

SUMMARY OF LTER REMOTE SENSING WORKSHOP
HELD AT THE UNIVERSITY OF NEW HAMPSHIRE, DURHAM, NH
NOVEMBER 2-3, 1989

John D. Aber
November 17, 1989

The workshop was held at the Institute for the Study of Earth, Oceans and Space within the University of New Hampshire. The purposes of the workshop were to 1) build a network of scientists within the LTER group interested in remote sensing, 2) stimulate cross-site research projects, and 3) determine the role of remote sensing technology in LTER research.

Nearly all LTER sites were represented (see attached list of attendees). In addition, two NASA researchers participated and added greatly to the discussions. Caroline Bledsoe and James Vande Castle represented NSF and the LTER office. Three other UNH people and a visitor from Rutgers University were also in attendance.

The format of the meeting initially called for four presentations on aspects of remote sensing applied to ecosystem research each morning, followed by relatively informal demonstrations of remote sensing research in the afternoon. However, the actual agenda (see attached) reflected the desire on the part of the participants to discuss formally as a group the potentials and limitations of remote sensing within the LTER context. These discussions focused on two areas: 1) potential for intersite research, and 2) current and future logistical limitations to the application of remote sensing.

1) Cross-site experiments

Six possibilities for cross-site comparative research were presented and discussed: 1) Calibrating NDVI estimations of net primary productivity, 2) Remote sensing of drivers of existing models of evapotranspiration, 3) Multi-scale approaches using, for example, TM and AVHRR data, 4) Remote sensing of biodiversity through patterns of landscape fragmentation and land use patterns, 5) Use of microwave remote sensing to examine ecosystem structure and biomass, and 6) High spectral resolution of canopy chemistry.

Of these six topics, the first was selected as the most important, and most likely to yield significant results. This was based on the notions that: 1) cross-site comparisons should make use of relatively mature methodologies being tested for generality across sites, 2) both NPP and NDVI are widely accepted and widely applied concepts, 3) a rigorous, cross-site test of the meaning and generality of the NDVI-NPP relationship has not been made, and 4) that the LTER group is the best one to provide accurate estimations of NPP for a wide variety of sites.

2) Logistics and Limitations

Topics discussed and on which general consensus was reached include:

1) Centralized acquisition of remote sensing data for use at LTER sites- It was strongly suggested that John Vande Castle should develop an acquisitions policy and arrange for archiving and retrieval of MSS, TM, AVHRR and SPOT data. This policy would include frequency of acquisition from each source for both past and future dates. Suggested frequencies included 2-3 times per year for AVHRR, 1 per year for MSS and TM in humid areas, perhaps more frequently in dry areas, and once every 1 to 3 years for SPOT data. There was also some discussion of collection of aerial photographic data. The limitations in ability to digitize these data was recognized as a serious drawback and no firm decision was reached. As part of this discussion, Caroline Bledsoe constructed a table of current acquisition rates by the different LTER sites (see attachment to her report).

2) Strong support for the high spectral and spatial resolution remote sensing effort under NASA's EOS program- Very strong concern was voiced over the potential that the EOS program might proceed without a high spatial and spectral resolution instrument. This resulted in the request that John Aber draft a letter in support of this instrument to be sent to the responsible parties at NASA with the signatures of all of the participants at the meeting (see attached).

3) The potential was raised that NASA might design a new instrument specifically to meet the needs of the biological research community.

4) There was much discussion on the need to develop both models of ecosystem function and regional data basis through GIS technology, and to link these to remote sensing data in order to make the fullest use of information available from remote sensing.

5) The participants suggested that the group assembled for this meeting should remain in contact as a means of facilitating remote sensing work across LTER sites.

ACTUAL AGENDA FOR ALL-LTER REMOTE SENSING WORKSHOP

THURSDAY, NOVEMBER 2

- 8:45- 9:00 Welcome, agenda, etc.
9:00- 1:00 Presentations by:
Mark MacKenzie, University of Wisconsin
"Application of remote sensing to North
Temperate Lakes LTER"
Forrest Hall, NASA Goddard Space Flight Ctr.
"Remote sensing of surface energy balances-
the FIFE experience at the Konza LTER"
John Briggs, Kansas State University
"Remote Sensing at the Konza Prairie LTER"
Bill Lawrence, Ctr. for Energy and Environ. Res.
"Remote sensing at the Luquillo LTER"
1:00- 2:00 Lunch
2:00- 3:45 Roundtable discussion on the future of remote
sensing within the LTER system
4:00- 5:30 Demonstrations by:
John Briggs
Steve DeGloria
Mark MacKenzie
Bill Lawrence

FRIDAY, NOVEMBER 3

- 8:30 Reconvene
8:30-12:00 Presentations by:
Dave Peterson, NASA Ames Research Center
"Scale and process in western coniferous forests"
Carol Wessman, Center for the Study of Earth
from Space, University of Colorado
"High spectral resolution remote sensing"
John Aber, University of New Hampshire
"Remote sensing of nitrogen saturation"
Barry Rock/Jim Vogelmann
University of New Hampshire
"Remote and field detection of air pollution
damage to northern conifer forests"
12:00- 1:00 Lunch
1:00- 3:00 Roundtable Discussion II
3:00- 4:00 Demonstrations by:
Mary Martin
Emery Boose
Barry Rock/Jim Vogelmann
Tour of Near Infrared Reflectance Lab
3:30- 4:00 Final Summation
4:00- Adjourn

LIST OF PARTICIPANTS
LTER REMOTE SENSING WORKSHOP
DURHAM, NH 2-3 NOVEMBER 1989

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DRAFT LETTER IN SUPPORT OF AVIRIS/HIRIS INSTRUMENTS
UNDER NASA-EOS PROGRAM

17 November 1989

Dr. Shelby Tilford
CODE
NASA Headquarters
Washington, DC 20xxx

Dear Dr. Tilford:

We are writing as a group representing remote sensing research within the National Science Foundation's Long-term Ecological Research Program to express our strong support for the development and deployment of HIRIS, the high spectral and spatial resolution remote sensing instrument within the EOS program. At a recent meeting, this group discussed at length the limitations which would be imposed on ecosystem-level research by the absence of this type of remotely sensed data.

Our program is fundamentally concerned with changes in land use and in ecosystem processes such as carbon storage, evapotranspiration, nutrient cycling and trace gas fluxes. These are processes which are driven by environmental and cultural variables which change at spatial scales much finer than the 250-500 meter resolution proposed for MODIS. There is also the potential that high spectral resolution remote sensing will provide truly unique information regarding canopy biochemistry and rates of biogeochemical functions. We understand that the processes of concern to the LTER program are also seen as central to the EOS and Earth System Science programs. We feel that regional to global understanding of these processes will require high spatial and/or spectral resolution remote sensing data.

Thank you for your attention.