Supporting Information for

Physics-Constrained Transfer Learning with a Spectral-Fidelity-Preserving Model for Satellite Remote Sensing Applications

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Table S1. Fitted coefficients, correlation coefficient and fitting residuals from FY-4B/AGRI to FY-4A/AGRI under the SFP model Framework.

Source_CH	Target_CH	Coeff_1	Coeef_2	Coeef_3	R	σ
FY4B_CH01	FY4A_CH01	0.98319	\	-0.21577	0.99999	0.30834
FY4B_CH02	FY4A_CH02	0.99994	\	-0.40578	0.99993	0.85746
FY4B_CH03	FY4A_CH03	1.00473	\	-1.62146	0.99940	1.92999
FY4B_CH04	FY4A_CH04	1.00887	\	0.09289	0.99984	0.10859
FY4B_CH05	FY4A_CH05	0.99335	\	0.05335	0.99998	0.04495
FY4B_CH06	FY4A_CH06	1.00006	\	-0.00527	0.99998	0.00981
FY4B_CH07	FY4A_CH07	1.03227	\	-0.00501	0.99775	0.00837
FY4B_CH09	FY4A_CH09	1.07933	\	0.01172	0.99858	0.00955
FY4B_CH10	FY4A_CH10	1.34361	\	0.00397	0.98106	0.08561
FY4B_CH12	FY4A_CH11	0.99529	\	0.04351	0.99988	0.02654
FY4B_CH13	FY4A_CH12	1.04527	\	0.81470	0.99729	0.12875
FY4B_CH14	FY4A_CH13	0.99720	\	0.07148	0.99996	0.01239
FY4B_CH15	FY4A_CH14	0.27439	0.06364	1.26143	0.97563	0.15720

Note: There is a significant difference in the central wavelengths between FY-4B channel 15 and FY-4A channel 14; therefore, higher-order conversion was employed. R and σ denote the correlation coefficient and fitting residuals, respectively.

Table S2. The Planck-weighted correction coefficients of FY-4/AGRI infrared channels.

Channel	Central_WL, μm	WN, cm^{-1}	Slope	Intercept
FY4A_CH07	3.750	2692.112	0.9963	2.6646
FY4A_CH09	6.250	1605.977	0.9932	3.1676
FY4A_CH10	7.100	1406.354	0.9988	0.5211
FY4A_CH11	8.500	1165.628	0.9967	1.1530
FY4A_CH12	10.700	923.872	0.9985	0.4470
FY4A_CH13	12.000	829.354	0.9987	0.3509
FY4A_CH14	13.500	738.288	0.9998	0.0529
FY4B_CH07	3.750	2697.713	0.9959	3.3928
FY4B_CH09	6.250	1613.826	0.9949	2.3641
FY4B_CH10	6.950	1443.641	0.9992	0.3555
FY4B_CH12	8.550	1168.197	0.9992	0.2808
FY4B_CH13	10.800	927.755	0.9989	0.3269
FY4B_CH14	12.000	837.692	0.9985	0.4104
FY4B_CH15	13.300	756.239	0.9977	0.5735

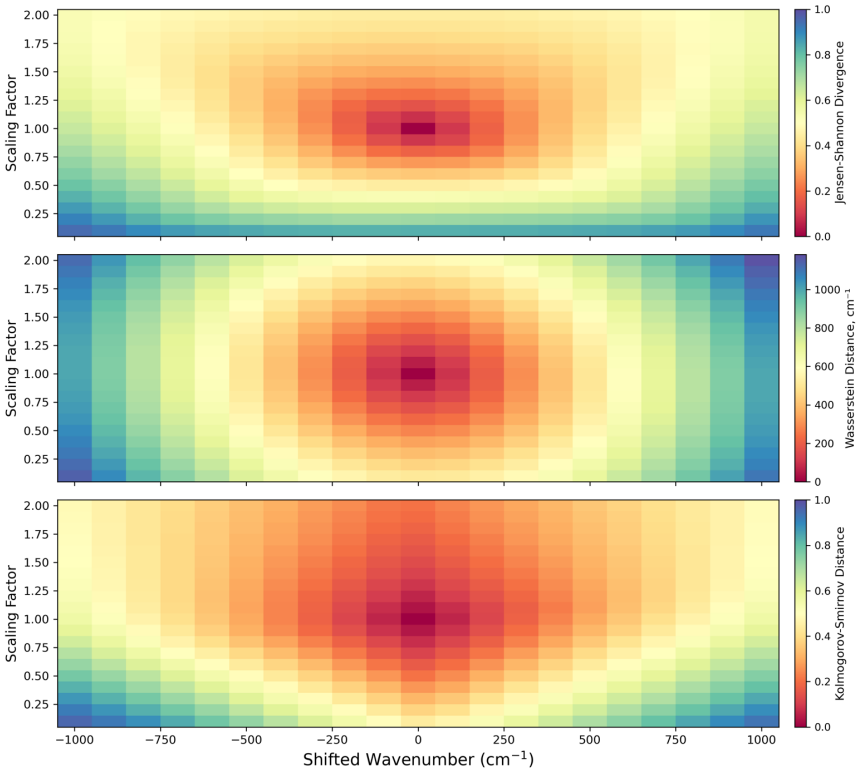

Figure S1. Same as Figure 5, but for the FY-4B/AGRI Channel 1 at 0.47 μm.

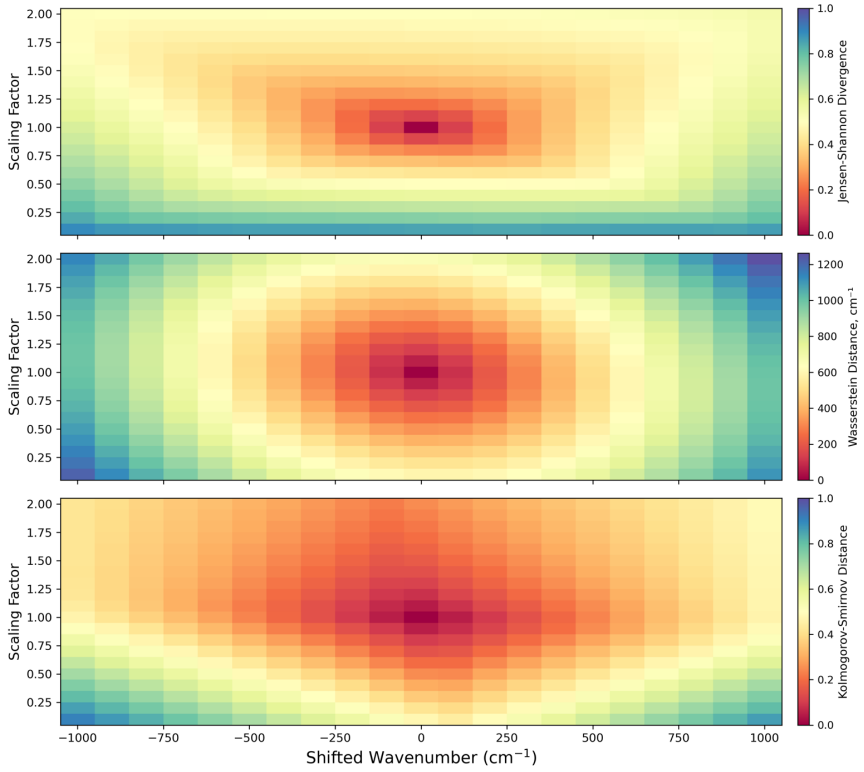

Figure S2. Same as Figure 5, but for the FY-4B/AGRI Channel 3 at 0.86 μm.

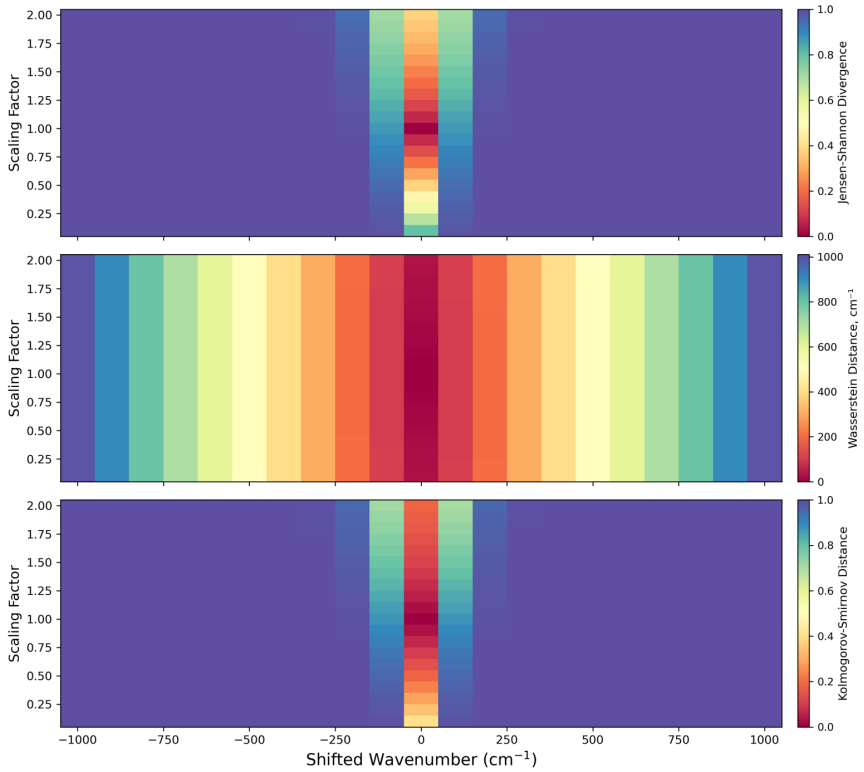

Figure S3. Same as Figure 5, but for the FY-4B/AGRI Channel 4 at 1.38 μm.

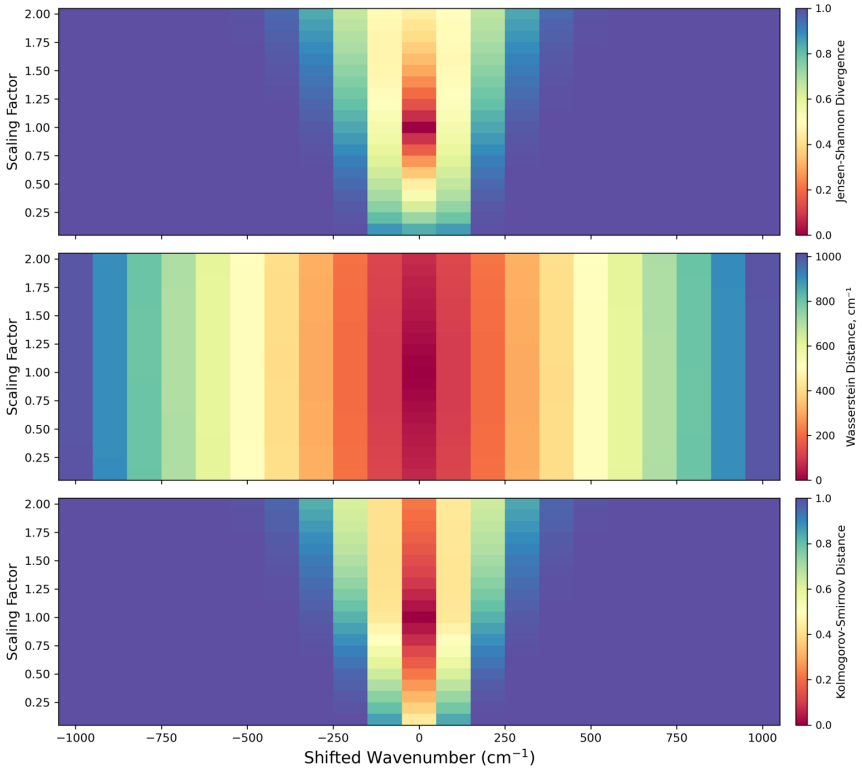

Figure S4. Same as Figure 5, but for the FY-4B/AGRI Channel 5 at 1.61 μm.

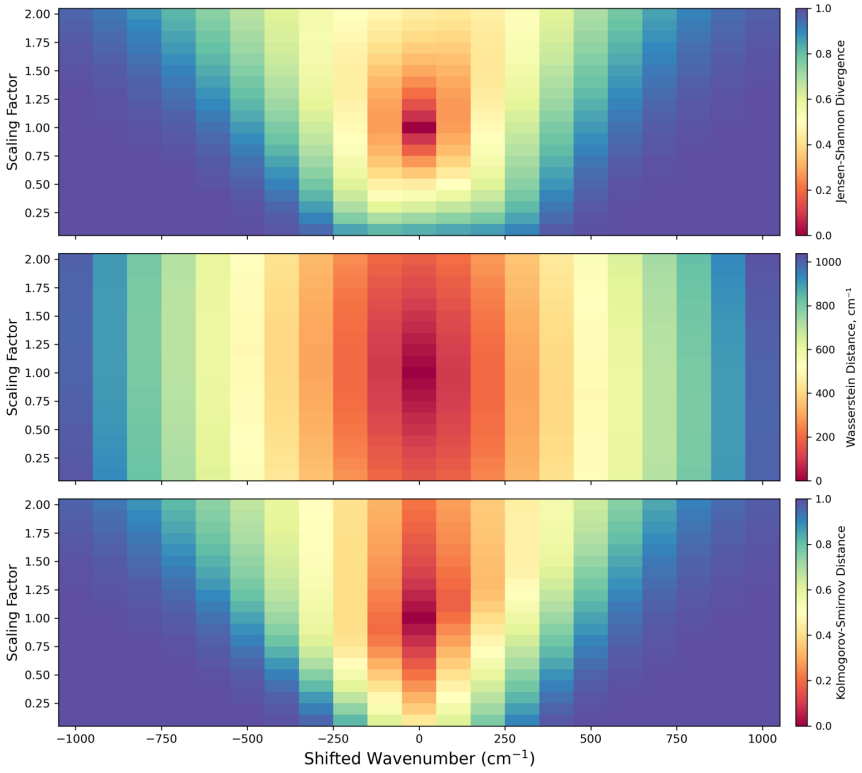

Figure S5. Same as Figure 5, but for the FY-4B/AGRI Channel 6 at 2.25 μm.

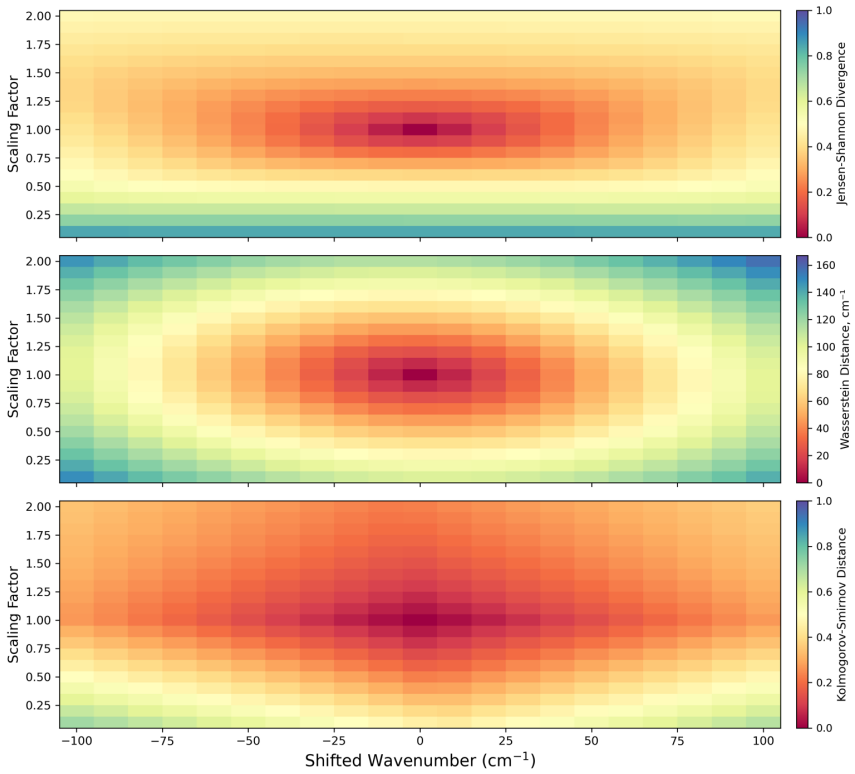

Figure S6. Same as Figure 6, but for the FY-4B/AGRI Channel 7 at 3.75 μm.

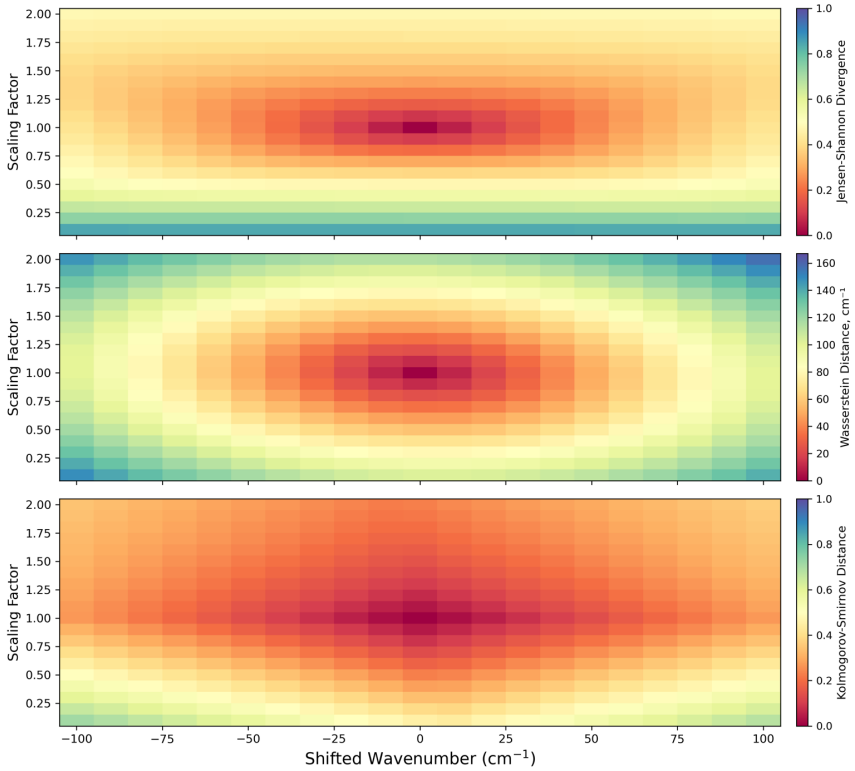

Figure S7. Same as Figure 6, but for the FY-4B/AGRI Channel 8 at 6.25 μm.

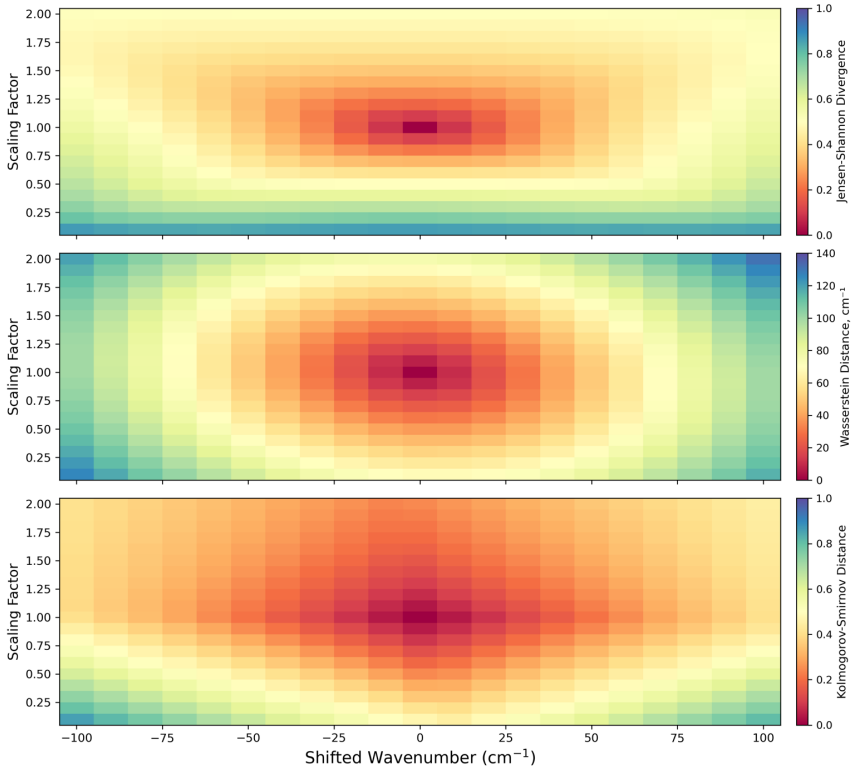

Figure S8. Same as Figure 6, but for the FY-4B/AGRI Channel 9 at 7.10 μm.

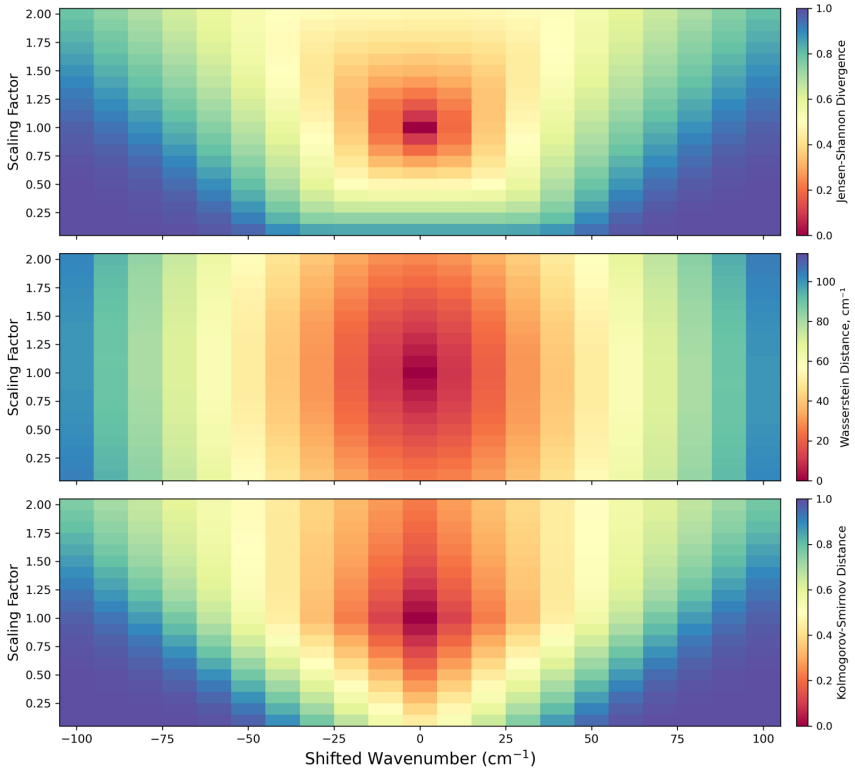

Figure S9. Same as Figure 6, but for the FY-4B/AGRI Channel 10 at 8.60 μm.

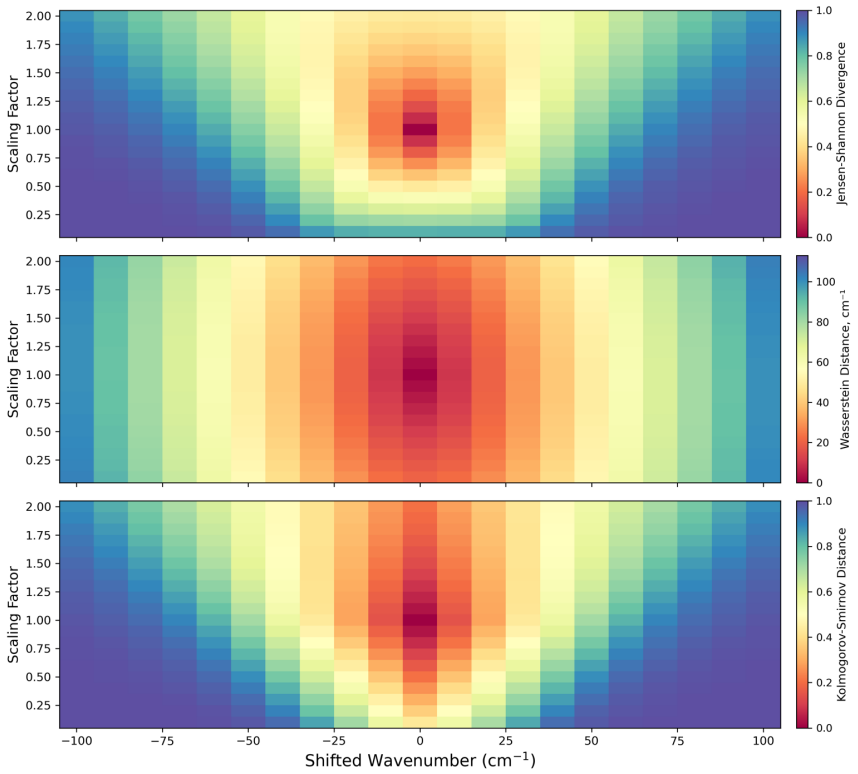

Figure S10. Same as Figure 6, but for the FY-4B/AGRI Channel 11 at 7.42 μm.

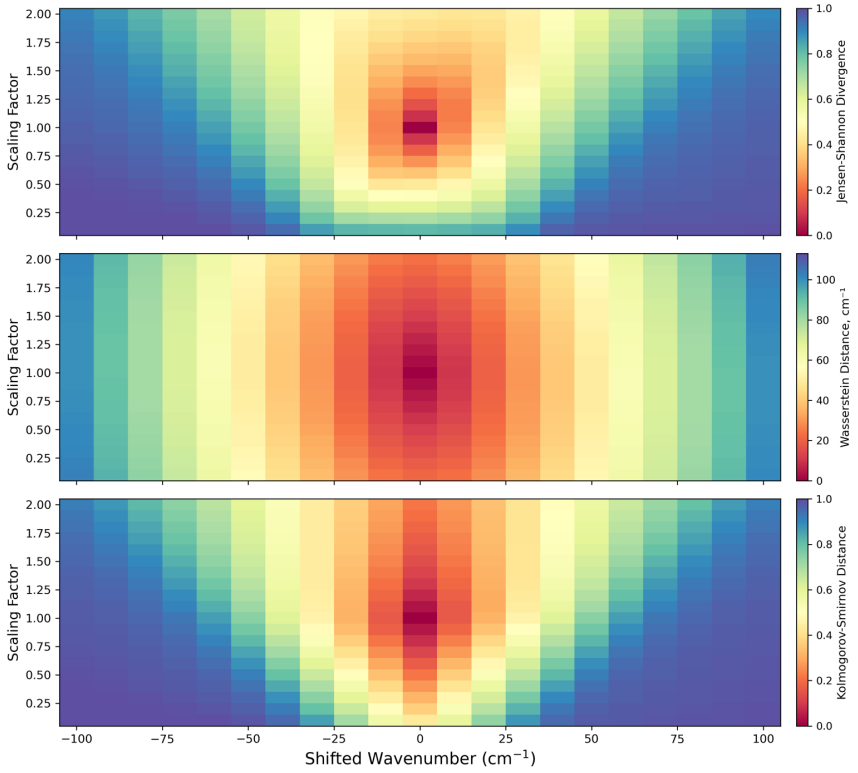

Figure S11. Same as Figure 6, but for the FY-4B/AGRI Channel 12 at 8.55 μm.

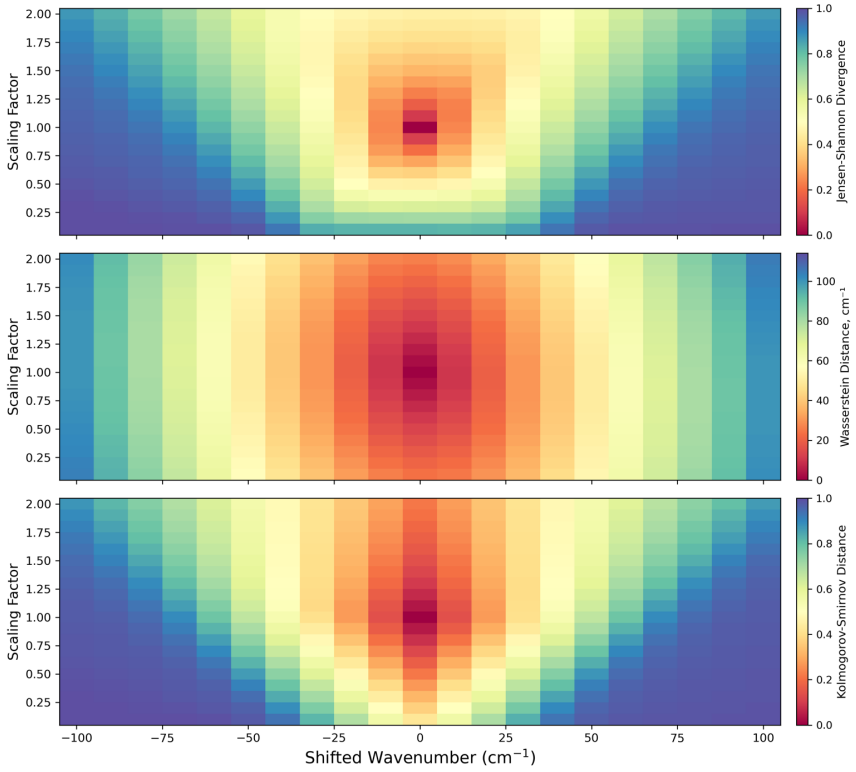

Figure S12. Same as Figure 6, but for the FY-4B/AGRI Channel 14 at 12.00 μm.

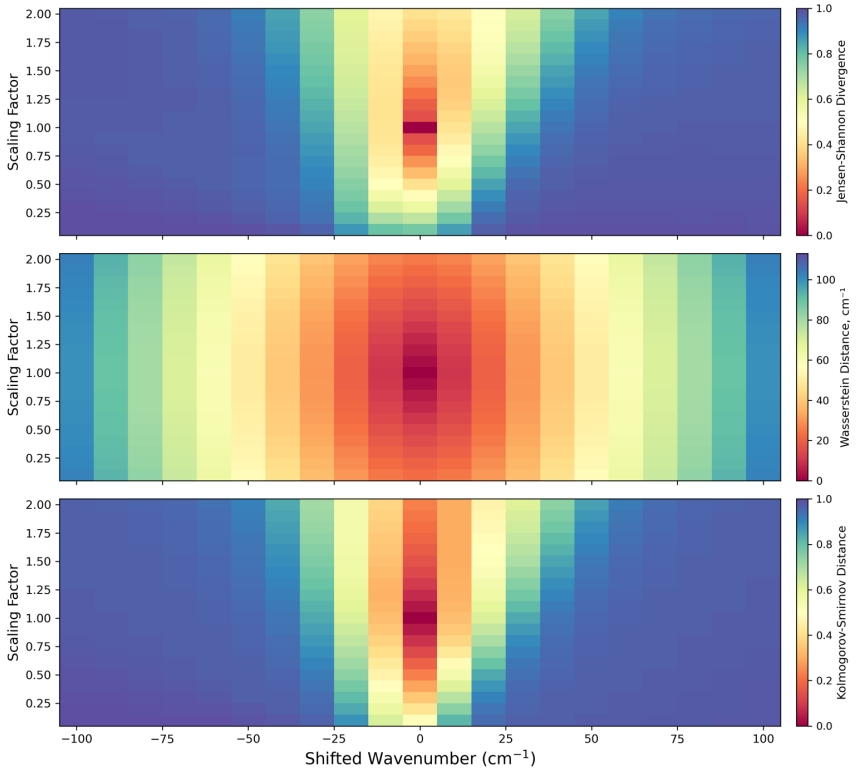

Figure S13. Same as Figure 6, but for the FY-4B/AGRI Channel 15 at 13.30 μm.