

# SUPPLEMENTARY MATERIALS

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## Multi-sample non-negative spatial factorization

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## 1 Supplemental Tables

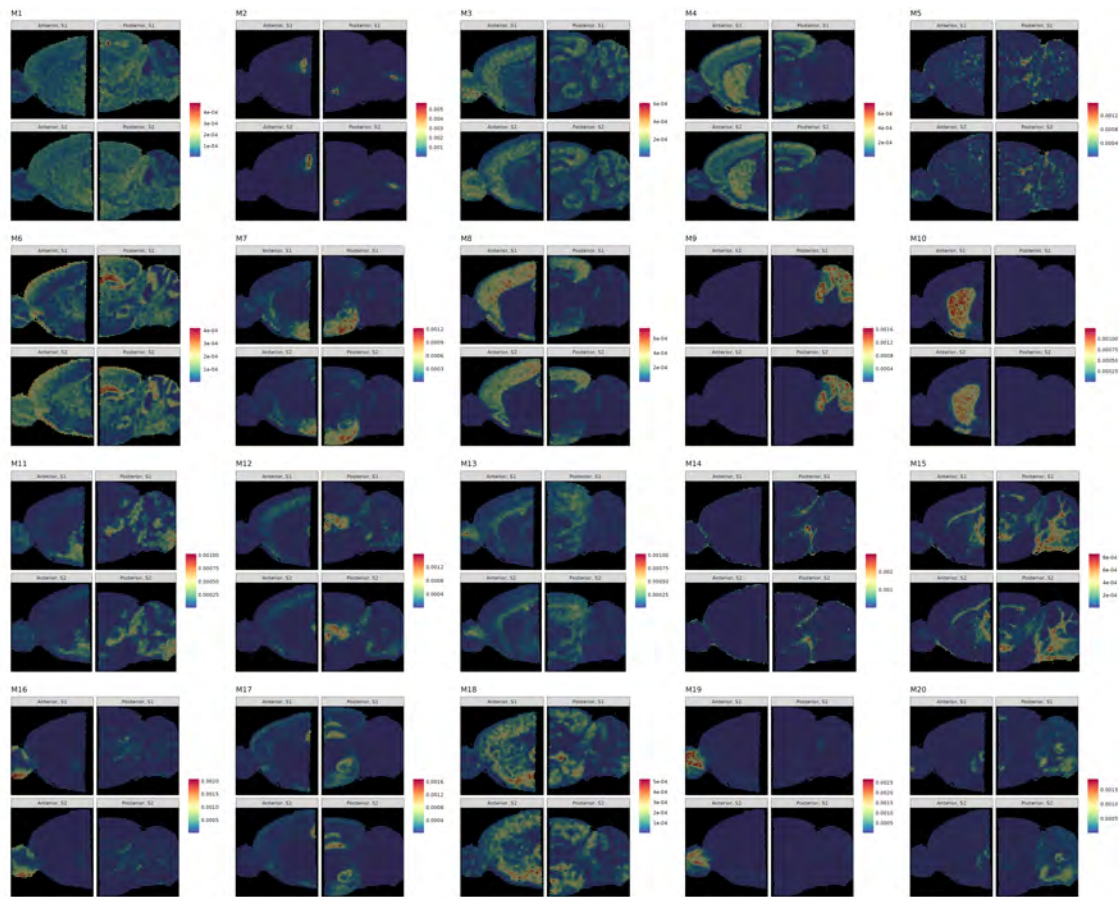
Factor	Gene symbol
M1	Tcf7l2, Bc1, Acta2, Slc17a6, Dcn, Trh, Tnnt1, Cabp7, Atp2a3, Ccn2
M2	Ttr, Enpp2, Ecrg4
M3	
M4	2010300C02Rik, Arpp21, Ppp3ca, Cx3cl1, Lamp5, Rgs4, Chst1, Pdp1, Ndr4, Kcnp2
M5	Hba-a1, Hbb-bs, Hba-a2, Hbb-bt, Alas2
M6	mt-Co1, mt-Nd5, mt-Co2, mt-Atp8, mt-Nd2, mt-Nd4, mt-Atp6, mt-Nd4l, mt-Co3, mt-Nd3
M7	Lypd1, Ly6h, Pgrmc1, Hap1, Lmo3, Gap43, Ccn3, Crym, Atp2b4, Ahi1
M8	Vxn, Stx1a, Lingo1, Dkk3, Tbr1, Cck, Mef2c, Nrn1, 1110008P14Rik, Slc30a3
M9	Pcp2, Car8, Cbln1, Rgs8, Calb1, Itpr1, Cbln3, Gng13, Zic1, Inpp5a
M10	Penk, Gpr88, Ppp1r1b, Pde10a, Tac1, Pde1b, Rgs9, Adcy5, Scn4b, Rasd2
M11	Scg2, Nap1l5, Resp18, Tuba1b, Gnas
M12	Prkcd, Adarb1, Nefm, Cplx1, Slc24a2, Rasgrp1, Uchl1, Thy1, Atp1a3
M13	Tmsb10, Fxyd6, Rpl37, Rplp1, Rpl13, Rpl9, Rps19, Rps27, Rpl37a, Clu
M14	Ptgds, Mgp, Igf2, Myoc, Nnat, Igfbp2
M15	Plp1, Mobp, Mbp, Trf, Mag, Mal, Cldn11, Cryab, Cnp, Mog
M16	Fabp7, S100a5, Slc6a11, Ptn, Apoe, Nrsn1, Aqp4, Vtn, Sparcl1, Pla2g7
M17	Cnih2, Ddn, Ptk2b, Nptxr, Ncdn, Nsmf, Nell2, Mmd, Thra, Selenow
M18	Sst, Npy, Gad1, Gad2, Slc32a1, Zwint, Pcsk1n, Cox8a, Snrpn, Cox6c
M19	Gng4, Synpr, Gpsm1, Pcbp3, Meis2, Cpne4, Ptpro, Tshz1, Pbx3, Pcp4l1
M20	Gm42418, Lars2, Nefh, Vamp1, Spp1, Malat1, Neffl, Nat8l

**Supplementary Table S1. Genes mostly associated with each factor in mouse sagittal section data |**

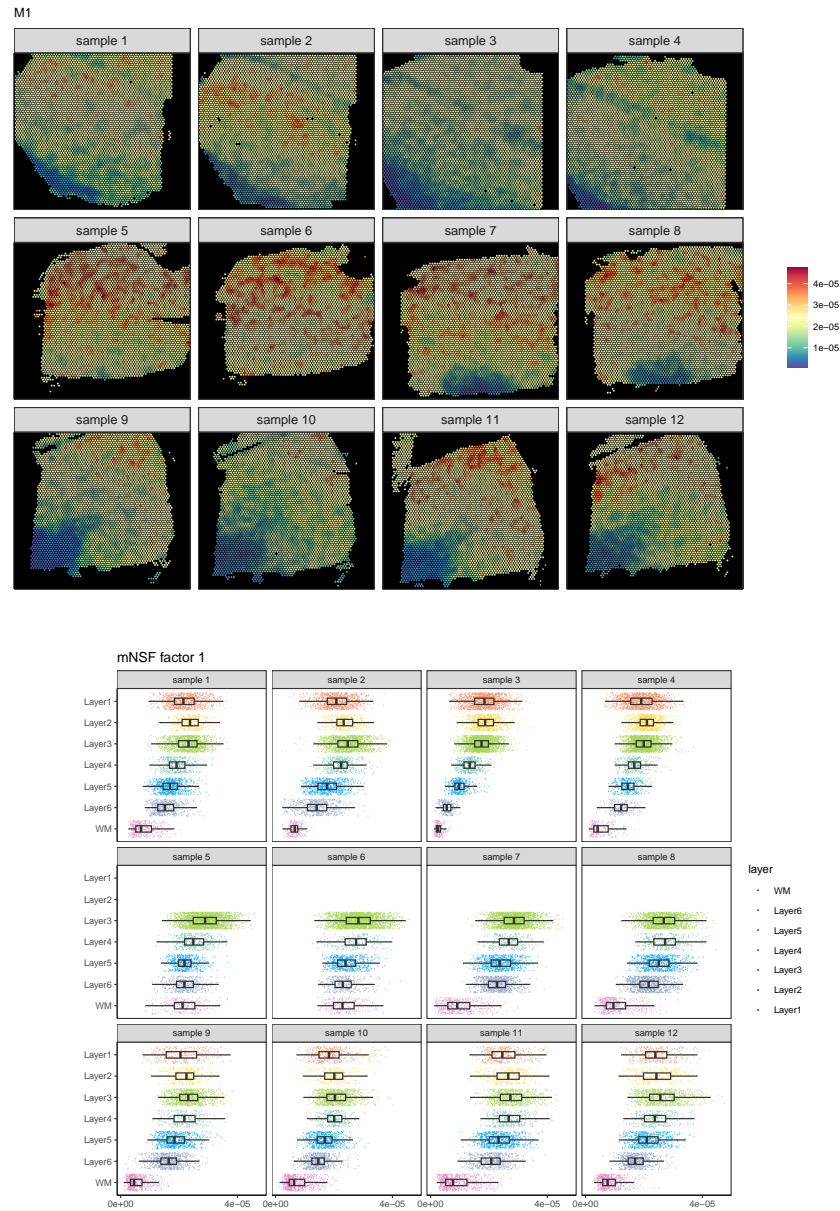
Factor	Gene symbol
M1	COX1, COX2, COX3, ND4, ATP6, ND2, ND3, CYTB, ND1, ND5
M2	KRT8, KRT18, S100A11, MOG, MOBP, HSPA2, BCAS1, IGFBP5, MBP, PAQR6
M3	FABP4, SAA1, AQP4, SNORC, CXCL14, VIM, SPARC, GJA1, GFAP, MT2A
M4	PPP3CA, DIRAS2, AK5, APP, THY1, PRKCB, CHN1, YWHAG, RTN4, PRNP
M5	PLP1, TF, CNP, CARNS1, HBA2, HBB, CLDND1, CLDN11, ENPP2, PPP1R14A
M6	HPCAL1
M7	NEFM, NEFL, SNCG, LGALS1, GAP43
M8	PCP4, SNCA, TUBB2A, TMSB10, SYT1, STMN2, STMN1, UCHL1, FABP3, TTC9B
M9	COX6C, SST, NPY
M10	SCGB2A2, SCGB1D2, TFF1, IGKC, IGHG3, AZGP1, IGHG4, TFF3, MUC1, IGLC2

**Supplementary Table S2. Genes associated with each factor in the DLPC data |**

## 2 Supplemental Figures

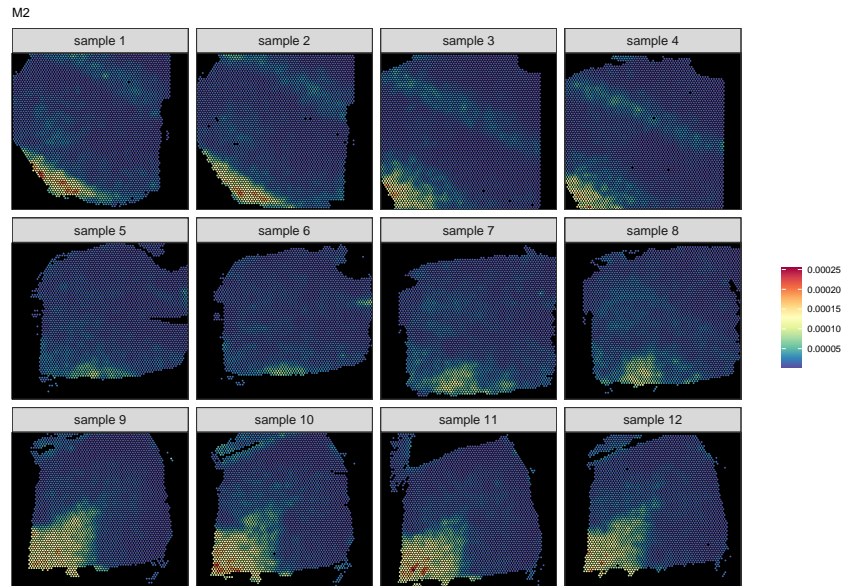


**Supplementary Figure S1. mNSF factors of mouse sagittal data show associations with the anatomical structure** | The dataset is composed of four samples – two pairs of replicates, each for the anterior and the posterior region. Four-sample NSF is applied in this data, with twelve factors used. Each pair of replicates is in the same column in each subplot. Comparing the spatial pattern of each factor to a reference diagram of the mouse brain, it is easy to establish that factor 16 and 19 are enriched in olfactory bulb, and factor 9 is enriched in cerebellum.

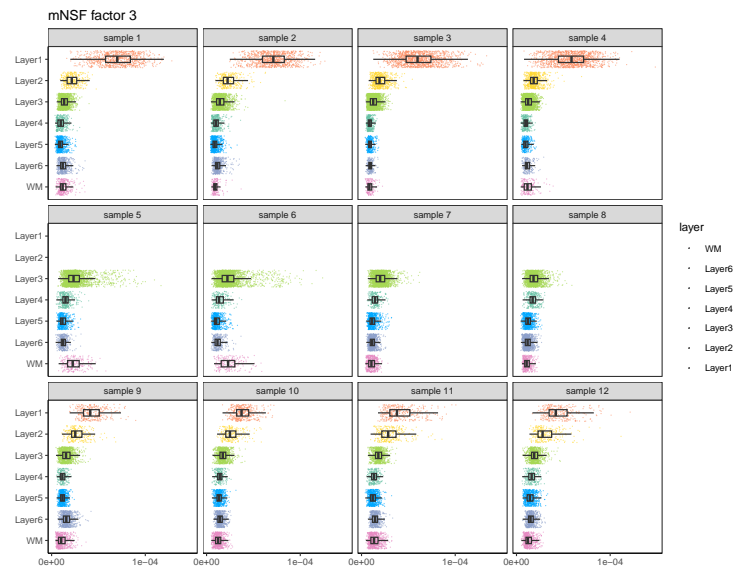
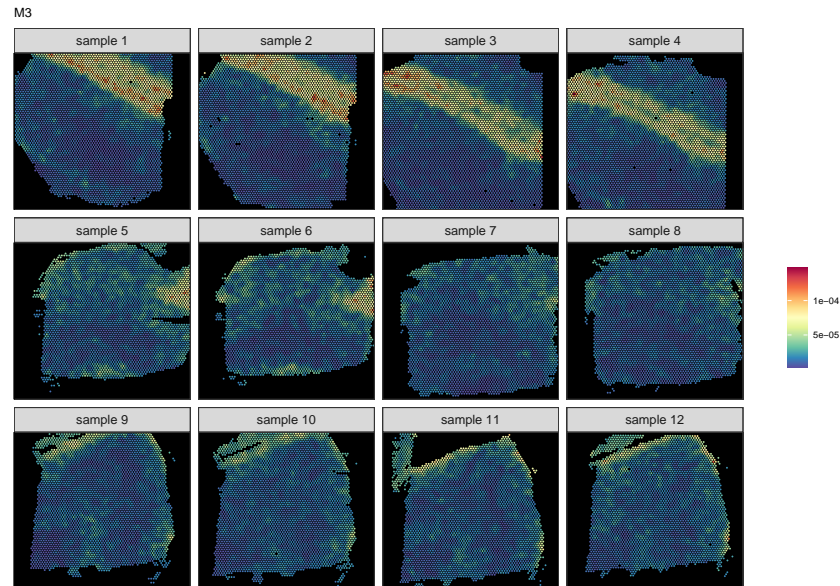


**Supplementary Figure S2. The value of each mNSF factor M1 for each of the 12 samples in DLPFC data**

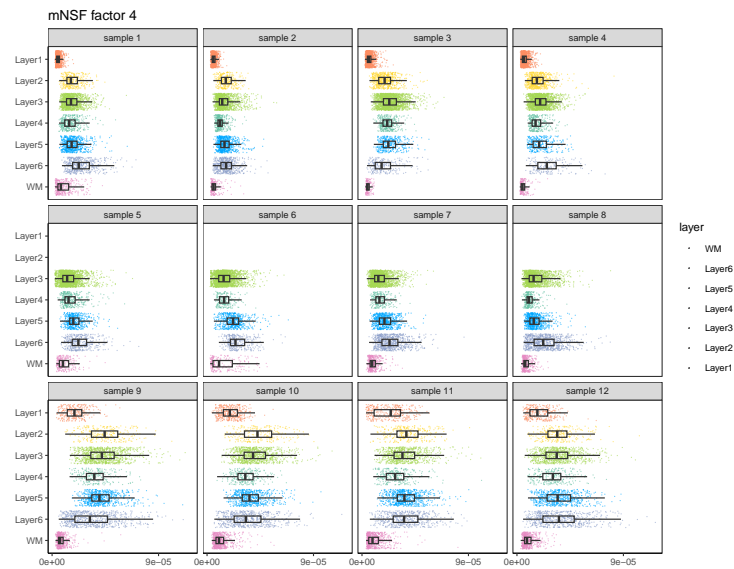
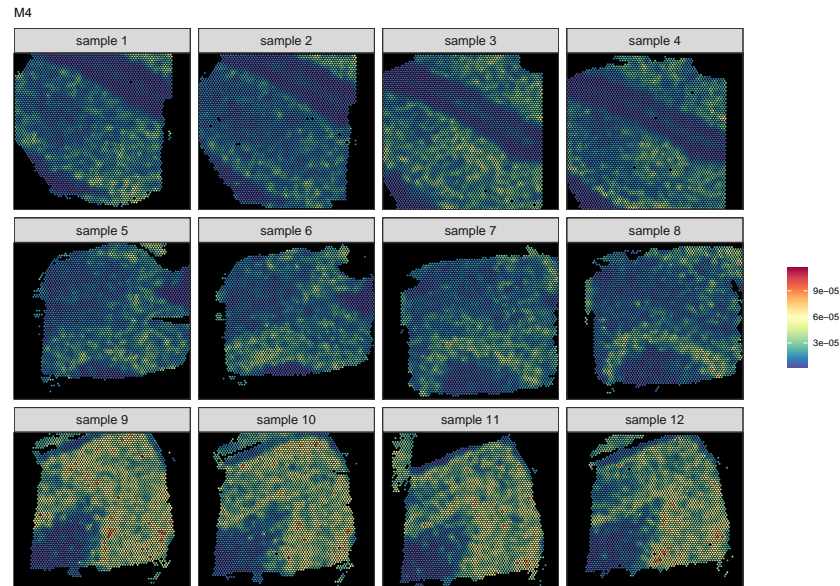




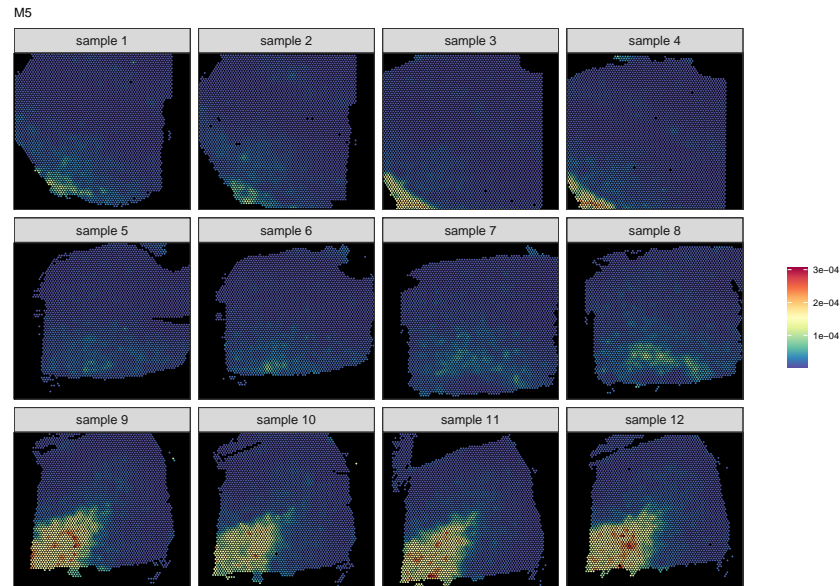
**Supplementary Figure S3. The value of each mNSF factor M2 for each of the 12 samples in DLPFC data**



**Supplementary Figure S4. The value of each mNSF factor M3 for each of the 12 samples in DLPFC data**

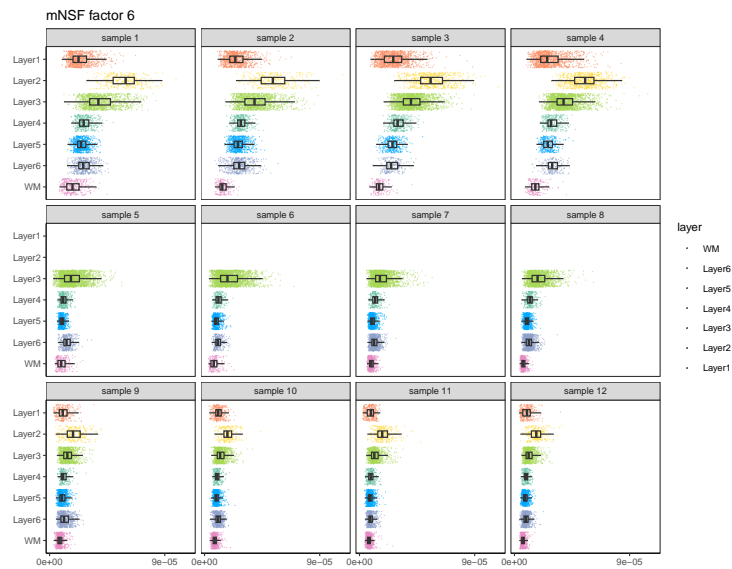
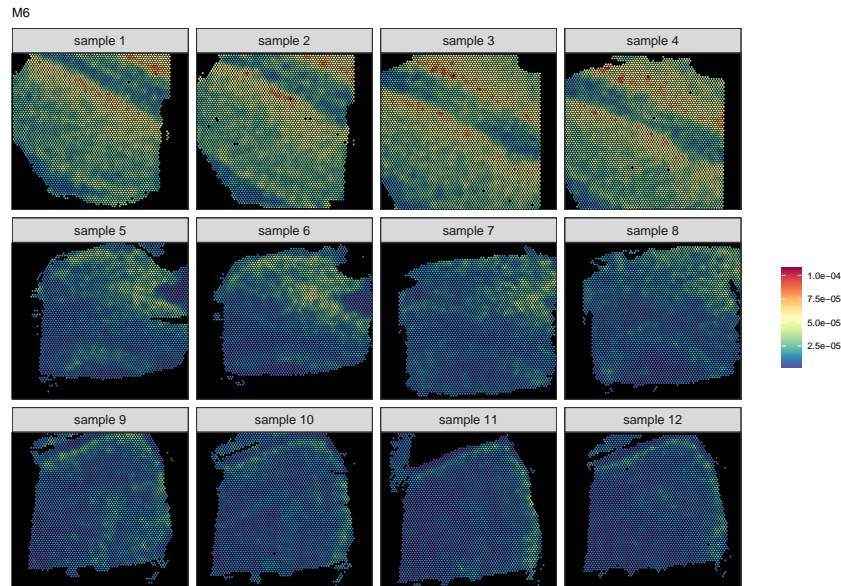


**Supplementary Figure S5. The value of each mNSF factor M4 for each of the 12 samples in DLPFC data**



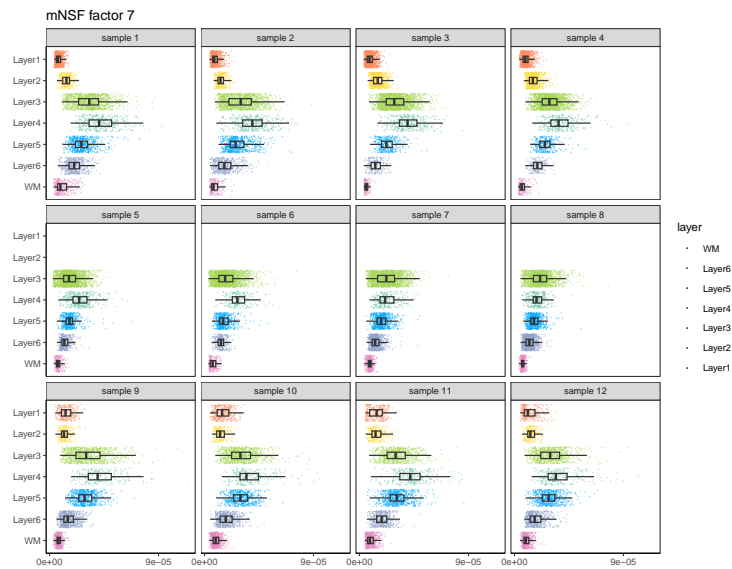
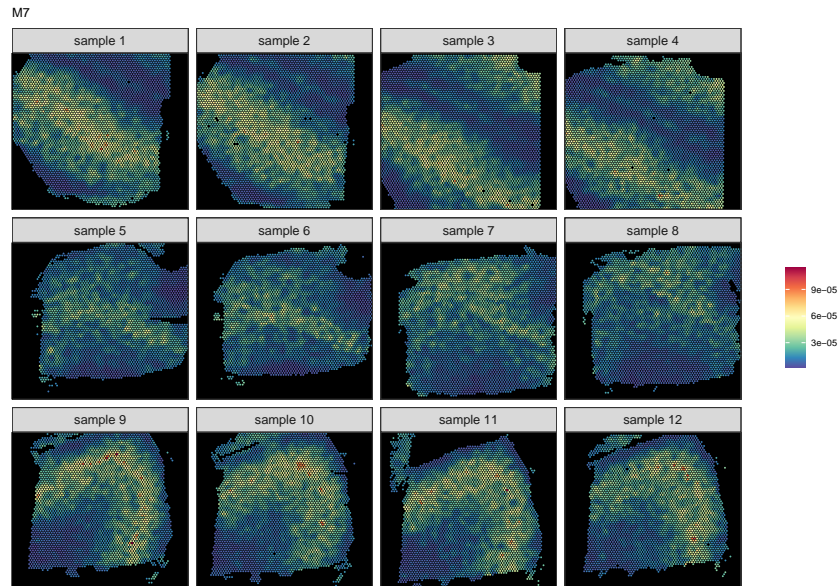
**Supplementary Figure S6. The value of each mNSF factor M5 for each of the 12 samples in DLPFC data**



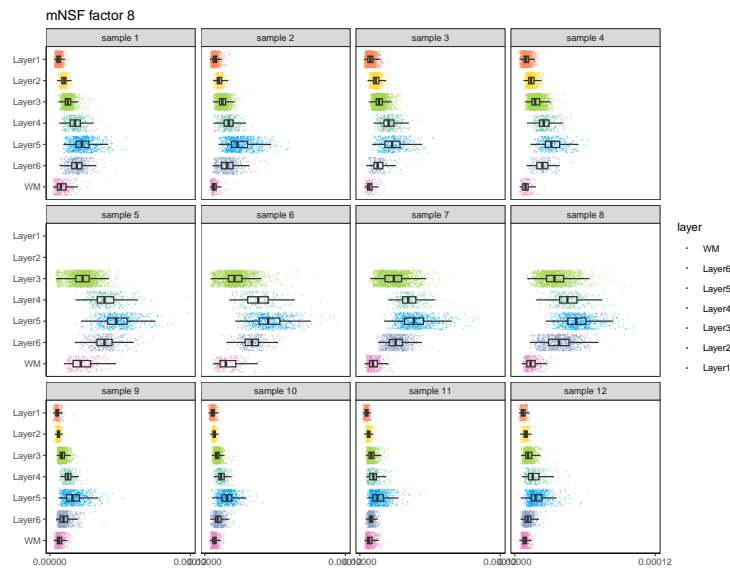
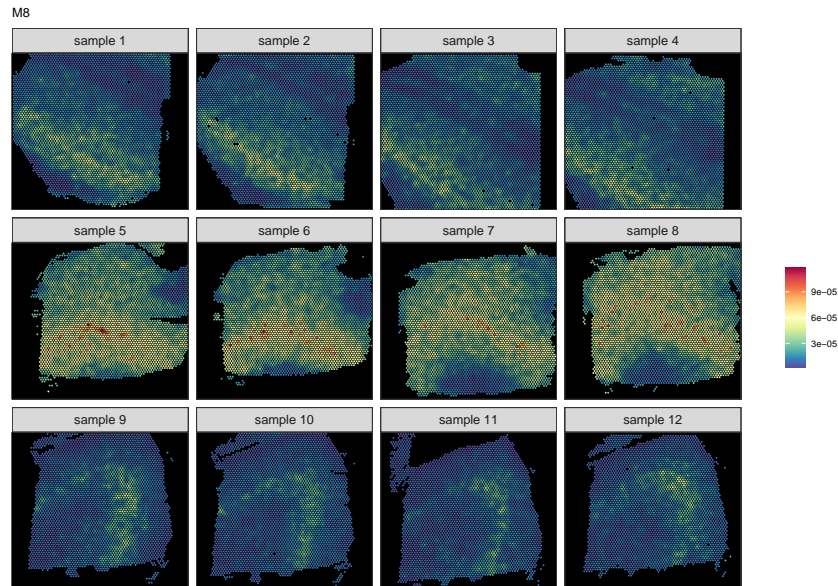


**Supplementary Figure S7. The value of each mNSF factor M6 for each of the 12 samples in DLPFC data**

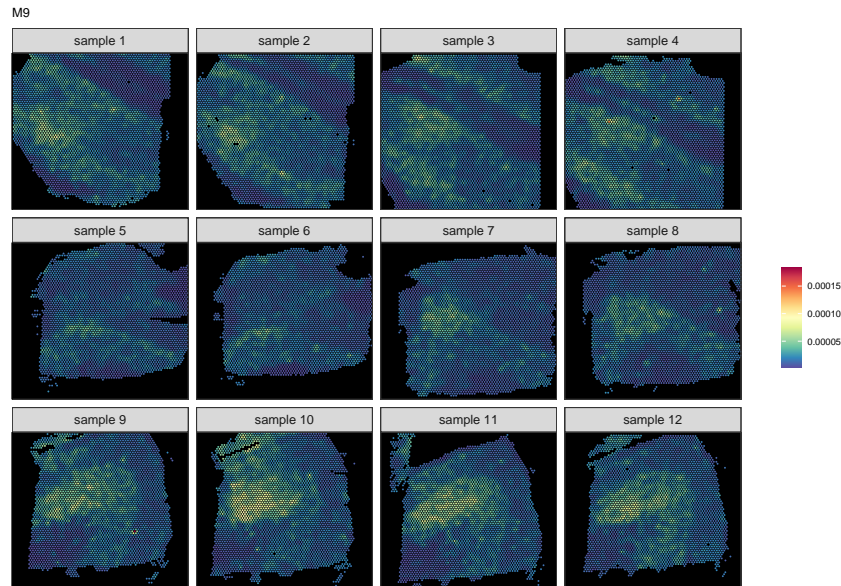




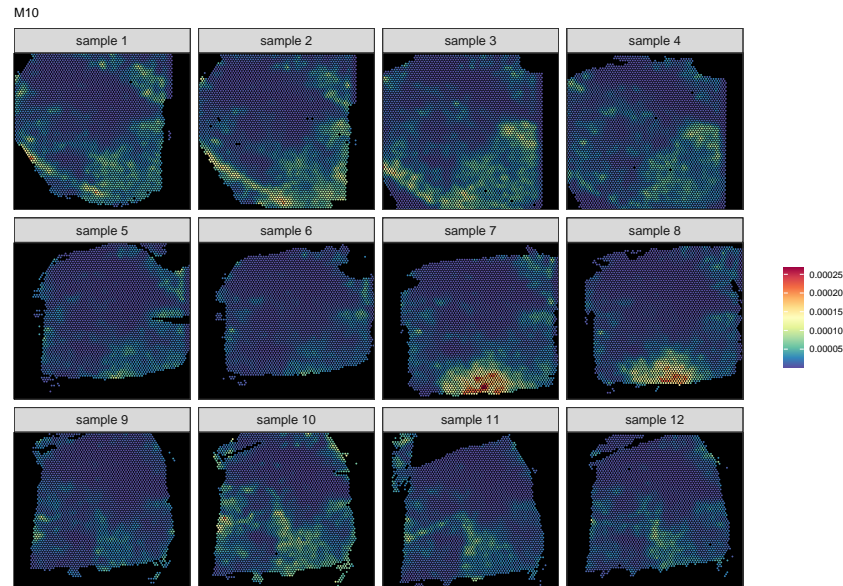
**Supplementary Figure S8. The value of each mNSF factor M7 for each of the 12 samples in DLPFC data**



**Supplementary Figure S9.** The value of each mNSF factor M8 for each of the 12 samples in DLPFC data



**Supplementary Figure S10. The value of each mNSF factor M9 for each of the 12 samples in DLPFC data**



**Supplementary Figure S11. The value of each mNSF factor M10 for each of the 12 samples in DLPFC data**