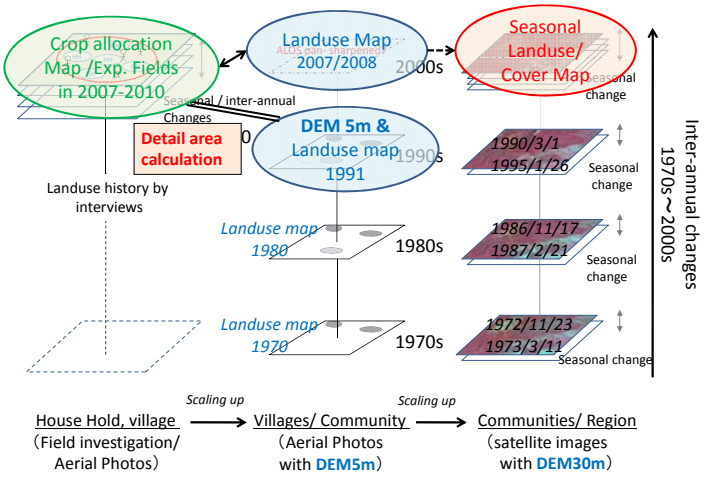
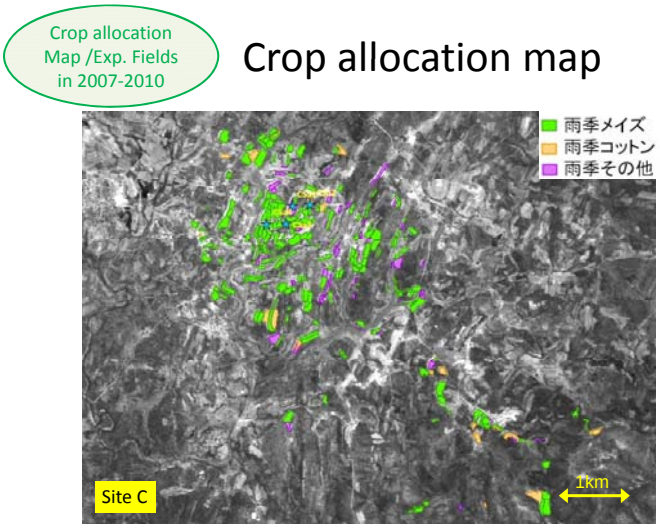
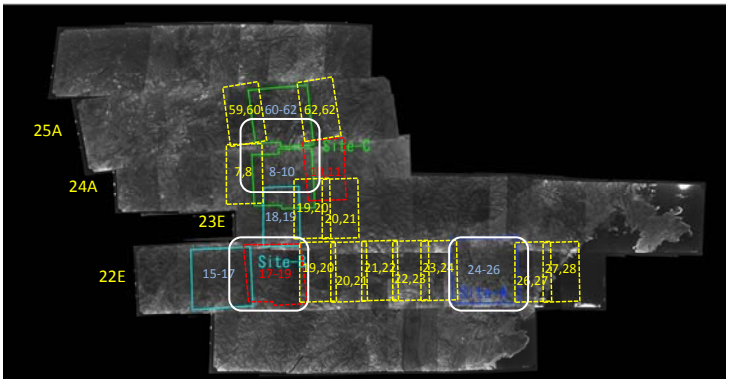
Research plan in FY2010



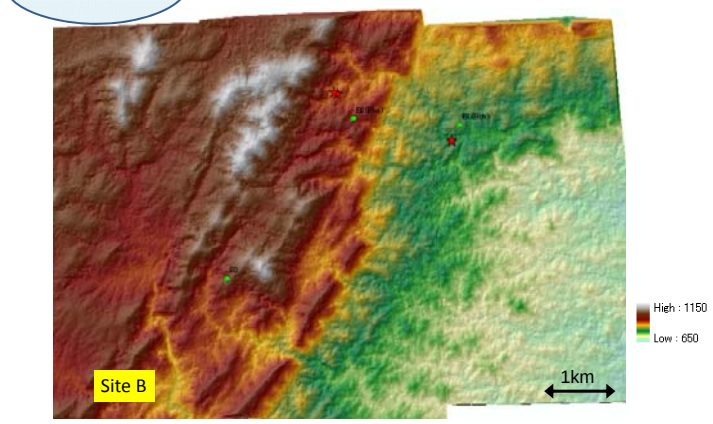
Crop allocation map



Area of Ortho and DEM by Aerial Photos 1991

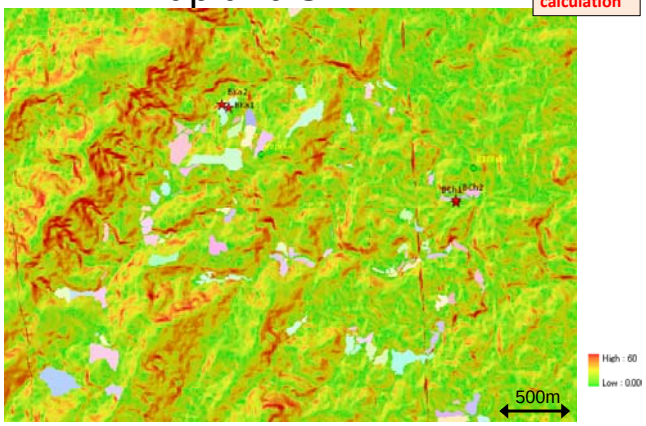


Digital Elevation Model with 5m grid size by aerial photos



Topographical analysis using crop map and 5m DEM

Detail area calculation



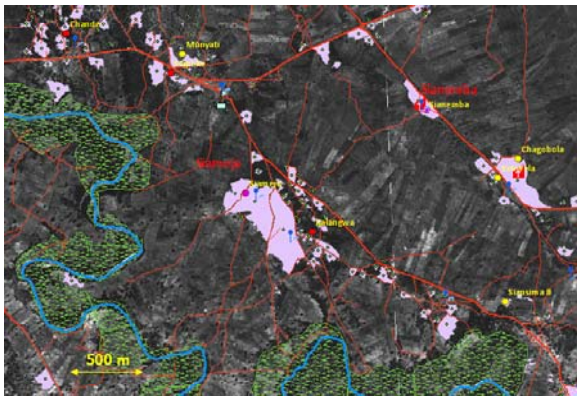
Detail area calculation

NAME of GPS data	Crop1	household	AREA (proj.)	θ :MEAN (slope)	MIN (slope)	MAX (slope)	STD (slope)	Area * 1/cos θ unit (m^2)
RM BCh10 080624M7-1	RM	BCh10	9193.7	10.21	0.00	32.31	7.36	9341.6
RM BCh10 080624M7-2	RM	BCh10	1181.0	13.10	0.00	21.80	5.41	1212.5
RM BCh10 080624M7-4	RM	BCh10	6910.7	8.52	0.00	29.50	6.76	6987.9
RM BCh10 080624M7-5	RM	BCh10	20810.6	11.53	0.00	45.14	7.17	21239.0
RM BCh10 080624M7-7	RM	BCh10	3420.7	13.66	0.00	28.30	5.16	3520.2
RM BCh11 080626M7-2	RM	BCh11	1390.0	15.93	0.00	29.69	6.20	1445.5
RM BCh11 080626M7-4	RM	BCh11	386.1	19.71	0.00	32.31	6.27	410.1
RM BCh11 080626M7-5	RM	BCh11	6506.9	19.38	0.00	31.31	5.22	6897.7
RM BCh11 080626M7-6	RM	BCh11	2608.4	12.54	0.00	22.99	5.79	2672.2
RM BCh11 080626M7-7	RM	BCh11	4875.3	10.77	0.00	21.80	5.02	4962.8
RM BCh11 080626M7-8	RM	BCh11	13118.6	15.07	0.00	50.29	8.11	13585.8
RM BCh12 080702M7-3	RM	BCh12	6426.2	13.64	0.00	31.31	7.21	6612.5
RM BCh14 080716M7-1	RM	BCh14	6810.4	15.65	0.00	29.69	6.70	7072.7
RM BCh14 080716M7-2	RM	BCh14	2904.4	6.33	0.00	19.83	5.38	2922.2
RM BCh14 080716M7-3	RM	BCh14	14956.9	13.90	0.00	39.51	7.32	15408.4
RM BCh14 080716M8-2	RM	BCh14	4947.2	18.08	0.00	31.31	6.02	5204.1
RM BCh14 080716M8-4	RM	BCh14	7567.9	13.60	0.00	29.50	5.63	7786.2
RM BCh14 080716M8-5	RM	BCh14	12757.9	9.50	0.00	31.31	6.83	12935.3
RM BCh15 080722M8-2	RM	BCh15	2238.1	12.48	0.00	32.31	8.98	2292.2
RM BCh15 080722M8-3	RM	BCh15	615.8	16.09	0.00	24.09	5.49	640.8
RM BCh15 080722M8-4	RM	BCh15	491.5	9.07	0.00	17.55	4.54	497.7

Calculation of the detail crop area by considering with slope using 5m DEM to understand **the situation of household's crop production**

Landuse map 1991

Ortho aerial Photos (siteA)

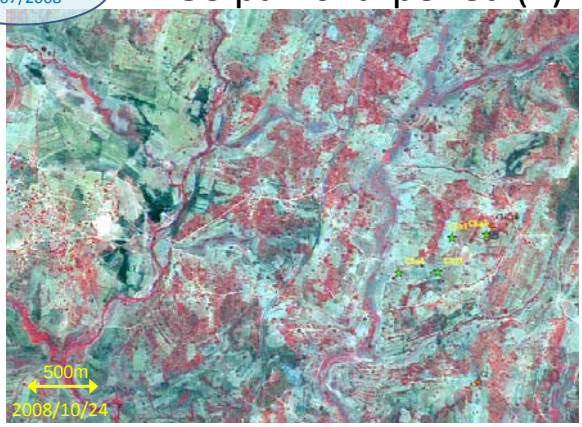


by Masako M.

Mapping work is still continuing.

Landuse Map 2007/2008

ALOS pan-sharpened (2)



Cropland, Forest, Bush and Settlement can be detected **by visual interpretation** in Site A, B and C.

Multi-temporal satellite images

Geometric correction for **ASTER images** completed.

1. Topographic correction also will be done for those images (Minnaert method)
2. Trying to classify by unsupervised / supervised classification and NDVI for selected two ASTER images using ground truth data (miyazaki-san)
3. Validation of trial classification results
4. Classify landuse/cover classes for all ASTER images

Sensor	Obs. Date	Season	Remarks	Geometric corr.
ETM	2001/8/30	Dry		
ETM	2001/10/1	end of Dry		
ETM	2001/12/20	Rainy		OK
ASTER	2002/2/6	Rainy		OK
ETM	2002/2/22	Rainy		
ETM	2002/5/13	Harvesting		
ETM	2002/8/17	Dry		
ETM	2002/10/20	end of Dry		
ETM	2002/11/21	Beginning of Rainy		
ASTER	2002/11/21	Dry to Rainy		OK
ASTER	2003/4/30	end of Rainy	a lettle of Clouds	OK
ASTER	2003/6/1	after Harvest		OK
ASTER	2003/7/3	Dry		OK
ASTER	2003/11/24	Dry to Rainy		OK
ASTER	2004/1/11	Rainy	Clouds 10%	OK
ASTER	2004/7/21	Dry		OK
ASTER	2004/8/22	Dry		OK
AVNIR-2	2006/9/3	dry		
AVNIR-2	2007/9/6	dry		
AVNIR-2	2007/10/22	end of dry		
AVNIR-2	2008/4/23	Harvest	Clouds 10%	
AVNIR-2	2008/6/8	end of Harvest		
AVNIR-2	2008/9/8	dry		
AVNIR-2	2008/10/24	end of dry		
AVNIR-2	2009/3/11	end of rainy	Clouds 10%	
AVNIR-2	2009/4/26	Harvest		
AVNIR-2	2009/9/11	dry		

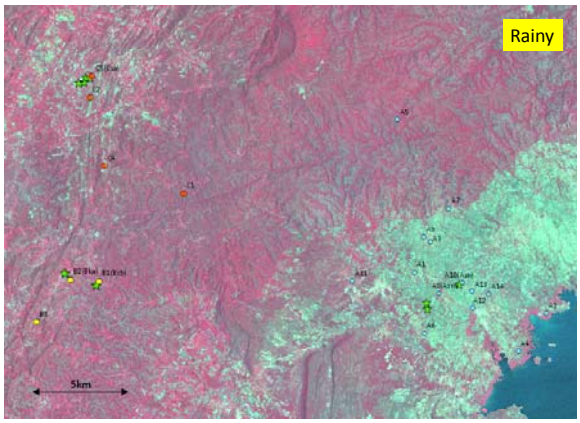
Landuse/ Cover classification

Multi-ground lavel's Land cover / Land use Classification (Ver.1)

Code			Ground resolution levels		
Aerial	ASTER	MODIS	Aerial Photo/ALOS Pan-sharpened (refer to SLCR2.0)	ASTER &Landsat	MODIS (refer to IGBP)
1	100	1000	Miombo Woodland	Forest (dense)	EVERGREEN BROADLEAF FOREST
2	100	1000	Miombo Woodland/Forest		
3	200	1000	Low Open Forest/Woodland	Forest (sparse)	
4	300	2000	Miombo Woodland And Woody Plantations	Mixed Forest and Shrub	WOODY SAVANNAS
5	300	2000	Savanna/Miombo Woodland		
6	300	3000	Low Shrub - Bushland Savanna		SAVANNAS
7	400	3000	Savanna with Cropland	Mixed Shrub and Grass	
8	400	3000	Open Miombo Woodland With Improved Grassland		
9	400	3000	Low Shrub Bushland with Cropland		
10	400	4000	Savanna/Cultivated Crops		
11	400	4000	Cropland/Woodland Savanna		CROPLAND/NATURAL VEGETATION MOSA
12	400	4000	Cropland/Miombo Woodland		
13	500	5000	Grassland/ Cropland	Grassland/ Cropland	CROPLANDS
14	600	6000	Barren Or Sparsely Vegetated	Barren / Clear land	BARREN OR SPARSELY VEGETATED
15	700	7000	Inland Water	Inland Water	WATER BODIES

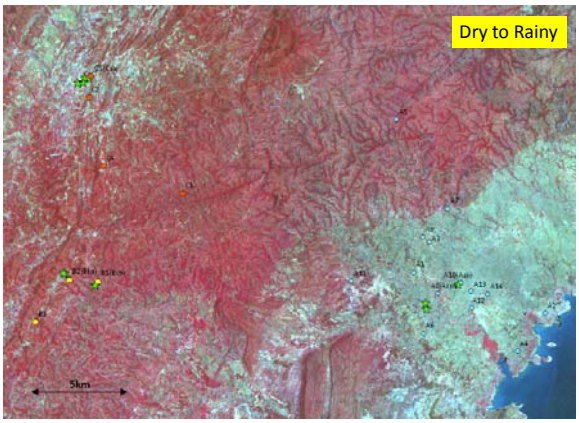
Villages/ Community level **Communities level** **District/ Province level**

Landsat/ETM image (pan-sharpened)



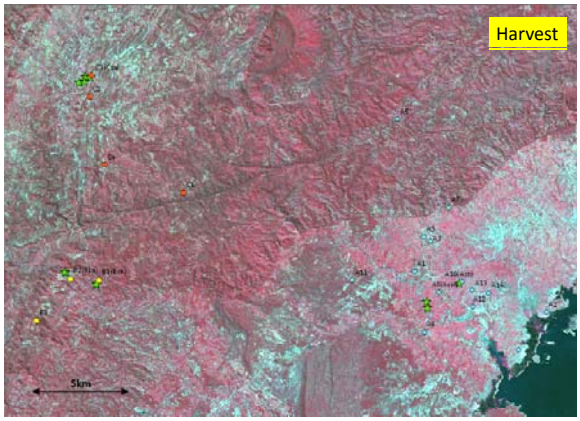
2001/12/20

Terra/ASTER image



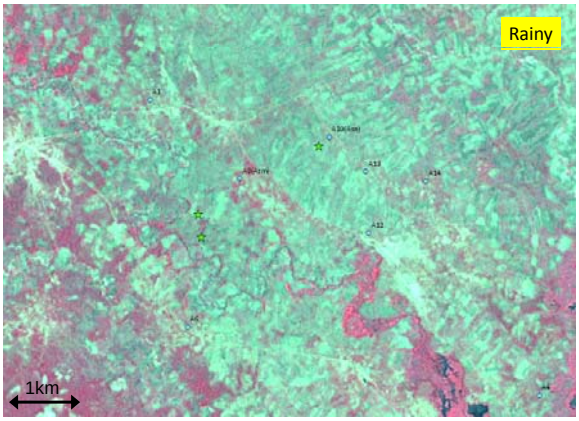
2002/11/21

ALOS/AVNIR-2 image



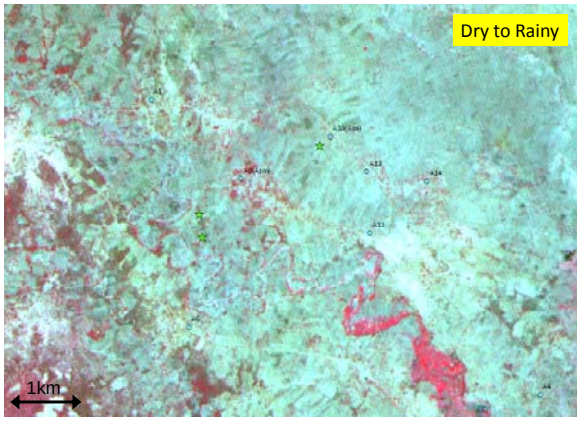
2009/04/26

Landsat/ETM image (pan-sharpened) Site A



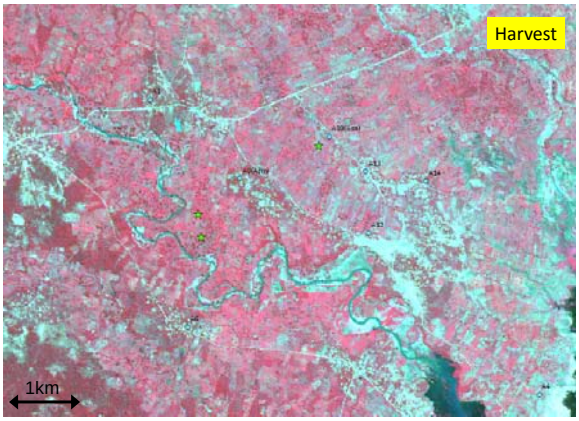
2001/12/20

Terra/ASTER image Site A



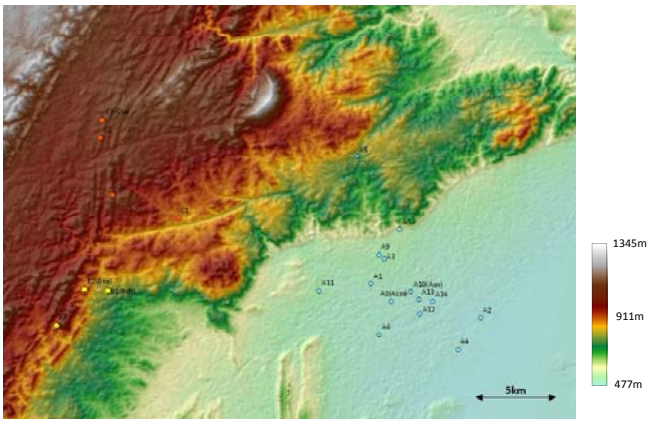
2002/11/21

ALOS/AVNIR-2 image Site A

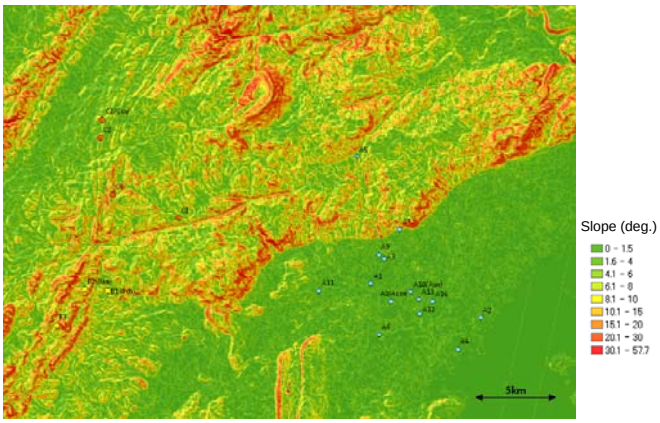


2009/04/26

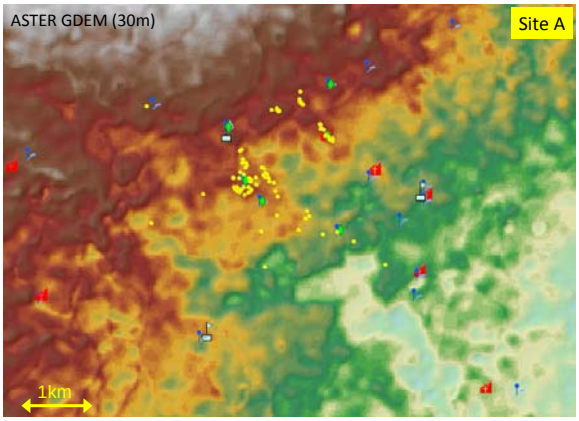
ASTER GDEM (30m)



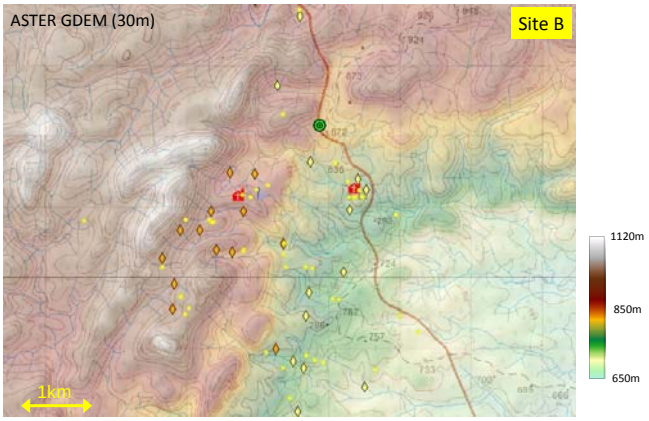
Slop class by ASTER GDEM (30m)



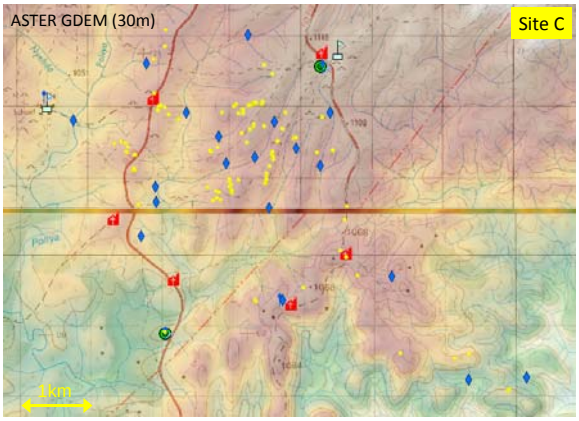
Locations of HH and Drawing water



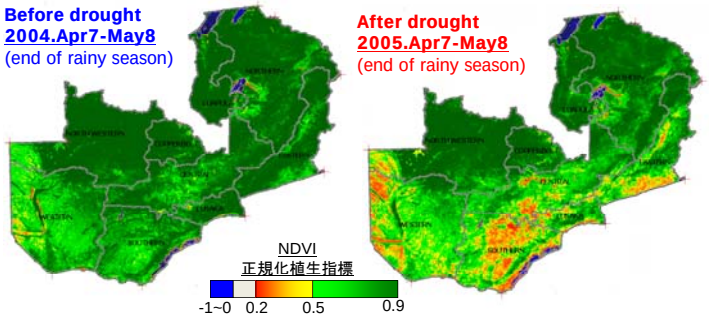
Locations of HH and Drawing water



Locations of HH and Drawing water



旱魃前後の正規化植生指標の分布
Comparison of NDVI distribution before and after drought



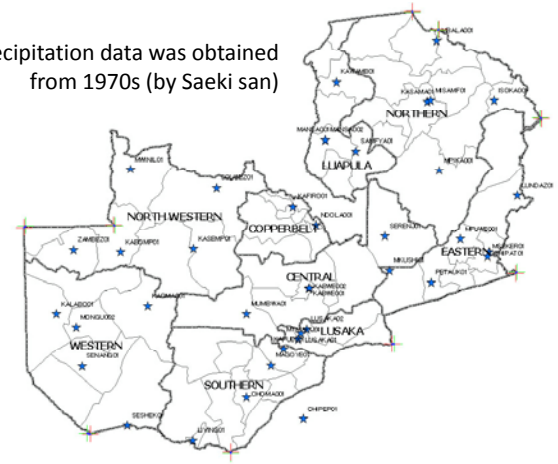
Vegetation extends through the whole area before drought.

The low values of NDVI (warm colors area) are widely shown in Southern and Eastern Provinces after drought.

This is the results of preliminary analysis using MODIS data in FY2006

Meteorological station in Zambia

Precipitation data was obtained from 1970s (by Saeki san)



今後の見通しと期待できる成果

（2009/10/30 WS）

- 世帯・村レベルでの生業調査結果より、**食料生産における脆弱性の高いor低い傾向**や**土地資源へのアクセスの利便性**を、**地形条件**から説明できるであろう。
- 現地調査結果と空中写真・衛星画像のスケールの異なる時空間データに見られる土地資源や食料生産量との関連性を導き出し、**世帯・村→近隣村落コミュニティ→地域レベルでのレジリアンス（すなわち、地域住民の生業活動）**を、**ボトムアップ式**に明らかにできるであろう。
- 地形条件をキーとして、**デジタル標高データ（DEM）の活用**により、調査対象範囲外地域の**食料生産における脆弱性の把握**や、気候変動に伴う**多雨or干ばつ年の食料生産に関するハザードマップ**を、**マルチスケール**で提示できるであろう。