	362	134	0	51.1	55.2	51.3	55.4	0.63	0.68	60.4	62.2	-	-	-	-
M4T-SMOTIF-TF	09:45:28	391	287	134	0	49.9	68.0	47.8	65.1	0.51	0.70	61.9	69.4	-	-	-	-
NaiveBLAST	00:00:21	391	347	134	0	48.9	55.1	47.8	53.9	0.59	0.67	59.8	63.4	-	-	-	-
SPARKS-X	06:57:41	391	336	134	0	47.9	55.8	50.8	59.1	0.46	0.54	55.3	64.0	-	-	-	-
Phyre2	01:27:43	391	383	134	0	47.5	48.5	54.1	55.2	0.49	0.50	63.4	64.8	-	-	-	-
RaptorX	18:01:12	391	271	134	0	45.2	65.3	45.7	66.0	0.44	0.64	43.1	66.5	-	-	-	-
IntFOLD4-TS	66:27:42	391	212	134	0	34.8	64.1	34.9	64.4	0.45	0.83	34.1	71.9	-	-	-	-

Showing 1 to 17 of 17 entries

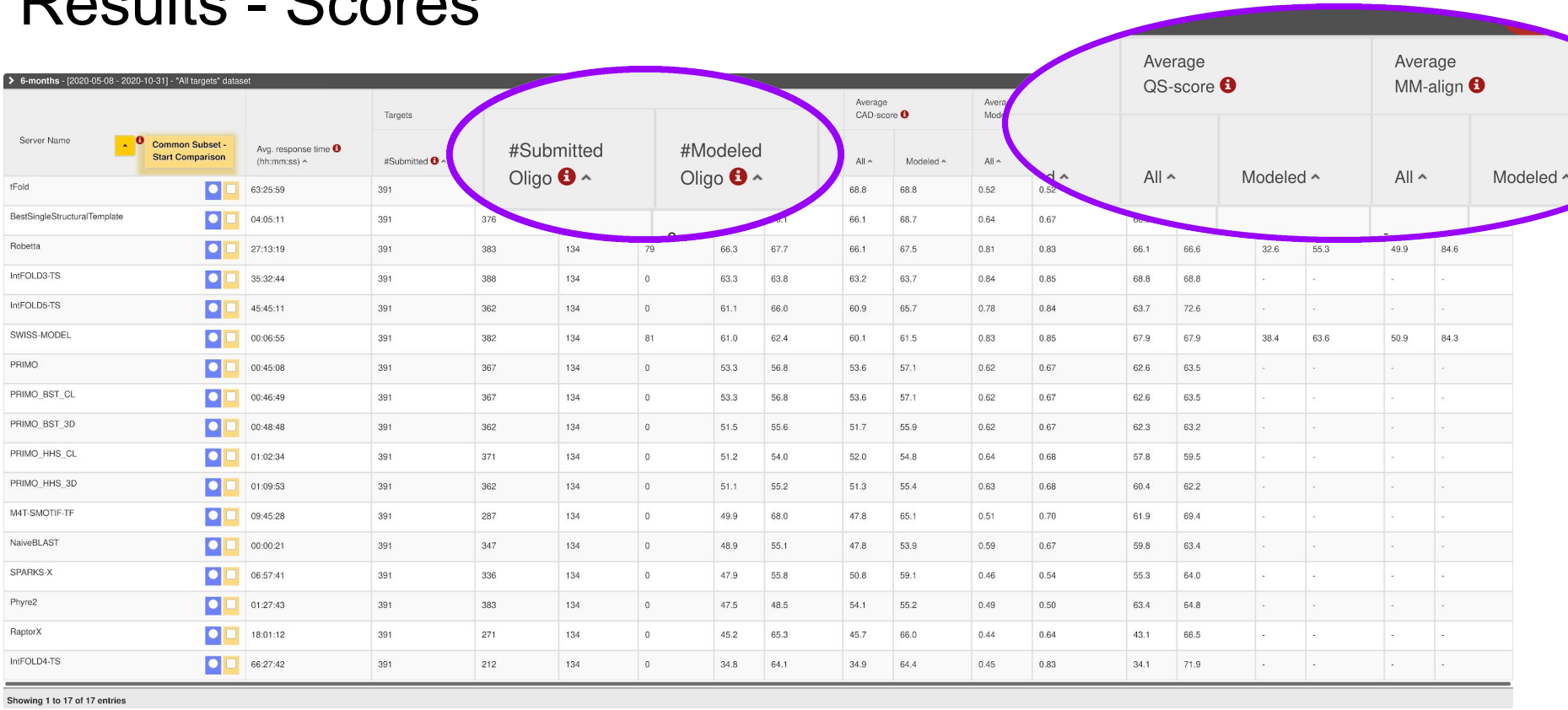
Results - 2



Server Name																	
							IDDT		CAD-score		Model Confidence (IDDT)		IDDT-BS		QS-score		MM-align	
		#Submitted	#Modeled				All	Modeled	All	Modeled	All	Modeled	All	Modeled	All	Modeled	All	Modeled
tFold		63:25:59			134	0	69.9	69.9	68.8	68.8	0.52	0.52	66.3	66.3	-	-	-	-
BestSingleStructuralTemplate		04:05:11	391	376	134	0	67.4	70.1	66.1	68.7	0.64	0.67	66.5	69.0	-	-	-	-
Robetta		27:13:19	391	383	134	79	66.3	67.7	66.1	67.5	0.81	0.83	66.1	66.6	32.6	55.3	49.9	84.6
IntFOLD3-TS		35:32:44	391	388	134	0	63.3	63.8	63.2	63.7	0.84	0.85	68.8	68.8	-	-	-	-
IntFOLD5-TS		45:45:11	391	362	134	0	61.1	66.0	60.9	65.7	0.78	0.84	63.7	72.6	-	-	-	-
SWISS-MODEL		00:06:55	391	382	134	81	61.0	62.4	60.1	61.5	0.83	0.85	67.9	67.9	38.4	63.6	50.9	84.3
PRIMO		00:45:08	391	367	134	0	53.3	56.8	53.6	57.1	0.62	0.67	62.6	63.5	-	-	-	-
PRIMO_BST_CL		00:46:49	391	367	134	0	53.3	56.8	53.6	57.1	0.62	0.67	62.6	63.5	-	-	-	-
PRIMO_BST_3D		00:48:48	391	362	134	0	51.5	55.6	51.7	55.9	0.62	0.67	62.3	63.2	-	-	-	-
PRIMO_HHS_CL		01:02:34	391	371	134	0	51.2	54.0	52.0	54.8	0.64	0.68	57.8	59.5	-	-	-	-
PRIMO_HHS_3D		01:09:53	391	362	134	0	51.1	55.2	51.3	55.4	0.63	0.68	60.4	62.2	-	-	-	-
M4T-SMOTIF-TF		09:45:28	391	287	134	0	49.9	68.0	47.8	65.1	0.51	0.70	61.9	69.4	-	-	-	-
NaiveBLAST		00:00:21	391	347	134	0	48.9	55.1	47.8	53.9	0.59	0.67	59.8	63.4	-	-	-	-
SPARKS-X		06:57:41	391	336	134	0	47.9	55.8	50.8	59.1	0.46	0.54	55.3	64.0	-	-	-	-
Phyre2		01:27:43	391	383	134	0	47.5	48.5	54.1	55.2	0.49	0.50	63.4	64.8	-	-	-	-
RaptorX		18:01:12	391	271	134	0	45.2	65.3	45.7	66.0	0.44	0.64	43.1	66.5	-	-	-	-
IntFOLD4-TS		66:27:42	391	212	134	0	34.8	64.1	34.9	64.4	0.45	0.83	34.1	71.9	-	-	-	-

Showing 1 to 17 of 17 entries

Results - Scores

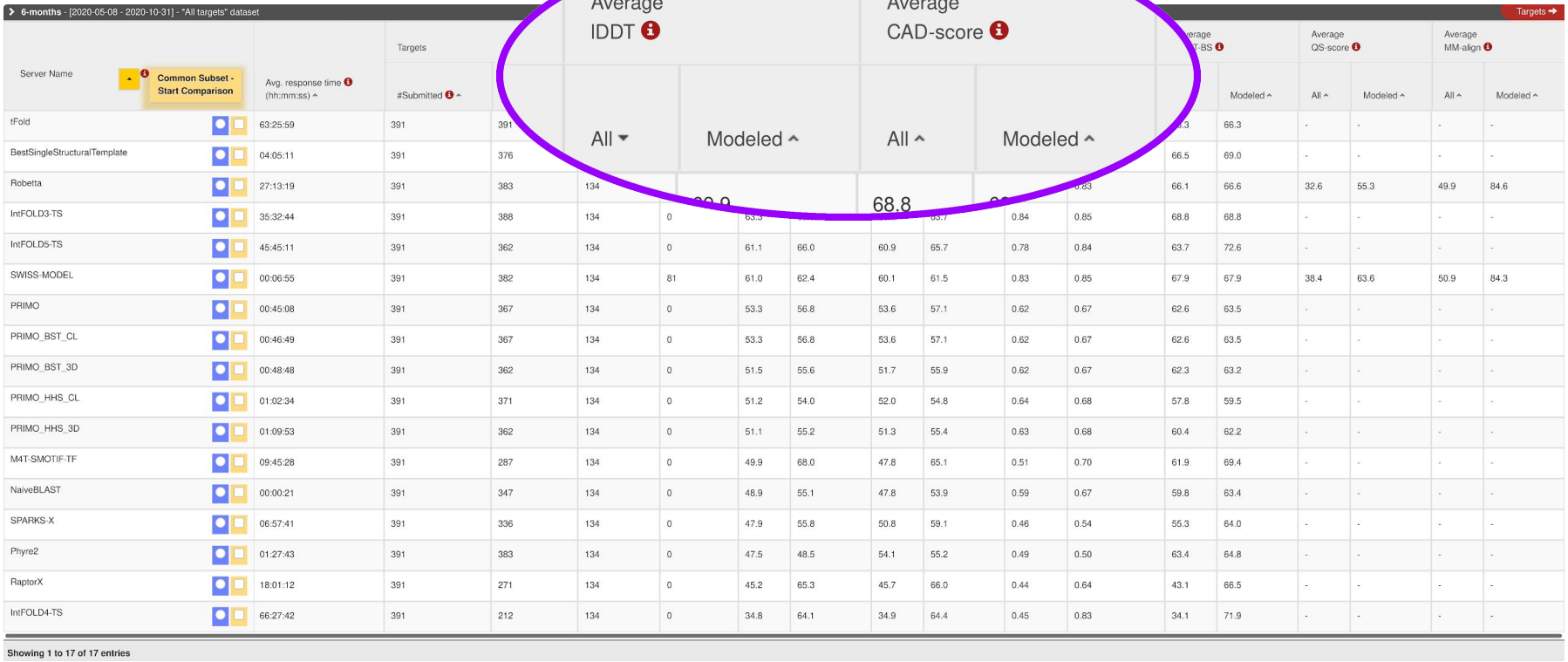


6-months - [2020-05-08 - 2020-10-31] - "All targets" dataset

Server Name	Common Subset - Start Comparison	Avg. response time (hh:mm:ss)	Targets	#Submitted Oligo	#Modeled Oligo			Average CAD-score		Average		Average QS-score		Average MM-align	
			#Submitted					All	Modeled	All		All	Modeled	All	Modeled
tFold		63:25:59	391					68.8	68.8	0.52	0.52				
BestSingleStructuralTemplate		04:05:11	391	376				66.1	68.7	0.64	0.67				
Robetta		27:13:19	391	383	134	79	66.3	67.7	66.1	67.5	0.81	0.83	66.1	66.6	32.6	55.3	49.9	84.6
IntFOLD3-TS		35:32:44	391	388	134	0	63.3	63.8	63.2	63.7	0.84	0.85	68.8	68.8	-	-	-	-
IntFOLD5-TS		45:45:11	391	362	134	0	61.1	66.0	60.9	65.7	0.78	0.84	63.7	72.6	-	-	-	-
SWISS-MODEL		00:06:55	391	382	134	81	61.0	62.4	60.1	61.5	0.83	0.85	67.9	67.9	38.4	63.6	50.9	84.3
PRIMO		00:45:08	391	367	134	0	53.3	56.8	53.6	57.1	0.62	0.67	62.6	63.5	-	-	-	-
PRIMO_BST_CL		00:46:49	391	367	134	0	53.3	56.8	53.6	57.1	0.62	0.67	62.6	63.5	-	-	-	-
PRIMO_BST_3D		00:48:48	391	362	134	0	51.5	55.6	51.7	55.9	0.62	0.67	62.3	63.2	-	-	-	-
PRIMO_HHS_CL		01:02:34	391	371	134	0	51.2	54.0	52.0	54.8	0.64	0.68	57.8	59.5	-	-	-	-
PRIMO_HHS_3D		01:09:53	391	362	134	0	51.1	55.2	51.3	55.4	0.63	0.68	60.4	62.2	-	-	-	-
M4T-SMOTIF-TF		09:45:28	391	287	134	0	49.9	68.0	47.8	65.1	0.51	0.70	61.9	69.4	-	-	-	-
NaiveBLAST		00:00:21	391	347	134	0	48.9	55.1	47.8	53.9	0.59	0.67	59.8	63.4	-	-	-	-
SPARKS-X		06:57:41	391	336	134	0	47.9	55.8	50.8	59.1	0.46	0.54	55.3	64.0	-	-	-	-
Phyre2		01:27:43	391	383	134	0	47.5	48.5	54.1	55.2	0.49	0.50	63.4	64.8	-	-	-	-
RaptorX		18:01:12	391	271	134	0	45.2	65.3	45.7	66.0	0.44	0.64	43.1	66.5	-	-	-	-
IntFOLD4-TS		66:27:42	391	212	134	0	34.8	64.1	34.9	64.4	0.45	0.83	34.1	71.9	-	-	-	-

Showing 1 to 17 of 17 entries

Results - Scores



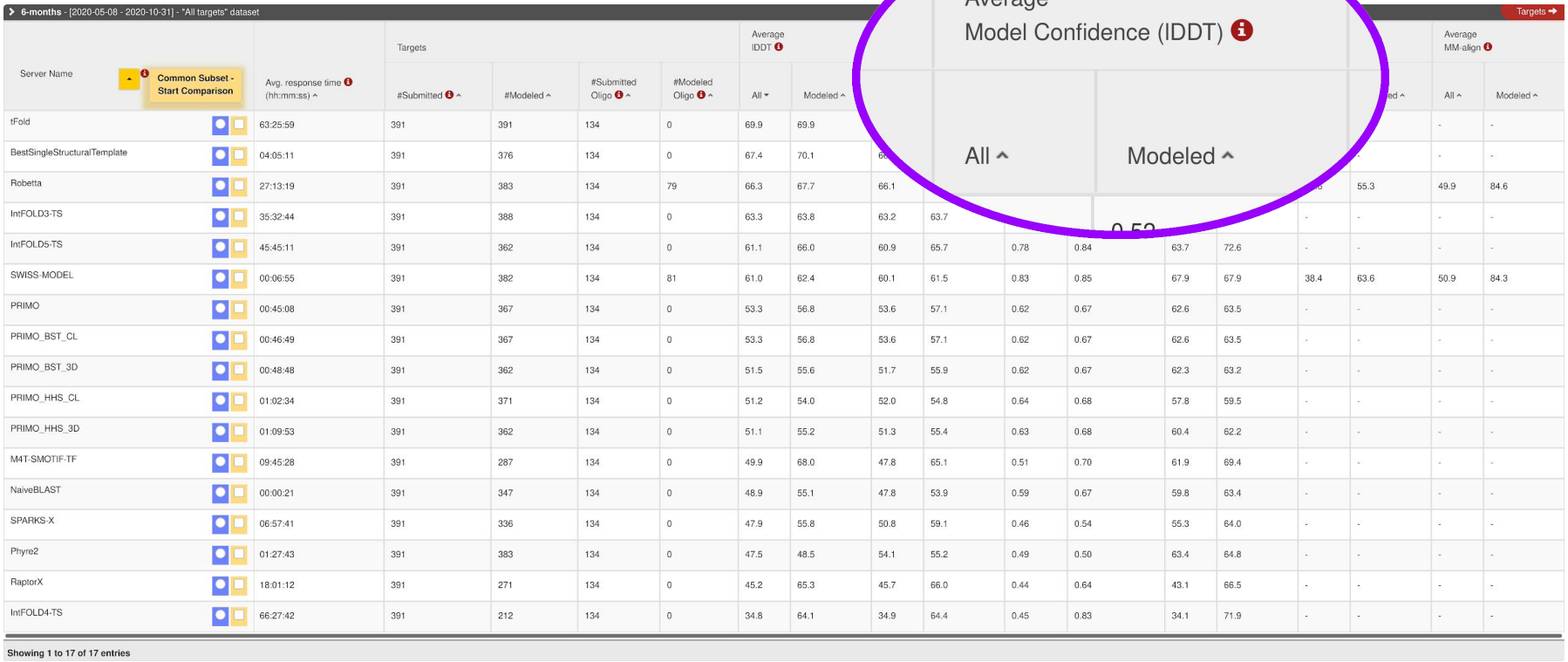
6-months - [2020-05-08 - 2020-10-31] - "All targets" dataset

Targets

Server Name	Common Subset - Start Comparison	Avg. response time (hh:mm:ss)	Targets #Submitted		Average IDDT All	Average IDDT Modeled	Average CAD-score All	Average CAD-score Modeled	Average T-BS	Average T-BS Modeled	Average QS-score All	Average QS-score Modeled	Average MM-align All	Average MM-align Modeled
tFold		63:25:59	391	391						66.3	-	-	-	-
BestSingleStructuralTemplate		04:05:11	391	376						69.0	-	-	-	-
Robetta		27:13:19	391	383	134		68.8		0.83	66.6	32.6	55.3	49.9	84.6
IntFOLD3-TS		35:32:44	391	388	134	0			0.84	0.85	68.8	68.8	-	-	-	-
IntFOLD5-TS		45:45:11	391	362	134	0	61.1	66.0	60.9	65.7	0.78	0.84	63.7	72.6	-	-	-	-
SWISS-MODEL		00:06:55	391	382	134	81	61.0	62.4	60.1	61.5	0.83	0.85	67.9	67.9	38.4	63.6	50.9	84.3
PRIMO		00:45:08	391	367	134	0	53.3	56.8	53.6	57.1	0.62	0.67	62.6	63.5	-	-	-	-
PRIMO_BST_CL		00:46:49	391	367	134	0	53.3	56.8	53.6	57.1	0.62	0.67	62.6	63.5	-	-	-	-
PRIMO_BST_3D		00:48:48	391	362	134	0	51.5	55.6	51.7	55.9	0.62	0.67	62.3	63.2	-	-	-	-
PRIMO_HHS_CL		01:02:34	391	371	134	0	51.2	54.0	52.0	54.8	0.64	0.68	57.8	59.5	-	-	-	-
PRIMO_HHS_3D		01:09:53	391	362	134	0	51.1	55.2	51.3	55.4	0.63	0.68	60.4	62.2	-	-	-	-
M4T-SMOTIF-TF		09:45:28	391	287	134	0	49.9	68.0	47.8	65.1	0.51	0.70	61.9	69.4	-	-	-	-
NaiveBLAST		00:00:21	391	347	134	0	48.9	55.1	47.8	53.9	0.59	0.67	59.8	63.4	-	-	-	-
SPARKS-X		06:57:41	391	336	134	0	47.9	55.8	50.8	59.1	0.46	0.54	55.3	64.0	-	-	-	-
Phyre2		01:27:43	391	383	134	0	47.5	48.5	54.1	55.2	0.49	0.50	63.4	64.8	-	-	-	-
RaptorX		18:01:12	391	271	134	0	45.2	65.3	45.7	66.0	0.44	0.64	43.1	66.5	-	-	-	-
IntFOLD4-TS		66:27:42	391	212	134	0	34.8	64.1	34.9	64.4	0.45	0.83	34.1	71.9	-	-	-	-

Showing 1 to 17 of 17 entries

Results - Scores



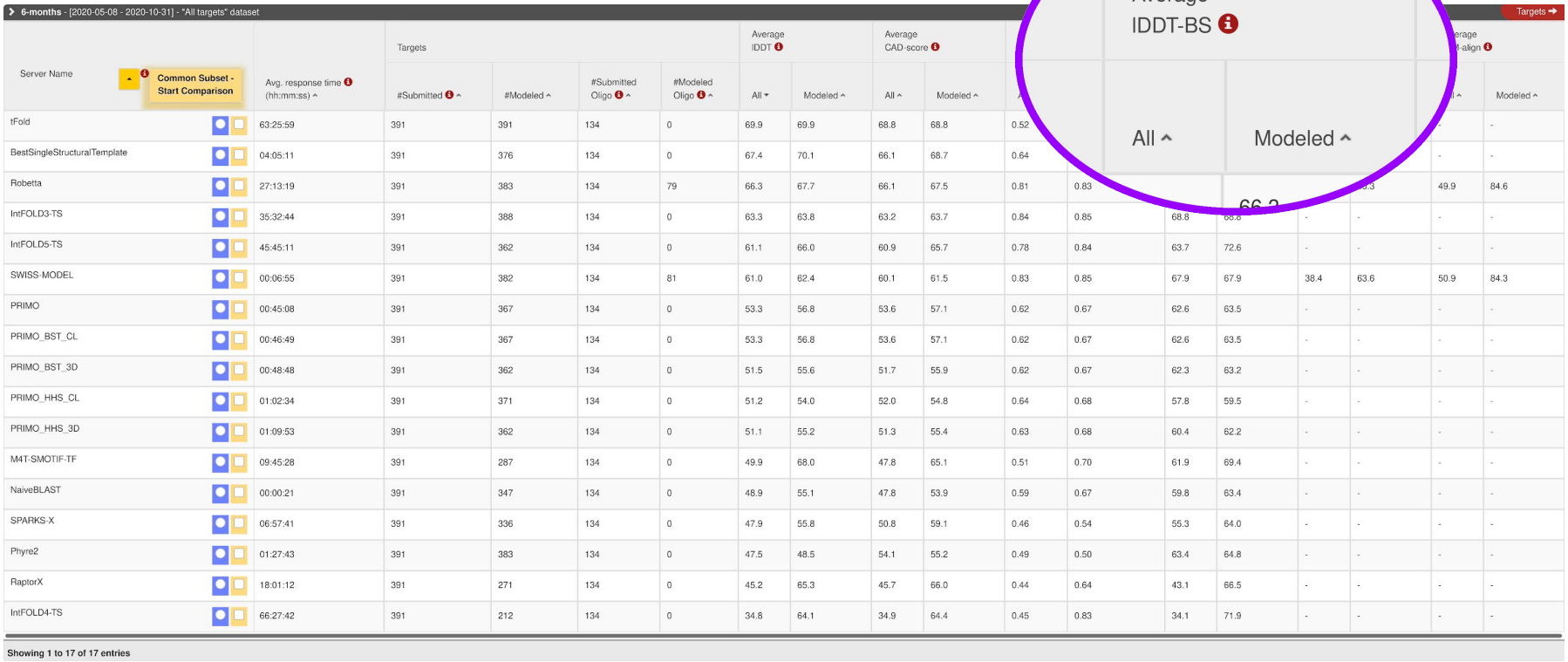
6-months - [2020-05-08 - 2020-10-31] - "All targets" dataset

Targets

Server Name	Common Subset - Start Comparison	Avg. response time (hh:mm:ss)	Targets				Average IDDT		Average Model Confidence (IDDT)						Average MM-align	
			#Submitted	#Modeled	#Submitted Oligo	#Modeled Oligo	All	Modeled	All	Modeled					All	Modeled
tFold		63:25:59	391	391	134	0	69.9	69.9							-	-
BestSingleStructuralTemplate		04:05:11	391	376	134	0	67.4	70.1							-	-
Robetta		27:13:19	391	383	134	79	66.3	67.7	66.1					55.3	49.9	84.6
IntFOLD3-TS		35:32:44	391	388	134	0	63.3	63.8	63.2	63.7			-	-	-	-
IntFOLD5-TS		45:45:11	391	362	134	0	61.1	66.0	60.9	65.7	0.78	0.84	63.7	72.6	-	-	-	-
SWISS-MODEL		00:06:55	391	382	134	81	61.0	62.4	60.1	61.5	0.83	0.85	67.9	67.9	38.4	63.6	50.9	84.3
PRIMO		00:45:08	391	367	134	0	53.3	56.8	53.6	57.1	0.62	0.67	62.6	63.5	-	-	-	-
PRIMO_BST_CL		00:46:49	391	367	134	0	53.3	56.8	53.6	57.1	0.62	0.67	62.6	63.5	-	-	-	-
PRIMO_BST_3D		00:48:48	391	362	134	0	51.5	55.6	51.7	55.9	0.62	0.67	62.3	63.2	-	-	-	-
PRIMO_HHS_CL		01:02:34	391	371	134	0	51.2	54.0	52.0	54.8	0.64	0.68	57.8	59.5	-	-	-	-
PRIMO_HHS_3D		01:09:53	391	362	134	0	51.1	55.2	51.3	55.4	0.63	0.68	60.4	62.2	-	-	-	-
M4T-SMOTIF-TF		09:45:28	391	287	134	0	49.9	68.0	47.8	65.1	0.51	0.70	61.9	69.4	-	-	-	-
NaiveBLAST		00:00:21	391	347	134	0	48.9	55.1	47.8	53.9	0.59	0.67	59.8	63.4	-	-	-	-
SPARKS-X		06:57:41	391	336	134	0	47.9	55.8	50.8	59.1	0.46	0.54	55.3	64.0	-	-	-	-
Phyre2		01:27:43	391	383	134	0	47.5	48.5	54.1	55.2	0.49	0.50	63.4	64.8	-	-	-	-
RaptorX		18:01:12	391	271	134	0	45.2	65.3	45.7	66.0	0.44	0.64	43.1	66.5	-	-	-	-
IntFOLD4-TS		66:27:42	391	212	134	0	34.8	64.1	34.9	64.4	0.45	0.83	34.1	71.9	-	-	-	-

Showing 1 to 17 of 17 entries

Results - Scores



6-months - [2020-05-08 - 2020-10-31] - "All targets" dataset

Targets

Server Name	Common Subset - Start Comparison	Avg. response time (hh:mm:ss)	Targets				Average IDDT		Average CAD-score									
			#Submitted	#Modeled	#Submitted Oligo	#Modeled Oligo	All	Modeled	All	Modeled								
tFold		63:25:59	391	391	134	0	69.9	69.9	68.8	68.8	0.52							
BestSingleStructuralTemplate		04:05:11	391	376	134	0	67.4	70.1	66.1	68.7	0.64							
Robetta		27:13:19	391	383	134	79	66.3	67.7	66.1	67.5	0.81	0.83					49.9	84.6
IntFOLD3-TS		35:32:44	391	388	134	0	63.3	63.8	63.2	63.7	0.84	0.85	68.8	68.8	-	-	-	-
IntFOLD5-TS		45:45:11	391	362	134	0	61.1	66.0	60.9	65.7	0.78	0.84	63.7	72.6	-	-	-	-
SWISS-MODEL		00:06:55	391	382	134	81	61.0	62.4	60.1	61.5	0.83	0.85	67.9	67.9	38.4	63.6	50.9	84.3
PRIMO		00:45:08	391	367	134	0	53.3	56.8	53.6	57.1	0.62	0.67	62.6	63.5	-	-	-	-
PRIMO_BST_CL		00:46:49	391	367	134	0	53.3	56.8	53.6	57.1	0.62	0.67	62.6	63.5	-	-	-	-
PRIMO_BST_3D		00:48:48	391	362	134	0	51.5	55.6	51.7	55.9	0.62	0.67	62.3	63.2	-	-	-	-
PRIMO_HHS_CL		01:02:34	391	371	134	0	51.2	54.0	52.0	54.8	0.64	0.68	57.8	59.5	-	-	-	-
PRIMO_HHS_3D		01:09:53	391	362	134	0	51.1	55.2	51.3	55.4	0.63	0.68	60.4	62.2	-	-	-	-
M4T-SMOTIF-TF		09:45:28	391	287	134	0	49.9	68.0	47.8	65.1	0.51	0.70	61.9	69.4	-	-	-	-
NaiveBLAST		00:00:21	391	347	134	0	48.9	55.1	47.8	53.9	0.59	0.67	59.8	63.4	-	-	-	-
SPARKS-X		06:57:41	391	336	134	0	47.9	55.8	50.8	59.1	0.46	0.54	55.3	64.0	-	-	-	-
Phyre2		01:27:43	391	383	134	0	47.5	48.5	54.1	55.2	0.49	0.50	63.4	64.8	-	-	-	-
RaptorX		18:01:12	391	271	134	0	45.2	65.3	45.7	66.0	0.44	0.64	43.1	66.5	-	-	-	-
IntFOLD4-TS		66:27:42	391	212	134	0	34.8	64.1	34.9	64.4	0.45	0.83	34.1	71.9	-	-	-	-

Showing 1 to 17 of 17 entries

Results - Hard Targets

Target Dataset Composition

	Any	Easy	Hard
Submitted Targets	391	74	90
With Homo-oligomer Assessment	134	39	23
Submitted Targets with Ligands	139	30	20

Total Numb

CAMEO | Continuous Automated Model EvaluatiOn

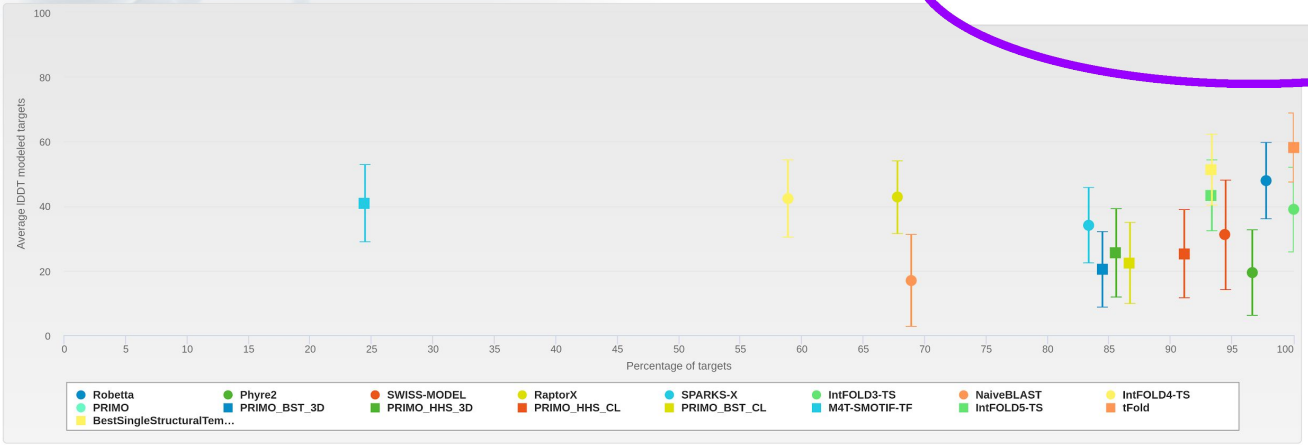
Home | 3D - Protein Structure | QE - Model Quality Estimation | Categories | More

CAMEO-3D 6-months Performance (2020-05-08 - 2020-10-31)

dels Assessed: 5947

1 Year | 6 Months | 3 Months | 1 Month | 1 Week

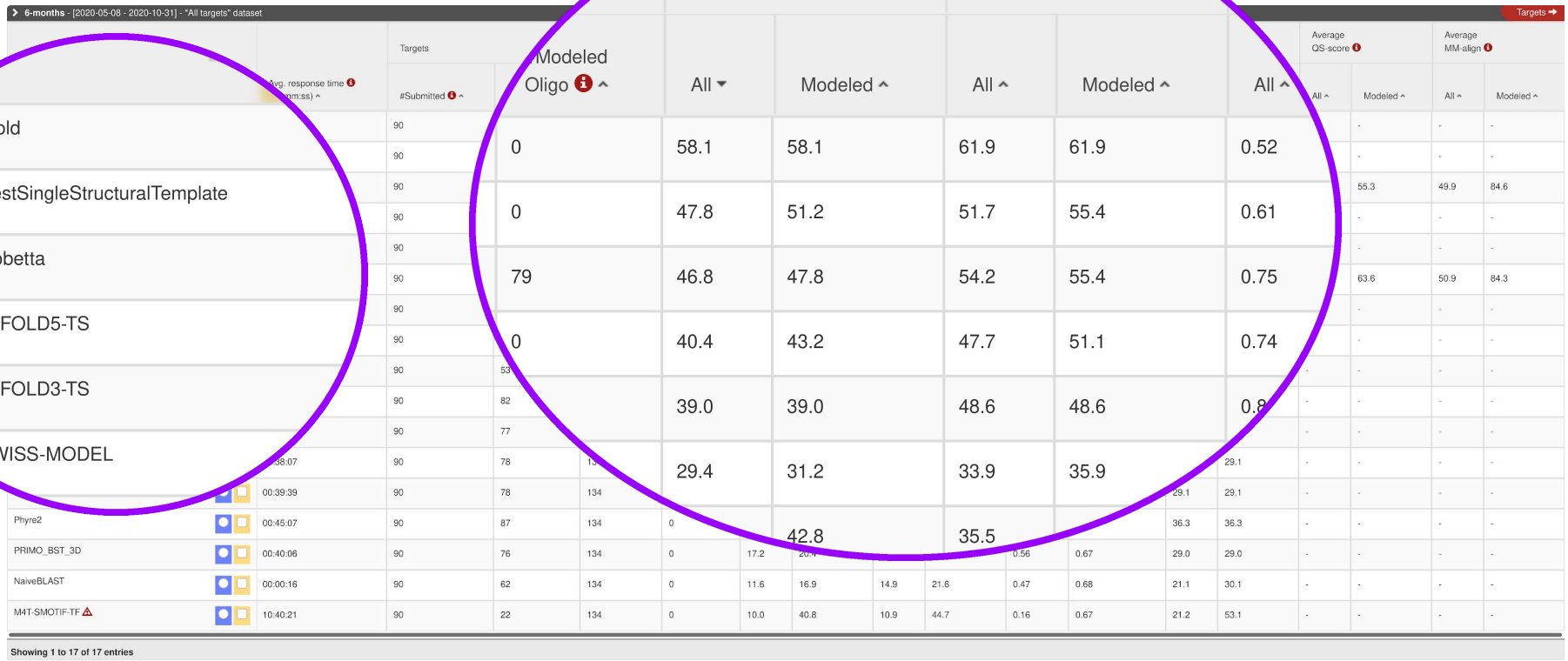
All targets | Easy | Medium | Hard



The vertical bars correspond to the standard deviation of a server for the given time frame (only model-1 data is incorporated). Please refer to the Help section for further details about the assessment procedure.

6-months - [2020-05-08 - 2020-10-31] - "All targets" dataset

Results - Hard Targets



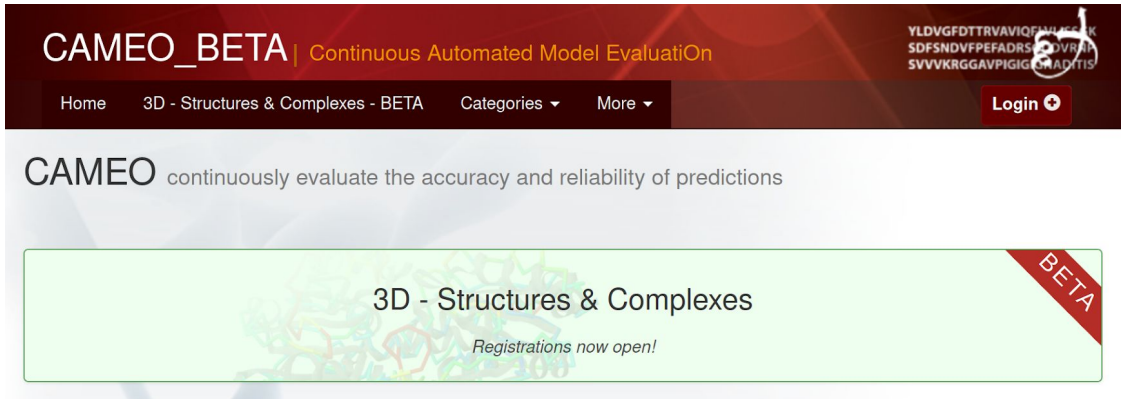
	Modeled Oligo	Average IDDT All	Average IDDT Modeled	Average CAD-score All	Average CAD-score Modeled	Average QS-score All
tFold	0	58.1	58.1	61.9	61.9	0.52
BestSingleStructuralTemplate	0	47.8	51.2	51.7	55.4	0.61
Robetta	79	46.8	47.8	54.2	55.4	0.75
IntFOLD5-TS	0	40.4	43.2	47.7	51.1	0.74
IntFOLD3-TS		39.0	39.0	48.6	48.6	0.8
SWISS-MODEL		29.4	31.2	33.9	35.9	
Phyre2			42.8		35.5	

Modeling of single protein chains…

What's the next frontier?

3D Structures & Complexes

- Provides full complexes as prediction targets to servers that support it:
  - One or more protein sequences
  - Ligands as InChI or PDB component ID (3 letter codes)
  - Canonical or modified sequence
  - DNA / RNA



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Complexes

- Homo-oligomers already scored in CAMEO
  - QS-score & oligomeric lDDT

Server Evaluations

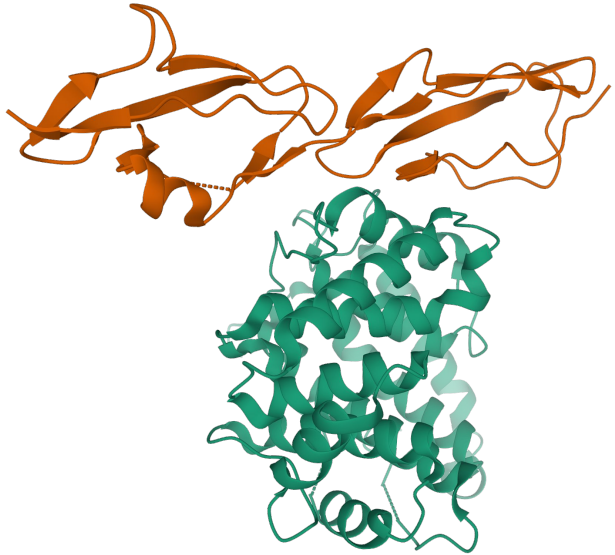
All scores | Superposition dependent | Superposition independent | Binding site scores | Oligomeric scores

Show 10 entries Filter:

Server Name	Predictions	Resp. time (hh:mm:ss)	From	To	Cov. (%)	QS-score	Oligo details	QS-score Best Match	IDDT Oligo	MM-align TM-score	MM-align RMSD	QScore
SWISS-MODEL	Oligo 1	00:21:28	-	-	-	0.83	Details	0.83	61.02	0.92	2.60	-
Robetta	Oligo 1	23:39:34	-	-	-	0.61	Details	0.64	57.36	0.93	2.64	-

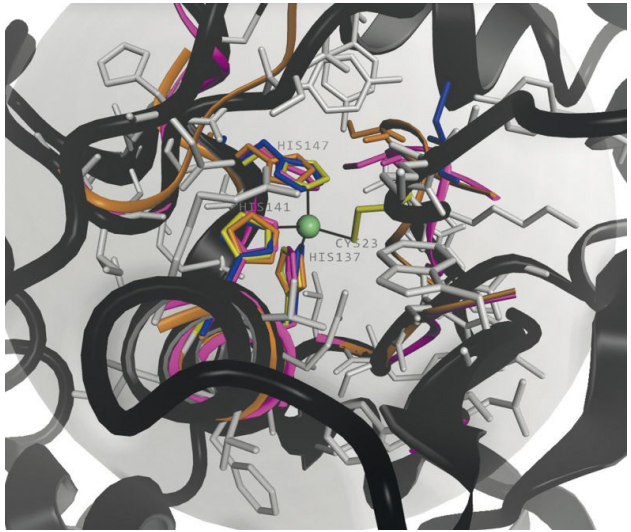
Complexes

- Homo-oligomers already scored in CAMEO
- Hetero-oligomers
  - Submitted as multiple sequences
- Target selection:
  - Difficulty of the members + novelty of the complex
- Scoring
  - Oligo-lDDT
  - QS-score
  - Model Confidence?
  - CAPRI
  - Collaboration with Elixir 3D-BioInfo



Ligands

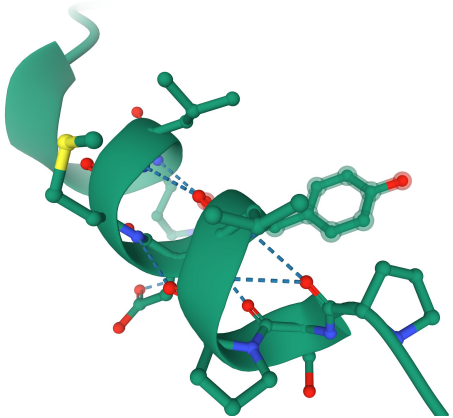
- PDB “non-polymer” entities
- Submitted as InChI or 3 letter codes
- Target Selection
  - Easy protein modeling targets?
- Scoring
  - RMSD
  - Collaboration with Elixir 3D-BioInfo



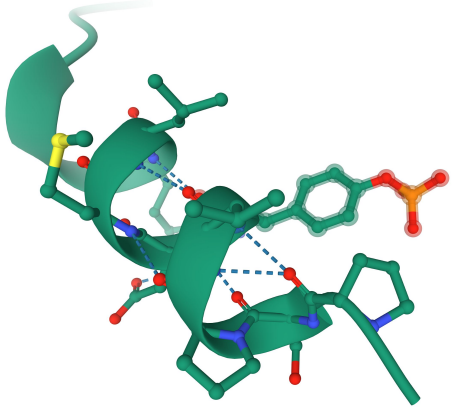
Haas et al. (2018). Proteins. 86, 387–398.

Side-chains / modified residues

- Modified / non natural residues
- Submitting non-canonical sequences
- All atom scores
  (IDDT, CAD-score)



DPSPLYDMLRKNLVT

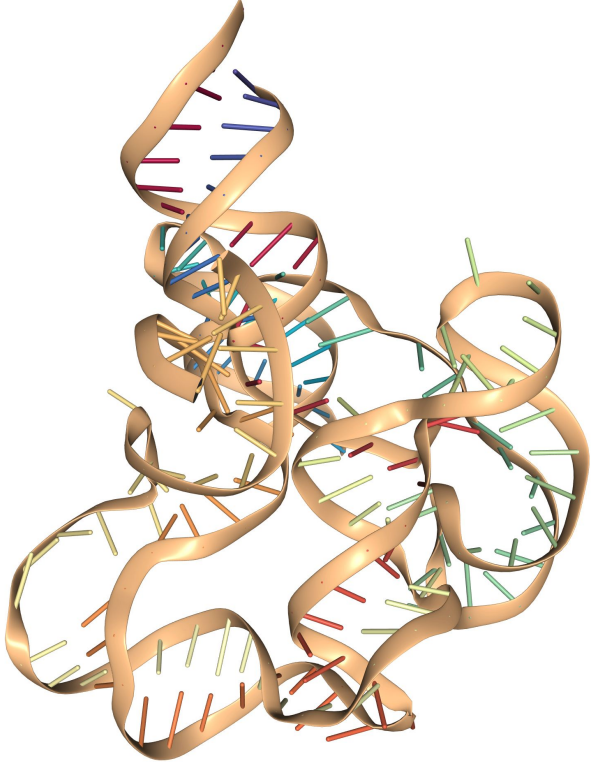


DPSPL(PTR)DMLRKNLVT

PDB: 4RXZ

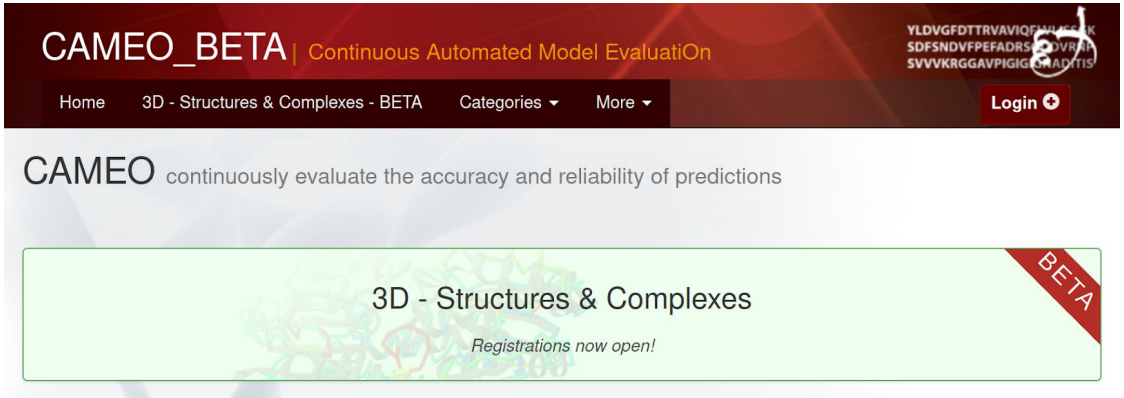
DNA / RNA

- Nucleic acids are part of the PDB pre-release
- Can already be submitted to servers
- Target selection?
- Scoring
  - CAD score?
- Elixir 3D-BioInfo Community



3D Structures & Complexes

- Will replace current 3D modeling category
- Opt-in
  - Servers can select what they can do



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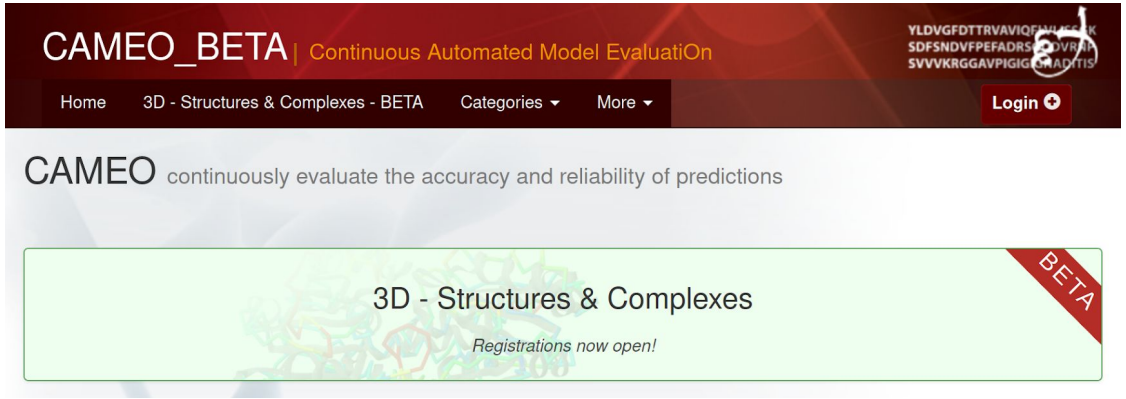
Aspects of modeling

- Predict correct oligomeric state from the sequence
- Model the full complex
- Return predictions in mmCIF or PDB format



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Work in progress

- Selection of relevant targets through flexible target sets
  - Free modeling with few single chain very hard targets
  - Template-based, more, easier targets
  - DNA & RNA
  - Ligand modeling: high sequence identity with new ligands
  - Variants modeling: high sequence identity
  - Core subset of targets
- Opt-in
- Selection of relevant scores
- Handling mmCIF predictions

Community White Paper

- Reflect on achievements so far
  - Looking for stories and input from participants
- Outline future developments
- Input from the community on future directions

Recommendations

- Servers are useful for:
  - Access to everyone
  - Reproducibility
  - Open Science
- Benefits for server developers:
  - Continuous benchmarking of server performance
  - Many targets to collect statistics
  - Development servers anonymized to benchmark new features

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CAMEO participants

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elixir SWITZERLAND Universität Basel sciCORE Center for scientific computing BIOZENTRUM Universität Basel The Center for Molecular Life Sciences SIB Swiss Institute of Bioinformatics OPENEBENCH