Northwest Columbia Plateau $PM_{10}$ Project

Objective 7: Human Activity on Suspended Dust and $PM_{10}$ Emissions

Personnel: Principal Investigators: Bruce E. Frazier, WSU; Richard Rupp, WSU.

Project Objectives

1. Establish and maintain geospatial database, produce background maps as needed for other investigators.


   - Subobjective 3: Develop remote sensing tool for assessing soil surface characteristics and crop cover based on radar and Landsat to provide an assessment of grower adoption.

   - Subobjective: Use of Landsat Data to Distinguish Soil Covers on Erodible Dryland Soils.
     A. Predict the change in use of conservation tillage over the past 10 years by quantifying the amount of bare soil in the same test areas for two dates about 10 years apart.
     B. Develop a technique to incorporate Landsat band 7 as an indicator of dead plant materials on the soil surface.

5. (2002-2003) CP$_3$ Objective 7: Human Activity
   - Subobjective: Use of Landsat Data to Distinguish Soil Covers on Erodible Dryland Soils.
     A. Document soil surface conditions within bare soil/summer fallow classes.
     B. Investigate surface radiance within bare soil/summer fallow classes.

   - Subobjective: Use of Landsat Data to Distinguish Soil Covers on Erodible Dryland Soils.
     A. Create data sets that are coincident with the L1 soils (Aridisols) and Path 44, Row 27 of Landsat such that sequences of at least three years are available.
     B. Determine the cropping cycle at specific sample locations using Landsat data.
     C. Determine the quality of soil cover during the summer fallow part of the cropping cycle.
Major Findings


- Data from our study of land cover change on the northern half of the Columbia Plateau dryland cropping area (L1 and L2 soils) with images from 1988 and 2002, Bare/Fallow was reduced from 40 to 27%; small grains increased from 28 to 43% by 2002.

- With regard to measuring dead plant material on the soil surface; while relationships have been shown with laboratory instruments, there was not enough difference in signal strength in the satellite data to show a relationship with crop residue in the field.

- Spectroradiometer data collected from plots with bare, low residue cover, and medium residue cover (estimated) showed nearly identical reflectance curves, but were offset along the Y axis. The offset appears to be the important feature in the data and probably indicates that more shadow is cast by rougher surfaces. This relationship will contribute to understanding and classification of Landsat scenes. These data were presented orally and by published abstract (Frazier, B.E., 2003. Field spectra, shadows, and Landsat. Soil and Water Conservation Society annual meeting, 28-31 July, Spokane, WA. SWCS Annual Conference Abstracts).

- On our Aridisol study area, land cover change from 1988 to 2003 is as follows: Bare/Fallow was reduced from 46% to 22% of the area; Range/CRP increased from 11 to 25%; and small grains increased from 21 to 28%.