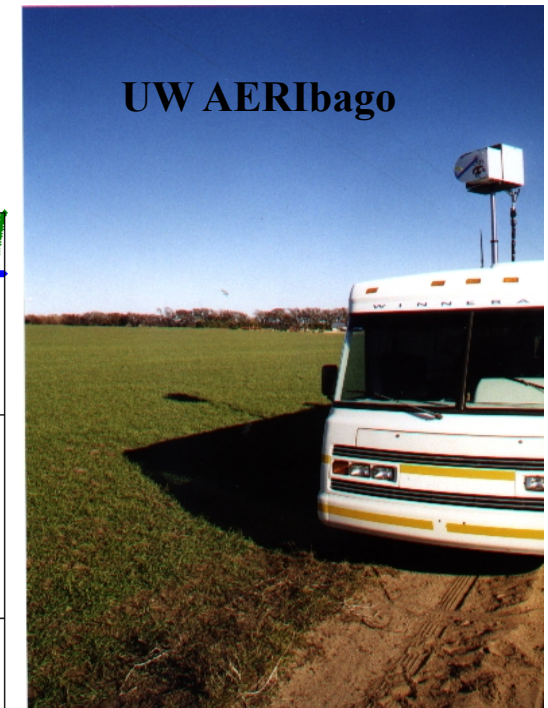
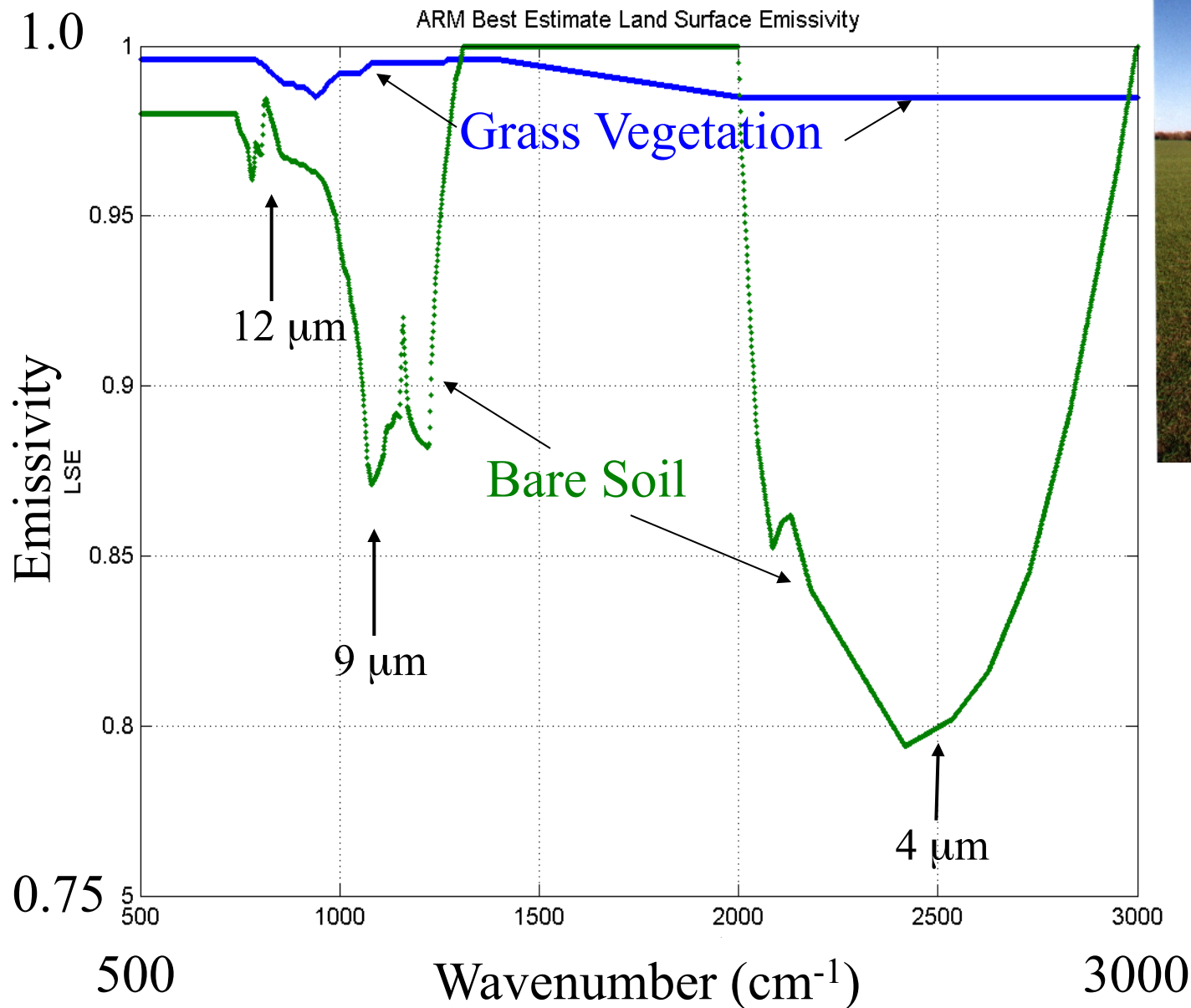


Become “spectrally aware” !

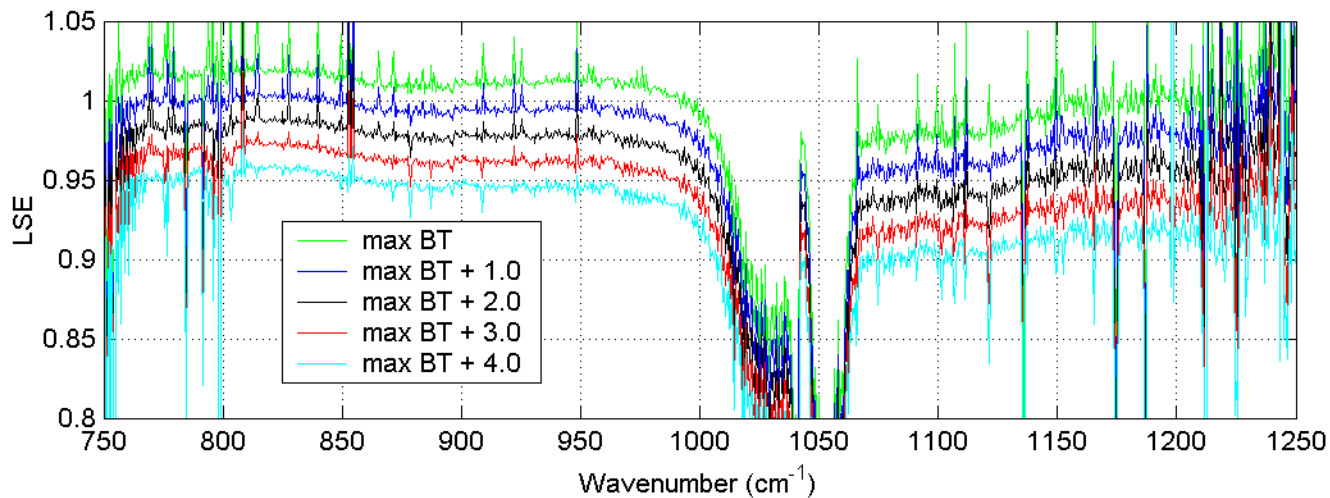
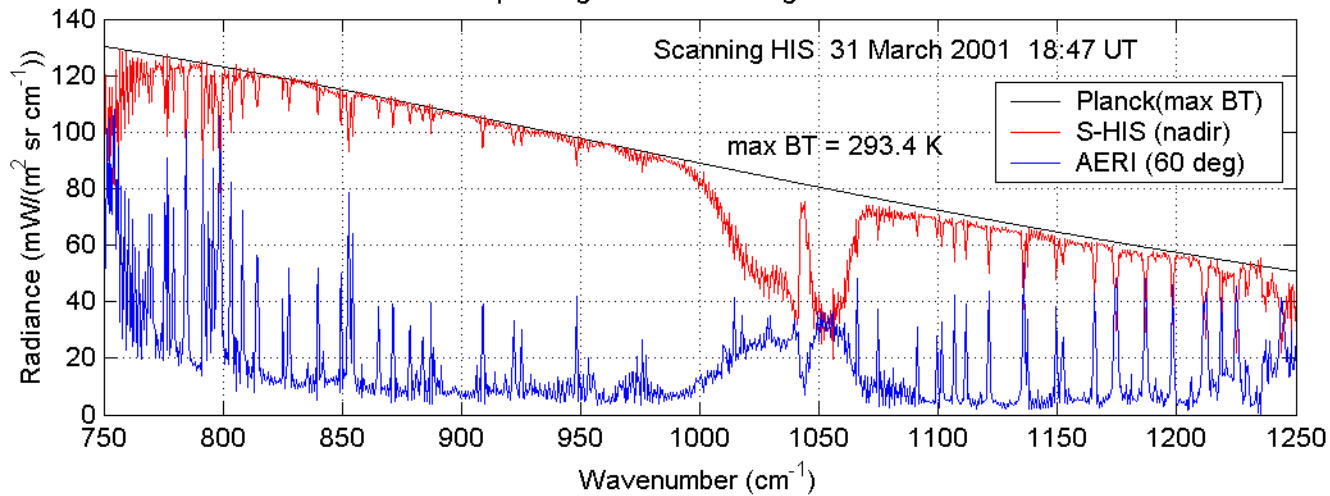


- ARM SGP site is dominated by two land cover types “grass vegetation” and “bare soil”.
- U. of Wisconsin measured the IR emissivity at high spectral resolution.

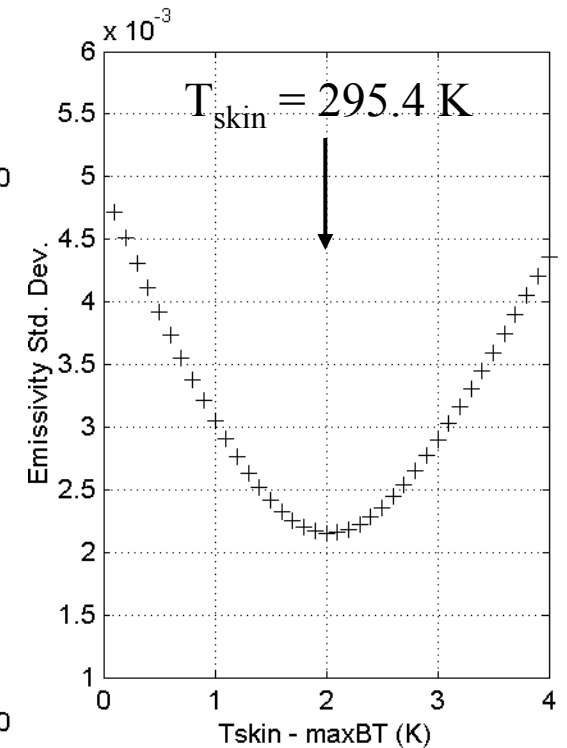
Validation Case Study: Southern Great Plains Site

S-HIS Observation

Upwelling and Downwelling Radiance



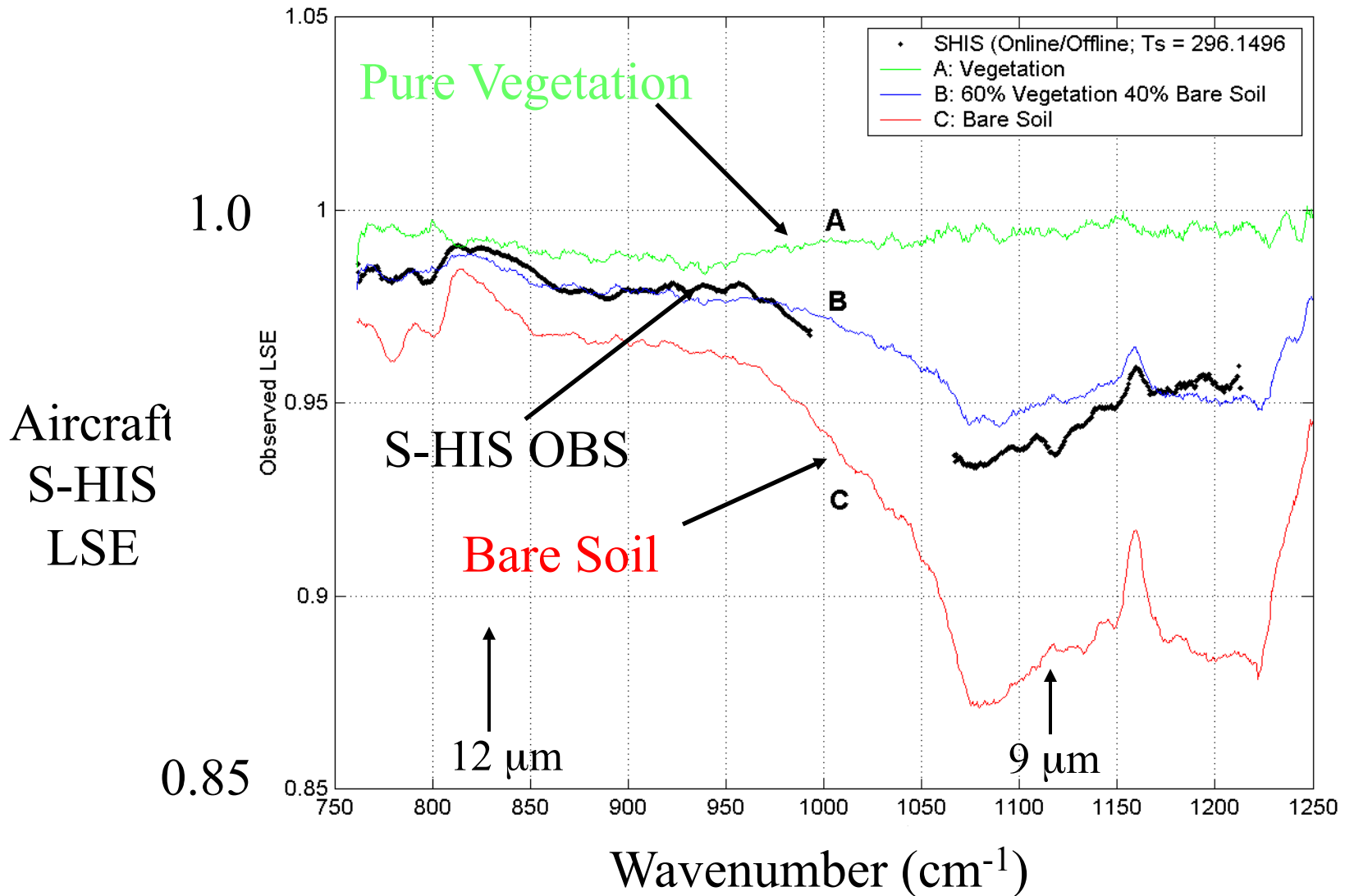
$$e_v = \frac{(N_v^{obs\uparrow} - N_v^{atm\uparrow}) / \tau_v^{tot} - \bar{N}_v^\downarrow}{B_v(T_S) - \bar{N}_v^\downarrow}$$



- Best fit to T_{skin} when spectral variance in emissivity is minimum.

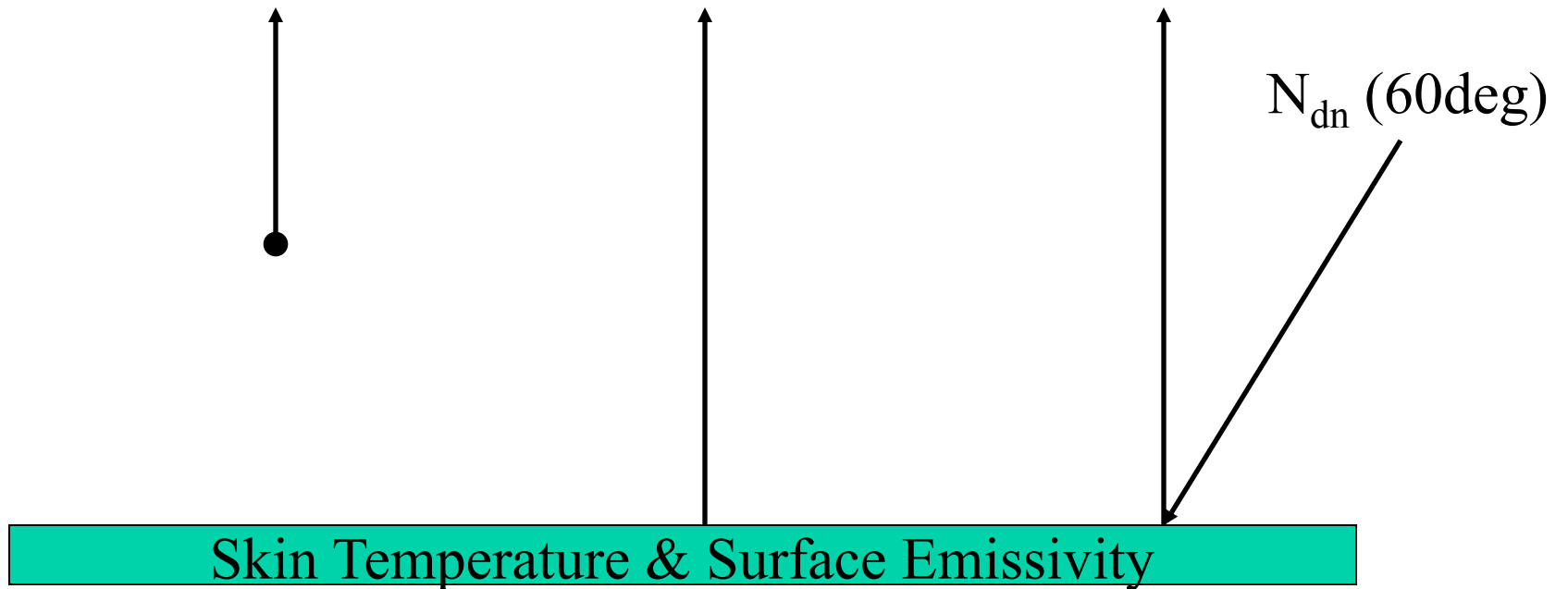


Aircraft validation measurements are consistent with a linear combination of vegetation and bare soil.



Infrared Radiative Transfer Equation (lambertian surface)

$$N_v^\uparrow = \underbrace{\int B_v(T(P))d\tau_v}_{N_v^{atm\uparrow}} + \underbrace{\tau_v^{tot} \cdot e_v \cdot B_v(T_S)}_{\text{Surface Emission}} + \underbrace{\tau_v^{tot} \cdot (1 - e_v)}_{\text{Surface Reflection}} \cdot \bar{N}_v^\downarrow$$

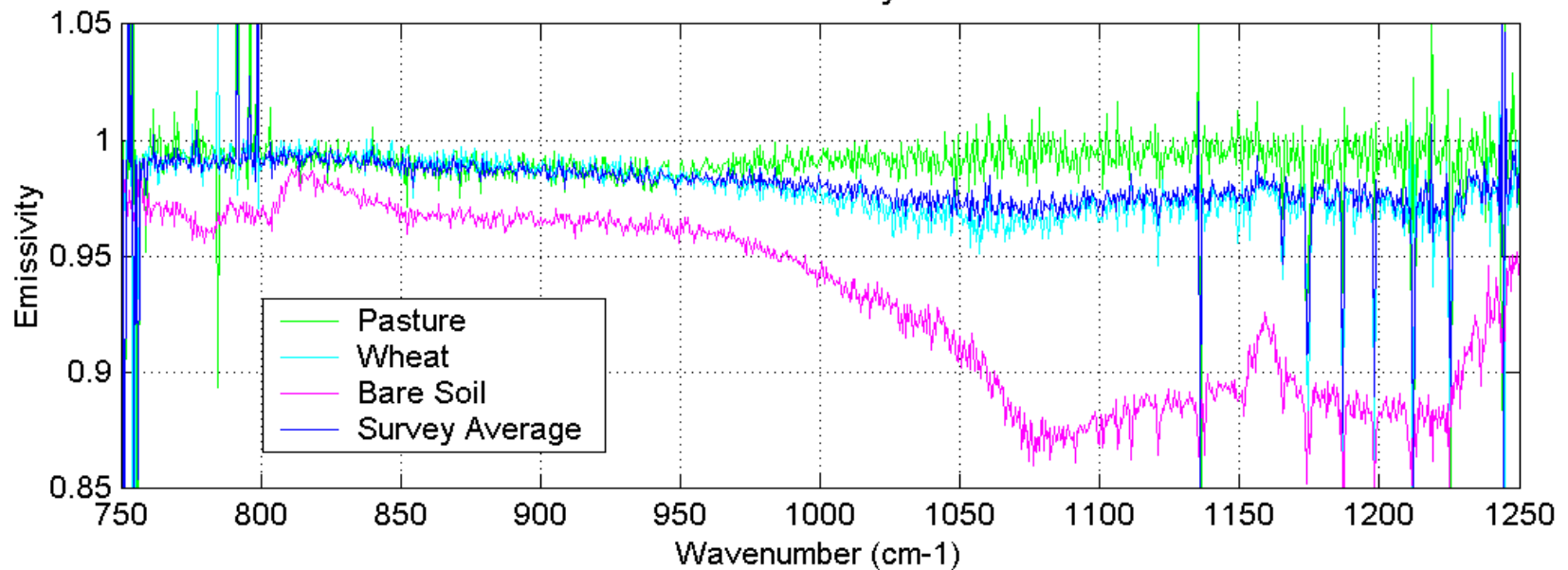


Emissivity Survey

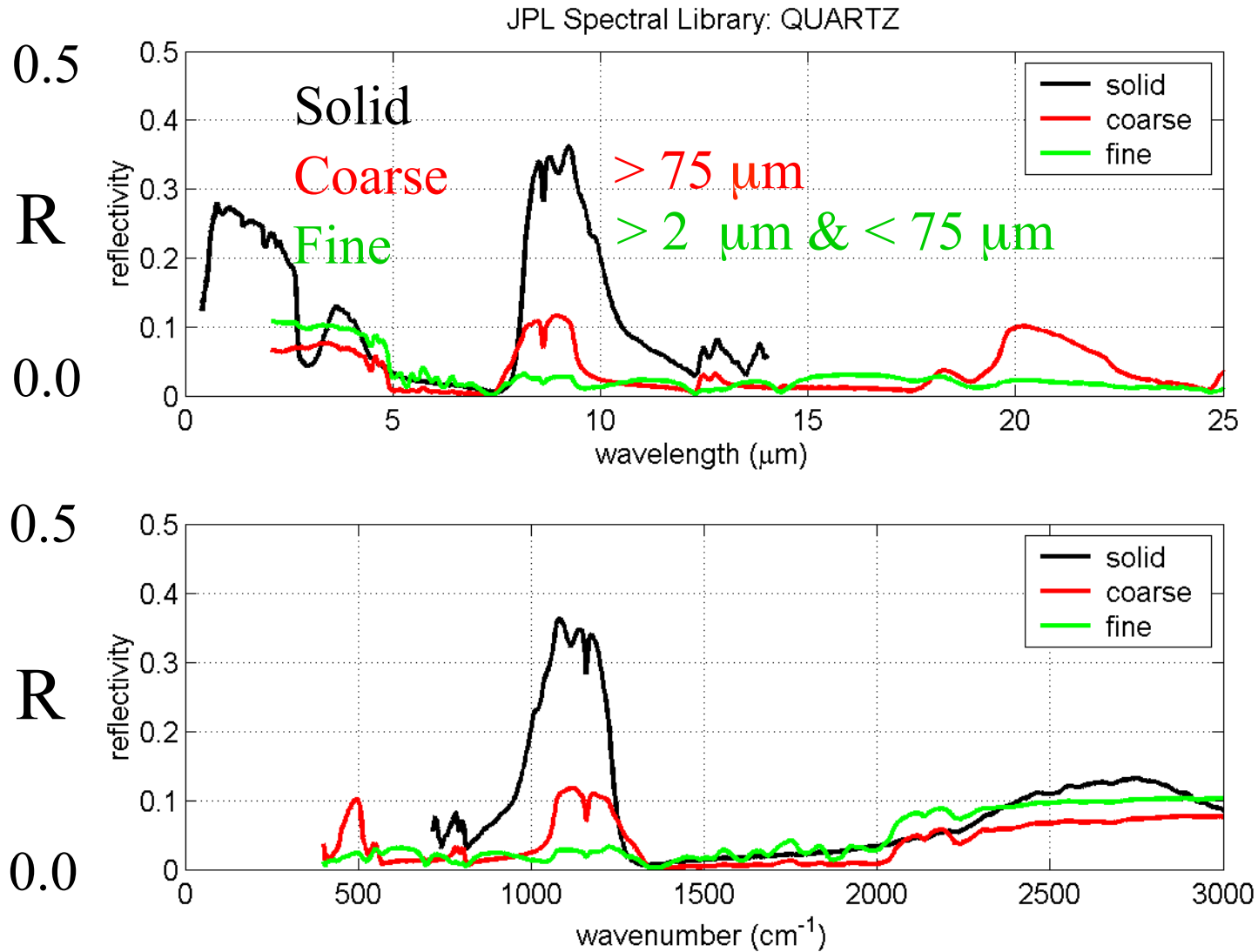
- ARM SGP site is dominated by two land cover types “pasture” and “wheat”.
- Notice that the measured wheat field emissivity can be approximated by a linear combination of pure scene types; bare soil and grass.



S-AERI Surface Emissivity Measurements

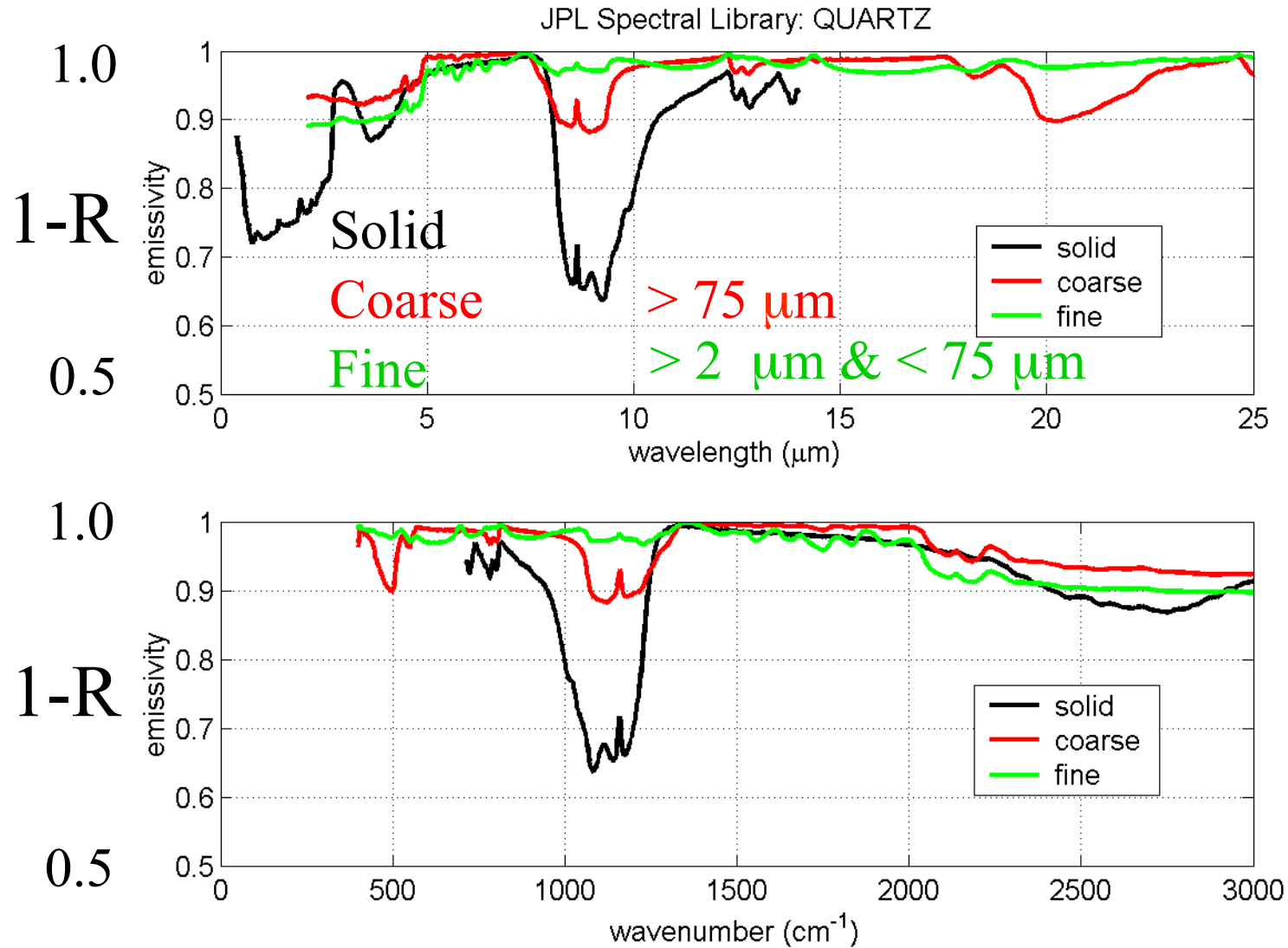


IR Land Surface Signatures: QUARTZ



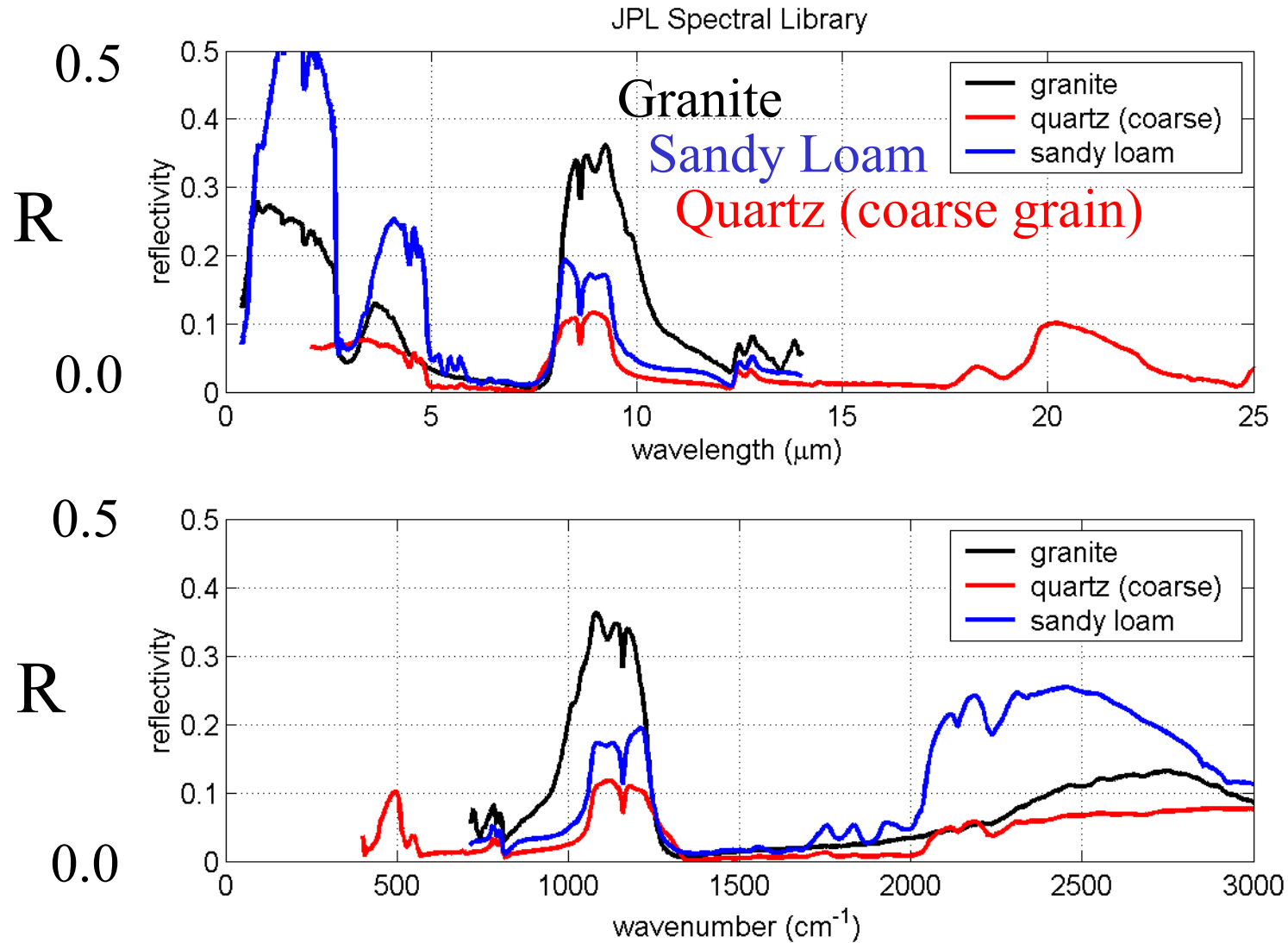
- QUARTZ Reflectivity (JPL Spectral Library from Lab Tests).

IR Land Surface Signatures: QUARTZ



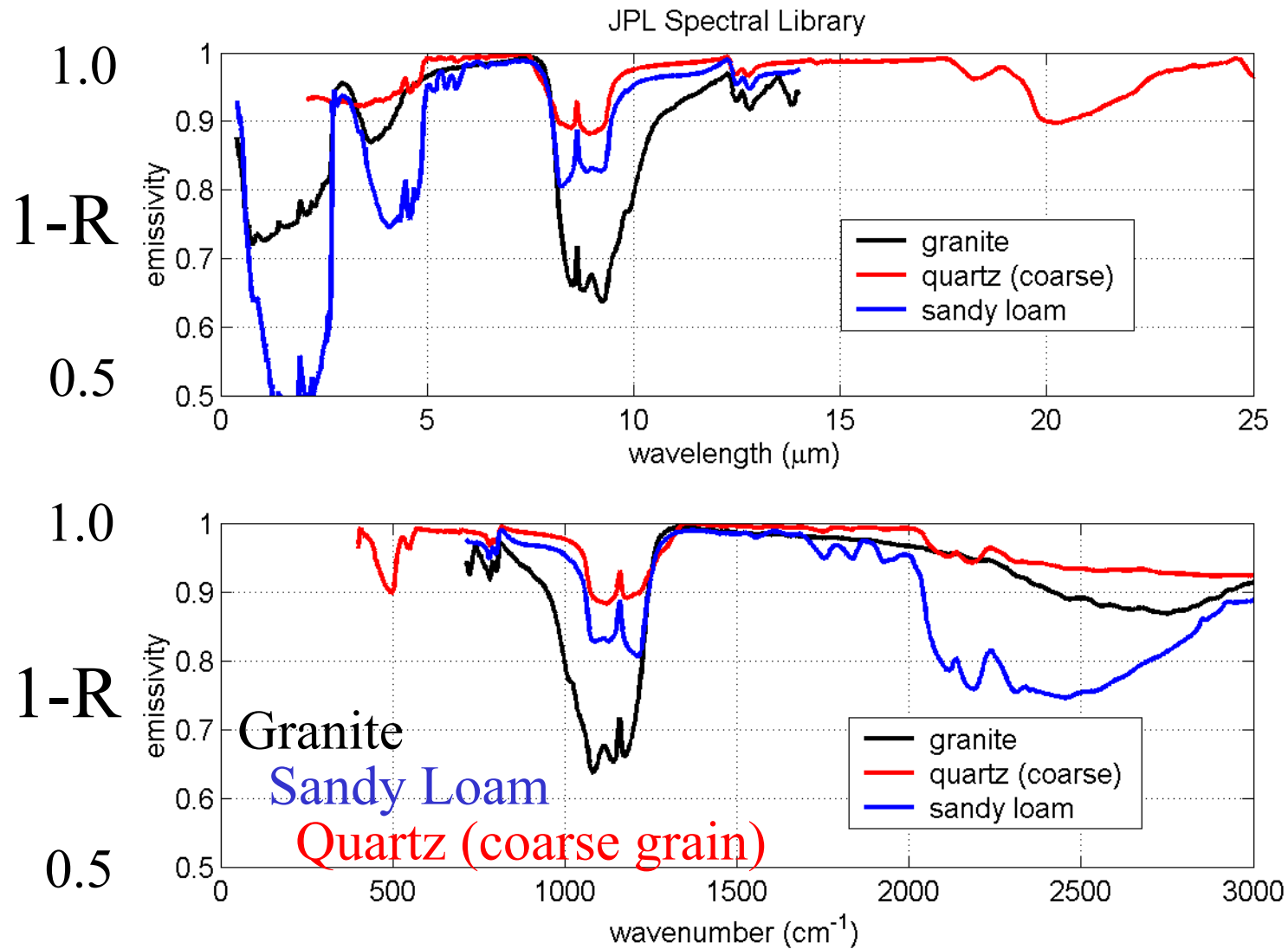
- QUARTZ Emissivity (JPL Spectral Library from Lab Tests).

IR Land Surface Signatures: JPL Library



- QUARTZ **Emissivity** (JPL Spectral Library from Lab Tests).

IR Land Surface Signatures: JPL Library



- QUARTZ Emissivity (JPL Spectral Library from Lab Tests).