

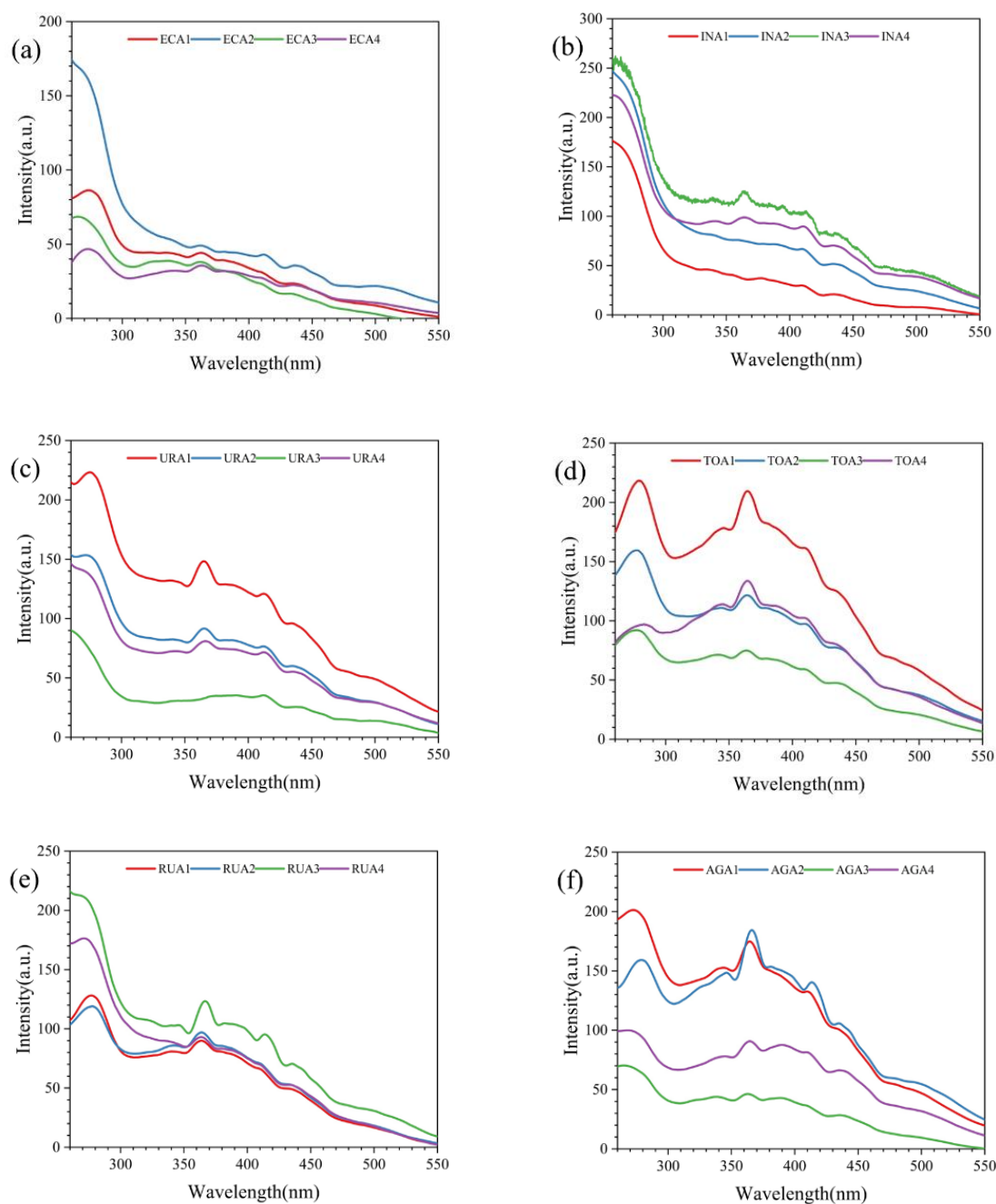


Fig. S1. Synchronous fluorescence spectra of ECA(a), INA(b), URA(c), TOA(d), RUA(e) and AGA(f) within the four different soil profiles. 1: 0-20cm, 2: 20-40cm, 3: 40-60cm, 4: 60-80cm.

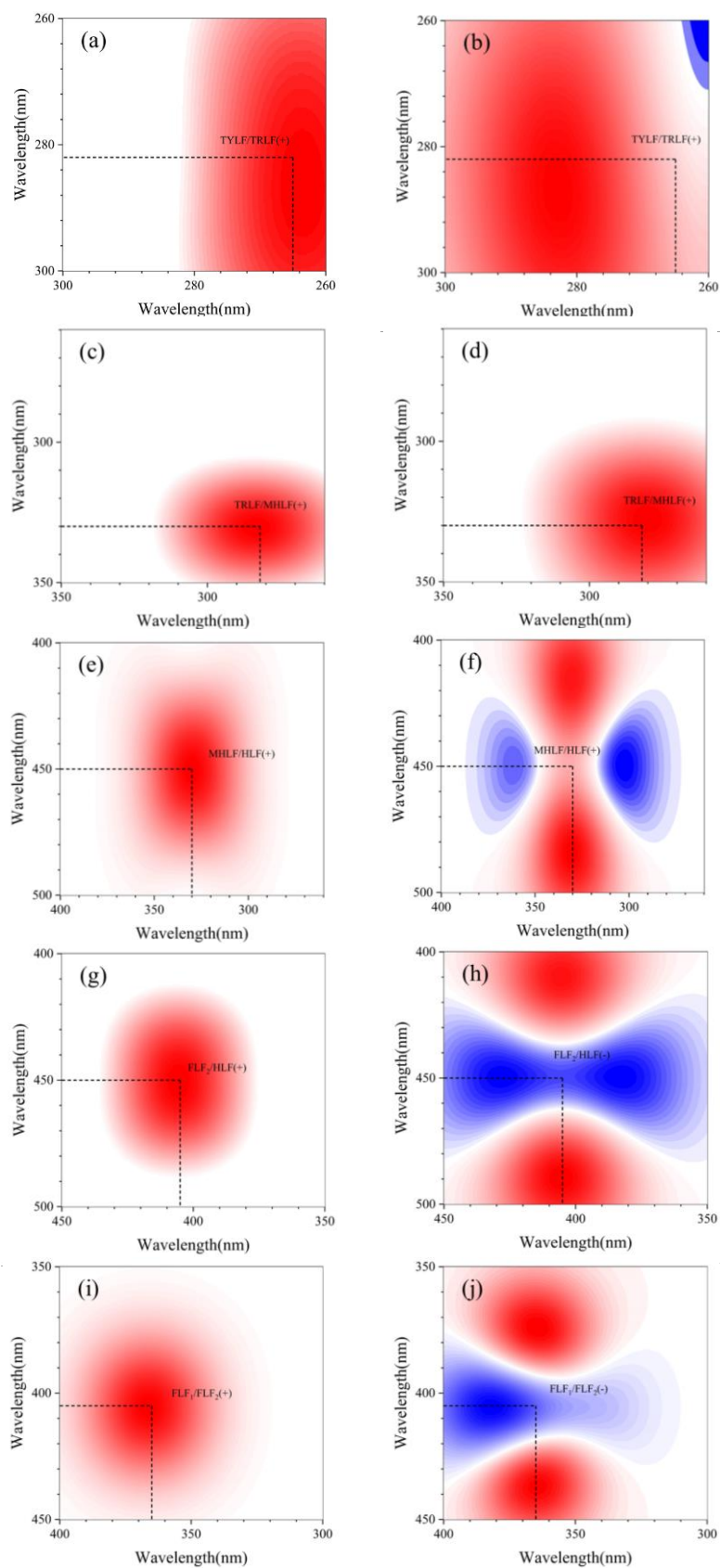


Fig. S2. Synchronous and asynchronous maps captured by 2D-SFS-COS of SOM fractions in the INA soil.

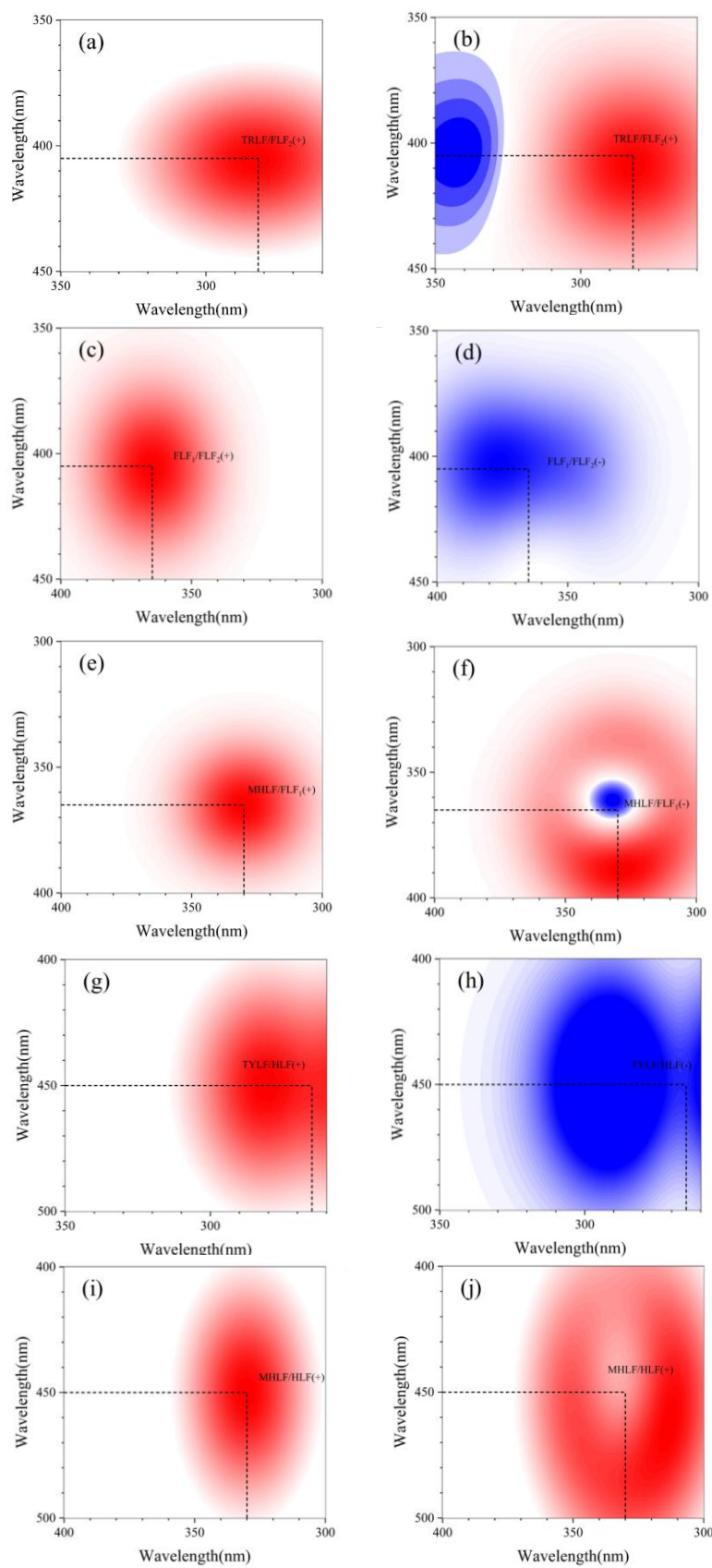


Fig. S3. Synchronous and asynchronous maps captured by 2D-SFS-COS of SOM fractions in the URA soil.

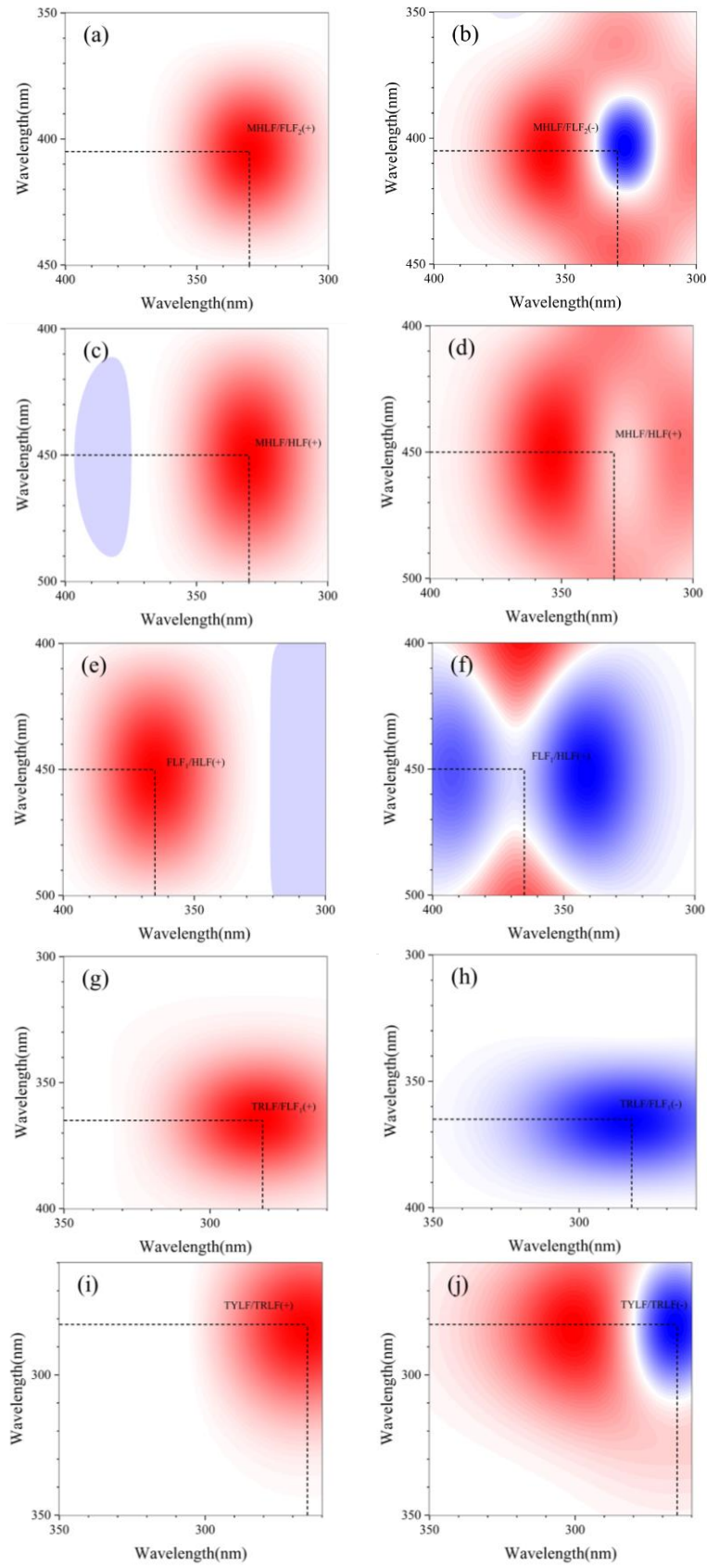


Fig. S4. Synchronous and asynchronous maps captured by 2D-SFS-COS of SOM fractions in the TOA soil.

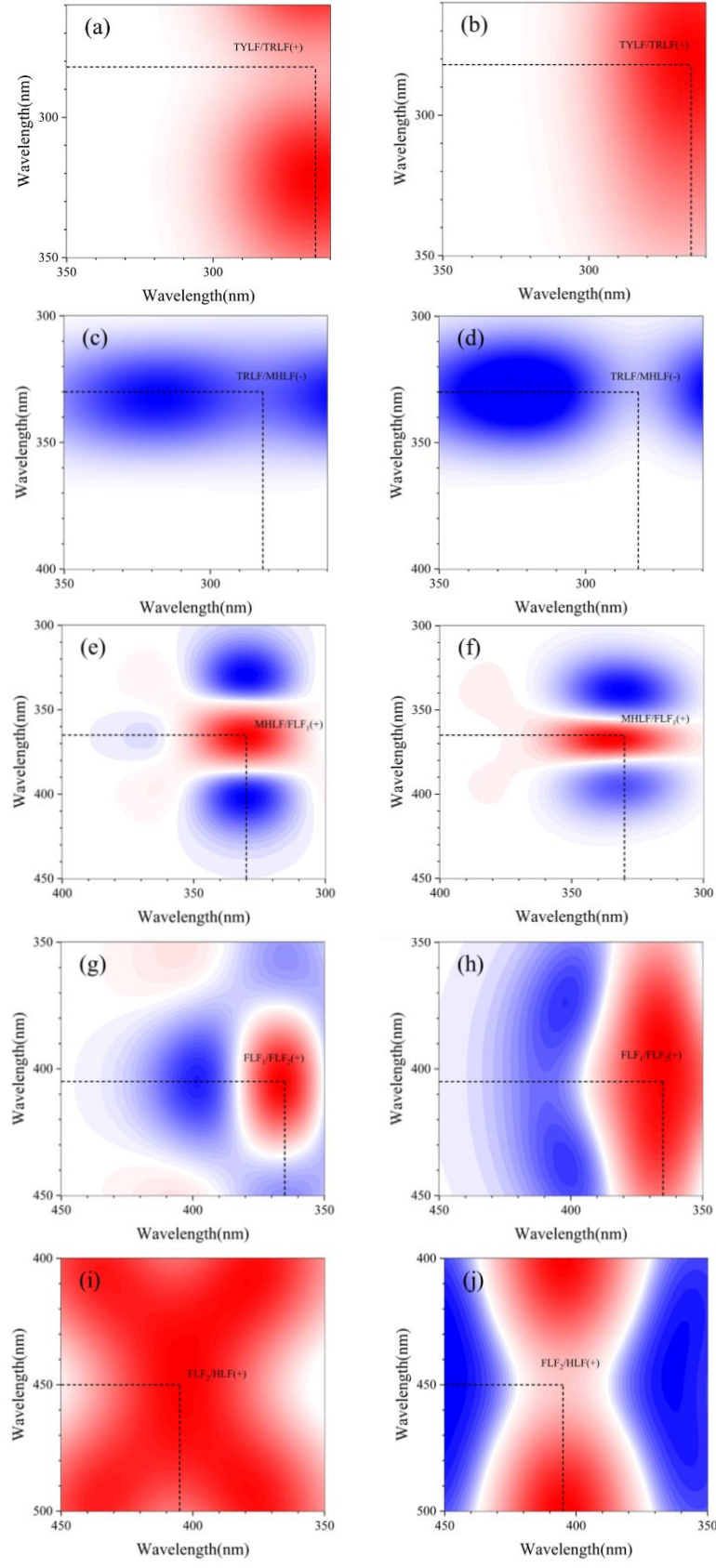


Fig. S5. Synchronous and asynchronous maps captured by 2D-SFS-COS of SOM fractions in the RUA soil.

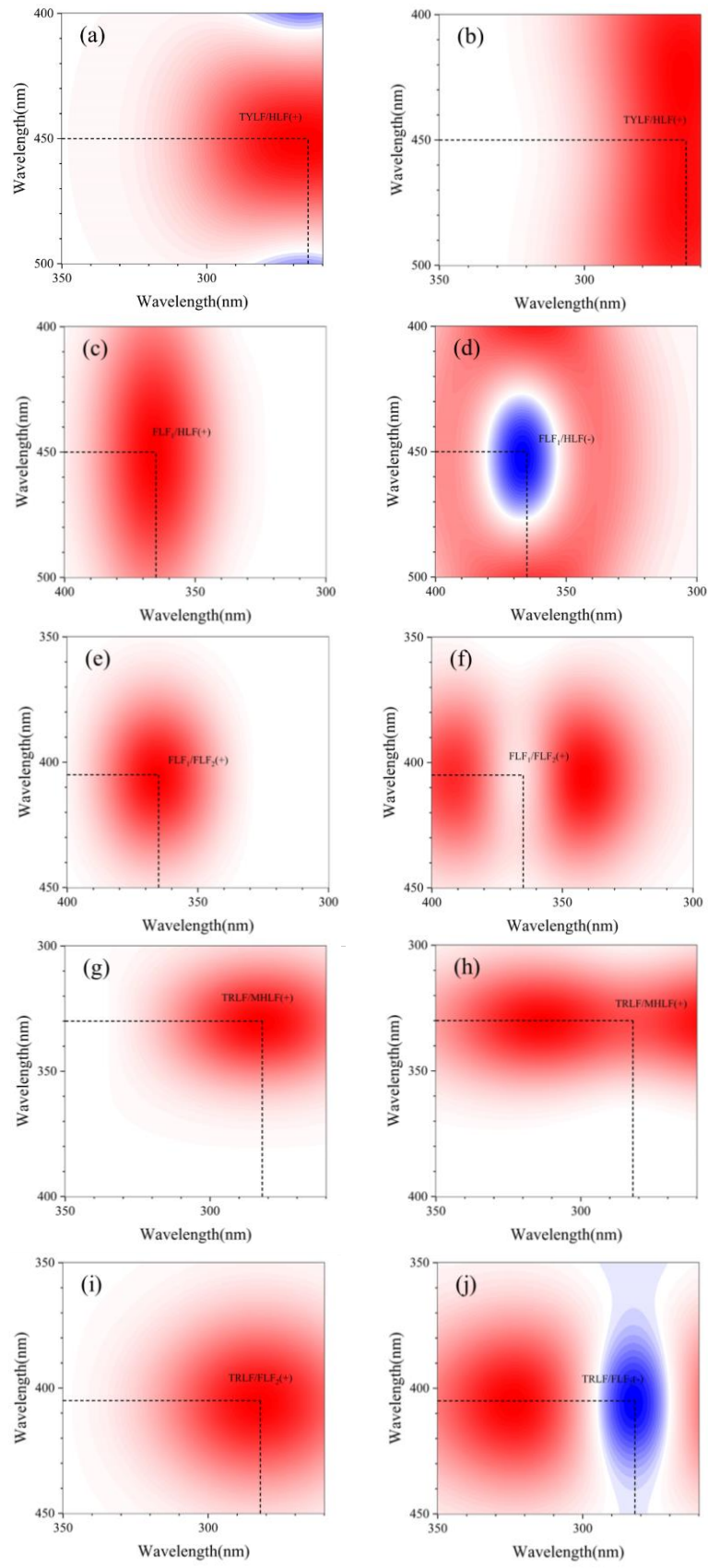


Fig. S6. Synchronous and asynchronous maps captured by 2D-SFS-COS of SOM fractions in the AGA soil.

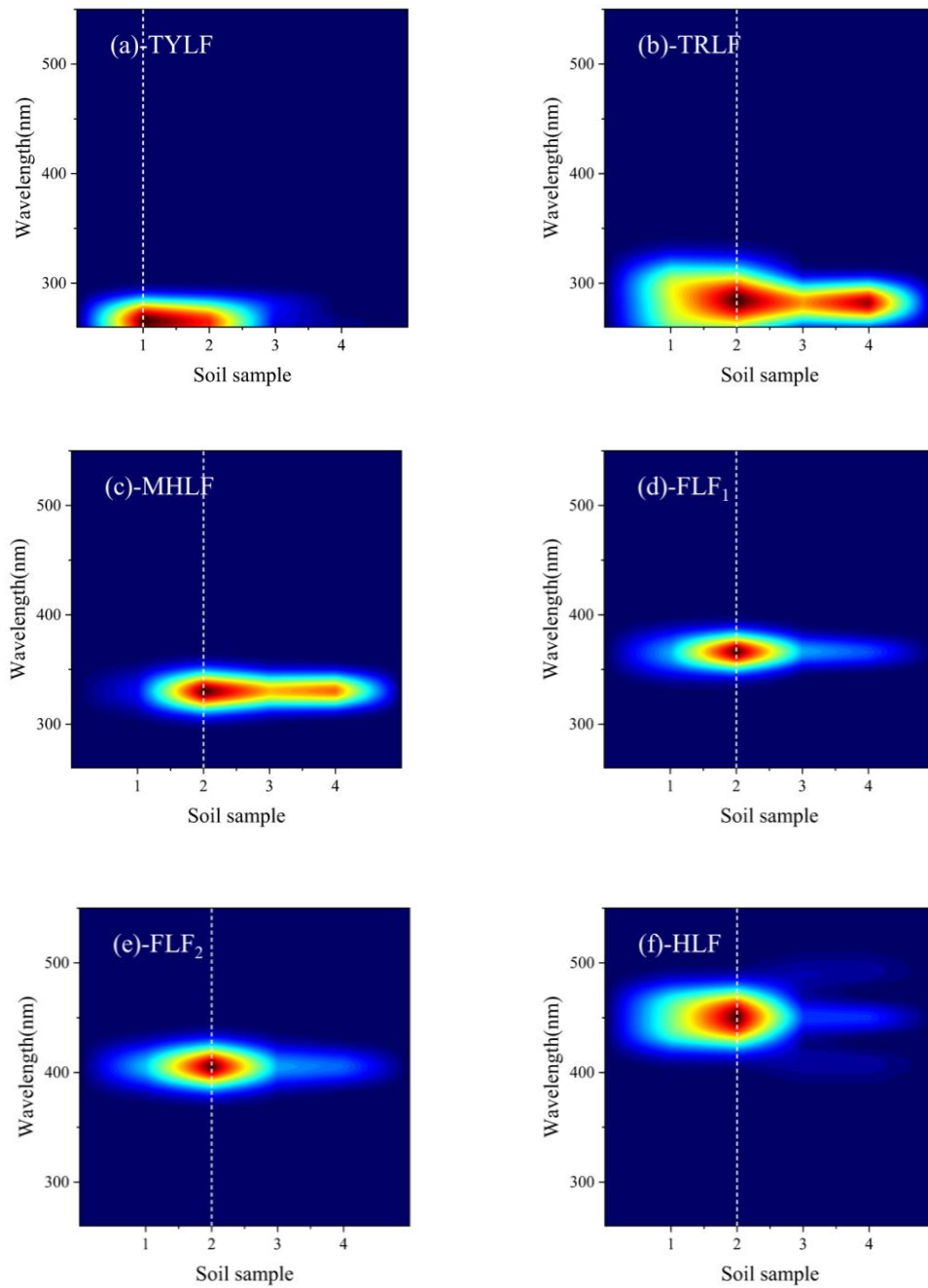


Fig. s7. MW-2D-SFS-COS maps of SOM in the INA soils. 1: 0-20 cm, 2: 20-40 cm, 3: 40-60 cm and 4: 60-80 cm.

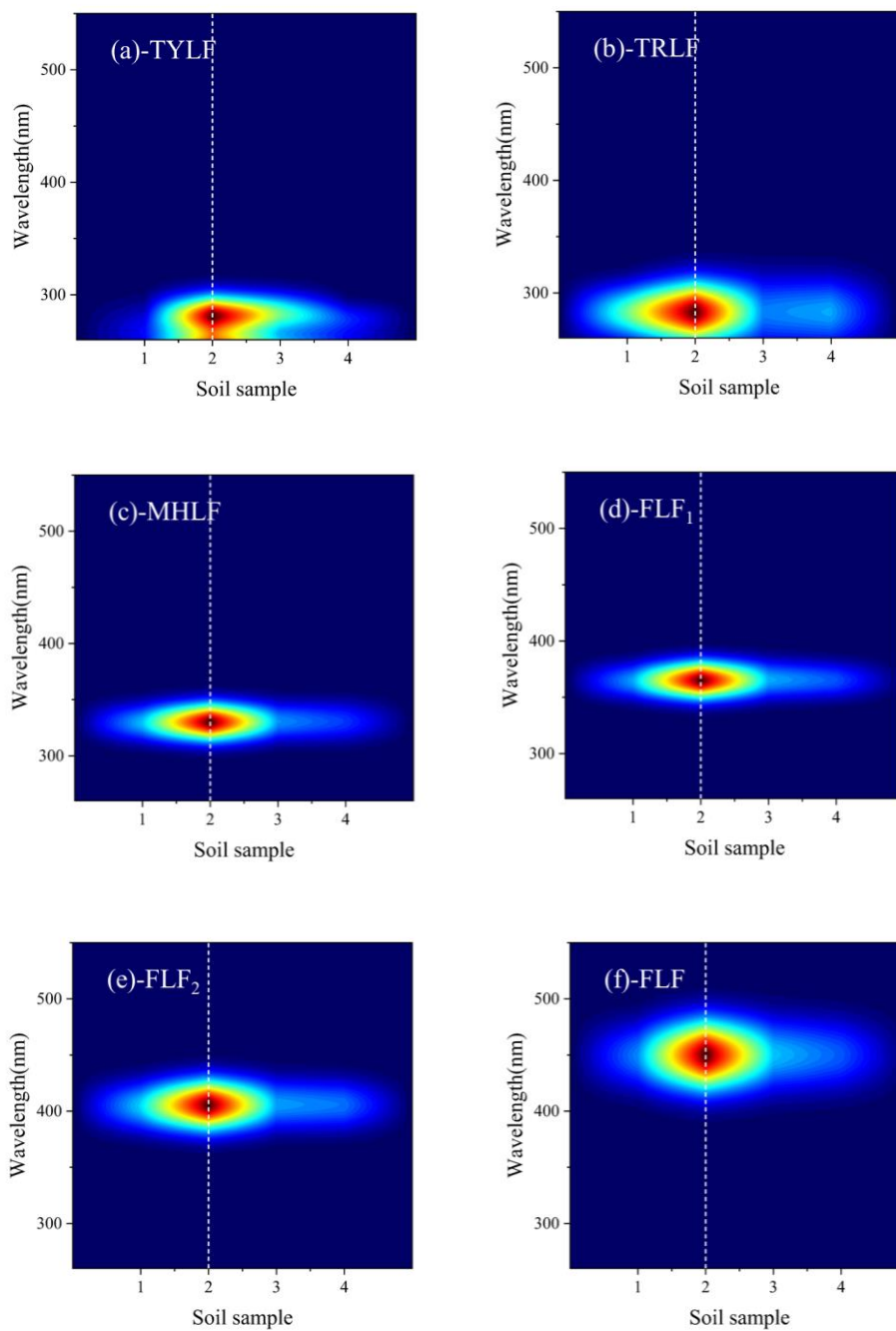


Fig. s8. MW-2D-SFS-COS maps of SOM in the URA soils. 1: 0-20 cm, 2: 20-40 cm, 3: 40-60 cm and 4: 60-80 cm.

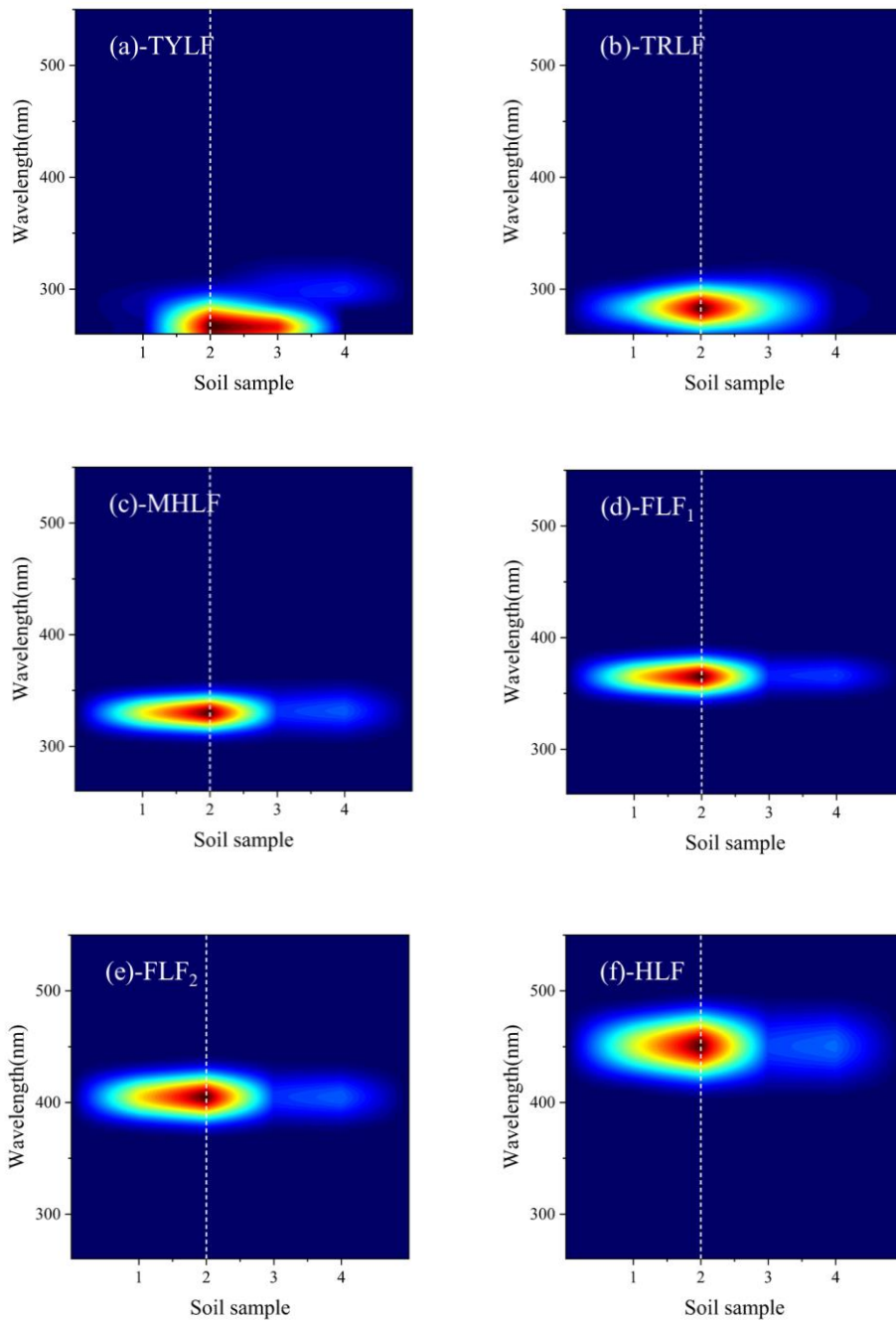


Fig. s9. MW-2D-SFS-COS maps of SOM in the TOA soils. 1: 0-20 cm, 2: 20-40 cm, 3: 40-60 cm and 4: 60-80 cm.

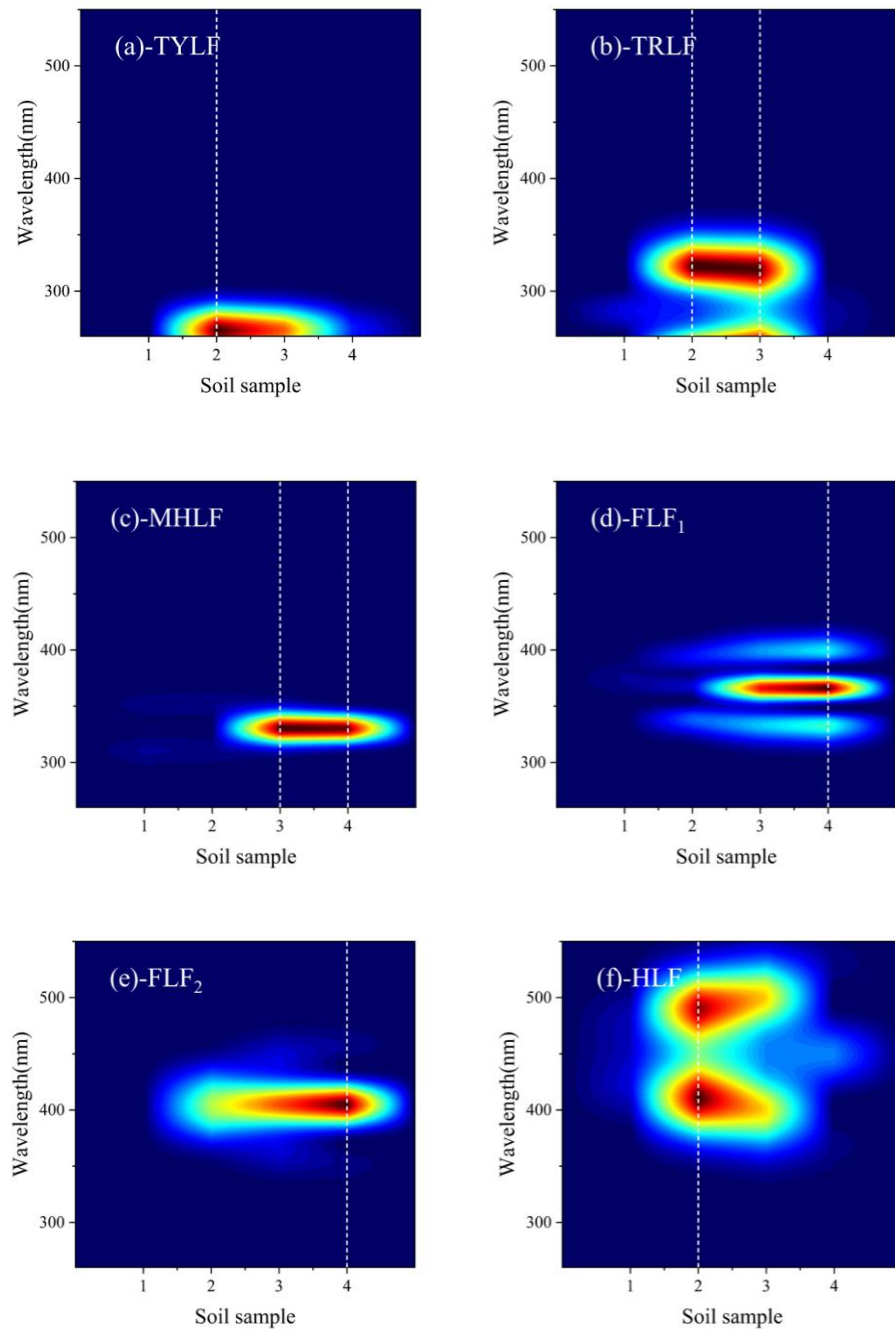


Fig. s10. MW-2D-SFS-COS maps of SOM in the RUA soils. 1: 0-20 cm, 2: 20-40 cm, 3: 40-60 cm and 4: 60-80 cm.

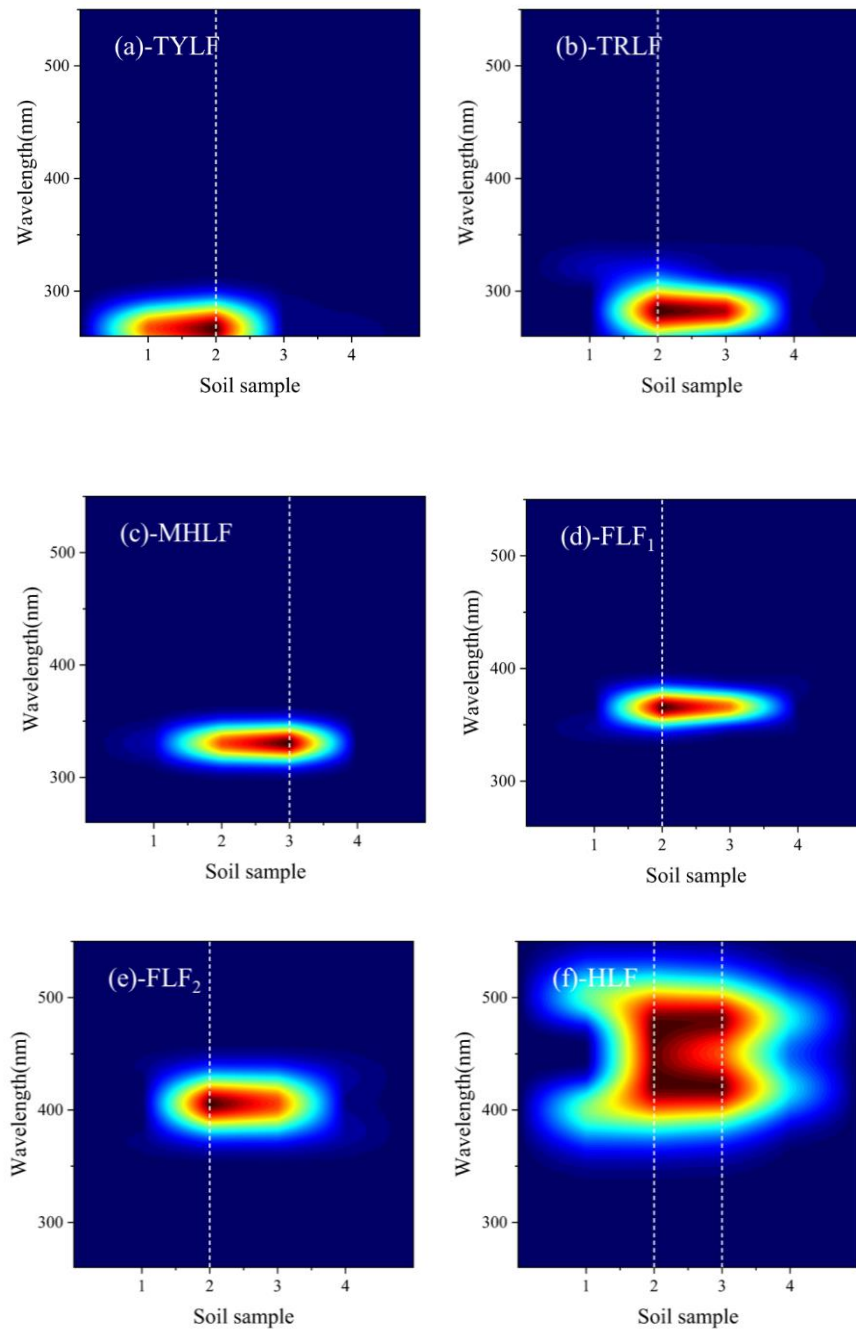


Fig. s11. MW-2D-SFS-COS maps of SOM in the AGA soils. 1: 0-20 cm, 2: 20-40 cm, 3: 40-60 cm and 4: 60-80 cm.

Table S1. BIX, P/H,H/F values of different soil profiles.

Soil sample	BIX	P/H	H/F
ECA1	1.007936	1.175912369	0.248583347
ECA2	1.134829	1.708591543	0.342887978
ECA3	1.02721	1.113740163	0.197273107
ECA4	0.877288	0.757645862	0.304315996
INA1	1.264682	2.355989922	0.2423695
INA2	1.105411	1.605271804	0.310852391
INA3	0.926164	1.126739998	0.300969163
INA4	0.935236	1.138275543	0.318348184
URA1	0.889505	0.886197683	0.312000176
URA2	0.896547	0.973826913	0.31282876
URA3	0.884167	1.261731017	0.331735347
URA4	0.878412	0.972730273	0.316961858
TOA1	0.787867	0.633436698	0.27635909
TOA2	0.8747	0.771031874	0.300253515
TOA3	0.916038	0.722828492	0.296379988
TOA4	0.787215	0.45568316	0.274651338
RUA1	0.870295	0.865109546	0.249312832
RUA2	0.846928	0.766895314	0.249423609
RUA3	0.84725	1.058935132	0.269694033
RUA4	0.973471	1.124968314	0.262969229
AGA1	0.828744	0.727416573	0.267452743
AGA2	0.752368	0.546596699	0.273722038
AGA3	0.92352	0.877601533	0.283906041
AGA4	0.802689	0.627187452	0.329218121