

LARS Contract Report 111580

Monthly Progress Report

Training Course Entitled
Remote Sensing for Mineral Specialists
Part II - Digital Techniques

Award No. AA-510-PPO-6

Reporting Period: October 15, 1980 to November 15, 1980

Submitted to: Bureau of Land Management
Denver Federal Center
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Introduction

This report covers activities during the second month of the contract to prepare and deliver Part II of the training course "Remote Sensing for Mineral Specialists." This has been a month of intense preparation for all the staff involved in presenting the course.

Significant Steps in the Development

During this reporting period a few specific items can be pointed to as indicators of our progress:

- 1) Donna Scholz visited LARS to confer with LARS staff involved in the course and thus to insure full coordination between the sections she is preparing and the lectures and laboratories prepared by the other staff. She also explored possibilities for creating and projecting IDIMS images on the Advent screen in support of the lectures. The lack of familiarity of two of the lecturers, Mr. Anuta and Dr. Bartolucci, with IDIMS image-processing hampered full acceptance of this method as a lecturing tool. Many examples will be used, but not in the number possible once the lecturers gain confidence in the success of the arrangements and understand more fully the image-processing capabilities of the system. Ms. Scholz' work with the LARS staff during those two days greatly benefited the planning and coordination of the course.
- 2) In order to help LARS' staff become further acquainted with the IDIMS processors the students will use, Dr. Swain prepared a list describing these processors and, where appropriate, comparing them to similar LARSYS functions. This document, which references the IDIMS manual, was prepared as a point of departure for the LARS staff who have not yet had experience using the system. A copy of this description is attached.
- 3) Pre-course reading packets have been assembled for the students, with mailing scheduled to allow delivery at least two weeks before the course starts.

Problems Encountered

- 1) During the first month of the contract period there were several discussions to identify the best data to use for each section of the course. Although it had appeared at first that Dr. Bartolucci would be able to build his lectures and workshops on classifications that had already been completed, in fact closer scrutiny of the available classifications revealed a number reasons why they all were inappropriate to this course. As a result, Dr. Bartolucci felt compelled to create a completely new classification study and workshop. Both the area studied and the type of materials present in the scene at the time of data collection were chosen specifically to meet the objectives of this course.
- 2) Although Ceavco Audio Visual (Denver) had agreed to provide a camera man to make videotapes of the course, we were notified by Mr. Don Roberts of that organization that their staff situation had changed and they were unwilling to accept the order. Through their recommendation, we were able to engage another Denver-based organization, Video-time Rentals, who will provide the required service at equivalent rates.

Change in Plans

The only notable changes in the plans this month were the addition of David L'Heureux to the teaching staff and another minor change is the teaching schedule.

Dave L'Heureux had already been on this project to assist in the development of laboratory exercises. Since his thesis research is forming the basis for the case study on data integration and models, Dr. Levandowski felt that Mr. L'Heureux could make important contributions to the presentation and be of help in describing the details of the work. He would then also be available to help during the laboratory exercises. After obtaining verbal approval from Mr. Juilliand, we completed plans for Mr. L'Heureux' participation in the course. His salary is being paid by the contract as planned, but his travel costs will be covered by funds from the Geosciences Department. He will arrive Tuesday evening, December 16, and remain until the end of the course.

The current schedule, including the most recent changes, is attached. The only change of importance to BLM is that the boxed session on Wednesday is moved one hour later. This means we will need access to the IDIMS from 11:00 - 3:00, instead of the 10:00 - 2:00 time previously requested.

Conclusions

At this time there appear to be no barriers to the successful delivery of the course as contracted.

Description of IDIMS Processors To Be Used for
BLM "Advanced" Course

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- 4-343 PLENTER (no LARSYS equivalent)
Loads Landsat Scenes → IDIMS
Corrects for earth-rotational skew, sets up info.
file needed for geometric correction.
- 4-189 HISTOG (similar to HISTOGRAM+GRAPHHISTOGRAM in LARSYS).
Histograms image for output at terminal or line printer.
Does all bands present; cumulative processing possible.
Option: compute means & std. dev. (takes 3 passes).
Actual intensity range found on one pass, divided into
"numbins" for histogramming on 2nd pass.
- 6-68 HISTOGV (no comparable LARSYS processor)
Display histogram on IDIMS using graphics overlay.
(It is not clear whether this processor actually
computes the histogram or gets it elsewhere --
but probably the former.)
- 4-497 TSSELECT (function similar to CLUSTER; interactive)
Trackball selection of polygonal training areas.
Calculate statistics.
Unsupervised classification of training areas.
(ISOCLS, up to 8 bands, usual ISOCLS parameters
and options) Assumed applied to one class at a
time. Produces stats, no image.
- ?What is an "Intensive Study Area" (ISA)?
 How and why is it used?
- 4-63 COMPARE (like COMPARERESULTS, but more general)
Compare two images, compile difference stats.
(Can apply to any data type.)
- 4-105 DIVERGE (like SEPARABILITY, but no feature ordering)
Computes transformed divergence based on class stats
(up to 160 classes).
?User can specify no. of bands, but not clear if
arbitrary bands can be selected.
- 4-439 SMART (similar function to MERGESTATS)
Stat file manipulations & combinations.

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- 4-83 CONVOL (no LARSYS equivalent)
 Image filtering (2-D convolution).
 Arbitrary filter windows definable up to 15x15.
 Numerous filter specifications are provided (e.g.,
 line enhancement -- gradient, Laplacian).
- 4-235 KLTRANS (PC,CA) (no LARSYS equivalent)
 Karhunen-Loeve (principal components) trans.
 Apparently has been augmented to allow canonical
 analysis as an option (based on class separation).
- 4-459 SPECRATO (no LARSYS equivalent)
 Produces a one-band image based on

$$uB_i / (w_1 B_1 + w_2 B_2 + \dots + w_n B_n)$$
 where u & w_i are weights, B_i are bands (channels)
- (none) GES (no LARSYS equivalent)
 Geographic Entry System -- not described in IDIMS
 documentation.
- 7-5 ALLCOORD (no LARSYS equivalent)
 Transforms one coordinate system into another.
 Very versatile in terms of choice of input and
 output coordinate systems.
- 7-67 STRATA (no LARSYS equivalent)
 Transforms geographical line and polygon data from GES
 into digital image representation.
- 4-37 BLDSTRAT (no LARSYS equivalent)
 Builds a strata mask file/image -- solid or
 boundary form.

Times	Monday	Tuesday	Wednesday	Thursday	Friday
8-9	Review (1/3) LAB, SMD	Classification (3/8) LAB	Mid-Course Evaluation	Integration (2/6) PEA	Models (4/7) DWL
9-10	Review (2/3) LAB, SMD	Classification (4/8) LAB	Enhancement (3/8) PEA	Integration (3/6) PEA/DWL	Models (5/7) DWL
10-11	Data Processing (1/3) DKS	Classification (5/8) LAB	Enhancement (7/8) DWL, DML	Models (1/6) DWL	*Models (6/7) DKS
11-12	Review (3/3) LAB, SMD	Classification (6/8) LAB	Enhancement (4/8) PEA, DML	Integration (4/6) PEA, DML	Written Evaluation SMD
12-1	*Data Processing (2/3) DKS	*Classification (7/8) DKS	Enhancement (5/8) PEA, DML	*Integration (5/6) DKS	Lunch
1-2	Data Processing (3/3) LAB, SMD	Lunch	*Enhancement (6/8) DKS	Lunch	Models (7/7) DWL
2-3	Lunch	Classification (8/8) LAB	Lunch	Models (2/7) DWL, DML	Wrap-up Staff
3-4	Classification (1/8) LAB	Enhancement (1/8) PEA, LAB	Enhancement (8/8) PEA	Integration (6/6) PEA	'BLM and remote sensing' J. Juilland et al.
4-5	Classification (2/8) LAB	Enhancement (2/8) PEA	Integration of Data (1/6) PEA	Models (3/7) DWL	*Exercise on IDIMS
evening		Optional Hands-on DKS, SMD		Optional Hands-on DKS, SMD	Boxes represent times set aside for individual work.