Heatmap of benchmark metrics (metric_grp: ATAC down, Both down, RNA down). Color scale from 0.4 (blue) to 1 (red).

Method	ARI.RNA (ATAC down)	AMI.RNA (ATAC down)	graph cLISI.RNA (ATAC down)	isolated labels ASW.RNA (ATAC down)	ARI level 1.RNA (ATAC down)	AMI level 1.RNA (ATAC down)	graph cLISI level 1.RNA (ATAC down)	isolated labels ASW level 1.RNA (ATAC down)	ARI.ATAC (ATAC down)	AMI.ATAC (ATAC down)	graph cLISI.ATAC (ATAC down)	isolated labels ASW.ATAC (ATAC down)	ARI level 1.ATAC (ATAC down)	AMI level 1.ATAC (ATAC down)	graph cLISI level 1.ATAC (ATAC down)	isolated labels ASW level 1.ATAC (ATAC down)	FOSCTTM (ATAC down)	Cell match (ATAC down)	Cell type match (ATAC down)	Cell type level 1 match (ATAC down)	ARI.RNA (RNA down)	AMI.RNA (RNA down)	graph cLISI.RNA (RNA down)	isolated labels ASW.RNA (RNA down)	ARI level 1.RNA (RNA down)	AMI level 1.RNA (RNA down)	graph cLISI level 1.RNA (RNA down)	isolated labels ASW level 1.RNA (RNA down)	ARI.ATAC (RNA down)	AMI.ATAC (RNA down)	graph cLISI.ATAC (RNA down)	isolated labels ASW.ATAC (RNA down)	ARI level 1.ATAC (RNA down)	AMI level 1.ATAC (RNA down)	graph cLISI level 1.ATAC (RNA down)	isolated labels ASW level 1.ATAC (RNA down)	FOSCTTM (RNA down)	Cell match (RNA down)	Cell type match (RNA down)	Cell type level 1 match (RNA down)	ARI.RNA (Both down)	AMI.RNA (Both down)	graph cLISI.RNA (Both down)	isolated labels ASW.RNA (Both down)	ARI level 1.RNA (Both down)	AMI level 1.RNA (Both down)	graph cLISI level 1.RNA (Both down)	isolated labels ASW level 1.RNA (Both down)	ARI.ATAC (Both down)	AMI.ATAC (Both down)	graph cLISI.ATAC (Both down)	isolated labels ASW.ATAC (Both down)	ARI level 1.ATAC (Both down)	AMI level 1.ATAC (Both down)	graph cLISI level 1.ATAC (Both down)	isolated labels ASW level 1.ATAC (Both down)	FOSCTTM (Both down)	Cell match (Both down)	Cell type match (Both down)	Cell type level 1 match (Both down)
GLUE	0.99	0.99	1.00	1.00	0.99	0.99	1.00	1.00	0.95	0.96	0.99	1.00	0.99	0.99	0.99	0.98	0.99	0.83	0.97	0.99	0.88	0.93	0.99	0.98	0.98	0.96	0.99	0.98	0.93	0.98	1.00	0.99	0.96	0.99	1.00	1.00	0.98	0.68	0.95	0.96	0.89	0.93	0.98	1.00	1.00	0.98	0.97	0.98	0.90	0.94	0.99	0.99	0.99	0.98	0.98	1.00	0.96	0.68	0.90	0.94
LIGER UINMF	1.00	1.00	1.00	0.99	0.99	0.99	1.00	1.00	0.87	0.87	0.98	0.91	0.91	0.89	0.96	0.92	0.99	0.94	1.00	0.99	0.79	0.77	0.96	0.88	0.82	0.79	0.92	0.91	0.87	0.92	0.99	1.00	0.92	0.93	0.97	0.94	0.99	0.67	0.91	0.89	0.78	0.74	0.95	0.84	0.78	0.75	0.91	0.91	0.63	0.58	0.91	0.99	0.62	0.58	0.83	0.88	0.98	0.69	0.99	0.94
LIGER iNMF	0.93	0.99	1.00	0.98	0.98	0.98	1.00	1.00	0.87	0.87	0.98	1.00	0.88	0.88	0.96	0.91	1.00	0.85	0.98	0.94	0.68	0.77	0.96	0.83	0.72	0.78	0.92	0.91	0.78	0.79	0.96	0.99	0.77	0.79	0.92	0.94	0.94	0.71	0.90	0.90	0.71	0.77	0.96	0.84	0.76	0.79	0.92	0.91	0.58	0.59	0.91	0.92	0.61	0.61	0.84	0.95	0.90	0.71	0.88	0.85
LIGER online iNMF	0.99	1.00	1.00	0.94	1.00	0.95	0.95	1.00	0.73	0.75	0.95	0.96	0.76	0.76	0.96	0.98	0.95	0.72	0.92	0.92	0.78	0.76	0.96	0.93	0.79	0.76	0.92	0.91	0.73	0.74	0.97	0.90	0.74	0.74	0.90	0.92	0.92	0.77	0.86	0.86	0.79	0.75	0.95	0.96	0.91	0.76	0.91	0.92	0.56	0.57	0.90	0.96	0.57	0.57	0.82	0.90	0.88	0.74	0.80	0.80
MaxFuse	0.87	0.93	0.98	0.97	0.95	0.95	0.95	0.97	0.88	0.92	0.98	0.99	0.99	0.93	0.98	0.99	0.93	0.56	0.87	0.87	0.92	0.88	0.97	1.00	0.93	0.93	0.92	0.96	0.97	0.99	0.99	1.00	0.96	0.99	1.00	1.00	0.93	0.56	0.92	0.95	0.85	0.82	0.98	0.99	0.99	0.77	0.89	0.91	0.97	0.82	0.98	0.99	0.99	0.98	0.98	1.00	0.87	0.61	0.83	0.89
MultiMAP	0.90	0.95	0.98	0.97	0.96	0.96	1.00	0.96	0.88	0.92	0.99	0.94	0.92	0.91	0.97	0.96	0.97	0.77	0.91	0.93	0.92	0.92	0.99	0.96	0.96	0.94	0.98	0.99	0.90	0.96	1.00	0.96	0.91	0.96	0.99	0.98	0.97	1.00	0.96	0.92	0.82	0.91	0.98	0.99	0.99	0.96	0.96	0.98	0.99	0.94	0.99	1.00	0.98	0.98	0.96	0.98	0.97	1.00	0.87	0.92
Pamona	0.73	0.77	0.97	0.97	0.72	0.75	0.93	0.99	0.72	0.83	0.96	0.99	0.71	0.80	0.91	0.98	1.00	0.62	0.83	0.91	0.63	0.66	0.91	0.96	0.67	0.66	0.98	0.97	0.67	0.66	0.98	0.81	0.77	0.85	0.96	0.95	1.00	0.88	0.99	0.96	0.55	0.57	0.90	0.97	0.55	0.56	0.78	0.97	0.67	0.85	0.96	0.96	0.63	0.81	0.96	0.96	1.00	0.71	1.00	1.00
SCALEX	0.94	0.97	1.00	0.96	0.98	0.96	0.99	0.99	0.75	0.82	0.97	0.94	0.85	0.94	1.00	0.99	0.93	0.68	0.88	0.93	0.77	0.83	0.97	0.98	0.84	0.88	0.98	0.99	0.77	0.84	0.99	0.99	0.80	0.88	0.95	0.98	0.93	0.61	0.88	0.92	0.74	0.80	0.96	0.96	0.79	0.82	0.93	0.93	0.90	0.88	0.95	1.00	0.90	0.88	0.95	1.00	0.93	0.64	0.83	0.86
SIMBA	1.00	1.00	1.00	0.95	1.00	0.98	1.00	1.00	0.81	0.85	0.97	0.84	0.81	0.85	0.96	0.97	0.97	0.64	0.89	0.91	0.83	0.87	0.98	0.97	0.95	0.90	0.96	0.95	0.90	0.88	0.98	0.99	0.98	0.95	0.96	0.98	0.97	0.64	0.89	0.93	0.75	0.77	0.96	0.96	0.78	0.78	0.93	0.95	0.92	0.92	0.98	0.94	0.92	0.95	0.98	0.94	0.92	0.46	0.79	0.86
Seurat v3 CCA	0.98	0.99	1.00	1.00	0.99	0.99	1.00	1.00	0.90	0.92	0.99	0.96	0.94	0.96	0.99	0.96	0.93	0.73	0.82	0.87	0.83	0.86	0.98	0.92	0.90	0.90	0.93	0.96	0.95	0.96	0.97	0.98	0.96	0.96	0.98	0.94	0.95	0.71	0.95	0.96	0.84	0.93	0.96	0.99	0.92	0.95	0.98	0.94	0.92	0.95	0.98	0.94	0.92	0.84	0.93	0.97	0.92	0.58	0.86	0.90
Seurat v4 RPCA	0.99	0.99	1.00	1.00	0.99	0.99	1.00	1.00	0.94	0.94	0.99	0.99	0.94	0.94	0.99	0.98	0.98	0.74	0.90	0.93	0.88	0.86	0.97	0.92	0.90	0.90	0.98	0.96	0.96	0.97	0.98	0.97	0.89	0.96	0.97	0.94	0.87	0.66	0.96	0.97	0.91	0.94	0.96	0.99	0.96	0.96	0.98	0.94	0.92	0.93	0.96	0.96	0.96	0.98	0.94	0.93	0.93	0.59	0.86	0.90
bindSC	0.94	0.94	0.99	0.92	0.96	0.94	0.98	1.00	0.96	0.96	0.99	0.92	0.98	0.97	0.98	0.99	0.98	0.64	0.87	0.92	0.81	0.82	0.97	0.99	0.86	0.83	0.95	0.99	0.86	0.99	1.00	1.00	0.99	1.00	0.99	0.98	0.97	0.78	0.89	0.90	0.74	0.77	0.97	0.96	0.72	0.75	0.93	0.99	0.94	0.96	0.98	0.96	0.96	0.98	0.94	0.95	0.94	0.81	0.86	0.90
uniPort	0.71	0.82	0.98	0.96	0.76	0.84	0.96	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.99	0.95	0.63	0.87	0.92	0.97	0.97	0.98	0.96	1.00	0.99	0.98	0.98	0.91	0.89	0.98	0.97	0.98	0.91	0.94	0.99	0.94	0.66	0.91	0.93	0.59	0.63	0.90	0.97	0.64	0.64	0.81	0.98	0.64	0.68	0.91	0.94	0.69	0.69	0.84	0.98	0.83	0.51	0.66	0.71
unionCom	0.96	0.97	1.00	0.99	0.96	0.97	1.00	0.98	0.57	0.59	0.91	1.00	0.59	0.59	0.84	0.99	0.85	0.48	0.61	0.67	0.80	0.78	0.96	1.00	0.85	0.80	0.92	0.96	0.66	0.68	0.96	1.00	0.69	0.70	0.92	0.96	0.82	0.41	0.59	0.64	0.77	0.84	0.96	1.00	0.83	0.79	0.92	0.94	0.58	0.60	0.92	1.00	0.64	0.61	0.85	0.93	0.79	0.39	0.54	0.58

metric_grp: ATAC down (green), Both down (salmon/red), RNA down (blue)