

# Interactive and collaborative exploratory analysis with *iSEE*

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R/Pharma, 2021-11-02

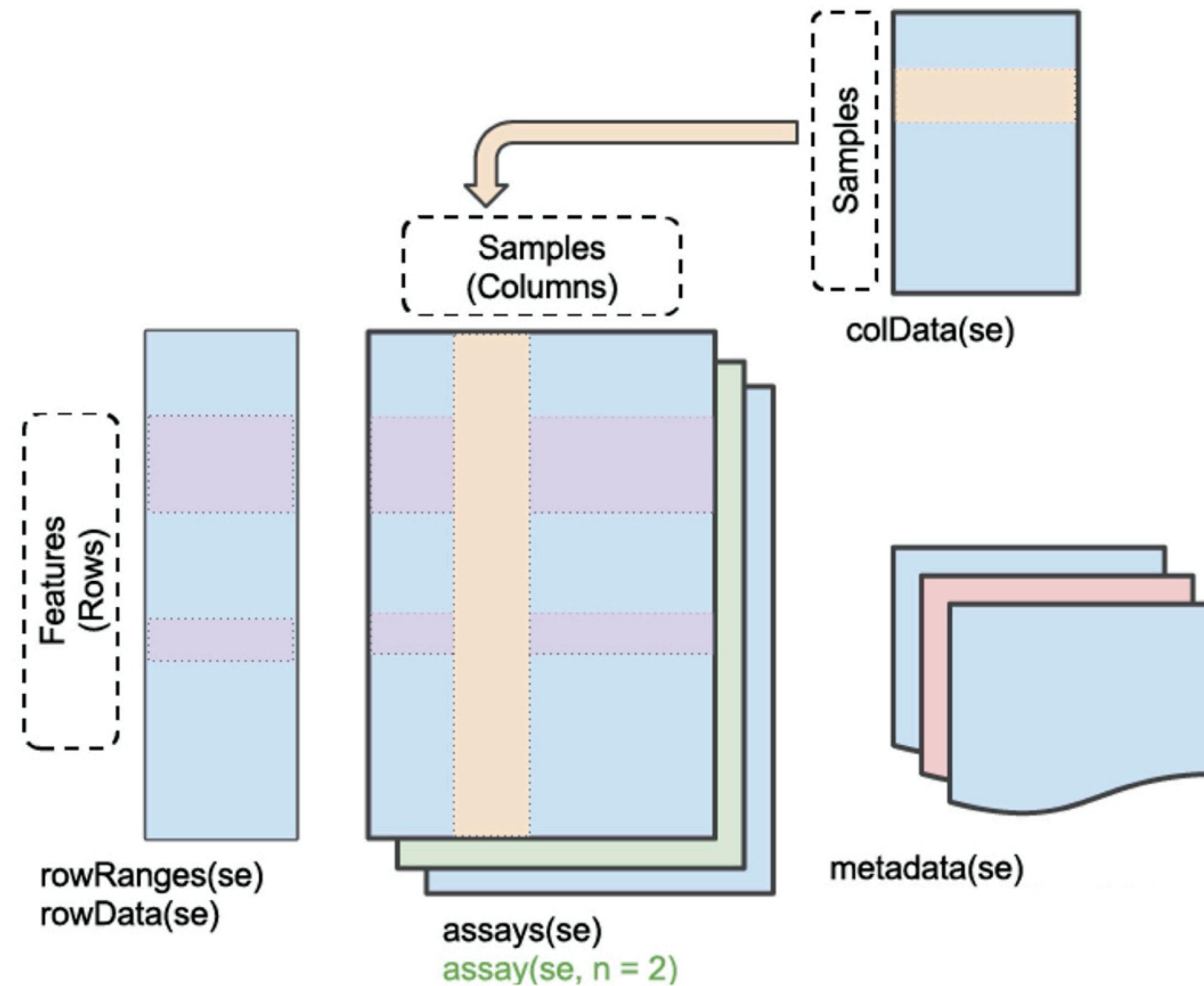


Friedrich Miescher Institute  
for Biomedical Research

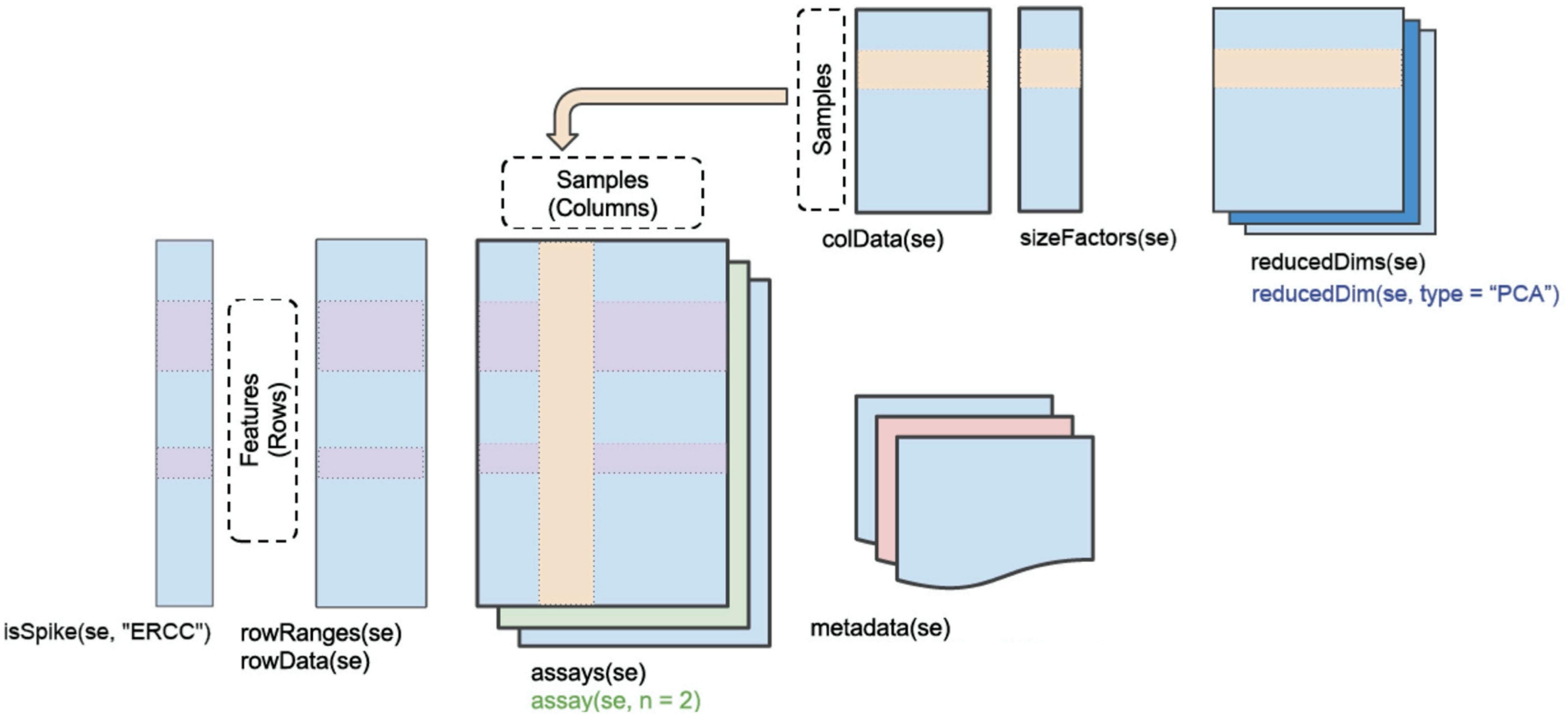


[www.bioconductor.org](http://www.bioconductor.org)

# SummarizedExperiment

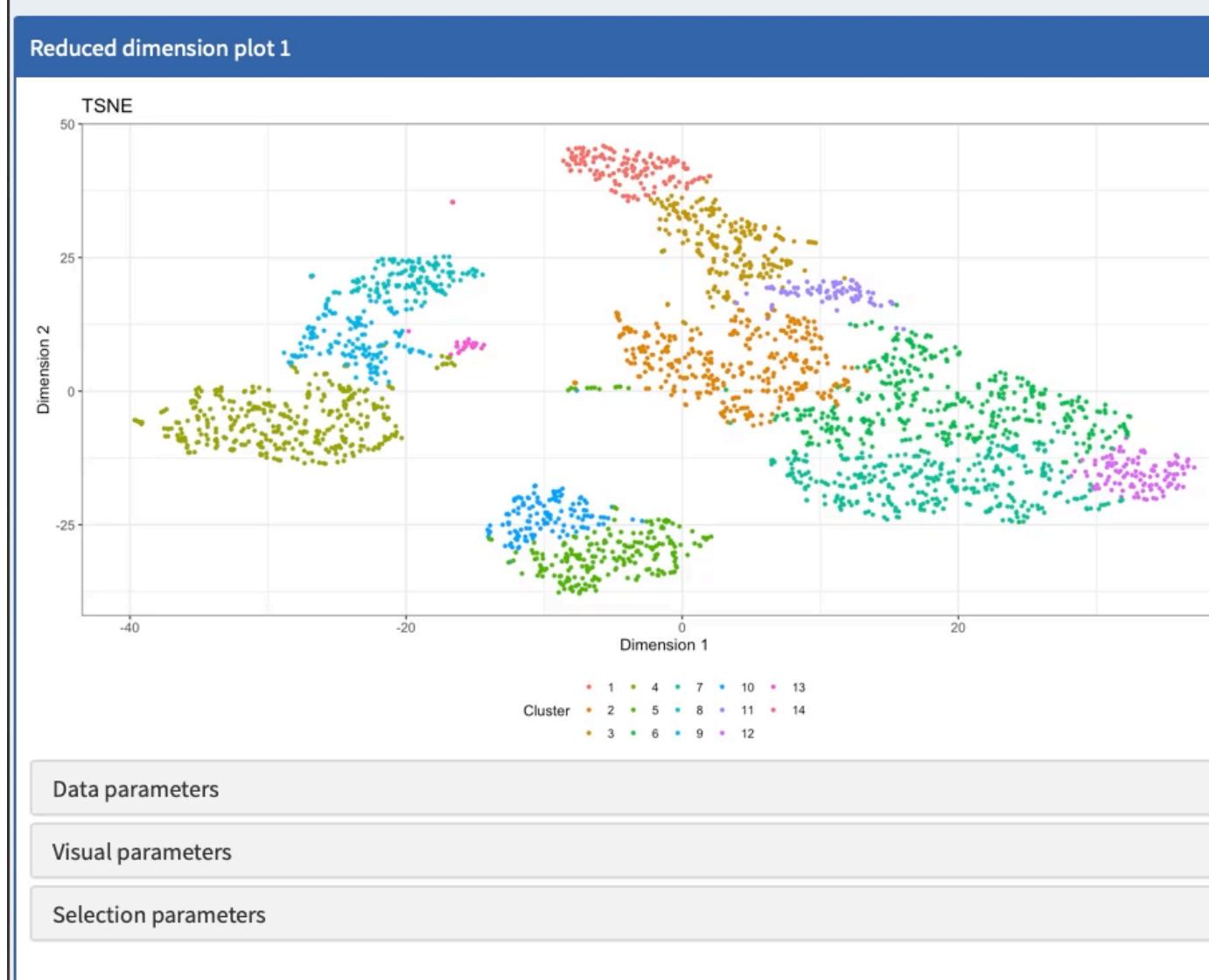


# SingleCellExperiment



*library(iSEE)*

*iSEE(sce)*



### Row data table 1

Show 10 entries Search:

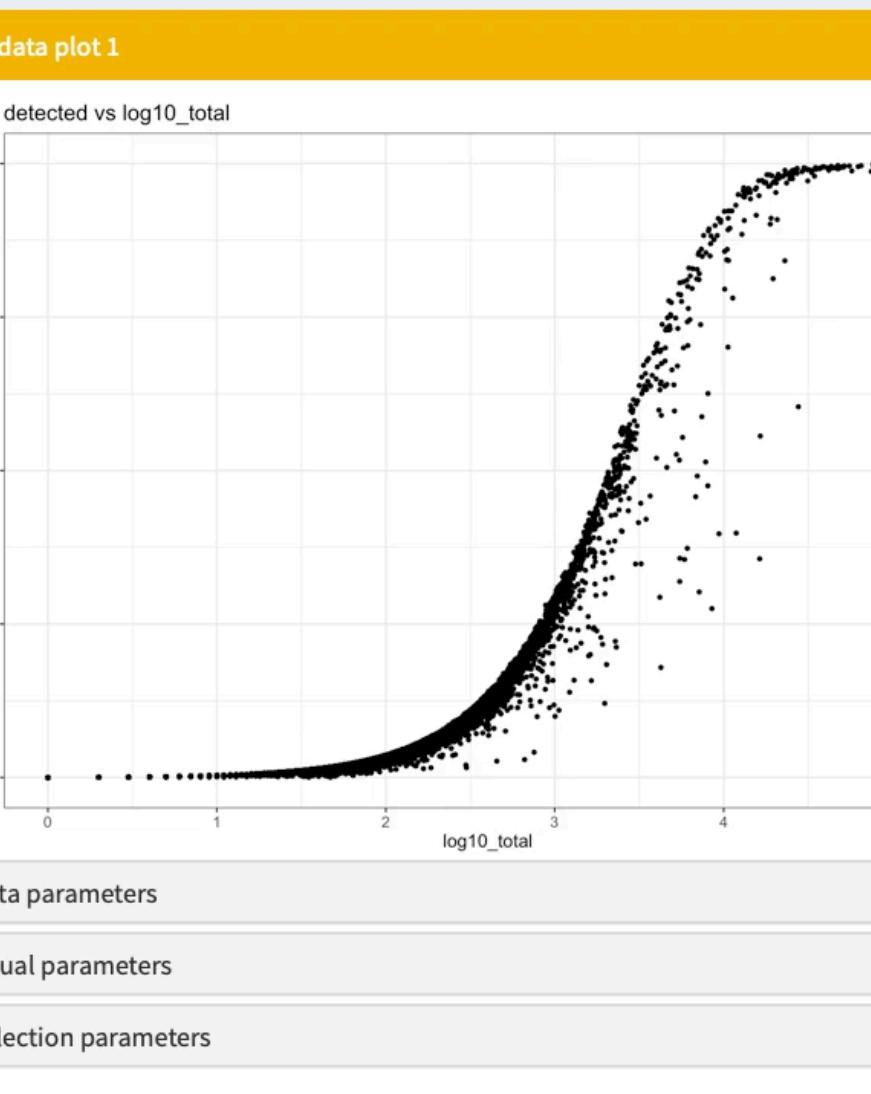
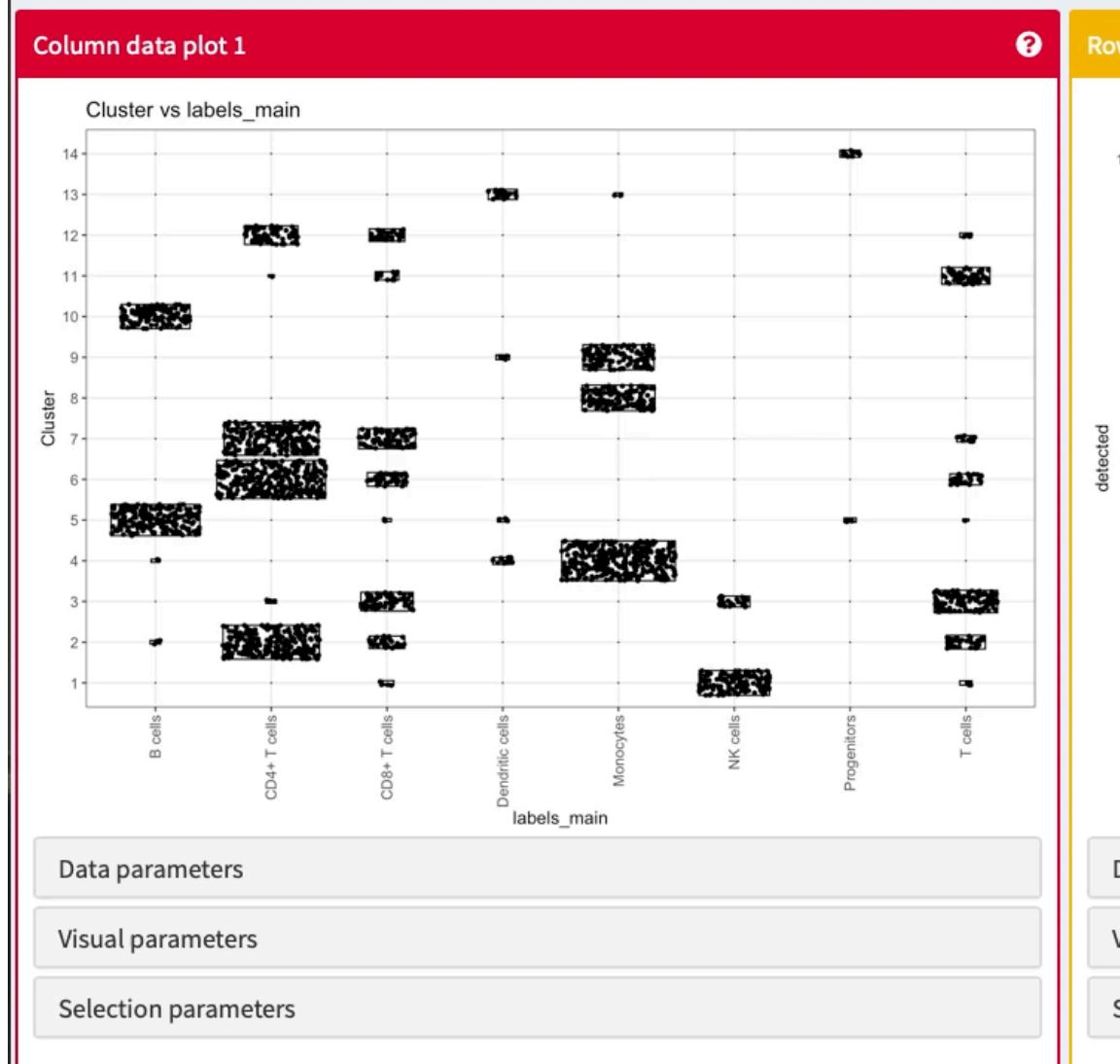
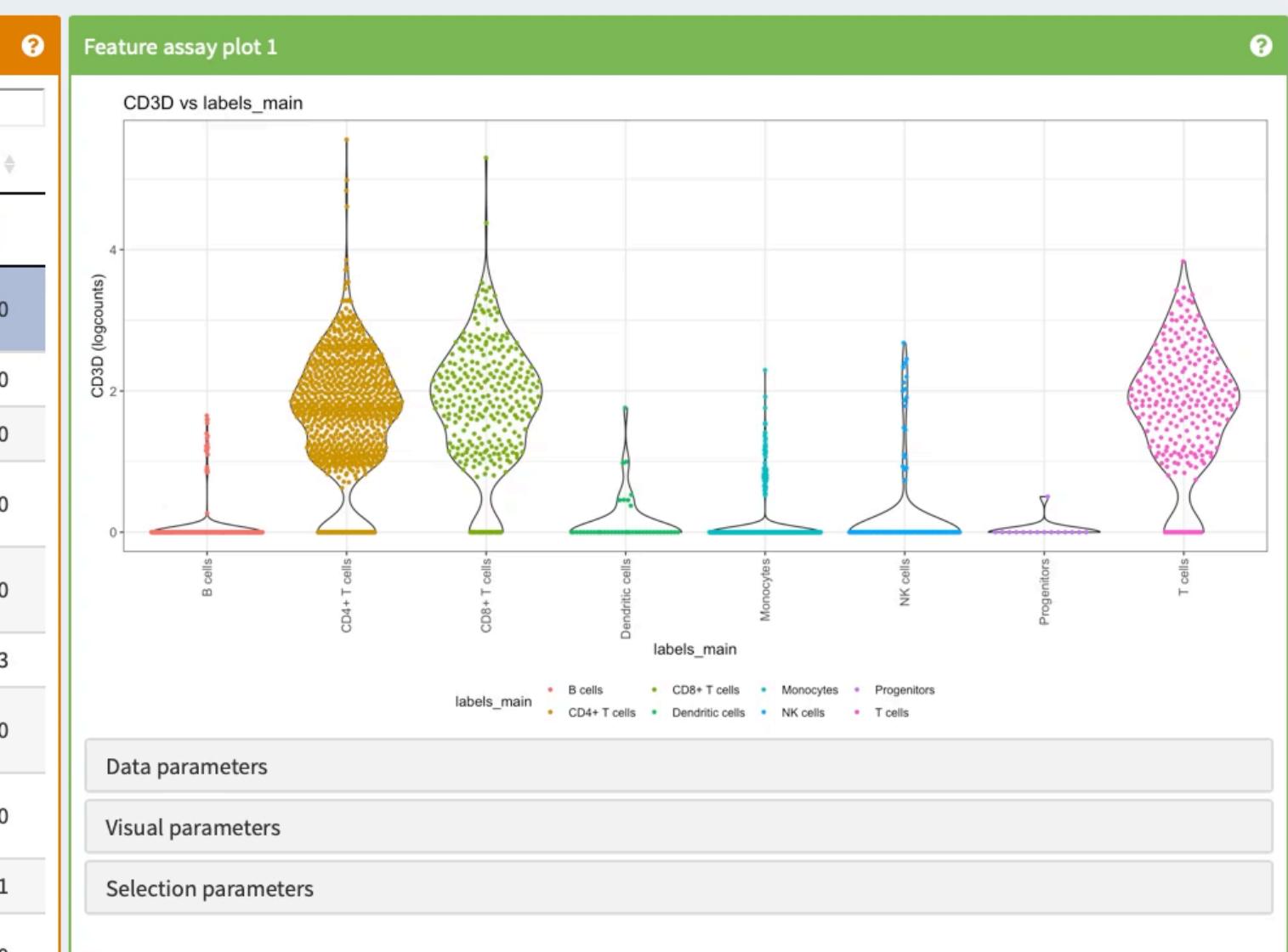
ENSEMBL_ID	Symbol_TENx	Symbol	mean	detected
All	All	All	All	All
MIR1302-10	ENSG00000243485	MIR1302-10	0	0
FAM138A	ENSG00000237613	FAM138A	0	0
OR4F5	ENSG00000186092	OR4F5	0	0
RP11-34P13.7	ENSG00000238009	RP11-34P13.7	0	0
RP11-34P13.8	ENSG00000239945	RP11-34P13.8	0	0
AL627309.1	ENSG00000237683	AL627309.1	0.0033333333333333	0.3333333333333333
RP11-34P13.14	ENSG00000239906	RP11-34P13.14	0	0
RP11-34P13.9	ENSG00000241599	RP11-34P13.9	0	0
AP006222.2	ENSG00000228463	AP006222.2	0.0011111111111111	0.1111111111111111
RP4-669L17.10	ENSG00000237094	RP4-669L17.10	0	0

Showing 1 to 10 of 32,738 entries Previous 1 2 3 4 5 ... 3274 Next

**Data parameters**

**Visual parameters**

**Selection parameters**



### Column data table 1

Show 10 entries Search:

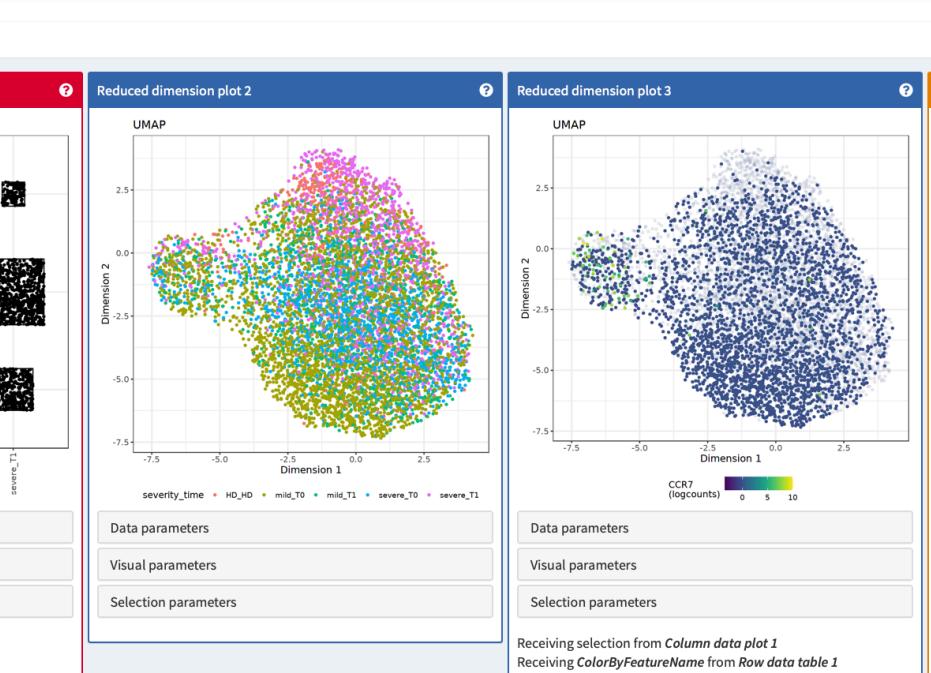
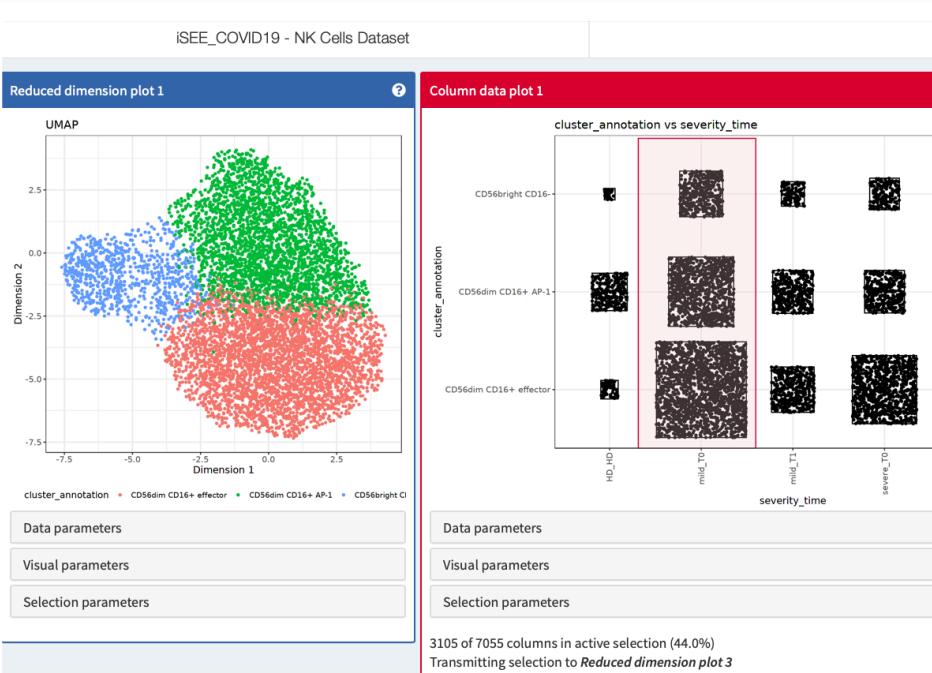
Sample	Barcode	Sequence	Library
All	All	All	All
AAACATACAACAC	pbmc3k	AAACATACAACAC-1	AAACATACAACAC
AAACATTGAGCTAC	pbmc3k	AAACATTGAGCTAC-1	AAACATTGAGCTAC
AAACATTGATCAGC	pbmc3k	AAACATTGATCAGC-1	AAACATTGATCAGC
AAACCGTGCTTCG	pbmc3k	AAACCGTGCTTCG-1	AAACCGTGCTTCG
AAACCGTGTATGCG	pbmc3k	AAACCGTGTATGCG-1	AAACCGTGTATGCG
AAACGCACTGGTAC	pbmc3k	AAACGCACTGGTAC-1	AAACGCACTGGTAC
AAACGCTGACCACT	pbmc3k	AAACGCTGACCACT-1	AAACGCTGACCACT
AAACGCTGGTTCTT	pbmc3k	AAACGCTGGTTCTT-1	AAACGCTGGTTCTT

**Data parameters**

**Visual parameters**

**Selection parameters**





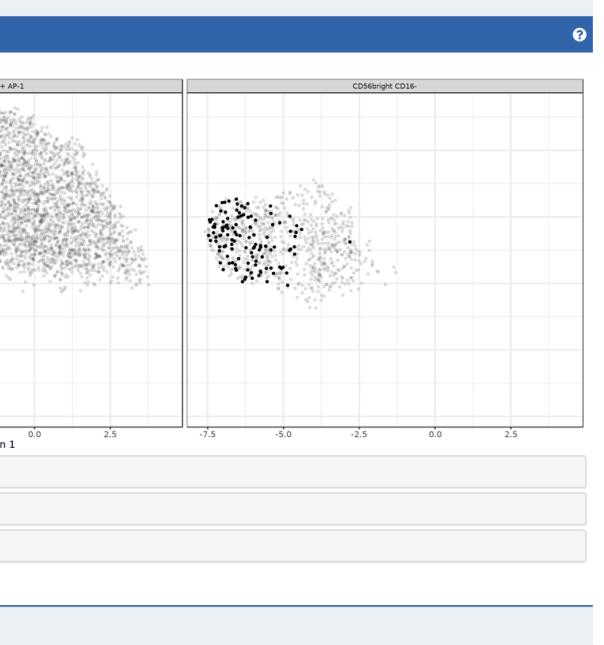
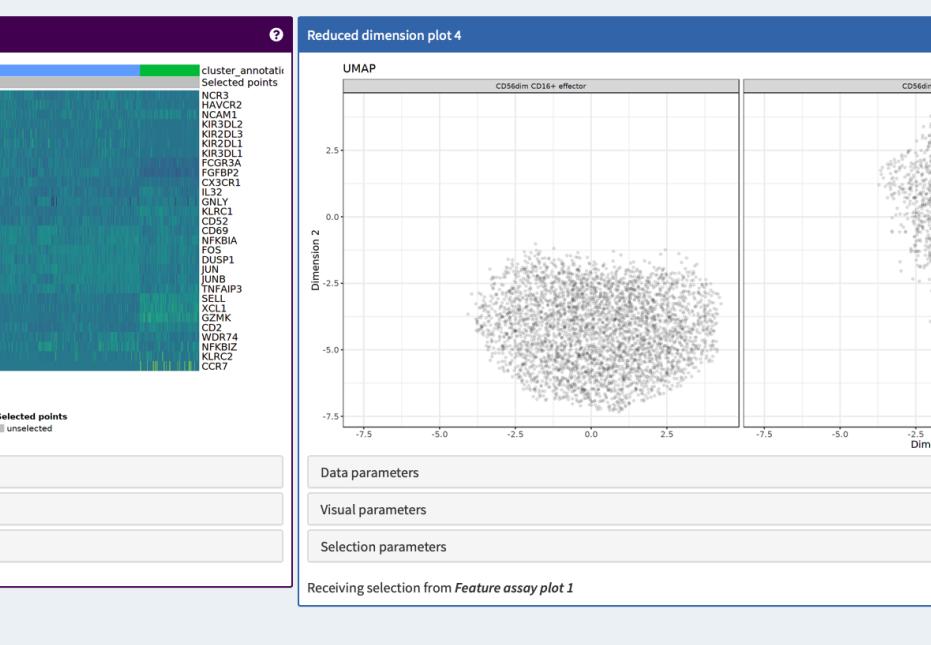
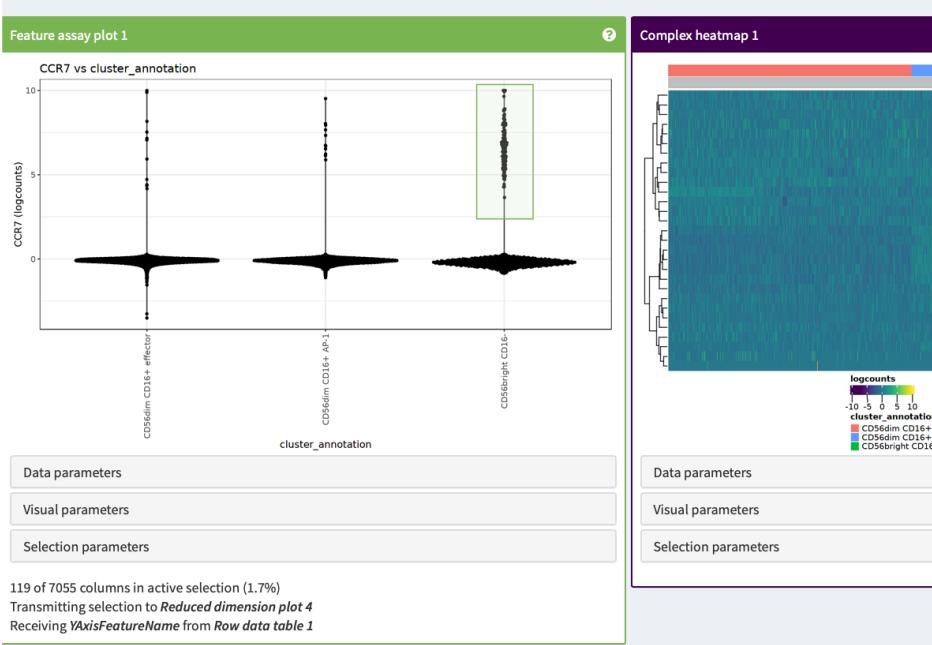
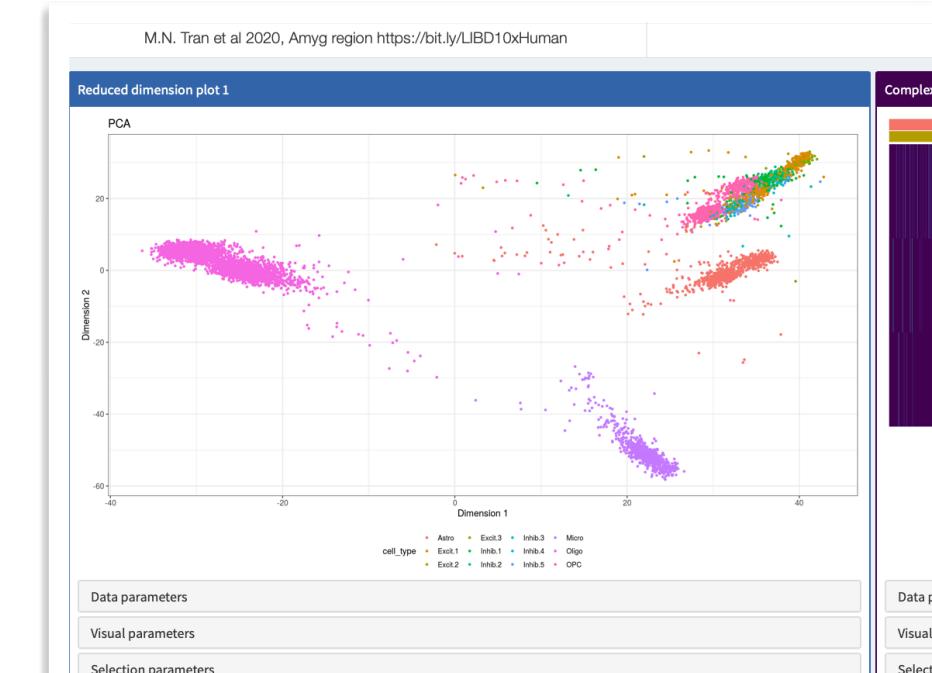
New data table 1

Show 10 entries Search: CCR

	gene_ids.scSQ_2562	feature_types.scSQ_2562	n_cells.scSQ_2562	gene_id:
	All	All	All	All
CR1	ENSG00000163823	Gene Expression	543	ENSG000
CR2	ENSG00000121807	Gene Expression	371	ENSG000
CR5	ENSG00000160791	Gene Expression	115	ENSG000
CRL2	ENSG00000121797	Gene Expression	102	ENSG000
CR6	ENSG00000112486	Gene Expression	408	ENSG000
CR7	ENSG00000126353	Gene Expression	2069	ENSG000
CR10	ENSG00000184451	Gene Expression	133	ENSG000

Showing 1 to 7 of 7 entries (filtered from 12,180 total entries)

Previous 1 Next



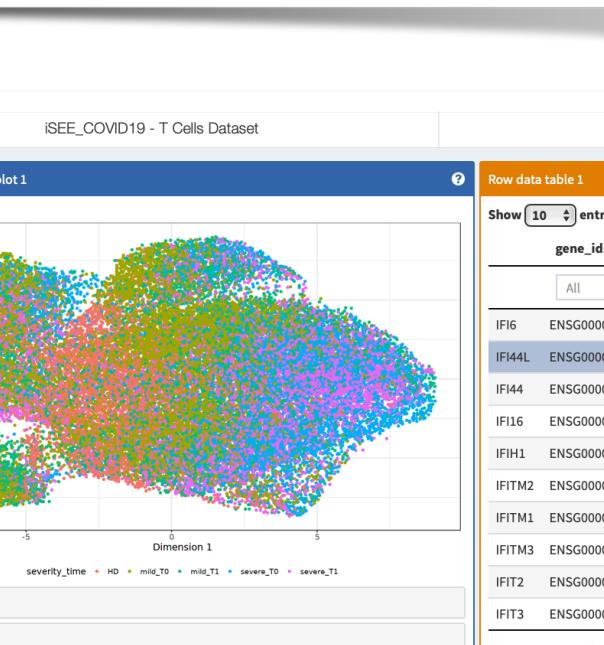
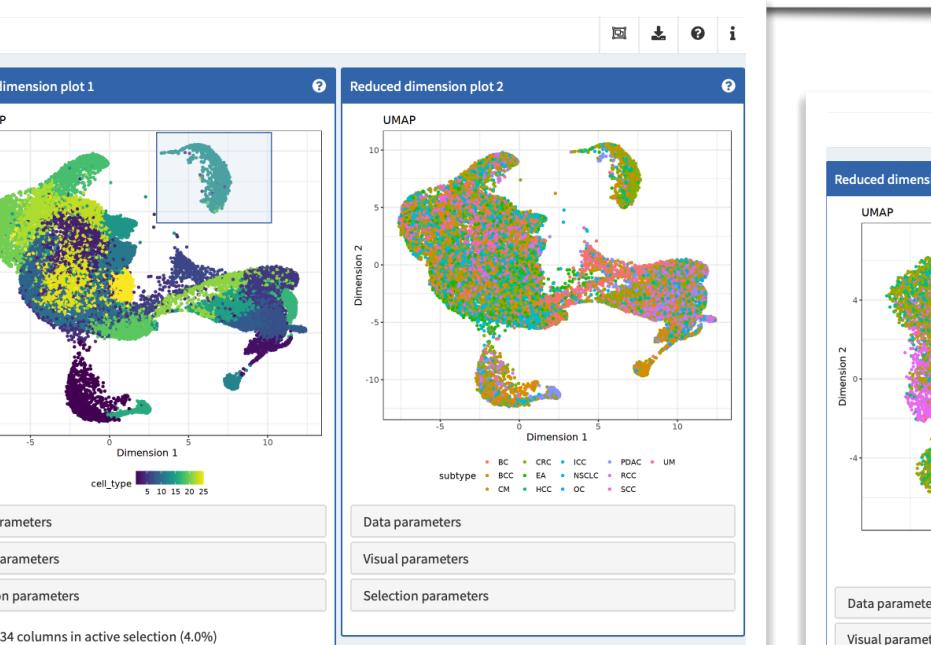
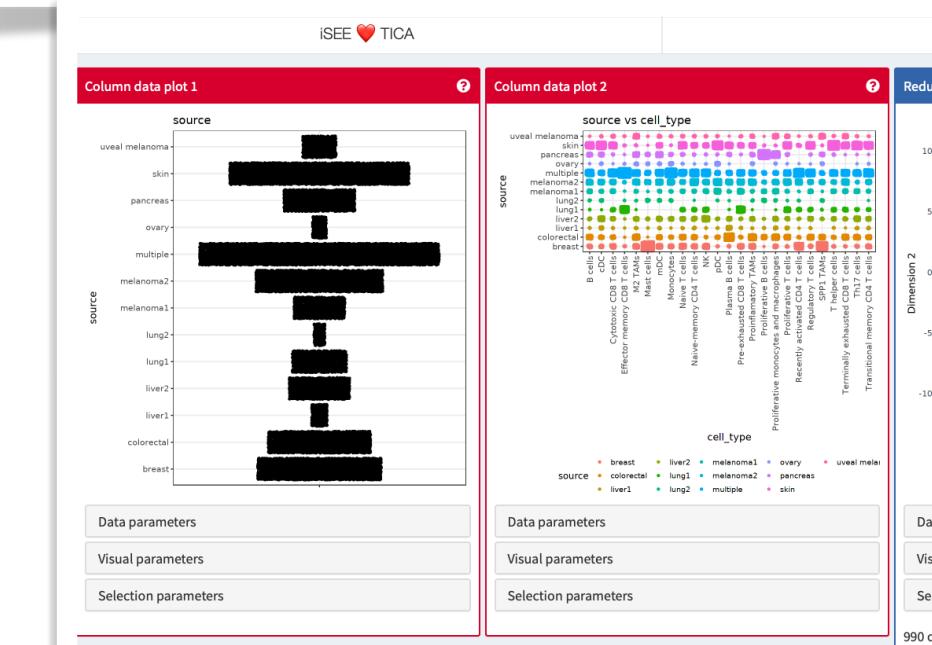
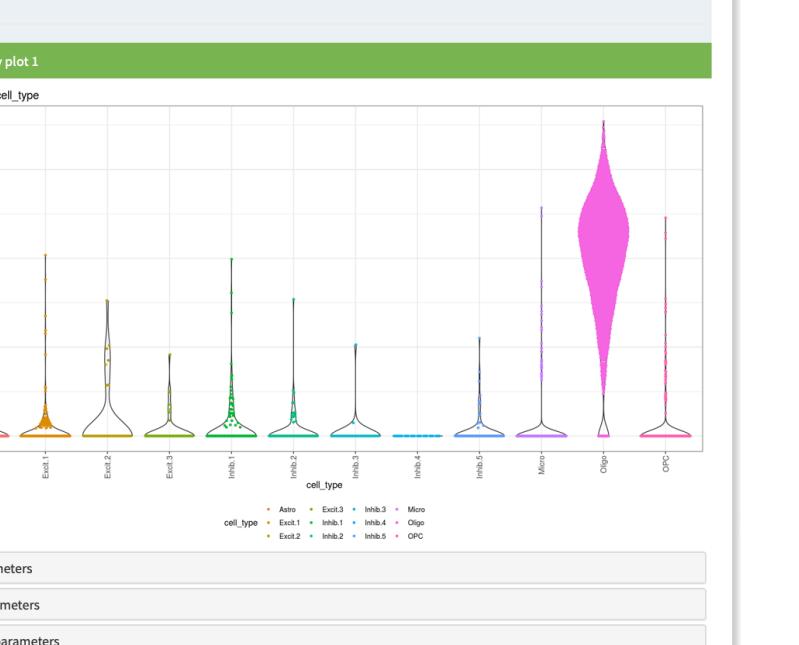
Row data table 1

Show 10 entries							Search:
ID	Symbol	propNucleiExprs	propExprsln.Astro	propExprsln.Excit.1	propE		
	All	All	All	All	All	All	
MIR1302-2HG	ENSG00000243485	MIR1302-2HG	0	0	0		
FAM138A	ENSG00000237613	FAM138A	0	0	0		
OR4F5	ENSG00000186092	OR4F5	0	0	0		
AL627309.1	ENSG00000238009	AL627309.1	0.0986022485566697	0.0927230046948357	0.332335329341317		
AL627309.3	ENSG00000239945	AL627309.3	0	0	0		
AL627309.2	ENSG00000239906	AL627309.2	0.000911577028258888	0	0.0029940119760479		
AL627309.4	ENSG00000241599	AL627309.4	0	0	0		
AL732372.1	ENSG00000236601	AL732372.1	0	0	0		
OR4F29	ENSG00000284733	OR4F29	0	0	0		
AC114498.1	ENSG00000235146	AC114498.1	0.00364630811303555	0.00469483568075117	0.0149700598802395		

Showing 1 to 10 of 33,538 entries

Previous 1 2 3 4 5 ... 3354 Next

Selection parameters



Transmitting **YaxisFeatureName** to **Feature assay plot 1**

Receiving

Search:

Q\_2562  n\_cells.scSQ\_2562

	All	All	All
709	Gene Expression	1841	ENSG000
959	Gene Expression	379	ENSG000
965	Gene Expression	565	ENSG000
565	Gene Expression	3426	ENSG000
267	Gene Expression	554	ENSG000
201	Gene Expression	7469	ENSG000
885	Gene Expression	6723	ENSG000
089	Gene Expression	3120	ENSG000
922	Gene Expression	378	ENSG000
917	Gene Expression	234	ENSG000

### Feature assay plot 1

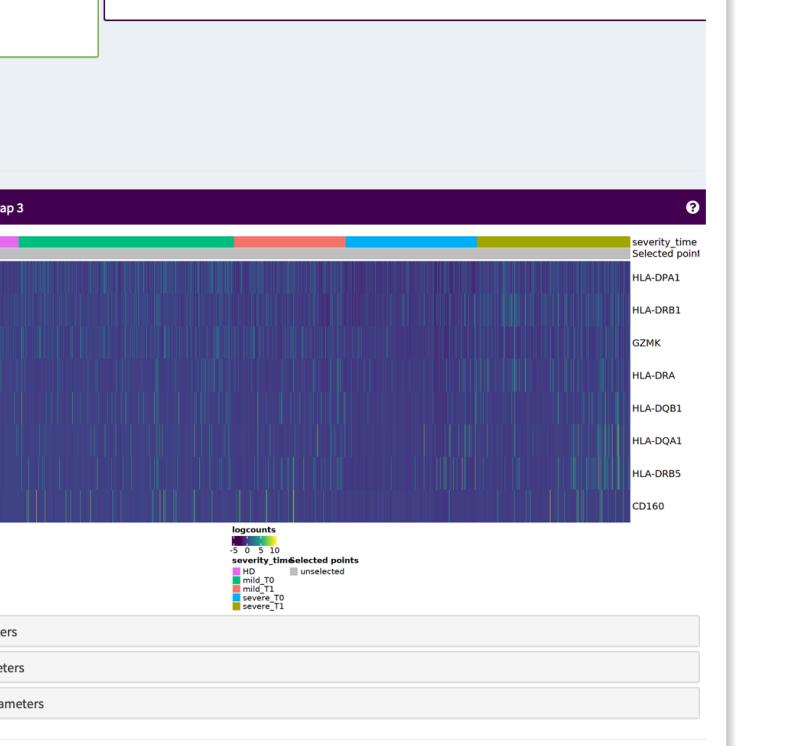
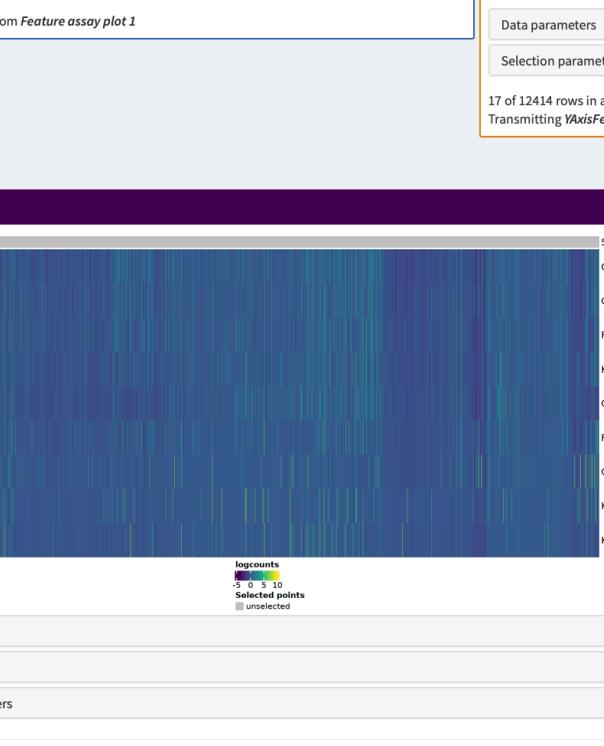
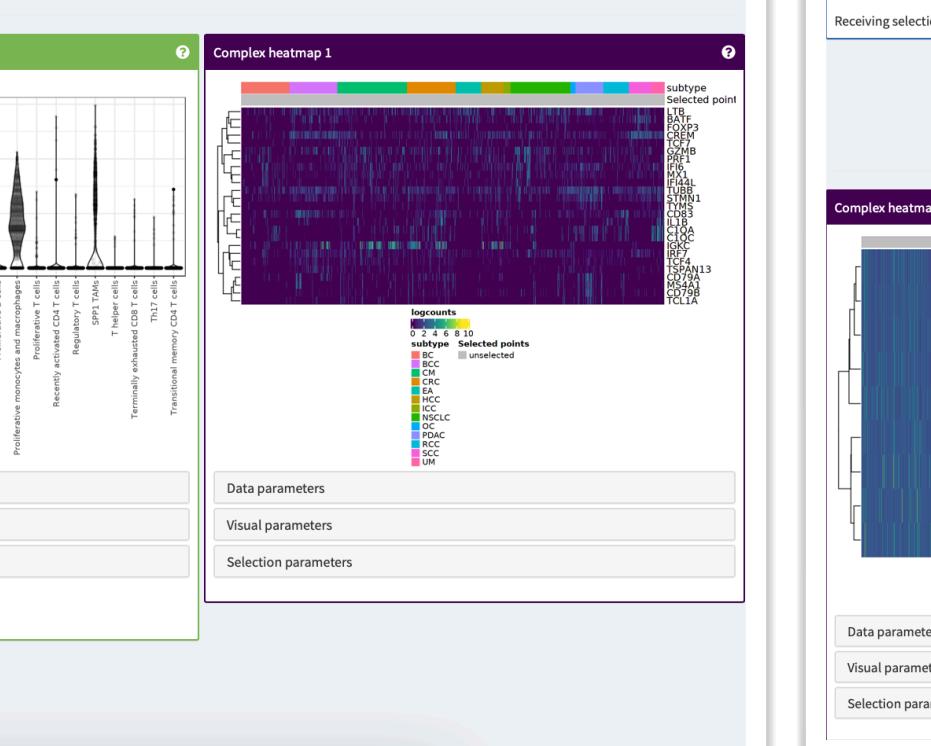
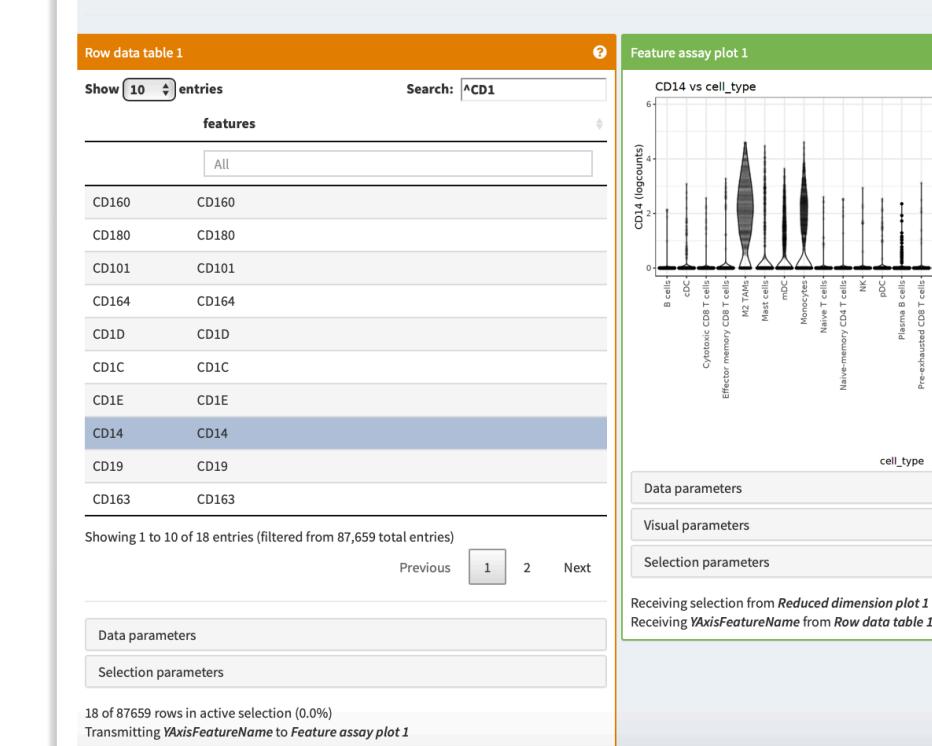
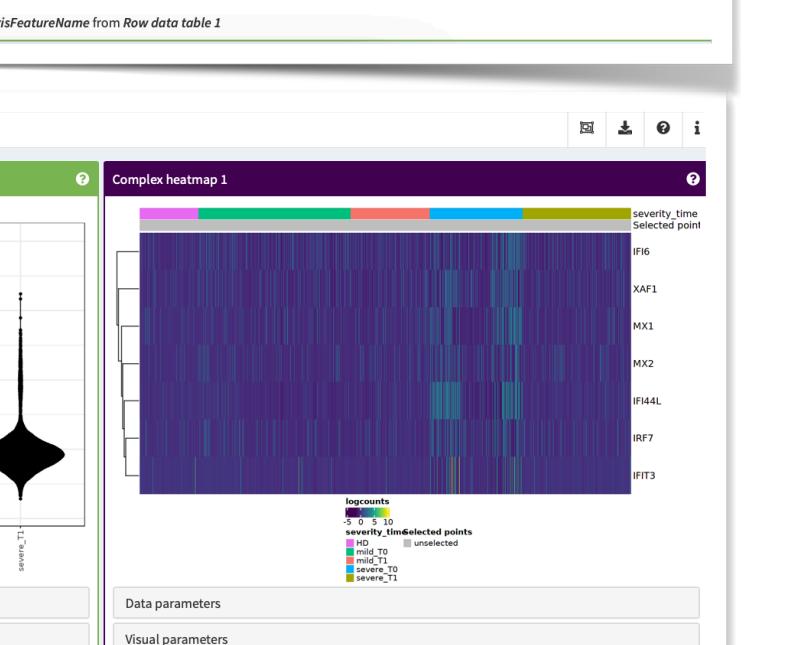
IFI44L vs severity\_time

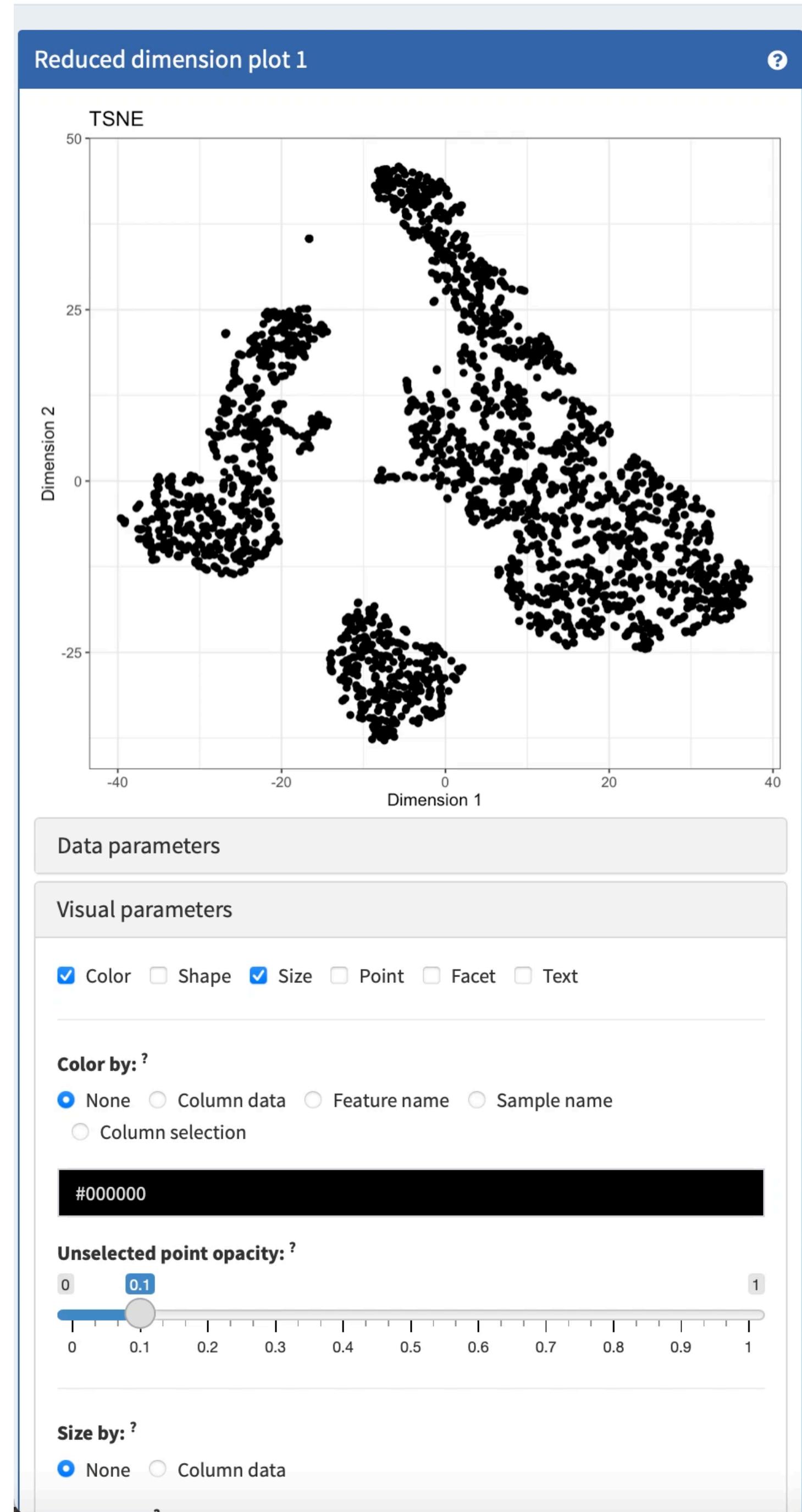
IFI44L (logcounts)

severity\_time

Data parameters

Visual parameters

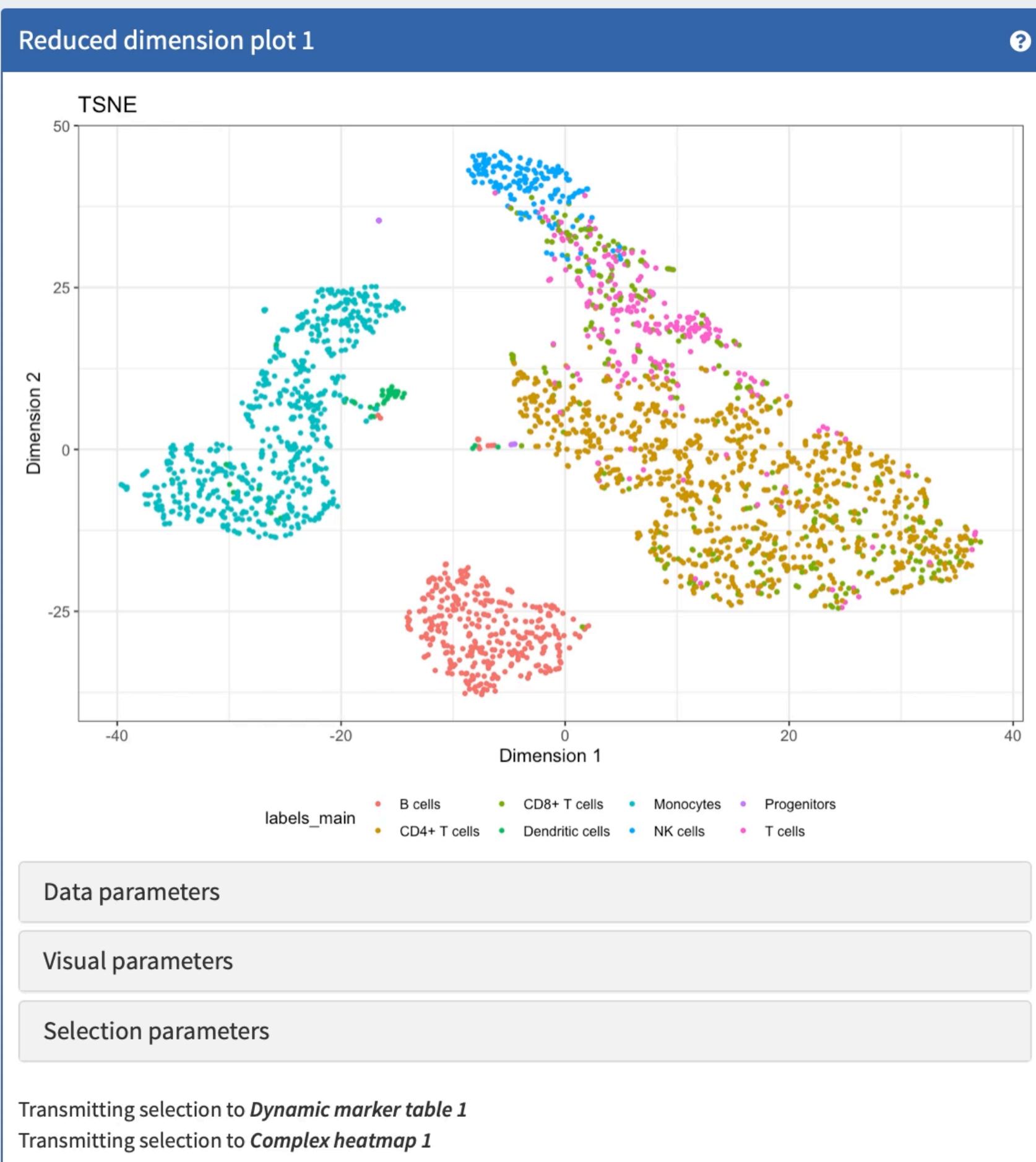




# Overlaying biological knowledge

# Transmitting selections

iSEE v2.6.0 - PBMC3k



### Dynamic marker table 1

Show 10 entries Search:

Top	p.value	FDR
All	All	All

No data available in table

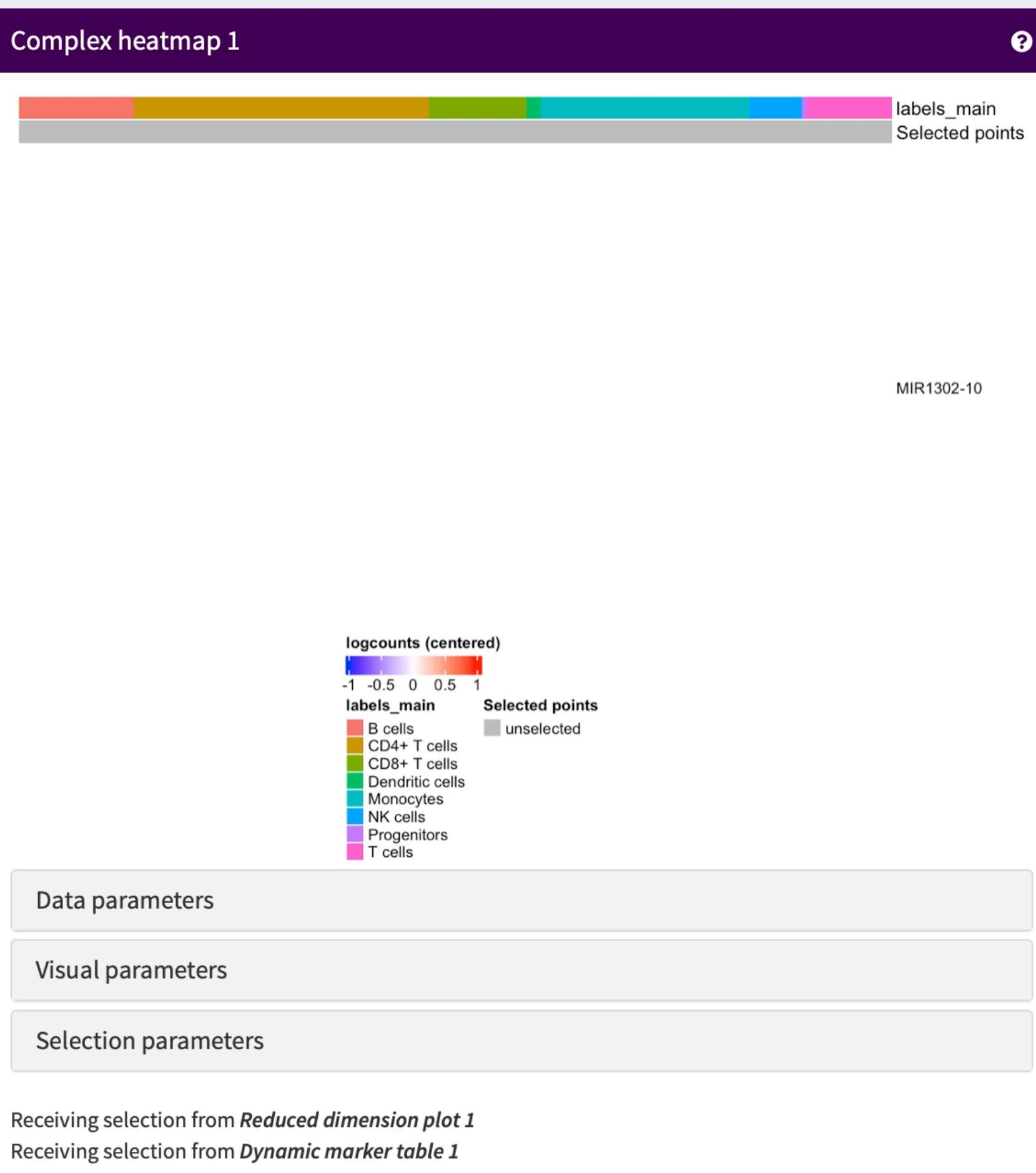
Showing 0 to 0 of 0 entries Previous Next

Data parameters

Selection parameters

Receiving selection from [Reduced dimension plot 1](#)

Transmitting selection to [Complex heatmap 1](#)



# Exporting code

iSEE v2.6.0 - PBMC3k



### Reduced dimension plot 1

TSNE

Dimension 2

Dimension 1

labels\_main

- B cells
- CD8+ T cells
- Monocytes
- Progenitors
- CD4+ T cells
- Dendritic cells
- NK cells
- T cells

Data parameters

Visual parameters

Selection parameters

339 of 2643 columns in active selection (12.8%)

Transmitting selection to **Dynamic marker table 1**

Transmitting selection to **Complex heatmap 1**

### Dynamic marker table 1

Show 10 entries

Search:

	Top	p.value	FDR	summary.logFC
CD74	1	0	0	3.42132381213097
HLA-DRA	2	0	0	3.44550072611305
HLA-DPB1	3	2.85219220717521e-207	3.11250228261667e-203	2.45929493768294
HLA-DRB1	4	7.24842631132653e-182	5.93247451450504e-178	2.16540610360739
HLA-DPA1	5	4.45119192384511e-164	2.91446242405679e-160	2.09455111380983
CD79A	6	1.25724230087112e-142	6.85993307431962e-139	2.36766542730215
CD79B	7	4.00884766756208e-136	1.87488078486638e-132	2.1103035043795
HLA-DQA1	8	1.06210843730209e-118	4.34641325254959e-115	1.88924192017757
CD37	9	1.04546646198276e-117	3.80294233693232e-114	1.70881757073607
MS4A1	10	1.96703781179909e-108	6.43968838826796e-105	1.68591352204917

Showing 1 to 10 of 10 entries (filtered from 32,738 total entries)

Previous 1 Next

Receiving selection from **Reduced dimension plot 1**

Transmitting selection to **Complex heatmap 1**

### Complex heatmap 1

Labels\_main

Selected points

CD74

HLA-DRA

HLA-DRB1

HLA-DQA1

HLA-DPA1

HLA-DPB1

MS4A1

CD79B

CD79A

CD37

logcounts (centered)

Labels\_main

Selected points

active

unselected

Data parameters

Visual parameters

Selection parameters

Receiving selection from **Reduced dimension plot 1**

Transmitting selection to **Complex heatmap 1**

# Exporting panel settings

iSEE v2.6.0 - PBMC3k



### Reduced dimension plot 1

TSNE

Dimension 2

Dimension 1

labels\_main

- B cells
- CD4+ T cells
- Monocytes
- Progenitors
- CD4+ T cells
- Dendritic cells
- NK cells
- T cells

Data parameters

Visual parameters

Selection parameters

339 of 2643 columns in active selection (12.8%)

Transmitting selection to **Dynamic marker table 1**

Transmitting selection to **Complex heatmap 1**

### Dynamic marker table 1

Show 10 entries

Search:

	Top	p.value	FDR	summary.logFC
CD74	1	0	0	3.42132381213097 3.4
HLA-DRA	2	0	0	3.44550072611305 3.4
HLA-DPB1	3	2.85219220717521e-207	3.11250228261667e-203	2.45929493768294 2.4
HLA-DRB1	4	7.24842631132653e-182	5.93247451450504e-178	2.16540610360739 2.1
HLA-DPA1	5	4.45119192384511e-164	2.91446242405679e-160	2.09455111380983 2.0
CD79A	6	1.25724230087112e-142	6.85993307431962e-139	2.36766542730215 2.3
CD79B	7	4.00884766756208e-136	1.87488078486638e-132	2.1103035043795 2.2
HLA-DQA1	8	1.06210843730209e-118	4.34641325254959e-115	1.88924192017757 1.8
CD37	9	1.04546646198276e-117	3.80294233693232e-114	1.70881757073607 1.7
MS4A1	10	1.96703781179909e-108	6.43968838826796e-105	1.68591352204917 1.6

Showing 1 to 10 of 10 entries (filtered from 32,738 total entries)

Previous 1 Next

Receiving selection from **Reduced dimension plot 1**

Transmitting selection to **Complex heatmap 1**

### Complex heatmap 1

labels\_main

Selected points

CD74

HLA-DRA

HLA-DRB1

HLA-DQA1

HLA-DPA1

HLA-DPB1

MS4A1

CD79B

CD79A

CD37

logcounts (centered)

-2 0 2 4 6

labels\_main

Selected points

B cells

CD4+ T cells

CD8+ T cells

Dendritic cells

Monocytes

NK cells

Progenitors

T cells

active

unselected

Data parameters

Visual parameters

Selection parameters

Receiving selection from **Reduced dimension plot 1**

Receiving selection from **Dynamic marker table 1**

# Tours

iSEE v2.6.0 - PBMC3k

### Reduced dimension plot 1

TSNE

Dimension 2

Dimension 1

labels\_main

- B cells
- CD4+ T cells
- CD8+ T cells
- Dendritic cells
- Monocytes
- NK cells
- Progenitors
- T cells

The Reduced dimension plot panel shows reduced dimensions from a `SingleCellExperiment` object or one of its subclasses. Here, each point corresponds to a column (usually a cell) of the `SingleCellExperiment` object.

Back Next

### Dynamic marker table 1

Show 10 entries Search:

	Top	p.value	FDR	summary.logFC
CD74	1	0	0	3.42132381213097 3.42
HLA-DRA	2	0	0	3.44550072611305 3.44
HLA-DPB1	3	2.85219220717521e-207	3.11250228261667e-203	2.45929493768294 2.45
HLA-DRB1	4	7.24842631132653e-182	5.93247451450504e-178	2.16540610360739 2.16
HLA-DPA1	5	4.45119192384511e-164	2.91446242405679e-160	2.09455111380983 2.09
CD79A	6	1.25724230087112e-142	6.85993307431962e-139	2.36766542730215 2.36
CD79B	7	4.00884766756208e-136	1.87488078486638e-132	2.1103035043795 2.11
HLA-DQA1	8	1.06210843730209e-118	4.34641325254959e-115	1.88924192017757 1.88
CD37	9	1.04546646198276e-117	3.80294233693232e-114	1.70881757073607 1.70
MS4A1	10	1.96703781179909e-108	6.43968838826796e-105	1.68591352204917 1.68

Showing 1 to 10 of 10 entries (filtered from 32,738 total entries)

Previous 1 Next

Receiving selection from *Reduced dimension plot 1*  
Transmitting selection to *Complex heatmap 1*

### Complex heatmap 1

labels\_main Selected points

CD74  
HLA-DRA  
HLA-DRB1  
HLA-DQA1  
HLA-DPA1  
HLA-DPB1  
MS4A1  
CD79B  
CD79A  
CD37

logcounts (centered)

labels\_main Selected points

B cells active  
CD4+ T cells unselected  
CD8+ T cells  
Dendritic cells  
Monocytes  
NK cells  
Progenitors  
T cells

Data parameters

Visual parameters

Selection parameters

Receiving selection from *Reduced dimension plot 1*  
Receiving selection from *Dynamic marker table 1*

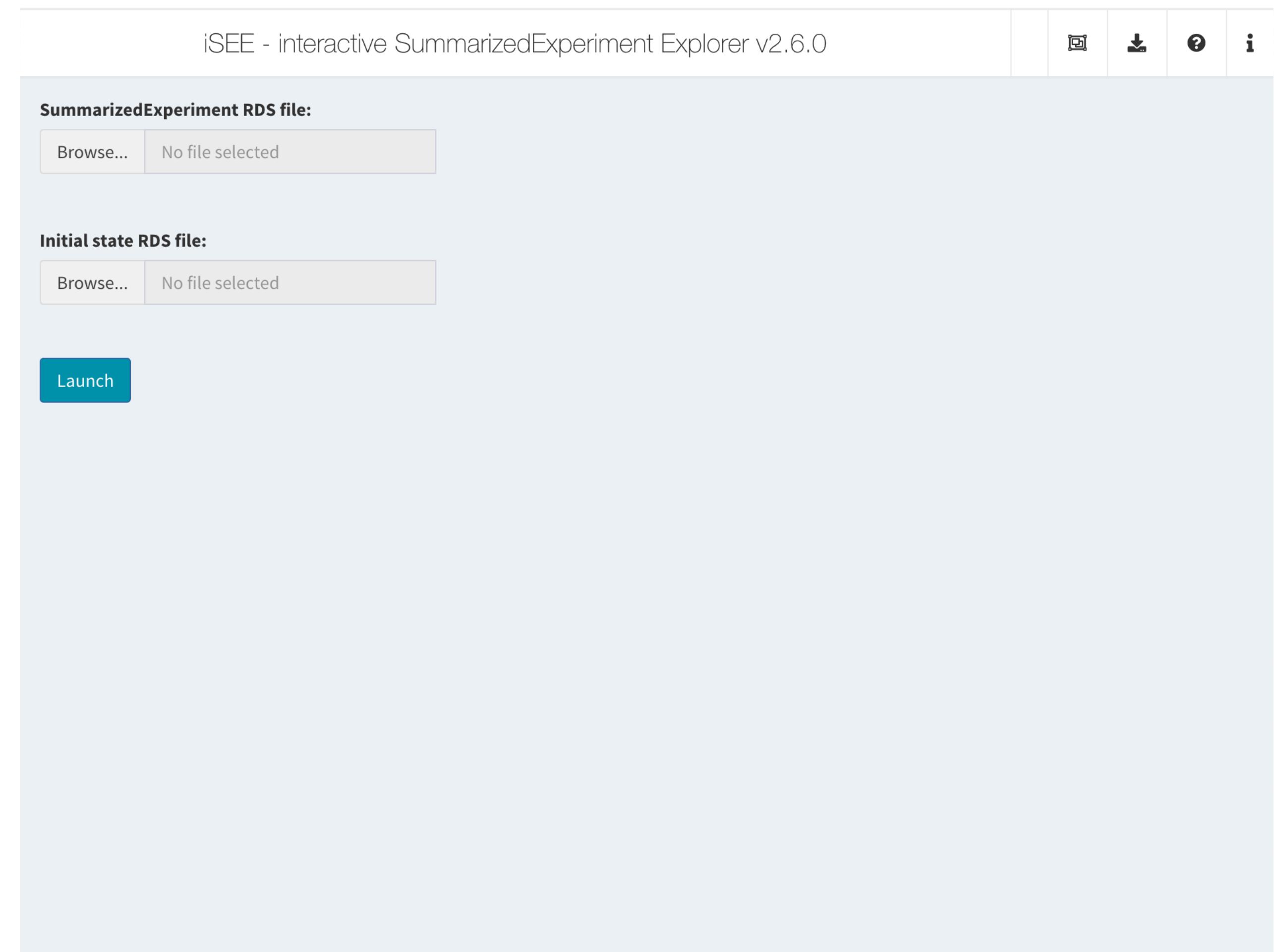
Receiving selection from *Reduced dimension plot 1*  
Transmitting selection to *Complex heatmap 1*

# How can iSEE be useful to you?

- \*Enable exploration and hypothesis generation.
- \*Simplify (cross-disciplinary) collaboration.
- \*Increase impact and reach of generated data.

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# Acknowledgements



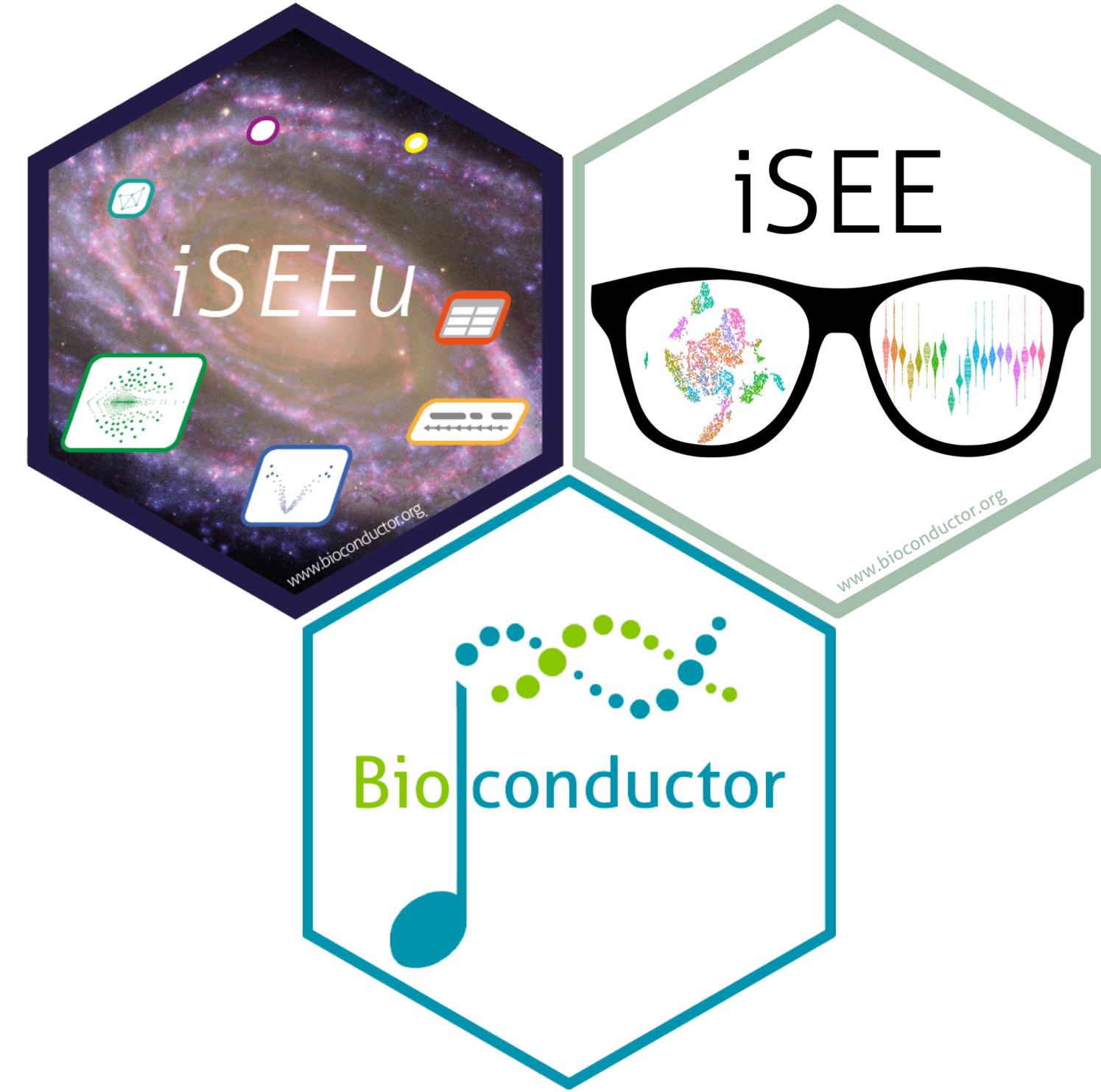
Kevin Rue-Albrecht



Federico Marini



Aaron Lun



- \* The bookdown book on *Extending iSEE*: <https://isee.github.io/iSEE-book/>
- \* Bioconductor landing page: <https://bioconductor.org/packages/iSEE/>
- \* Publication (F1000Research, 2018): <https://f1000research.com/articles/7-741/v1>
- \* *iSEE* in production: <http://www.teichlab.org/singlecell-treg>, [https://libd.shinyapps.io/tran2020\\_Amyg/](https://libd.shinyapps.io/tran2020_Amyg/),  
[http://shiny.imbei.uni-mainz.de:3838/iSEE\\_covidIT/](http://shiny.imbei.uni-mainz.de:3838/iSEE_covidIT/)
- \* GitHub organization: <https://github.com/isee>