Surface Spectral Albedo VAP

A Tale of Fact, Speculation, and Fiction

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Data used:

- **E13 and C1 MFRSR for downwelling**
- **E13 10m MFR and Tower 25m MFR for upwelling**
- **BEFlux and 25m broadband SW**
  - **Used for QC**
  - **Broadband reference for continuity**

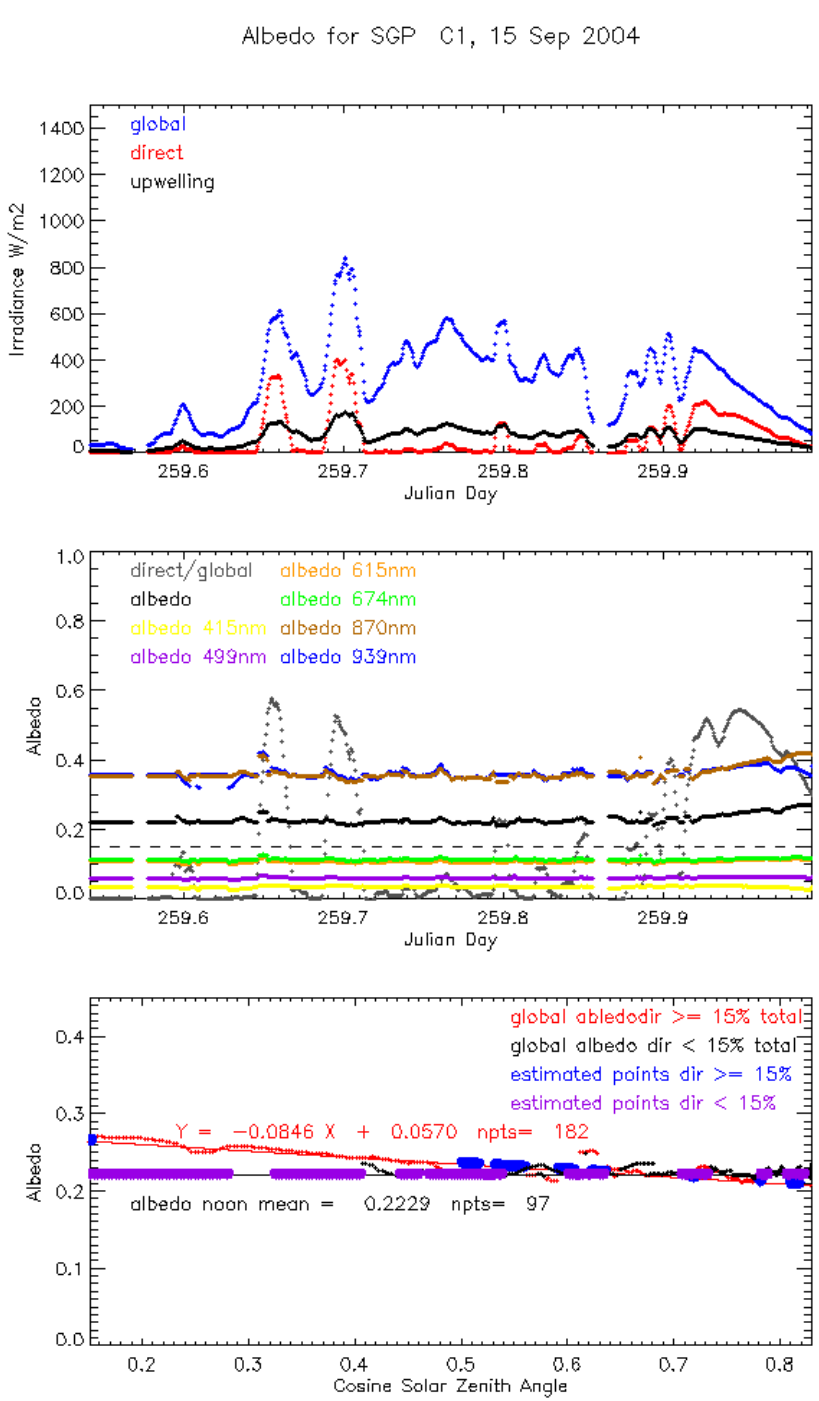
Data Used

Methodology: Irradiances

- **Quality assess upwelling and downwelling broadband and spectral irradiance values (Gaustad and Long, 2006).**
- **Missing irradiance values are filled by:**
  - **Calculate average ratio of nearby ‘good’ irradiances to appropriate broadband irradiance reference.**
  - **Use resultant ratio and reference broadband to estimate missing values.**

Methodology: Albedos

- **Calculate broadband and spectral albedos of data passing all testing.**
- **Estimate the albedo of all remaining samples using the relationship of albedo to cosine solar zenith angle separated as to whether the ratio of direct to total irradiance is less than or greater than 15%.**



Diffuse versus Direct Albedo

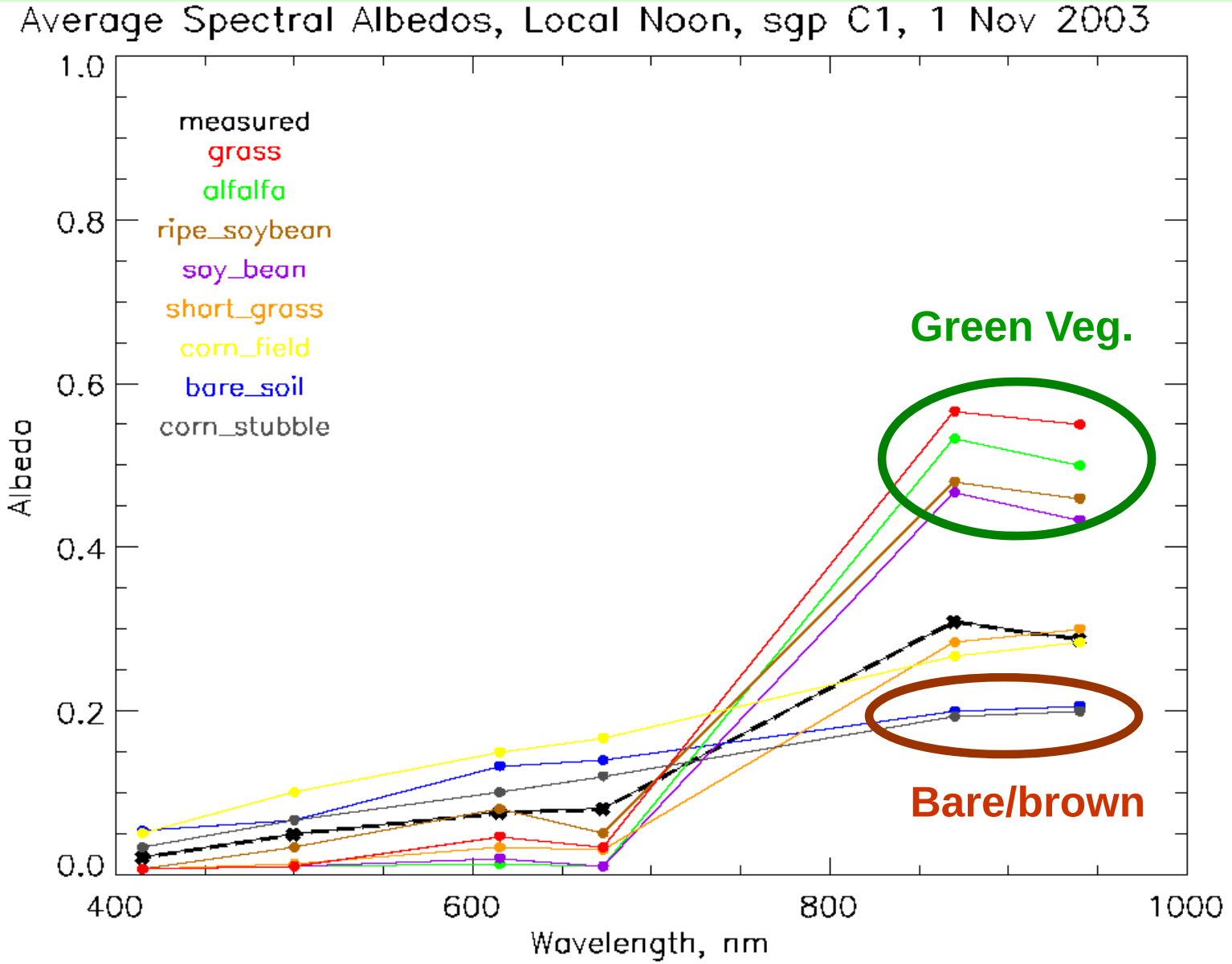
Current status

- **Evaluation Product is available from Archive**
  - **sgpsurfspecalb1mlawerC1.c1**
- **Albedo as weighted average (BBHRP) (2*mfr10m_alb+mfr25m_alb)/3**
- **Output consists of the best estimate irradiance and weighted surface albedo values, plus the QC’d MFRSR down, MFR up, and BEFlux VAP irradiances used as input**

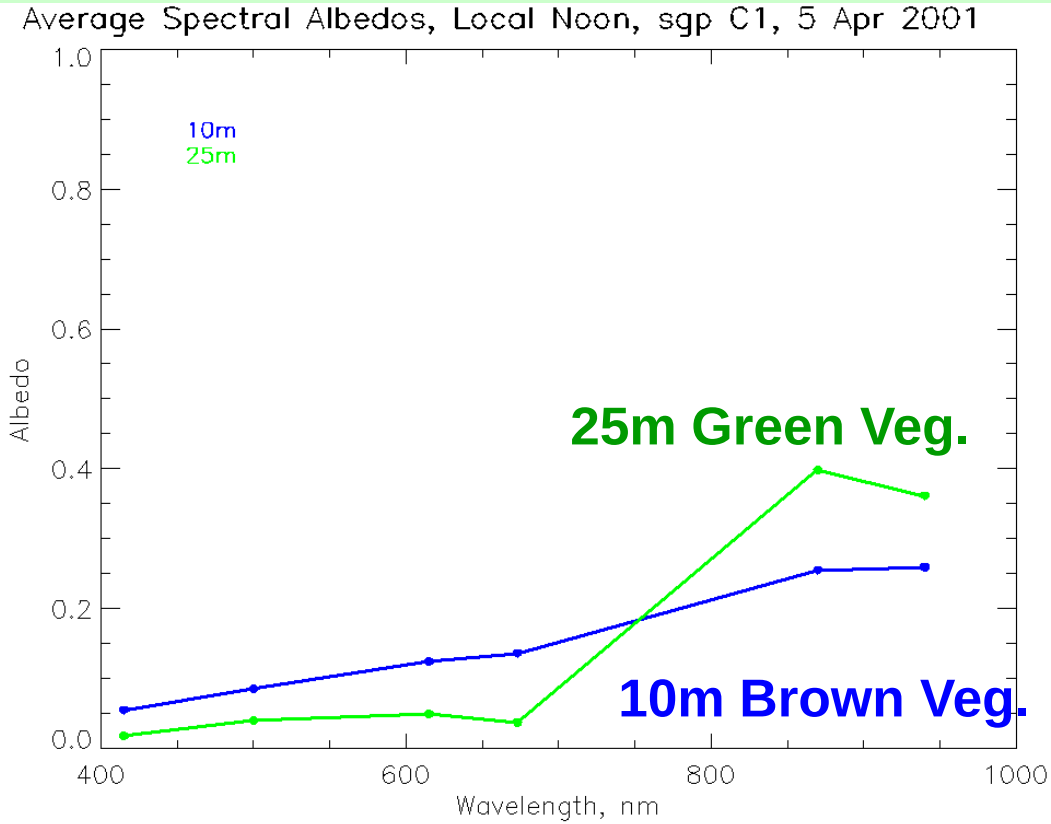
Next: Speculation

- **Preliminary work indicates we can reliably detect 4 surface states:**
  - **Green vegetation**
  - **Bare soil/brown vegetation**
  - **Mixed bare soil to green vegetation**
  - **Snow**
- **Full SW spectral distribution from literature**
  - **Validating MODIS land surface reflectance and albedo products: methods and preliminary results, Liang et al. (2002), Remote Sensing of Environment 83, 149–162**
  - **Comparison of Helicopter and SARB/CRS Derived Surface Albedo at ARM SGP, Rutan et al. (2003), 28th CERES Science Team Meeting Proceedings, Norfolk May 6-8, 2003**

Detecting Surface Type

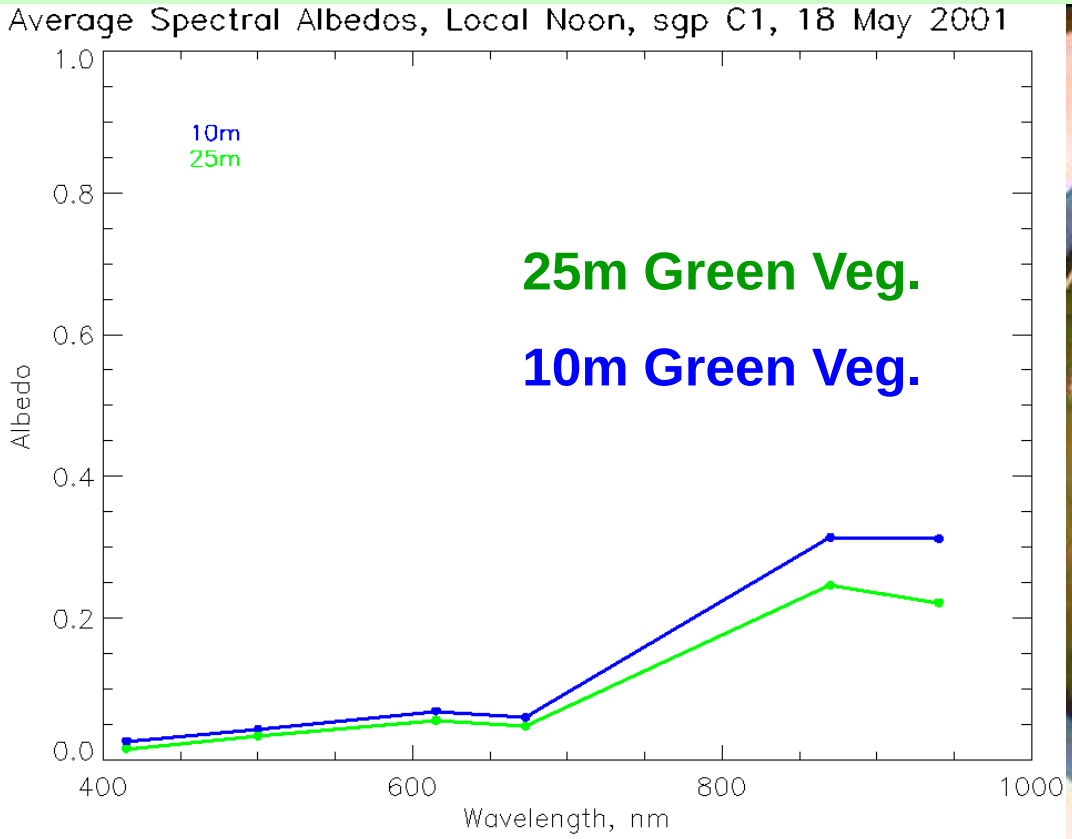


Detecting Surface Type



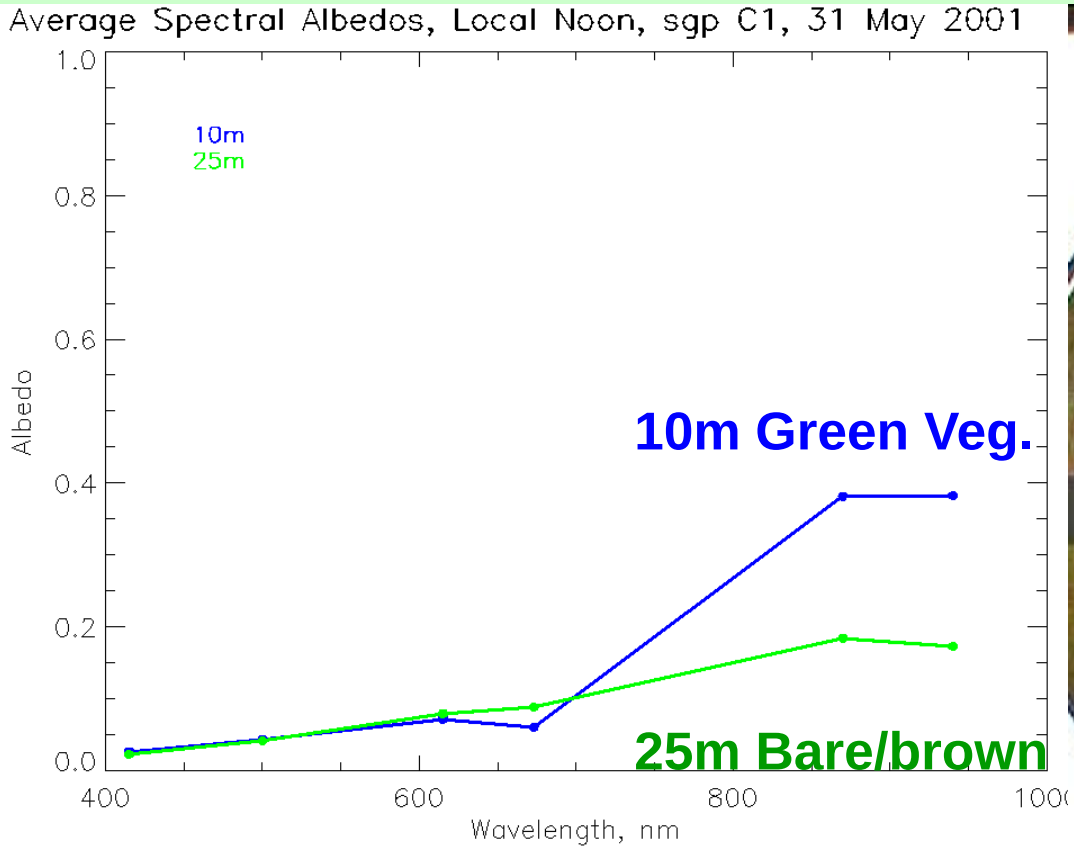
From onsite observer reports:
10m soil condition – brown, dry, and dusty
25m soil condition – winter wheat, green, ground covered

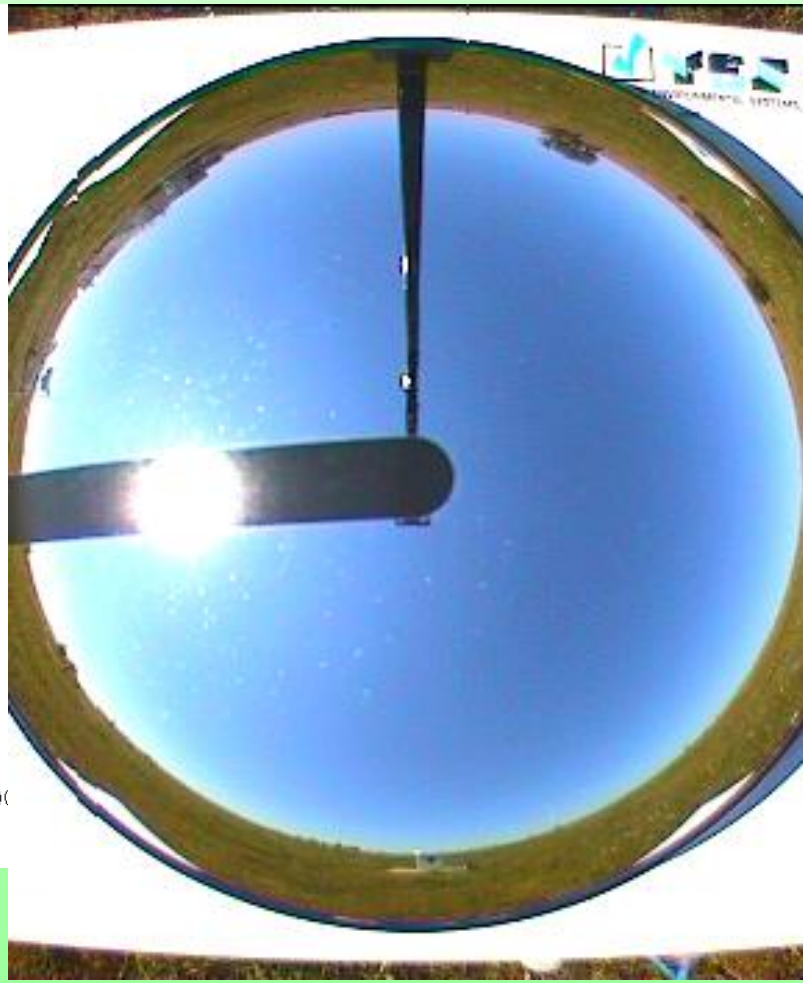
Detecting Surface Type



From onsite observer reports:
10m soil condition – lush green, unwilted
25m soil condition – winter wheat, green, ground covered

Detecting Surface Type



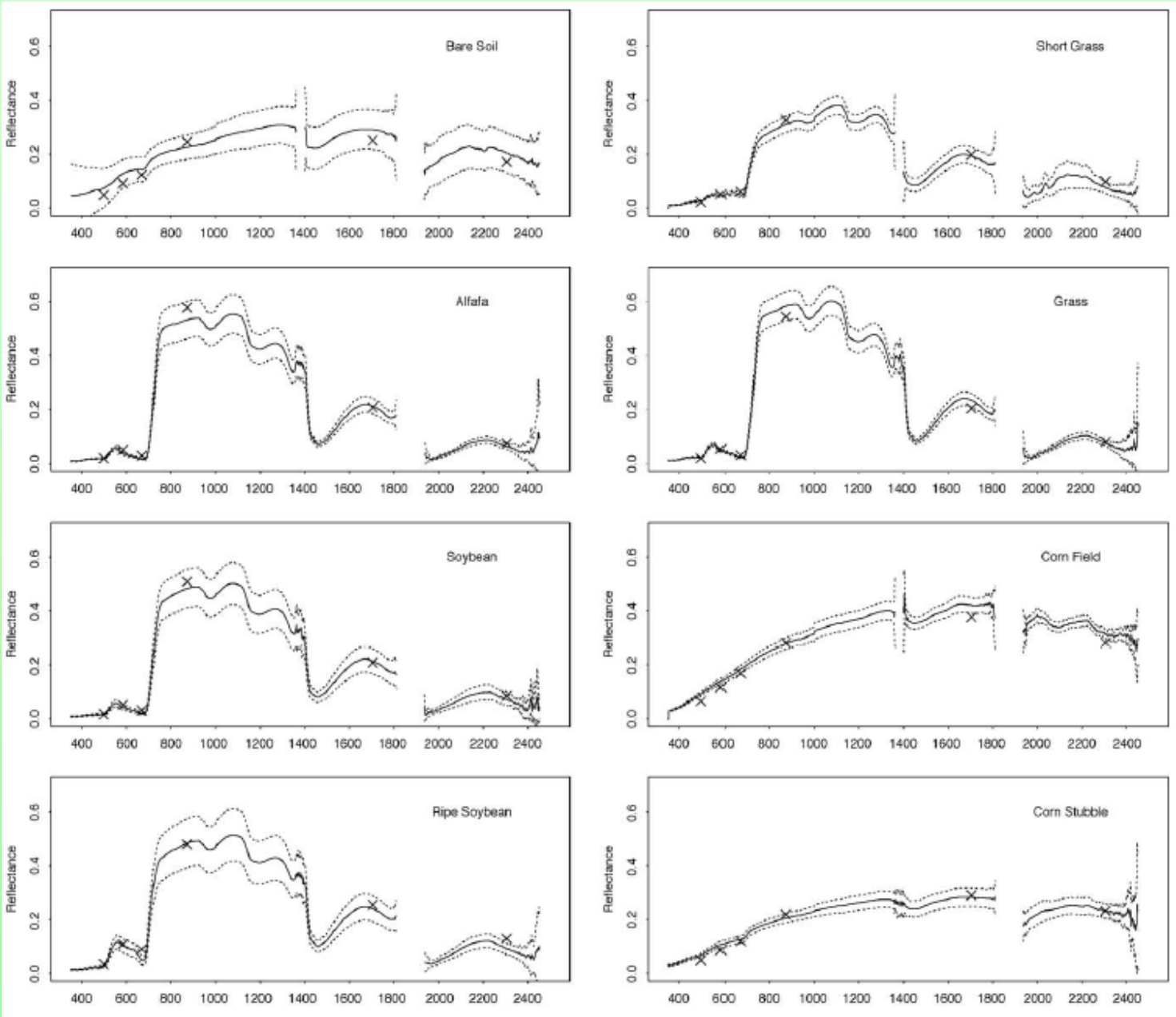


From onsite observer reports:
10m soil condition – lush green, unwilted
25m soil condition – winter wheat, stubble after harvest

Next: Fiction

- **Relationship between MFR channels and wider spectral range is surface type/condition dependent**
- **Identify 10m and 25m surface type**
  - **Collaborate with Eli Mlawer**
- **Determine weighting**
  - **Analyses of downward MFR on IAP**
- **Interpolate for wider spectral range**
  - **Collaborate with Eli Mlawer**

Spectral Signature of Surface Types



From Liang et al., 2002

Thanks