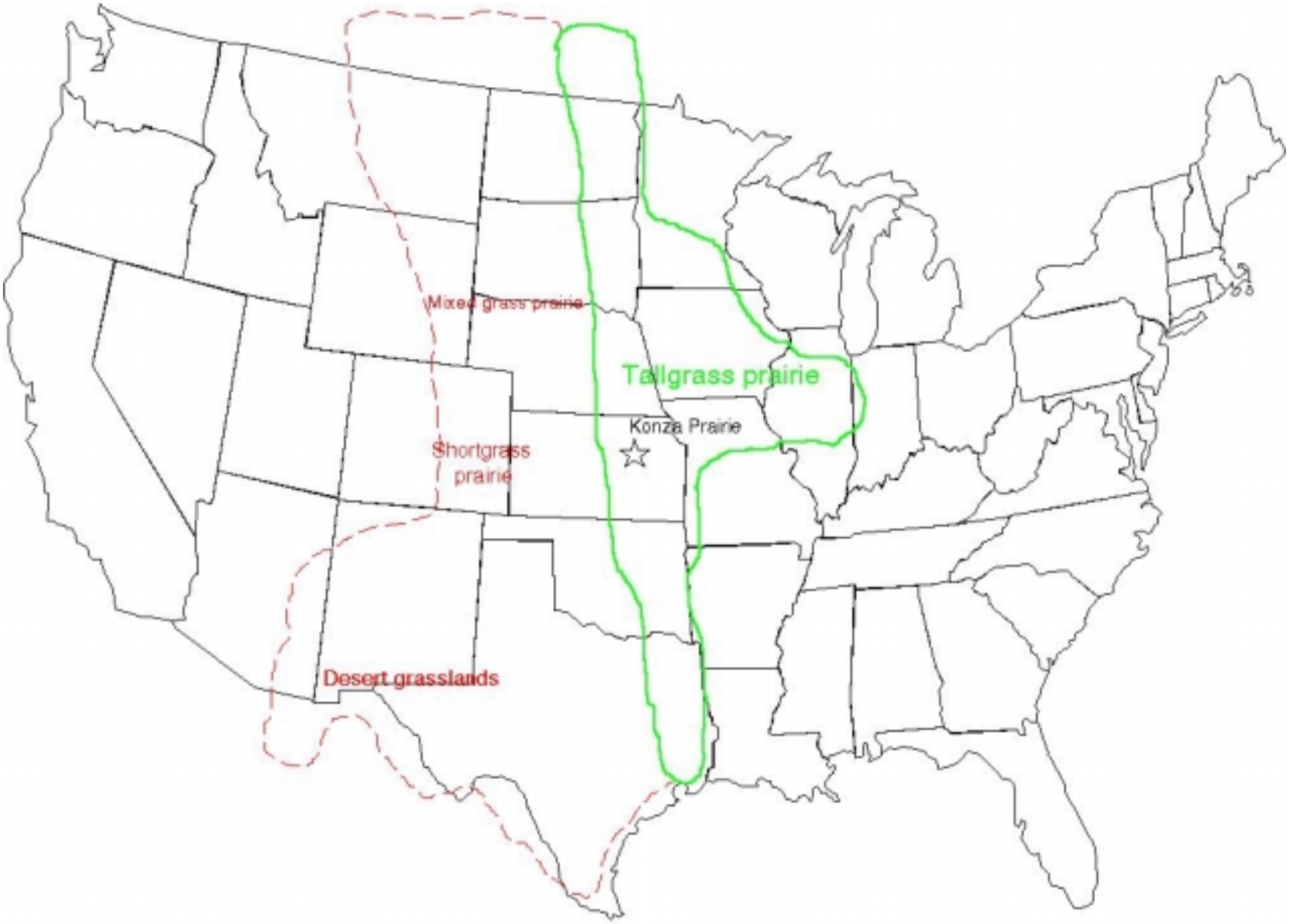
1999 Konza Grassland Experiment University of Arizona Component

- **Terrestrial Biophysics & Remote Sensing** Participants
  - Karim Batchily
  - Laerte Ferreira
  - Fricky Keita
  - Pamela Nagler
  - Hiroki Yoshioka

The U.S. Grasslands



Objectives

- **Field Experience and Data Collection in a Tall Grassland Prairie Site**
- **Validation of MQUALS**
  - **to fly coincident with AVIRIS and AIRMISR**
- **To evaluate the effect of solar zenith angles on vegetation indices and biophysical parameters**

KONZA July 1999

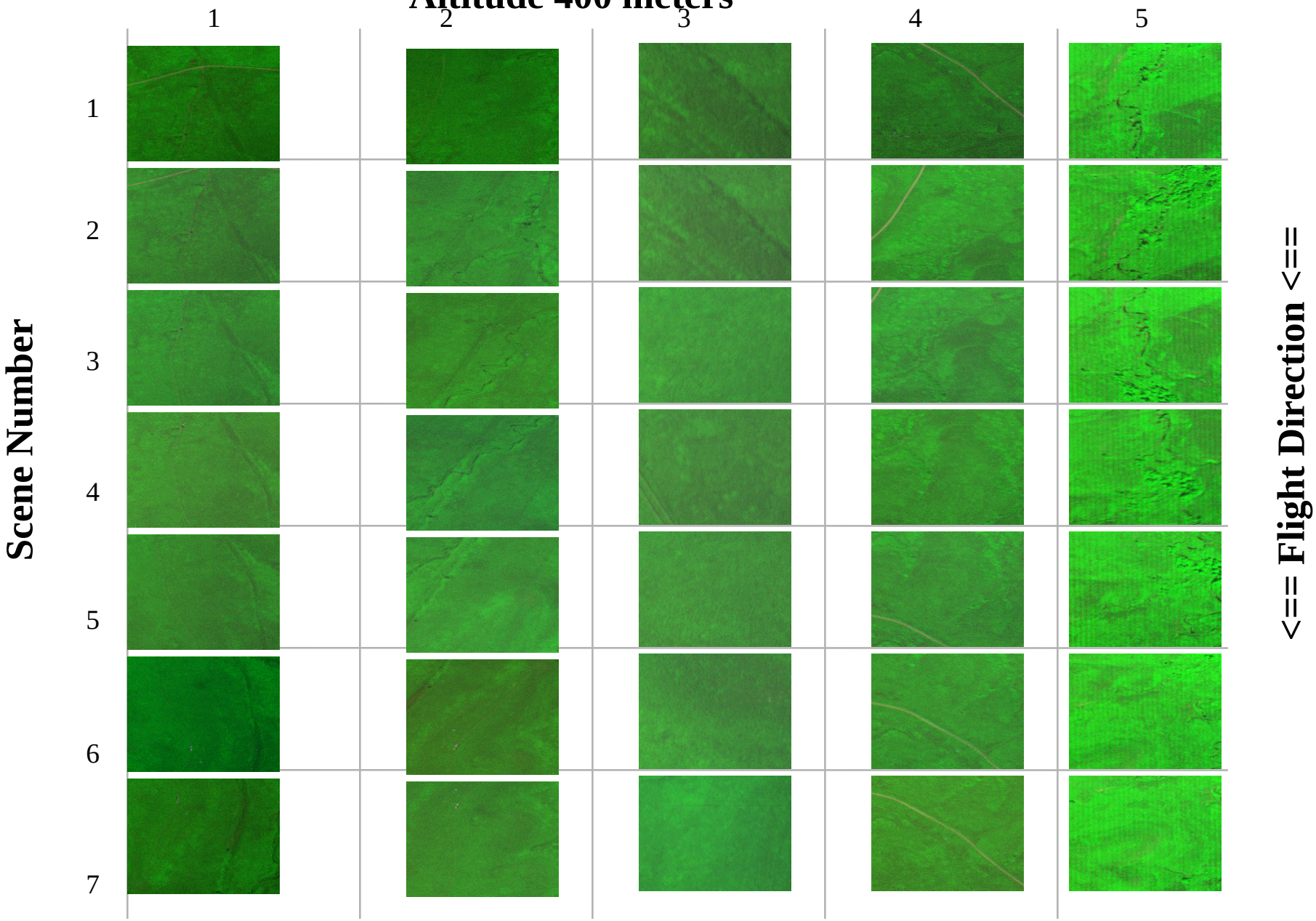
	Day of the Year						
	192	**192**	**193**	**194**	**195**	**195**	**196**
Field Conditions	clear sky 10:30); very we grass;	clear sky 10:30); ve wet gras	cloudy sk very we grass;	**very clea sky; moderat win (S to dry grass**	slightly clou sky; moderate wind(S to dry grass	slightly cloudy sk moderate wind to N); dry grass;	slightly cloudy sk moderate wind(S to dry grass

AVIRIS

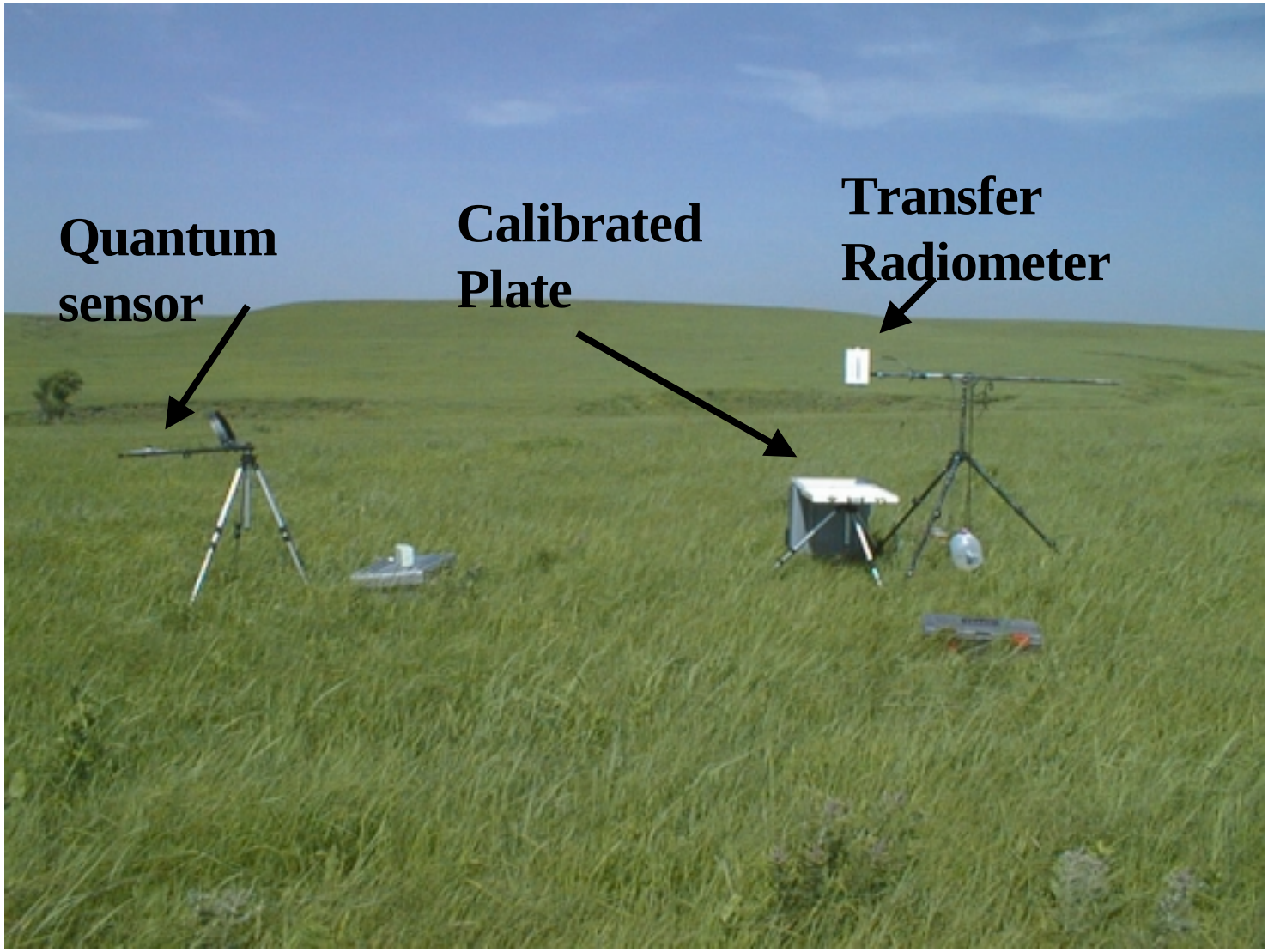
Collected Data (Konza 7/99)

- **Digital Images and Pictures**
- **Airplane Exotech Radiometer**
- **Ground Exotech Radiometer**
- **Continuous Plate and Quantum Sensor**
- **fAPAR/ LAI**
- **Biomass**

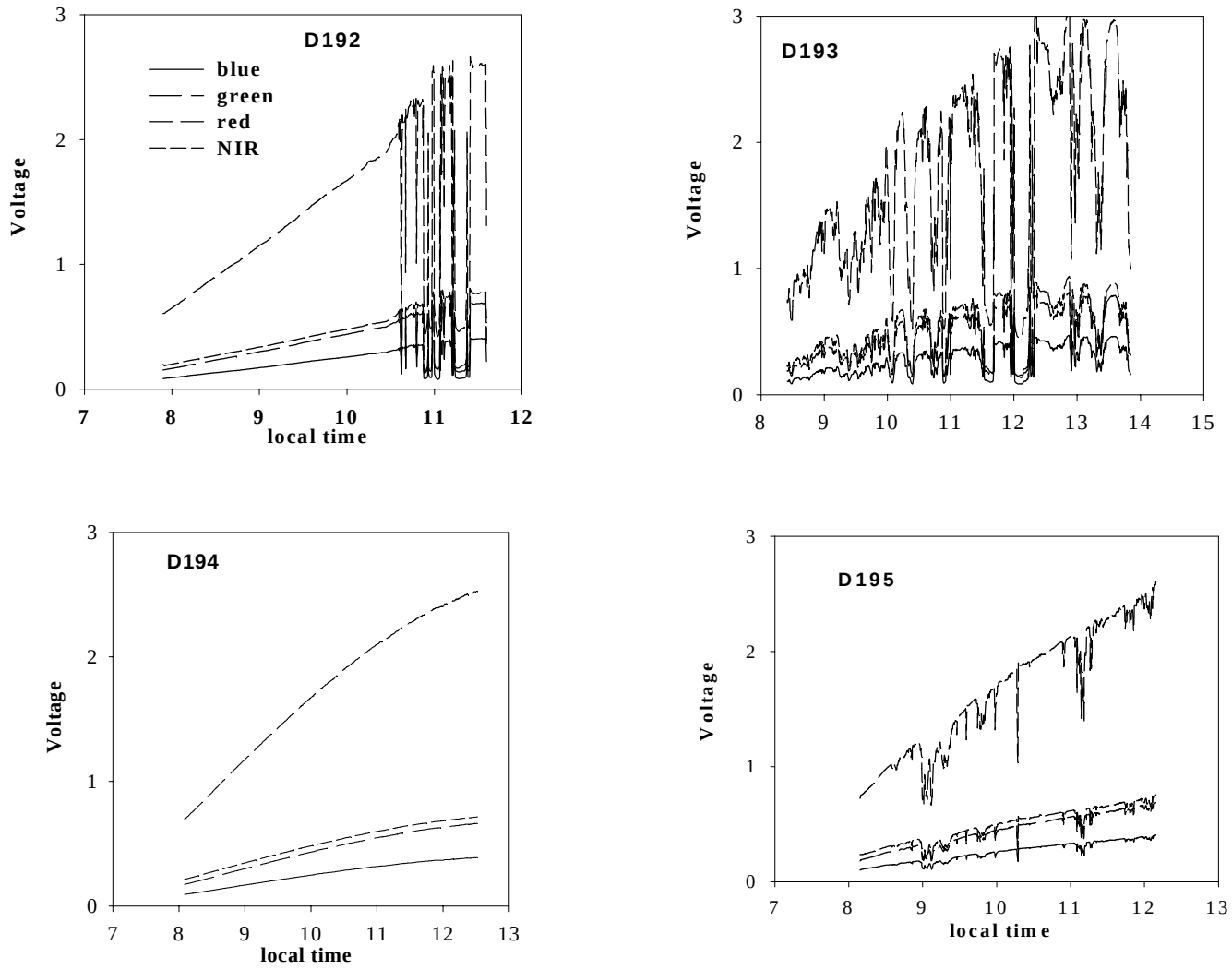
MQUALS Run Number (13-July-1999)
Altitude 400 meters



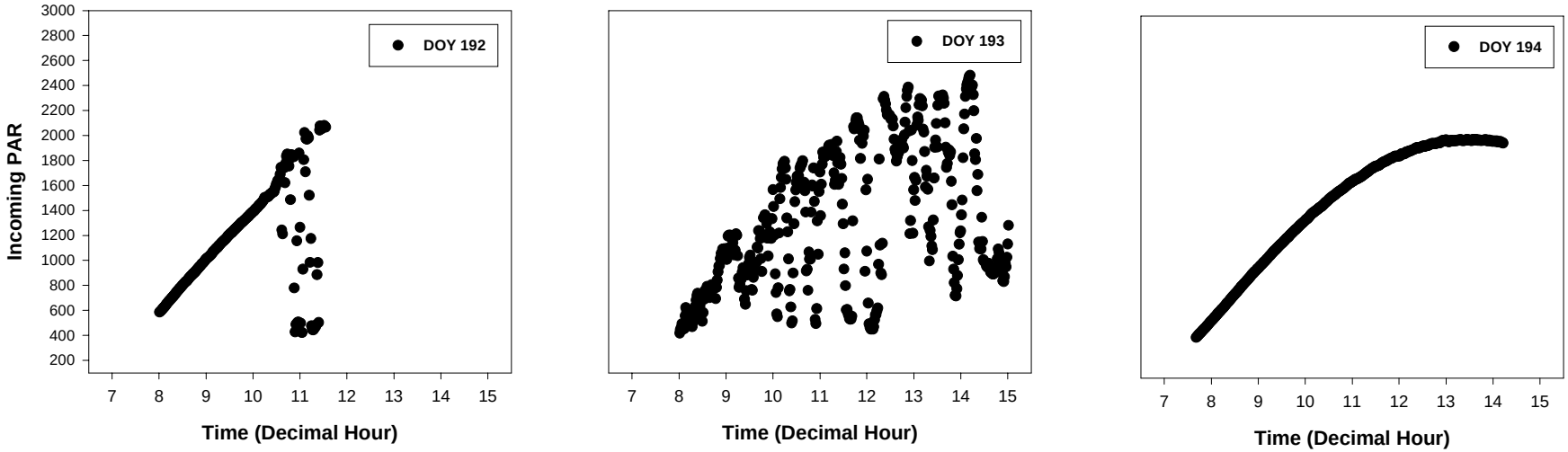
Konza July, 1999



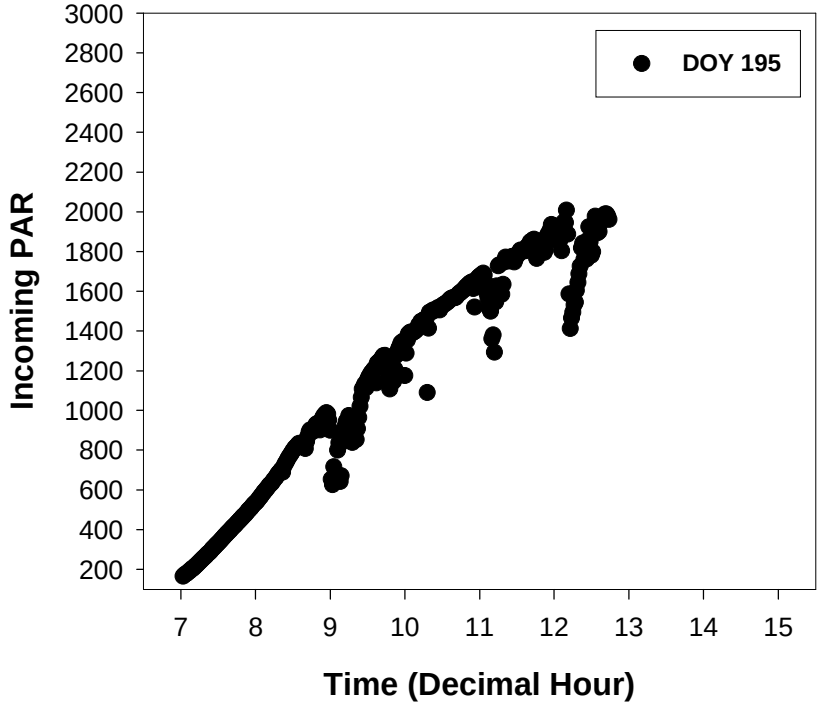
Continuous Exotech Radiometer over Reference Plate

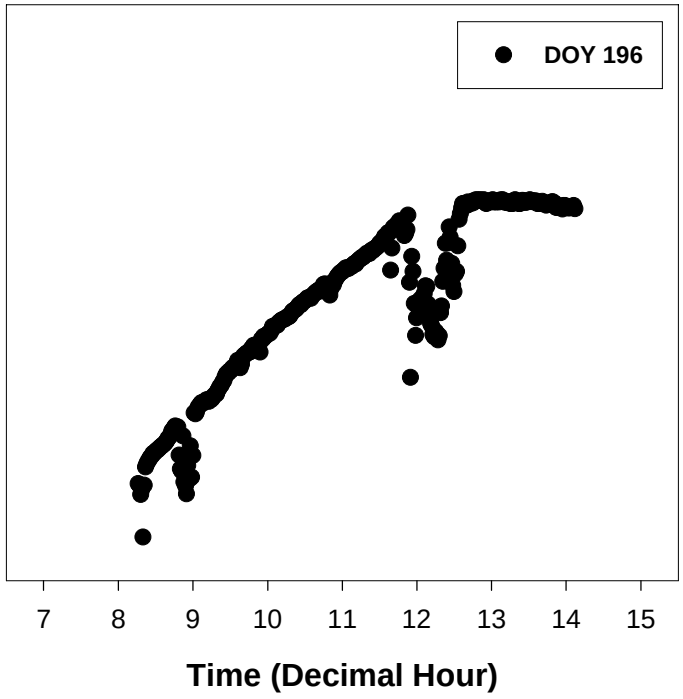


Quantum Sensor Data



Quantum Sensor Data





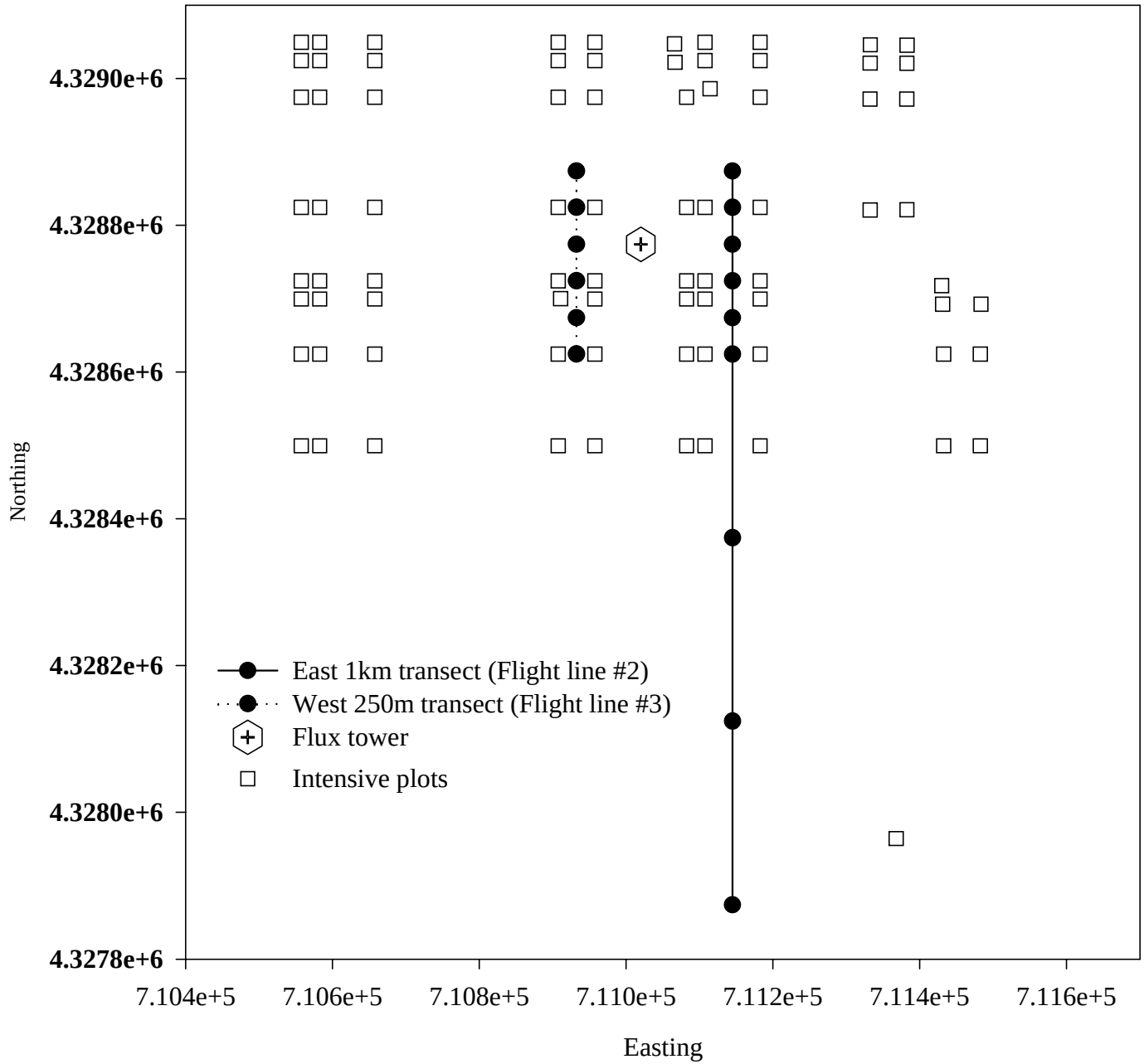


Fig. Ground transects and nearby intensive plots

Flight Line # 2 (N-S Transect, East Side)
(Konza - 7/99)

“North” Look

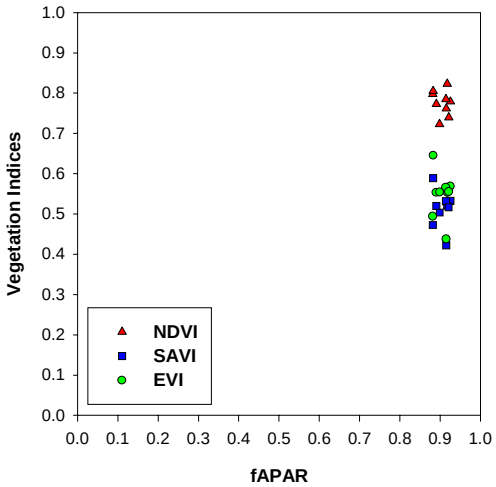
“South” Look

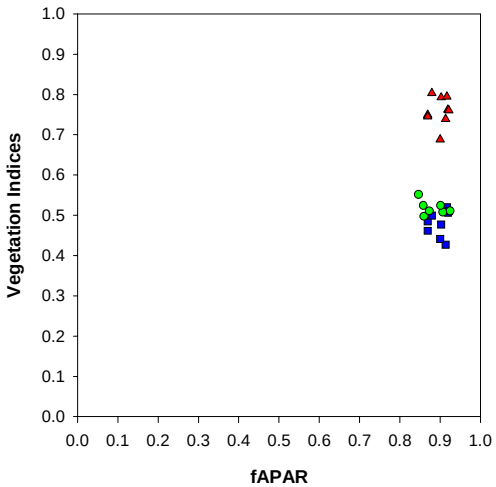
Yoke-based Exotech at Konza (7/99)

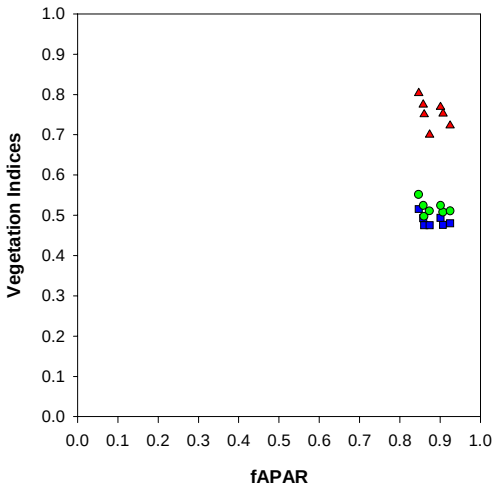
KONZA Summary Chart (7/99)

The Konza grassland Experiment (07/11/99 to 07/15/99) Summary Informatio Related to the Ground Exotech Measurements								
DOY	Exotech	# Transects	Acquisition Time	Solar Zenith	Reflectance(mean)			
					Blue band	Green band	Red band	NIR band
192_East	3570	1-250m to 0m	8.29-8.31	65	0.0334	0.0678	0.0482	0.3961
		2-250m to 0m	8.55-9.02	59	0.0332	0.0656	0.0458	0.3883
		3- 1 km to 0 m	8.56-10.30	48	0.0315	0.0627	0.0439	0.3874
192_West	3526	1-250m to 0m	8.24-8.29	65	0.03255	0.1429	0.0325	0.4226
		2-250m to 0m	8.57-9.03	59	0.0301	0.1263	0.0316	0.412
		3-250m to 0m	9.28-9.36	53	0.0223	0.1138	0.0313	0.4052
		4-250m to 0m	9.53-9.59	48	0.0275	0.1105	0.032	0.4223
		5-250m to 0m	10.27-10.33	42	0.0278	0.1041	0.0314	0.4111
		6-250m to 0m	11.10-11.16	36	0.0298	0.1656	0.0274	0.4422
193_east	3570	1-250m to 0m	8.39-8.45	65	0.0319	0.0683	0.05	0.396
		2-250m to 0m	8.59-9.05	59	0.0322	0.063	0.049	0.3641
		3-500m to 0m	11.18-11.38	36	0.0322	0.0605	0.0489	0.3608
194_East	3570	1-1km to 0m	8.28-9.09	65	0.0316	0.0632	0.0463	0.3946
		2-0m to 1 km	9.14-10.17	59	0.0328	0.0649	0.0484	0.3977
		3-1km to 0m	10.21-10.49	48	0.0316	0.0593	0.0454	0.3621
		4-0m to 500m	10.53-11.09	42	0.0342	0.0648	0.0504	0.3648
		5-500m to 0m	11.16-11.33	36	0.0329	0.0607	0.0485	0.3477
195_East	3570	1-1kmto 0m	8.42-9.11	65	0.03208	0.0652	0.0507	0.3993
		2-0m to 1km	9.15-9.54	60	0.0323	0.0674	0.0519	0.4008
		3-1kmto 0m	10.33-10.57	42	0.0327	0.0633	0.051	0.3715
		4-0m to 1km	11.01-11.39	36	0.0324	0.0635	0.0513	0.3681

DOY 194 - fAPAR vs. “MODIS” Vegetation Indices







Solar zenith angles

Reflectance: ~ 65º
fAPAR: 65.63-54.04º

Reflectance: ~ 48º
fAPAR: 36.08-54.04º

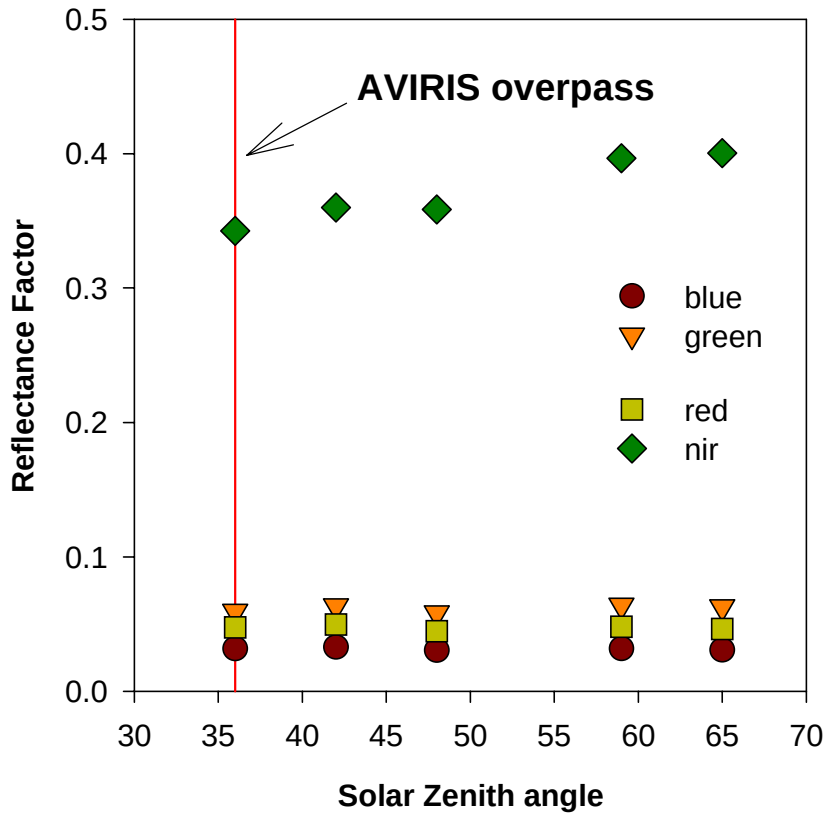
Reflectance: ~ 36º
fAPAR: 36.08-26.3º

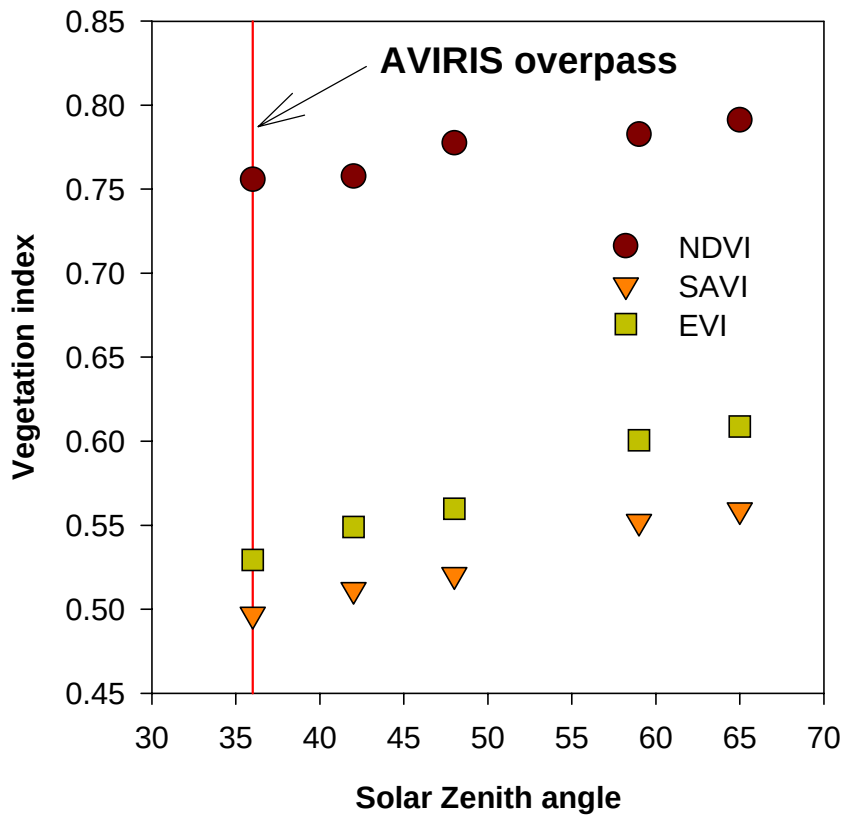
The Konza Grassland Experiment (07/11/99 to 07/15/99)

Summary Information Related to the fAPAR measurements

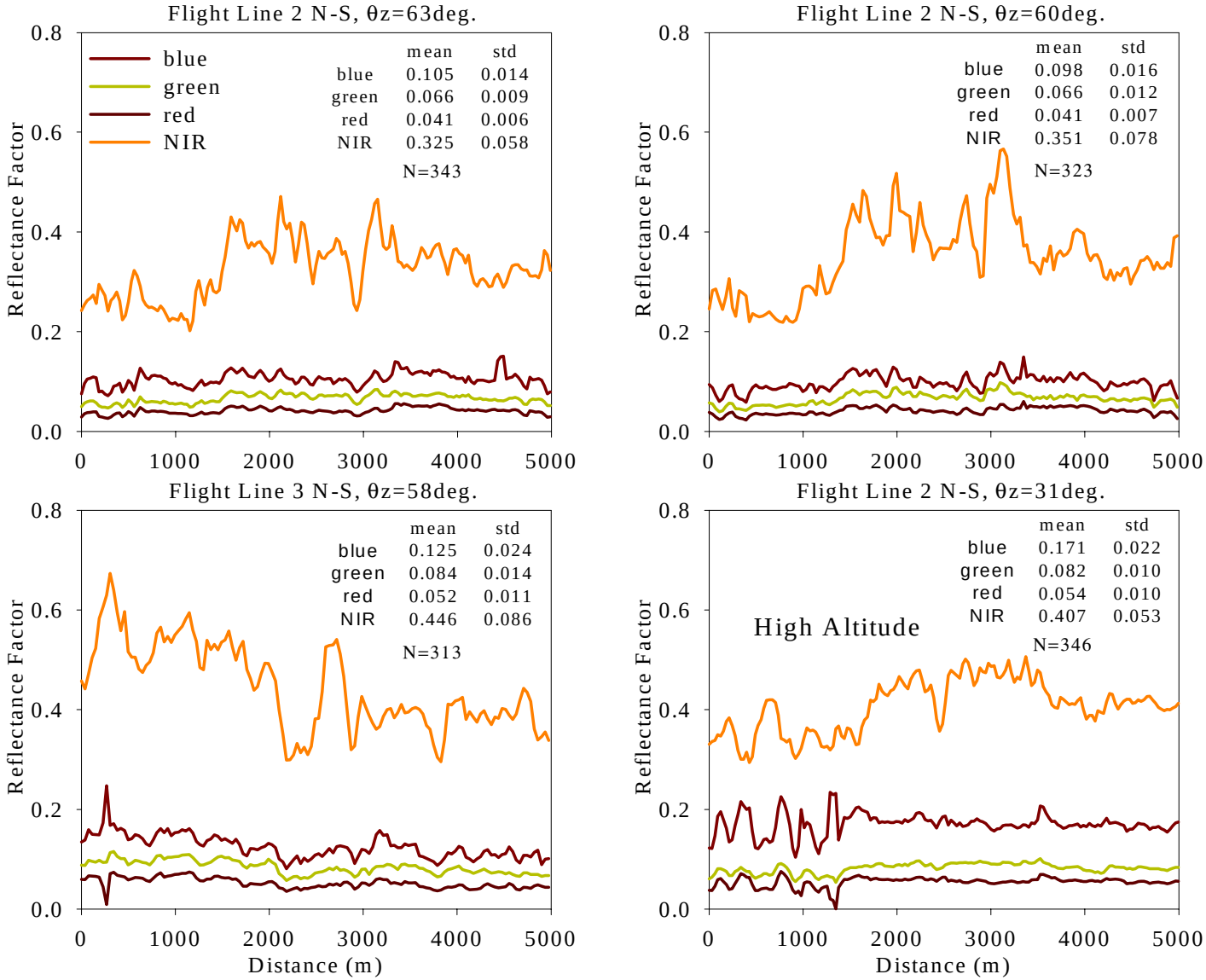
DOY	Field Conditions	Field Characteristics	Background	# Transects	~ Solar Zenith	fAPAR (Mean & St. Dev.)
North - South Transects						
192	clear sky (~ 10:30); very wet grass;	2 years burning (east side)	dark soil	1km transect #1 - 250m to 0m; #2 - 250m to 0m; #3 - 1km to 0m;	#1 - 65.42; #2 - 59.65; #3 - 36.59 - 31.13;	#1 - 0.9035, 0.0113; #2 - 0.9123, 0.0081; #3 - 0.9112, 0.0191;
192	clear sky (~ 10:30); very wet grass;	1 year burning (west side)	dark soil	250m transect #1 - 250m to 0m; #2 - 250m to 0m; #3 - 250m to 0m; #4 - 250m to 0m; #5 - 250m to 0m;	#1 - 65.42; #2 - 59.65; #3 - 53.83; #4 - 48.02; #5 - 42.25;	#1 - 0.7938, 0.0743; #2 - 0.7908, 0.0547; #3 - 0.7574, 0.0654; #4 - 0.7109, 0.0847; #5 - 0.6230, 0.1095;
193	cloudy sky; very wet grass;	2 years burning (east side)	dark soil	1km transect #1 - 250m to 0m; #2 - 250m to 0m; #3 - 500m to 0m;	#1 - 59.75; #2 - 59.75; #3 - 31.24;	#1 - 0.8918, 0.0157; #2 - 0.8932, 0.0135; #3 - 0.8030, 0.1503;
194	very clear sky; moderate wind (S to N); dry grass;	2 years burning (east side)	dark soil	1km transect #1 - 1km to 0m; #2 - 0m to 1km; #3 - 1km to 0m;	#1 - 65.63 - 54.04; #2 - 54.04 - 36.08; #3 - 36.08 - 26.3;	#1 - 0.9039, 0.0124; #2 - 0.8999, 0.0228; #3 - 0.8885, 0.0300;
195	slightly cloudy sky; moderate wind (S to N); dry grass;	2 years burning (east side)	litter mat	1km transect #1 - 1km to 0m; #2 - 1km to 0m;	#1 - 65.73 - 54.14; #2 - 42.57 - 31.48;	#1 - 0.8874, 0.0240; #2 - 0.8678, 0.0373;
195	slightly cloudy sky; moderate wind (S to N); dry grass;	2 years burning (east side) and 1 year burning (west side)	litter mat (2 years); dark soil (1 year);	JPL "Parabolas" 2 years: 5 "poles"; 1 year: 7 "poles";	#1 - 26.42; #2 - 26.42 - 22.05;	#1 - 0.8873, 0.0066; #2 - 0.7037, 0.0318;

DOY 194. Mean ground Exotech reflectance factors and VI vs. SZA

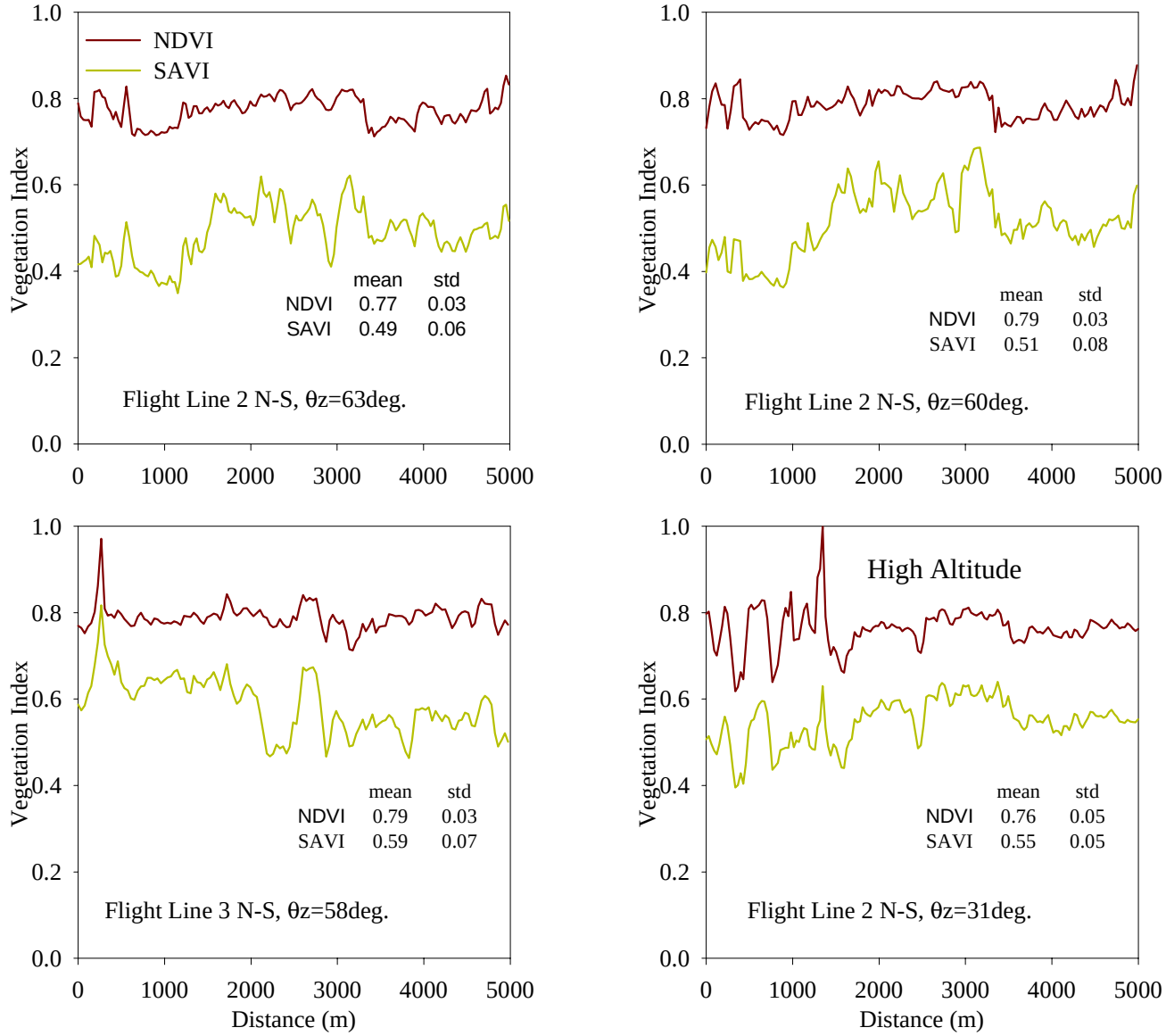




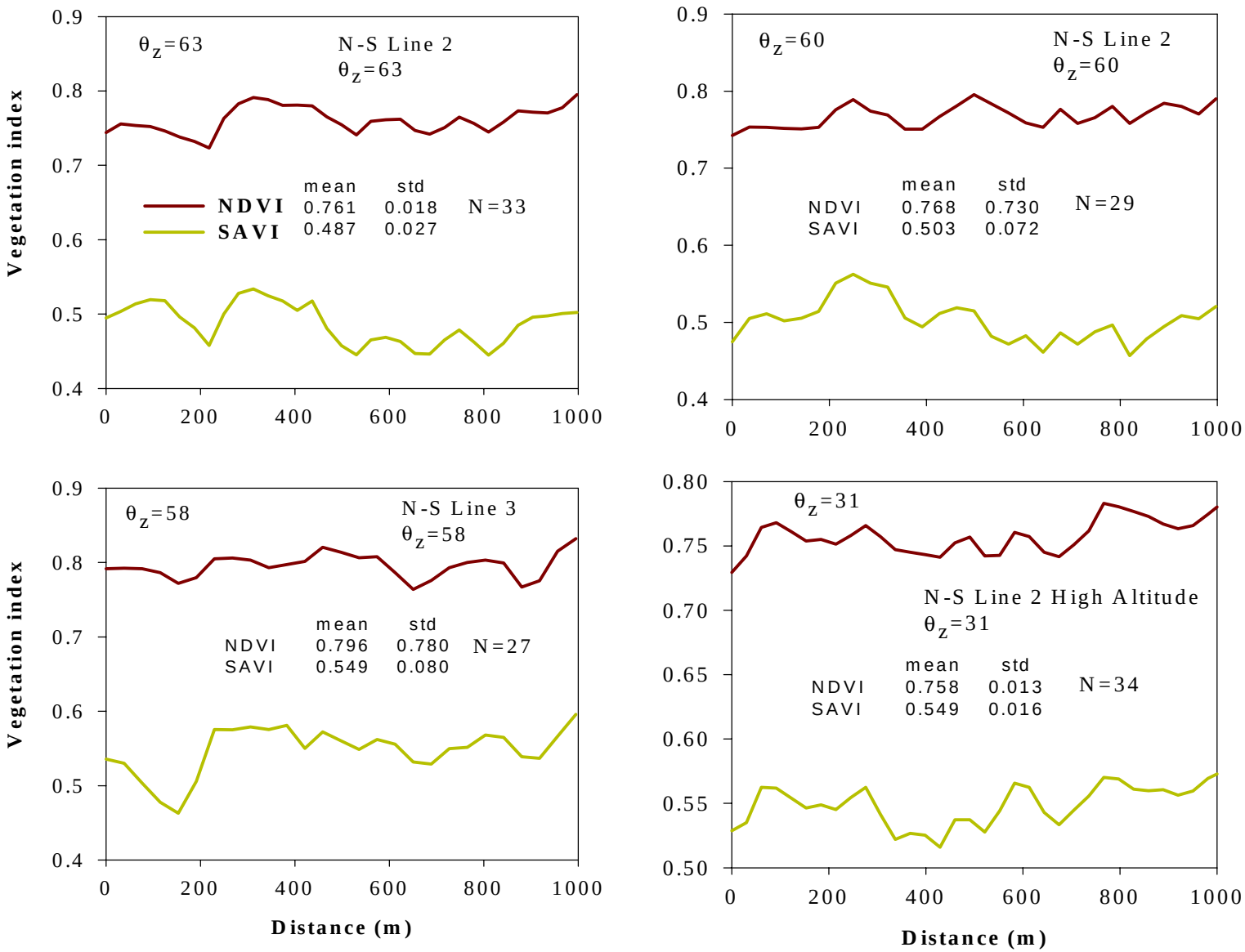
DOY 195. Airplane Exotech Reflectance Factors (relative distance from 0-5 km)



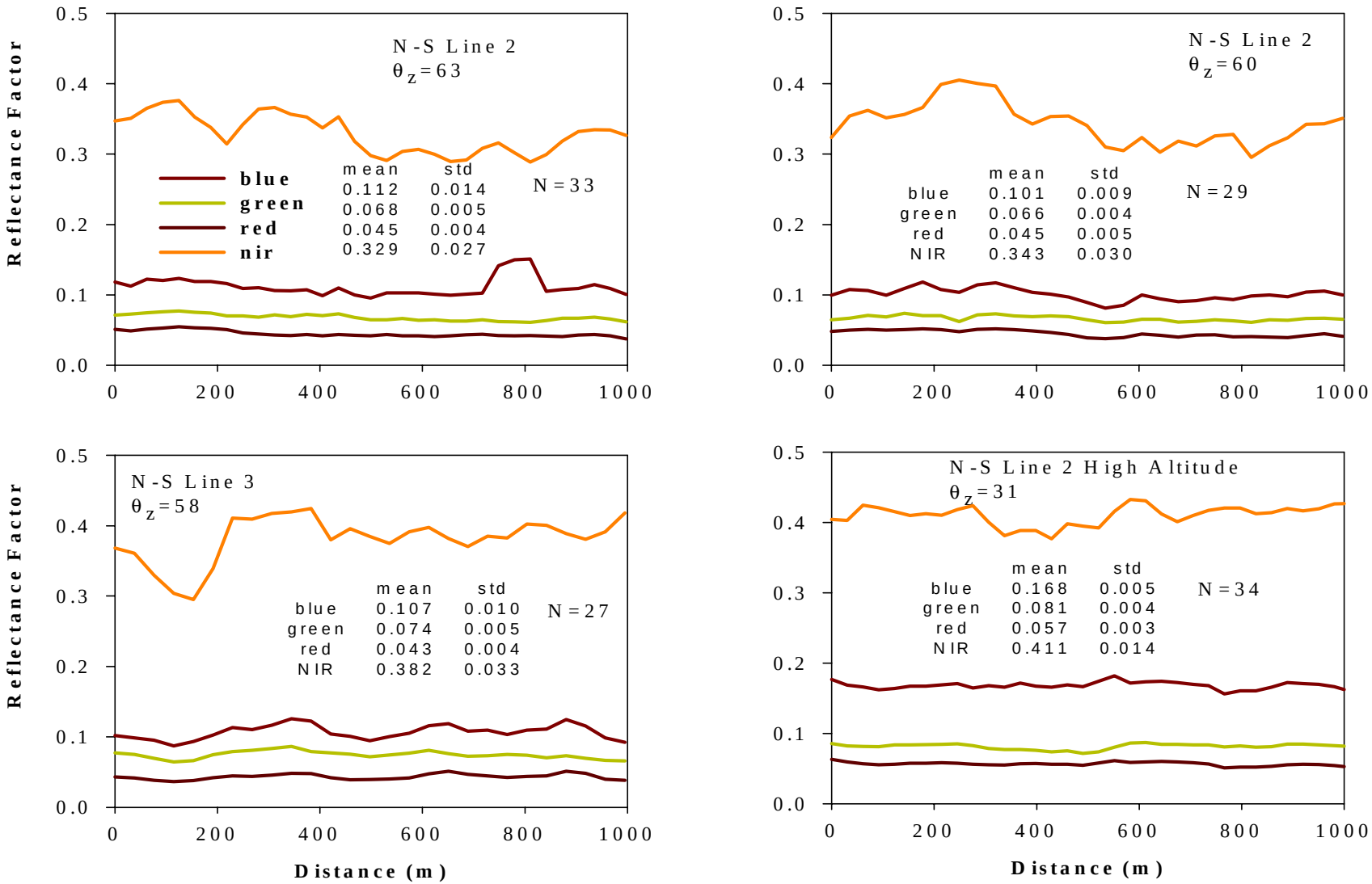
DOY 195. Airplane Exotech Vegetation Indices (relative distance from 0-5 km)



DOY 195. Airplane Exotech Vegetation Indices (relative distance 0 to 1 km)



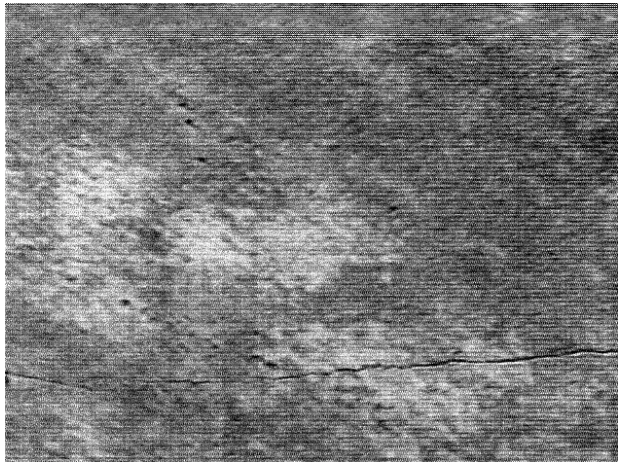
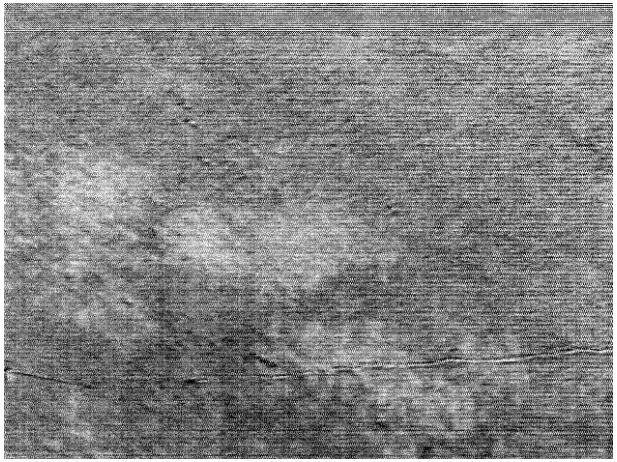
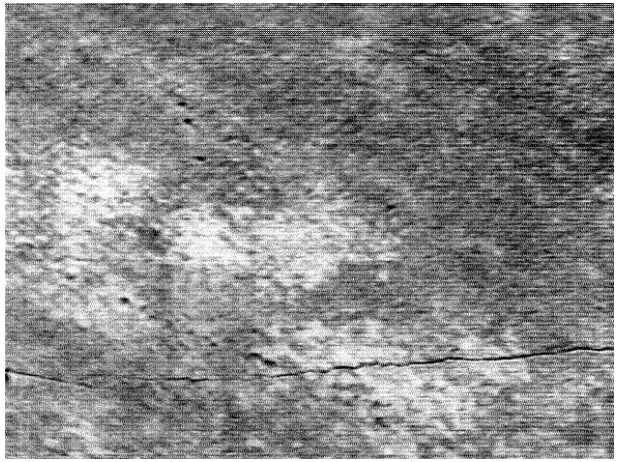
DOY 195. Airplane Exotech reflectance factors (relative distance 0 to 1 km)



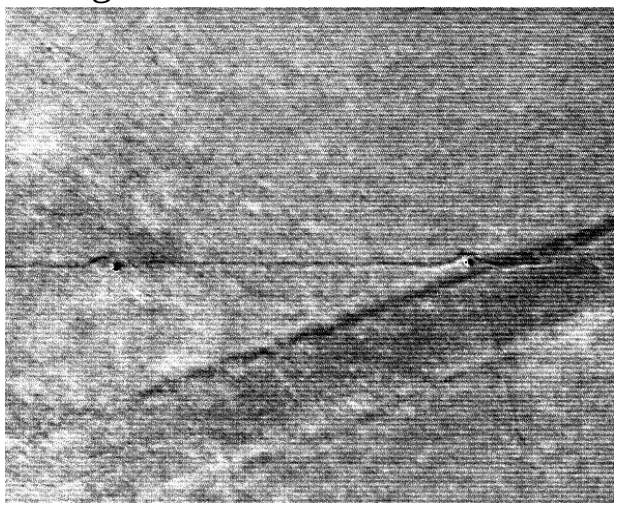
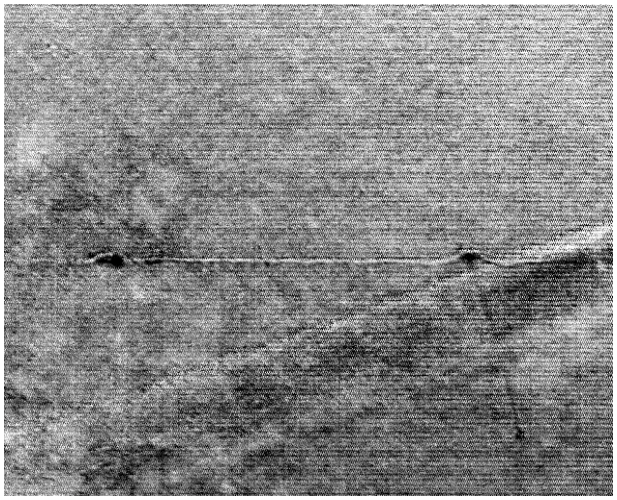
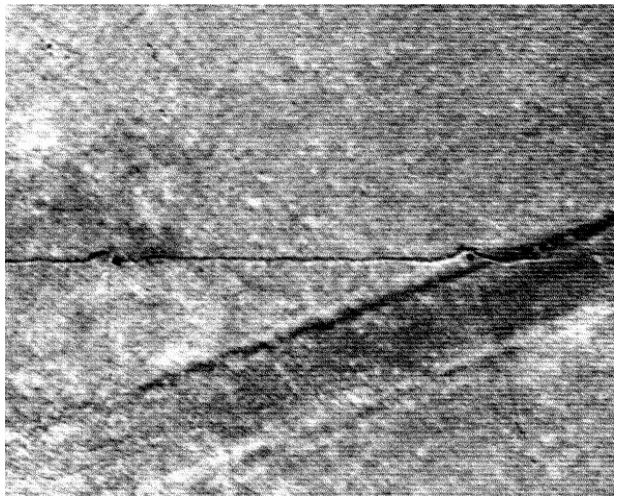
Flight Path N-S: Images 101 and 102
Images of VIs (3)

EVI NDVI SAVI

Images at NS1-01

Images at NS1-02

Comparison Dycam/Exotech data
Konza field experiment

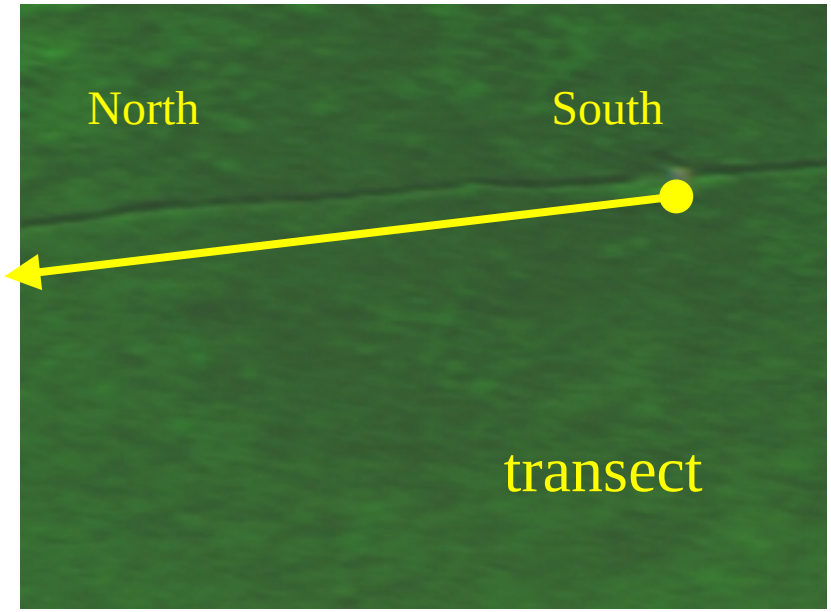
PROCEDURE:

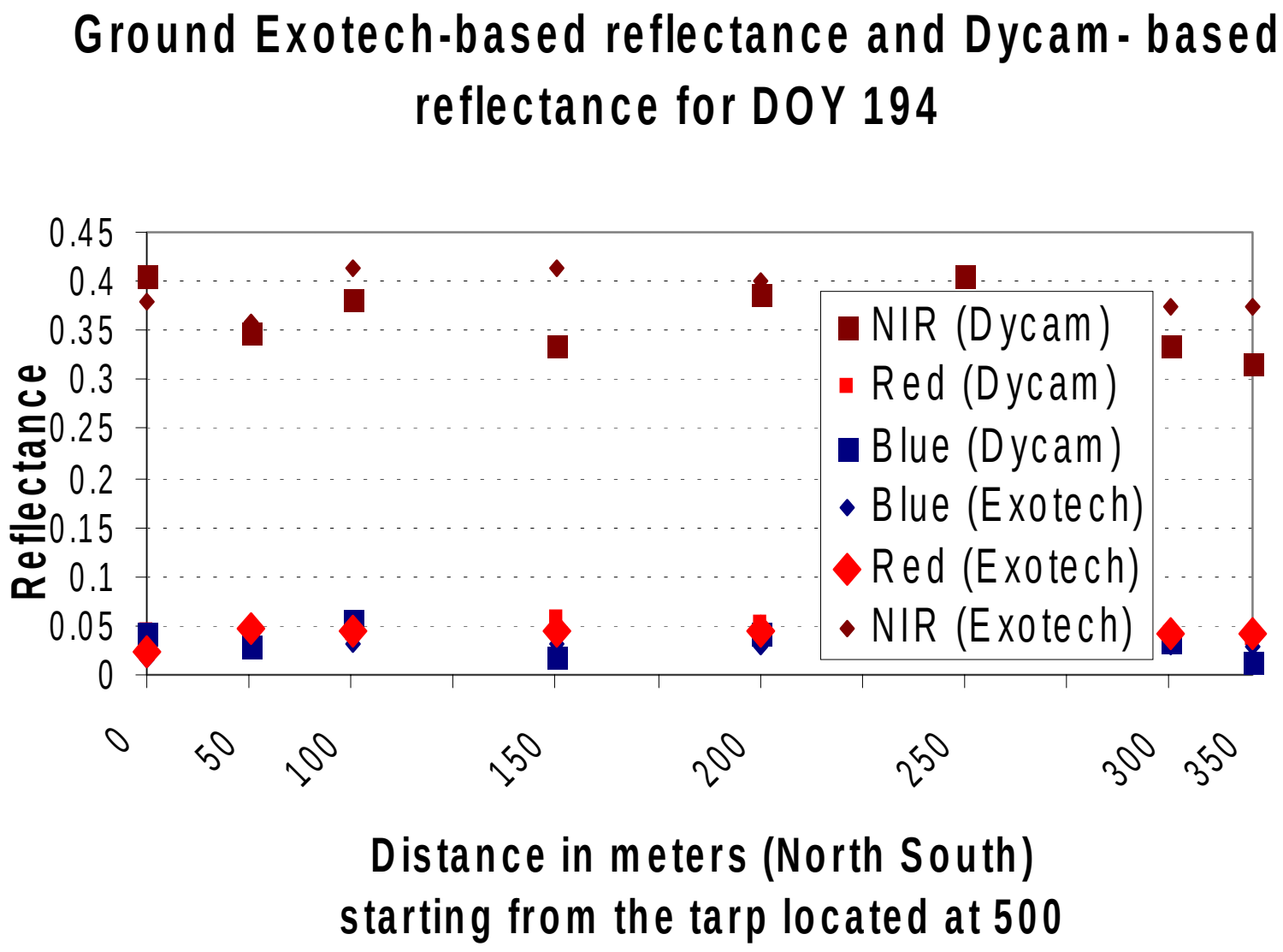
•Compute Exotech reflectance for the transect

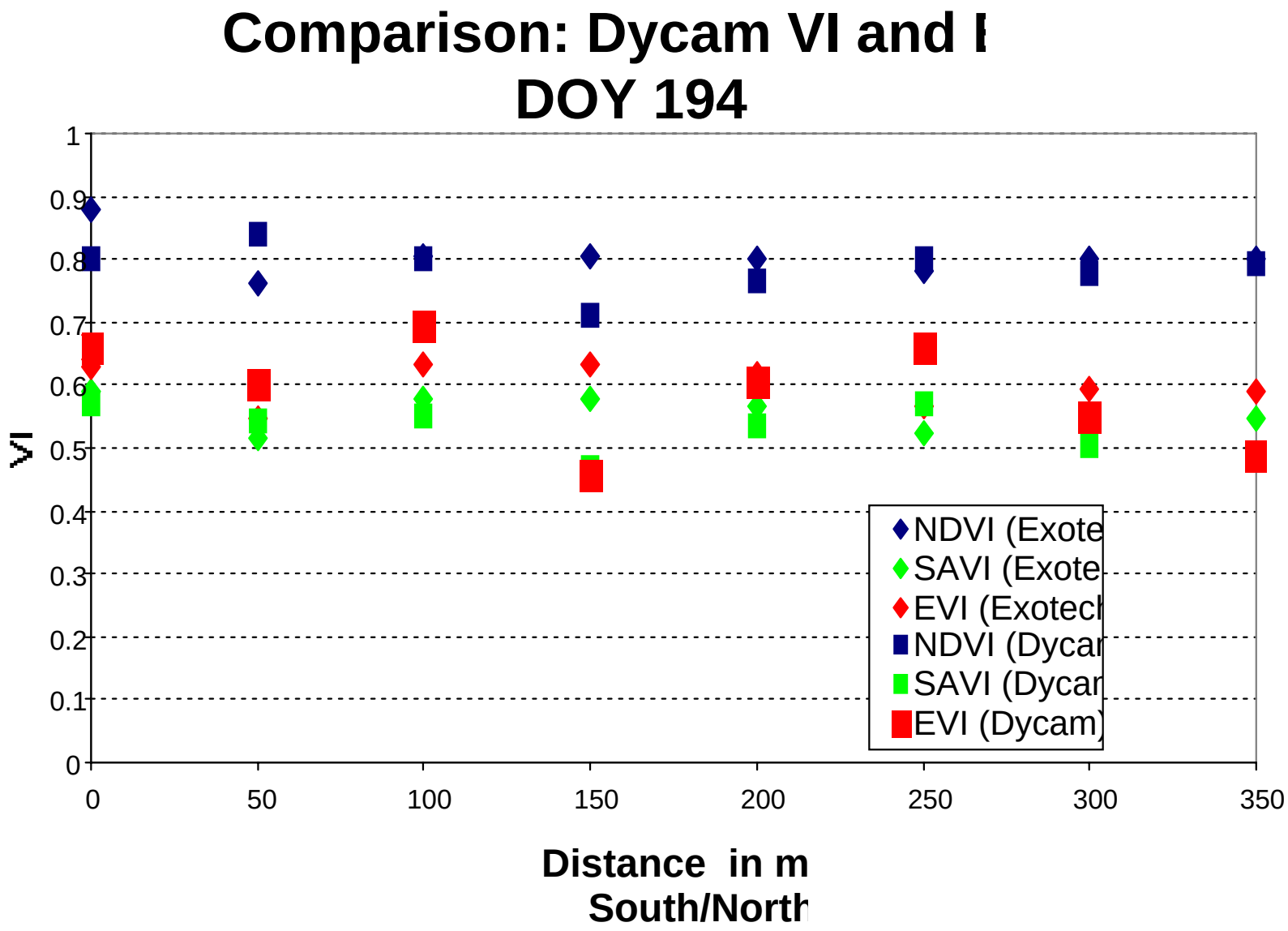
•Convert Dycam data into reflectance for the same transect, same zenith angle

•Compute Vegetation indices

•Plot results




Ground Exotech-based reflectance and Dycam- based reflectance for DOY 194
Reflectance
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
50
100
150
200
250
300
350
NIR (Dycam)
Red (Dycam)
Blue (Dycam)
Blue (Exotech)
Red (Exotech)
NIR (Exotech)
Distance in meters (North South)
starting from the tarp located at 500


Comparison: Dycam VI and I
DOY 194
VI
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
50
100
150
200
250
300
350
NDVI (Exote
SAVI (Exote
EVI (Exotech
NDVI (Dycar
SAVI (Dycar
EVI (Dycam)
Distance in m
South/North

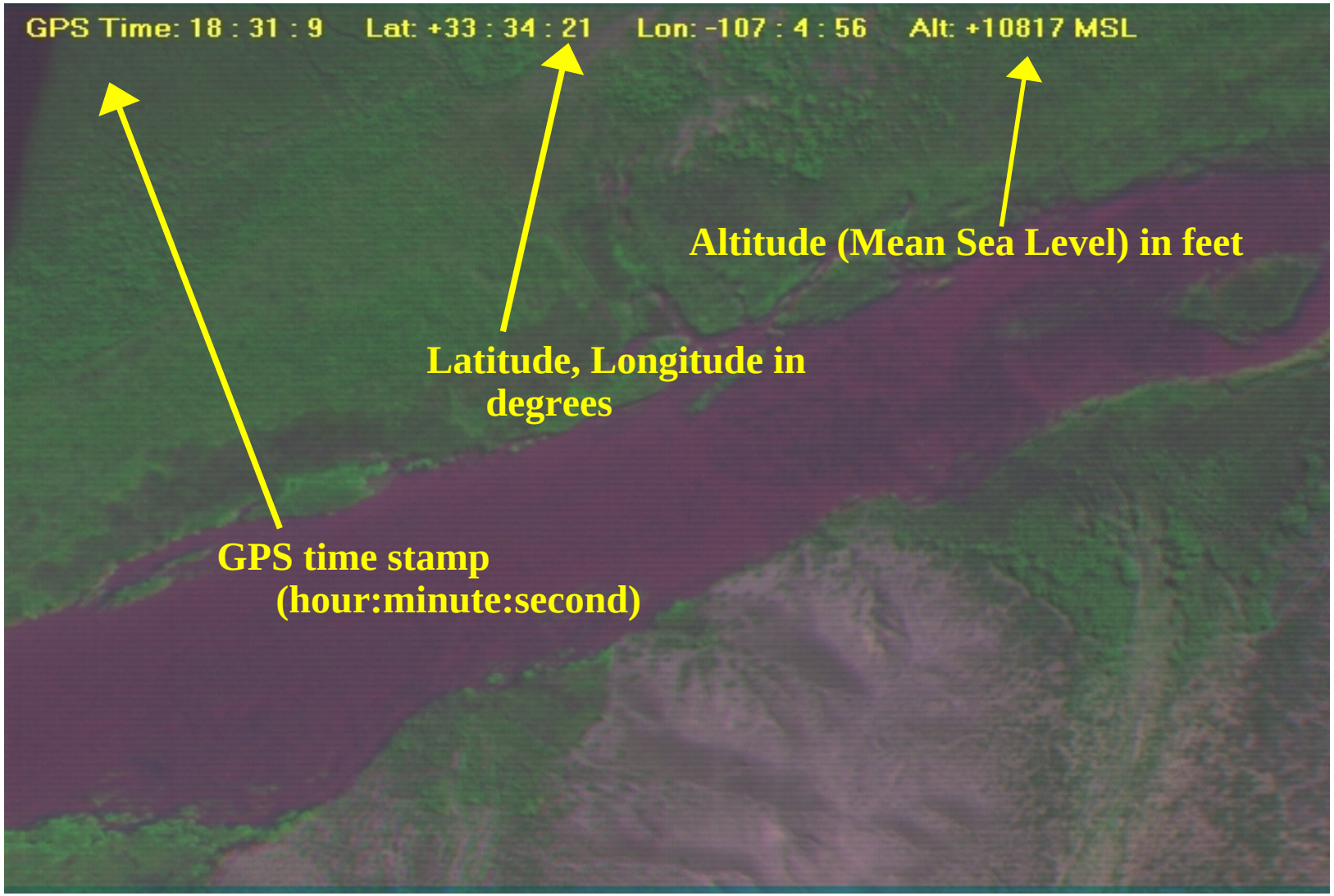
Summary (Konza)

Average values along the South-North transect for DOY 194, solar zenith angle 60°

	Blue band	Red band	NIR band	NDVI	SAVI	EVI
Dycam (Average)	0.0342	0.0436	0.365	0.80	0.55	0.60
Exotech (Average)	0.0280	0.0418	0.384	0.79	0.53	0.59
Absolute Difference	**0.0061**	**0.0018**	**0.020**	**0.02**	**0.03**	**0.01**

Dycam GPS upgrade

- GPS coordinates: Latitude/Longitude
- GPS time stamp: HH:MM:SS
- Altitude

Ability to match Dycam reflectance based data with Exotech based reflectances

La Jornada field experiment
September 28th