4.8 Project Element - Preprocessing

4.8.1 Task 1 - Preprocessing Procedures

4.8.1.1 Description of Task

1. Objectives

   a. Determine if atmospheric and sensor corrections applied to Landsat MSS data improve land cover classification in a cost-effective manner and whether or not these corrections are needed in other tasks.

   b. Determine usability of an automated cloud masking procedure and investigate land cover estimation problems when clouds are present.

2. Scope

   Select an atmospheric correction and cloud classification algorithm to test and evaluate over a limited data set to determine their usefulness in the domestic crops and land cover program. The scanner correction algorithm will not require testing.

4.8.1.2 Research to be Conducted

The first step in the technical approach is to assess currently available atmospheric correction, scanner correction, and cloud classification algorithms. Some candidates are the XSTAR (ERIM), ATCOR (Lockheed), and the procedures used at JSC and GSFC. The assessment will examine the type of corrections performed, testing and evaluation reports, and run costs. Based on this assessment, only one algorithm in each of the three areas will be selected for further investigation.

1. Atmospheric Correction
   a. Select best varying haze correction algorithm (detects and corrects only those areas within scene that are attenuated).
   b. Build test data set of attenuated and non-attenuated MSS data.
      - o consider different degrees of haze
      - o use ground truth segments having similar land cover types
   c. Develop procedures to use algorithm in the following areas:
      - o improving classification
      - o extending training statistics
   d. Test and evaluate specific procedures, in a proof-of-concept, over an equivalent one scene or less
   e. modify based on results
2. Scanner Correction
   a. select algorithm which is most efficient in debanding or destriping
   b. no testing
3. Cloud Mapping
   a. select best algorithm in classification of clouds
   b. develop a procedure for:
      - o automatically mapping clouds and shadows
      - o estimating area
      - o applying cloud map as a mask against Landsat data
   c. test and evaluate above procedure in proof-of-concept

d. develop and test methodology to proportion cloud and shadow areas into appropriate land covers

Based on the proof-of-concept testing, the three components of this task will be adapted and put on-line for pilot testing. The anticipated result is a preprocessing software package that will be added to the front end of the current domestic crops and land cover procedures. This added capability will allow analysis of Landsat scenes having significent attenuation and cloud cover.

4.8.1.3 Responsibility

1. JSC will provide:
   a. Technical and contract management of their assigned work within the task.
   b. Assessment of preprocessing technology.
   c. Development of procedures.
   d. Proof-of-concept test and evaluation.
   e. Support to pilot test accuracy assessment and performance evaluation.
   f. Support design specification development for LSAT.
   f. Support technology adaptation.
2. ESCS will be overall Task Manager and will:
   a. Conduct pilot test.
   b. Perform pilot test accuracy assessment and performance evaluation.
   c. Support the assessment, procedure development, and proof-of-concept testing.
   d. Establish performance criteria.
   e. Decide go-no-go for technology adaption to on-line.
   f. Perform technology adaption.

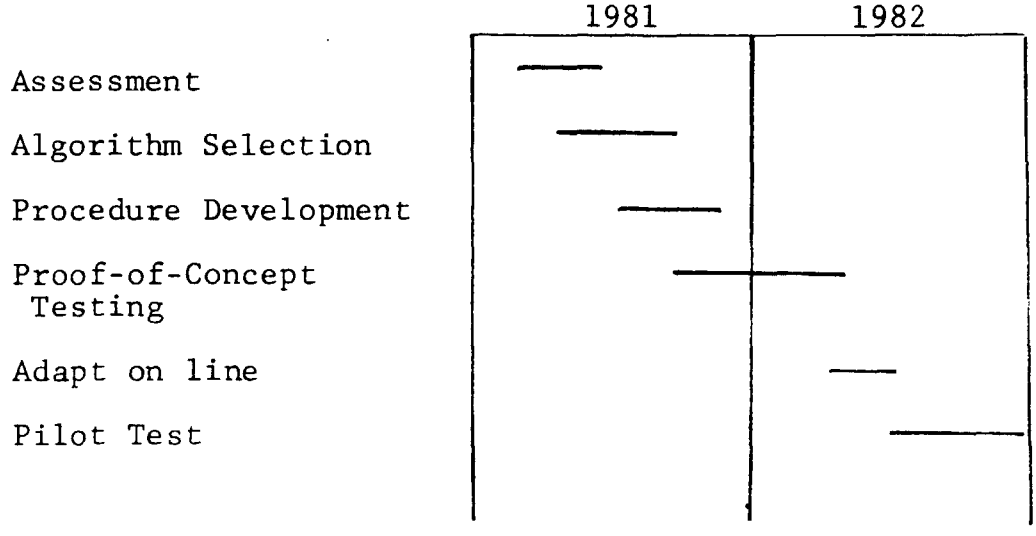
4.8.1.4 Resources

	FY 81		FY 82	
	$	MYE	$	MYE
ESCS	50	.25	50	.5
JSC	100	.25	100	.5

JSC will provide the overall technical and contract management of their assigned responsibilities. They will be responsible for the overall technical integrity of their assigned work. JSC resources given here allow procedure development for data processing, and special data acquisition requirements.

ESCS will provide predominately civil service manpower for their assigned responsibilities. A majority of data acquisition and processing costs for pilot testing will be their responsibility. The adaption of developed procedures to on-line facilities will be funded by ESCS. Special ground truth acquisition for this task will also be funded by ESCS.

4.8.1.5 Schedule



4.8.1.6 Interfaces

Coordination with other Agristars projects particularly Early Warning and FCPF.

4.8.1.7 Data Requirements

Landsat MSS and ground truth for portions of full scenes from the "Major Crop Area Estimation Task." Need data under two sets of conditions:

1. Haze/clear areas within scene.
2. Scattered popcorn clouds.