



Satellite Data and Information Services

Overview & examples

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Netherlands Space Office

G4AW Space for Food Security
March 16, 2017 Yangon, Myanmar





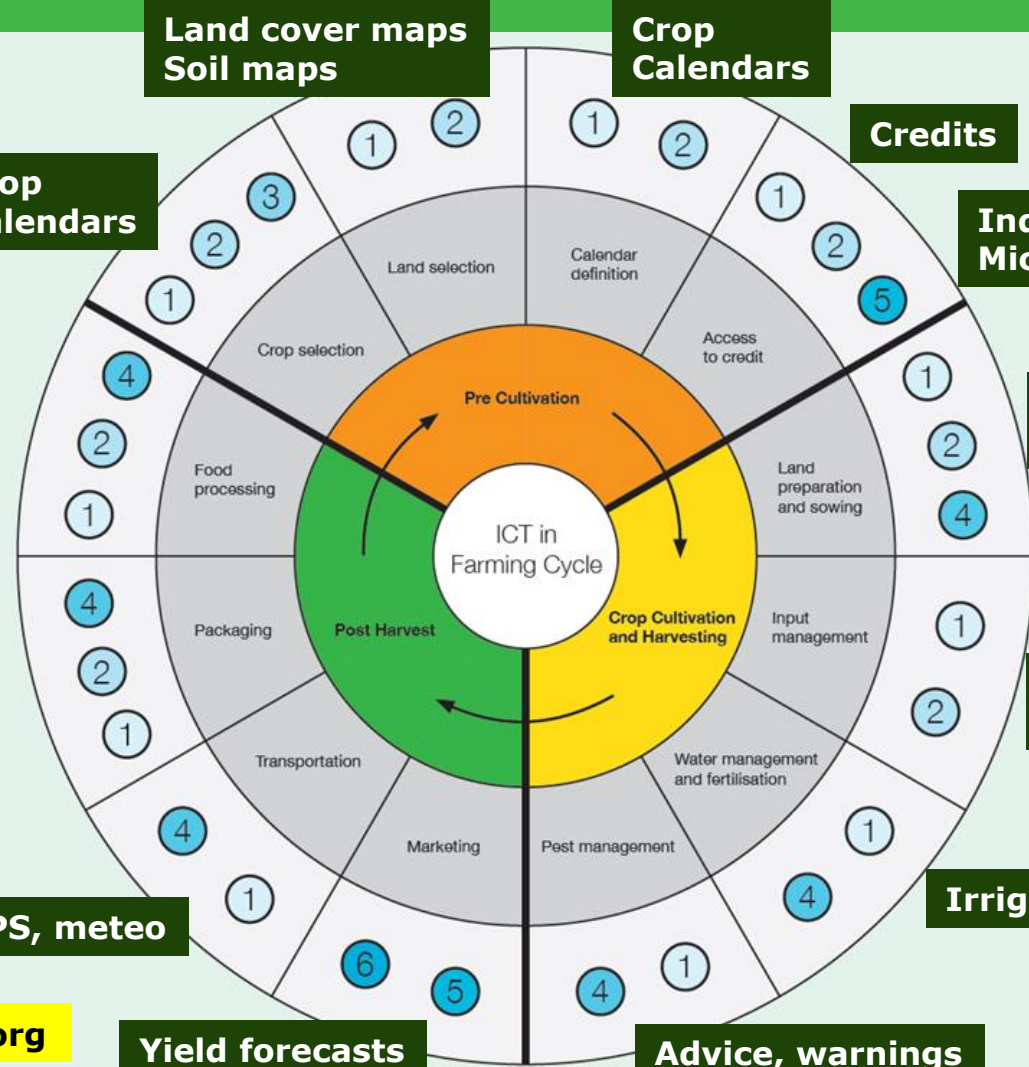
Challenge

- World population
- Food production
- Climate change

- Need: better informed decisions at farmer level



- 1 Information systems including DSS/MISS/GIS etc
- 2 ICT-enabled learning and knowledge exchange
- 3 Modelling solutions
- 4 Sensory and proximity devices
- 5 ICT-enabled networking solutions
- 6 Online commerce tools (eCommerce/mCommerce)





Agriculture related application areas



Food security

Agro business

Crops

Irrigation

Water management

Drought

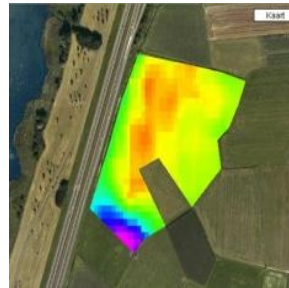
Water quality

(Integrated) satellite applications (more examples later on)

Geo-information



+



Precision farming



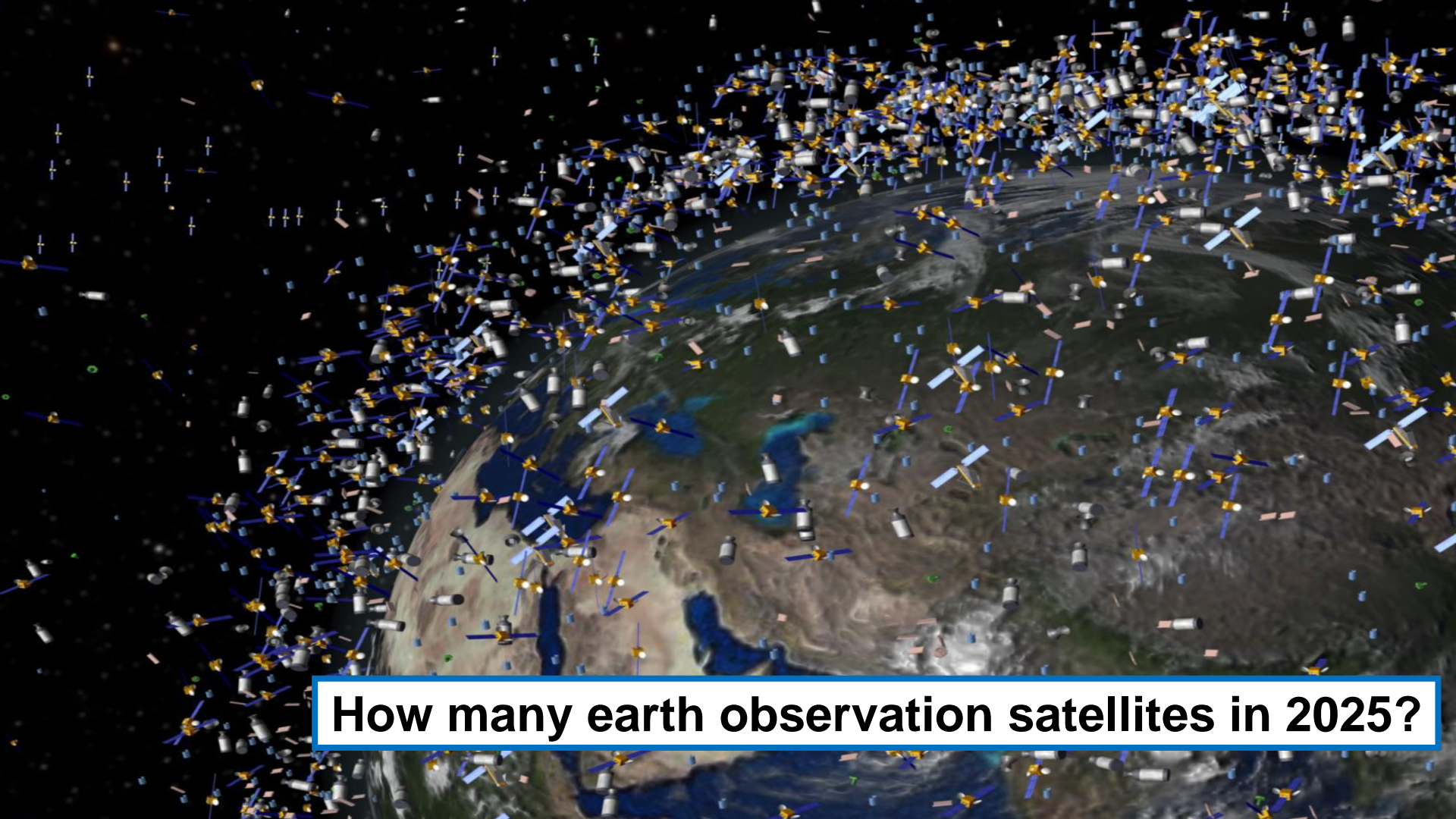
Soil moisture



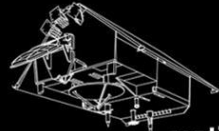
Flood risk



Crop health



How many earth observation satellites in 2025?



sentinel-6

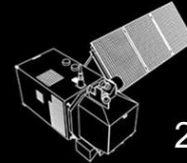


sentinel-1

2014



sentinel-5



sentinel-2

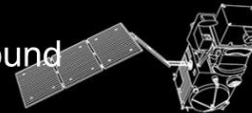
2015



sentinel-5p

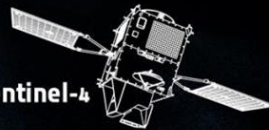
2017

Each type of satellite:
2 in space, 1 spare on ground



sentinel-3

2016



sentinel-4

2017



Land
Monitoring



Atmosphere
Monitoring



Emergency
Management



Marine
Environment



Climate

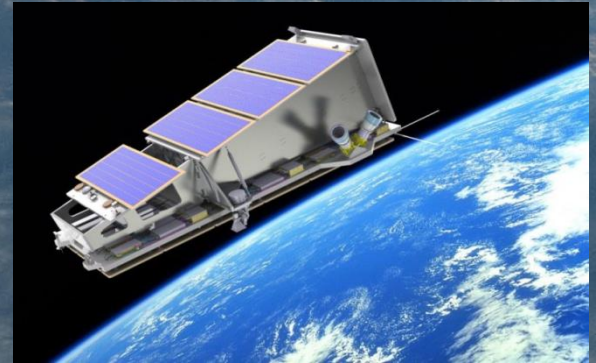
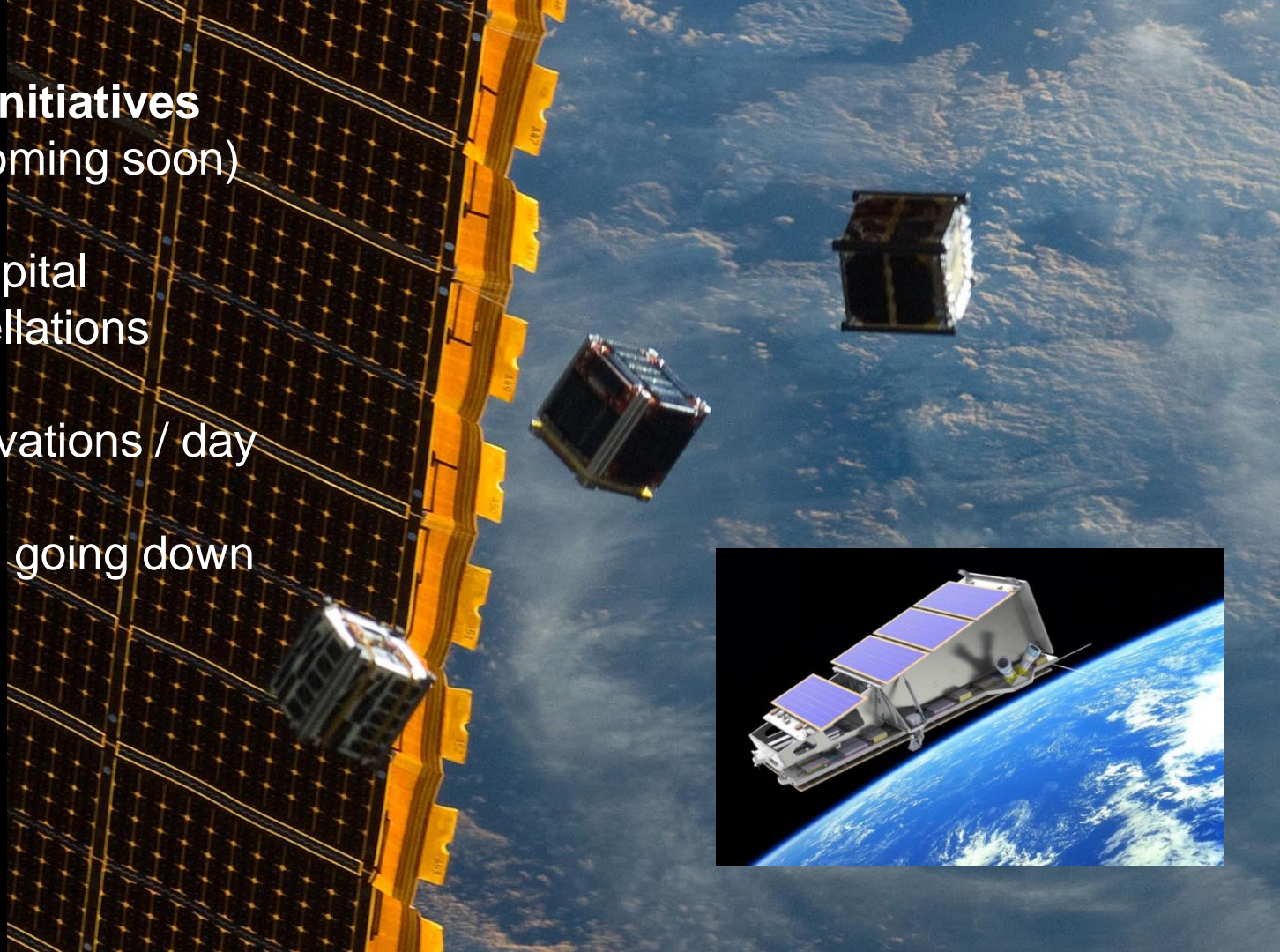


Security

- > 20 years free satellite data
- > Billion investment by "tax payer" (confirmed by BH, PWC)

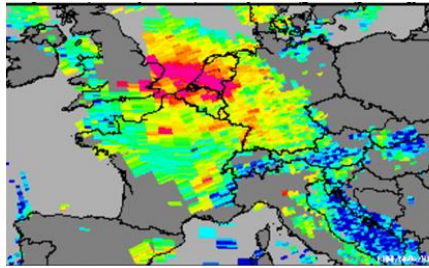
Private sector initiatives (Just arrived / coming soon)

- > 10 Venture Capital financed constellations
- > Multiple observations / day
- > Price per ha is going down

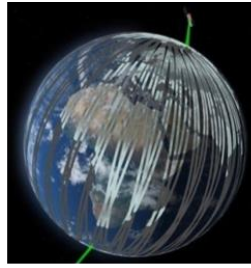




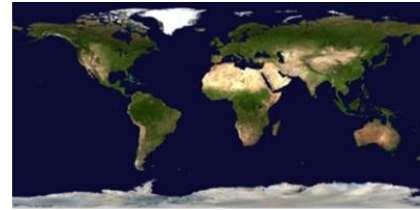
Added value of satellites



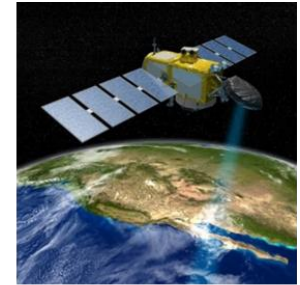
Large regions



Global coverage

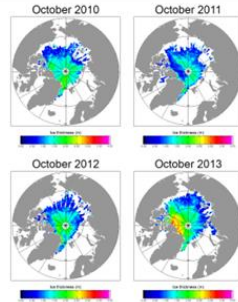


Global access



Homogeneous data

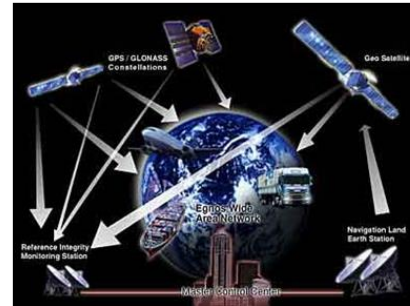
Repeated obs
Historical data



Integration



Multiple users



Near real time

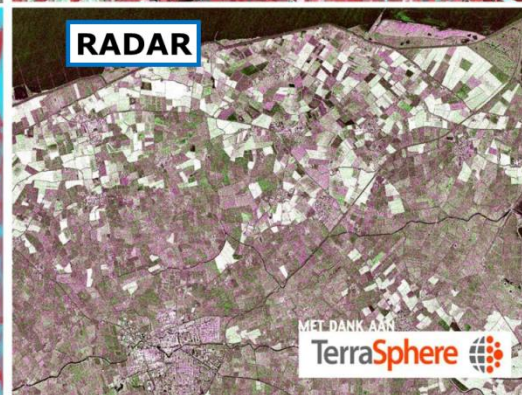
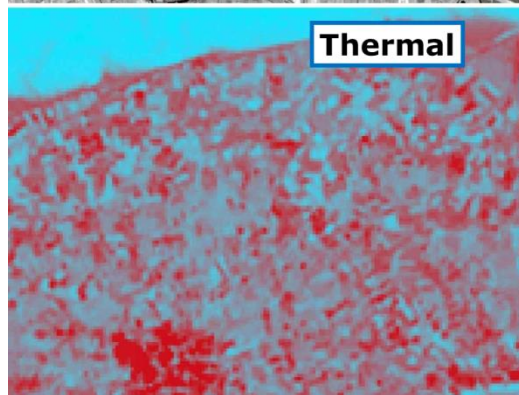
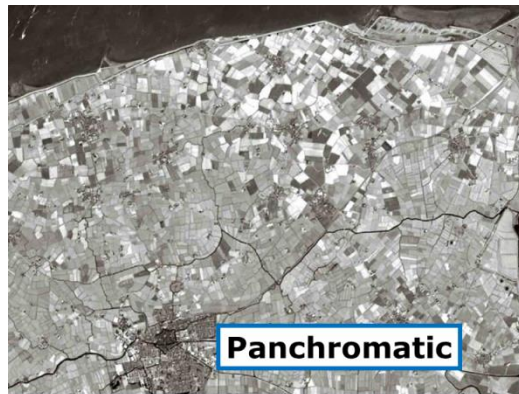




Different types of sensors

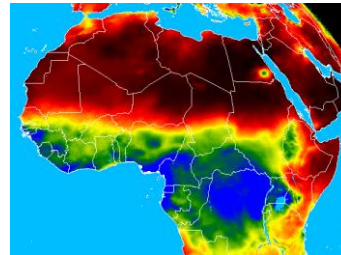
Radar:
penetrating clouds,
better classification
of crops

Thermal:
measuring
evapotranspiration
from crops





Major (technology) enablers for service provision



Satellite and other sensor systems

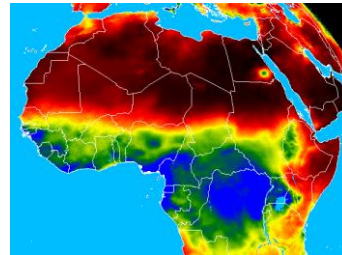
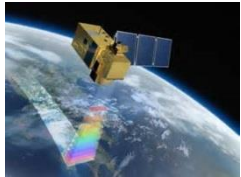
Operational infrastructure

Value adding services

Distribution channels



But don't forget the social aspects



Satellite and other sensor systems

Operational infrastructure

Value adding services

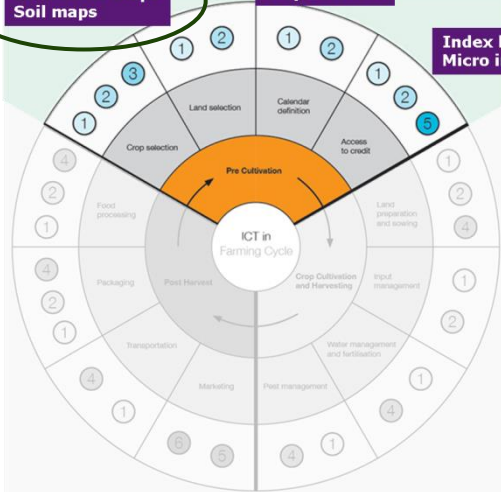
Distribution channels



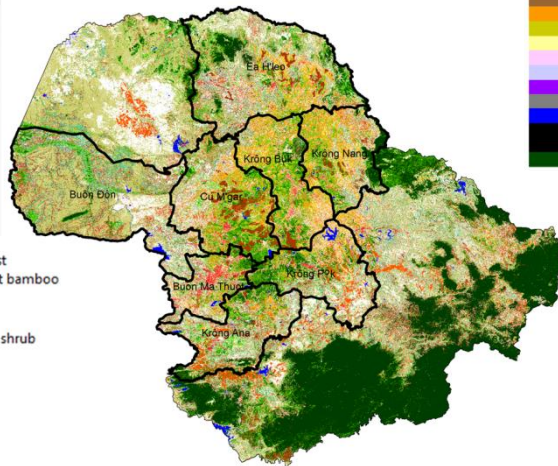
Land cover maps
Soil maps

Crop calendar

Index based
Micro insurance



Vietnam Central Highlands



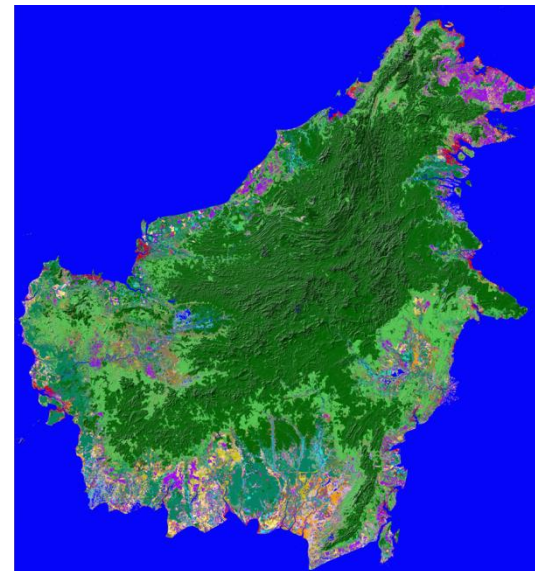
- Dense evergreen forest
- Open evergreen forest bamboo
- Coniferous forest
- Riparian forest
- Deciduous forest and shrub
- Tree plantations
- Coffee (dense)
- Coffee (open)
- Rice
- Built-up area
- Water bodies
- Other

ALOS PALSAR 2007

LULC classification
Borneo

(shaded relief version)

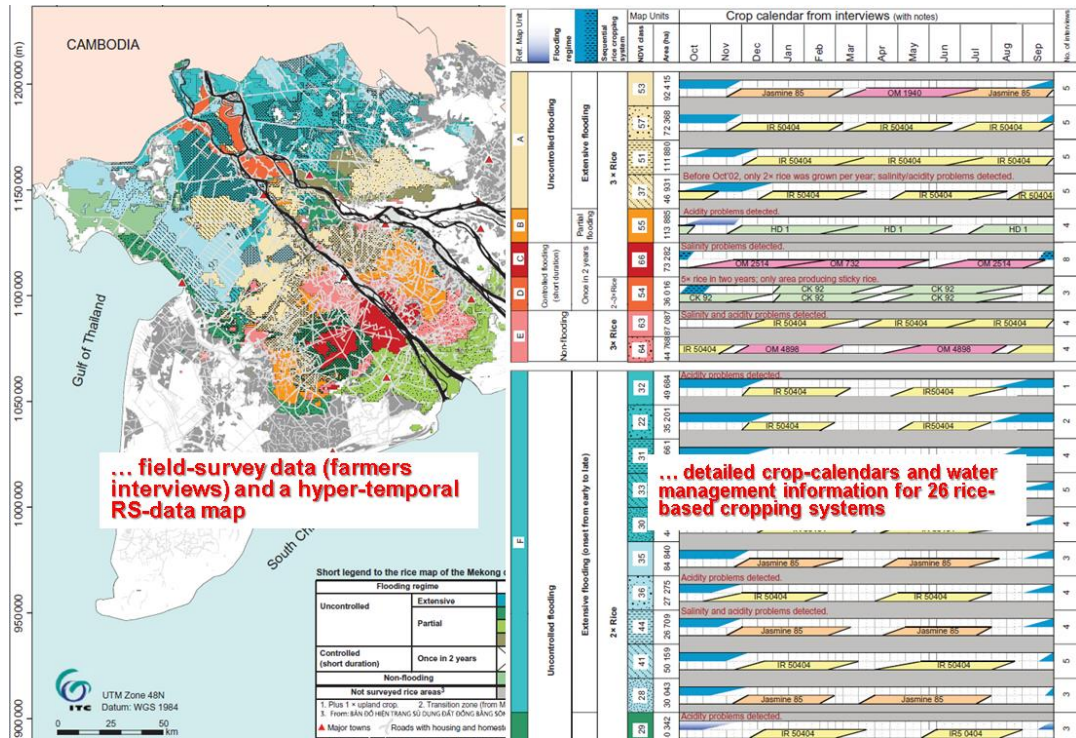
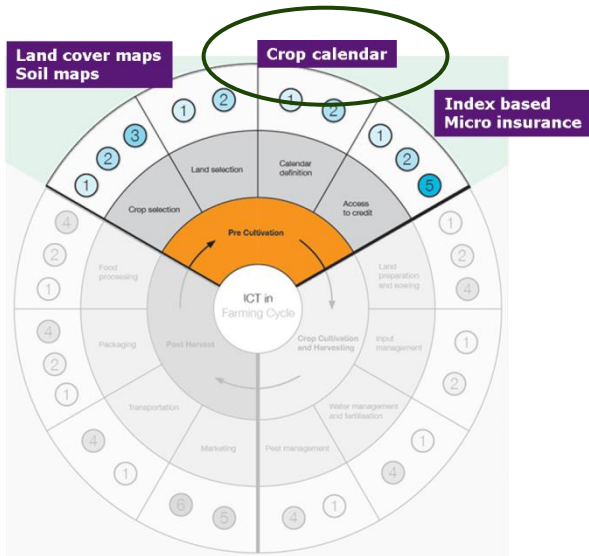
- Lowland forest
- Riverine forest
- Swamp forest
- Mangrove forest
- Nipah mangrove forest
- Peat swamp forest (pole)
- Peat swamp/riverine shrub
- Forest mosaics/degraded
- High shrub
- Medium shrub
- Ferns / grass
- Grassland
- Cropland (upland)
- Cropland (irrigated)
- Plantations (oil palm)
- Tree cover, burnt
- Water bodies
- Layover /Shadow
- No strip coverage
- Mountain forest



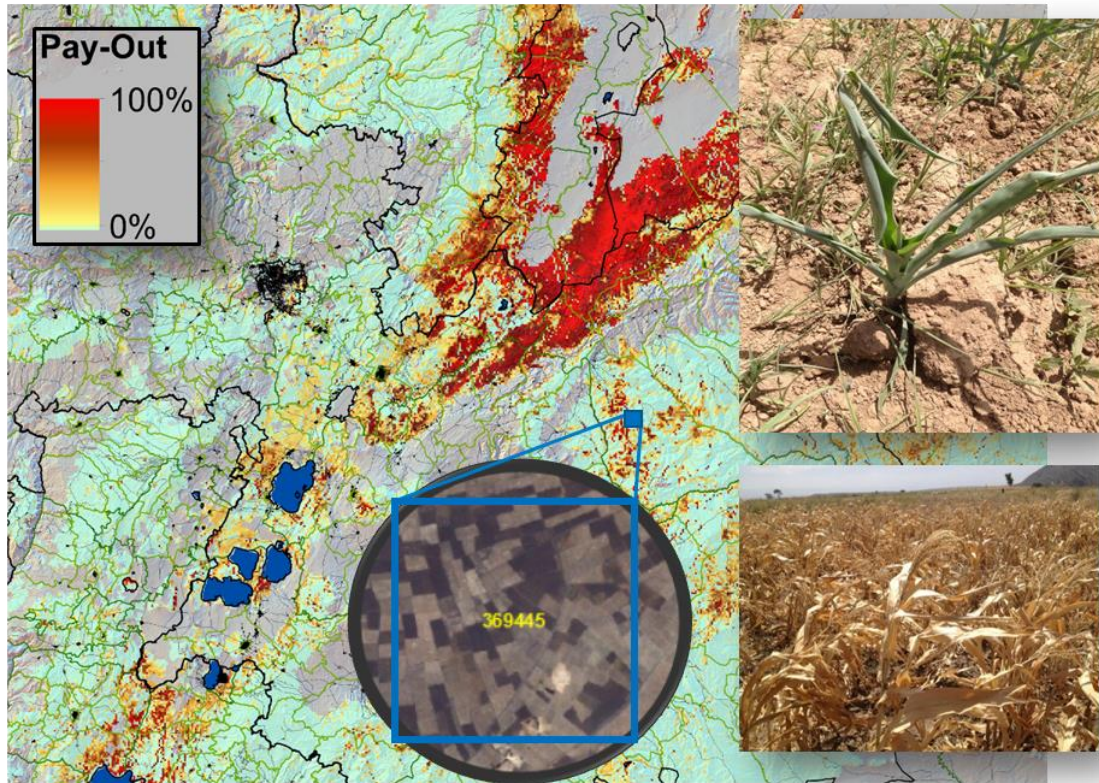
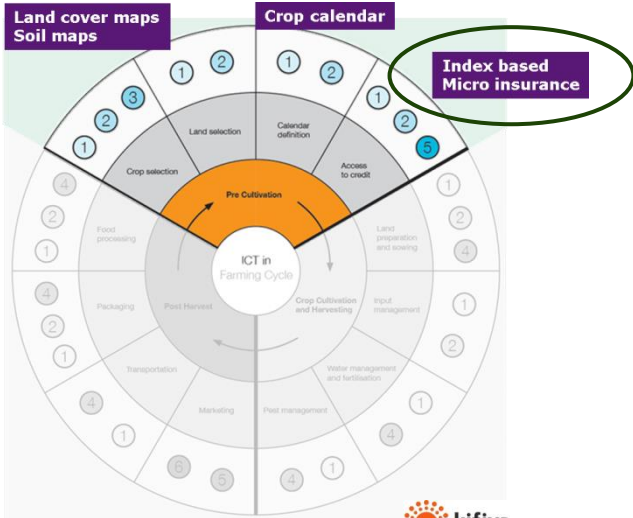
WAGENINGEN UNIVERSITY
ENVIRONMENTAL SCIENCES

SarVision

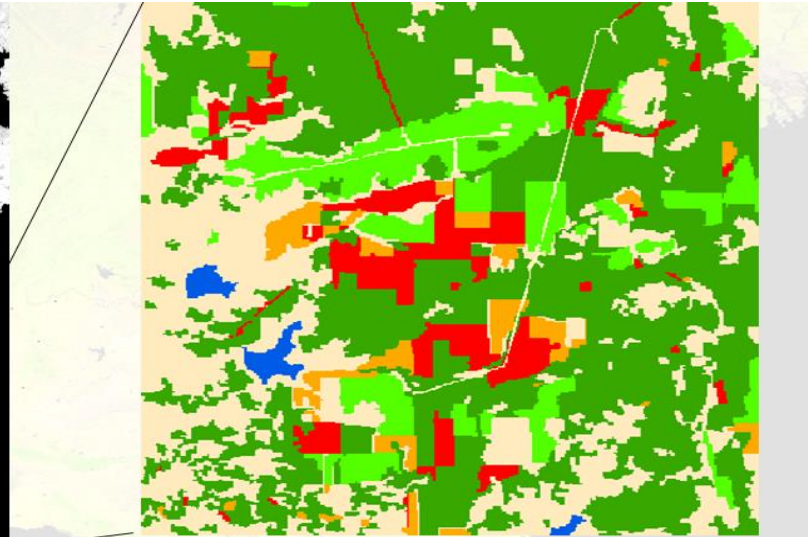
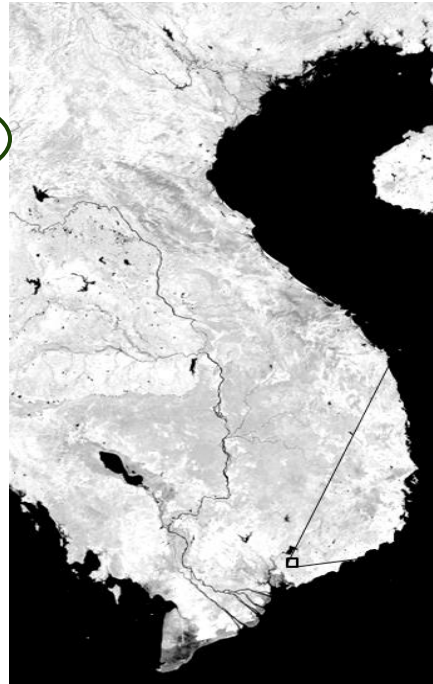
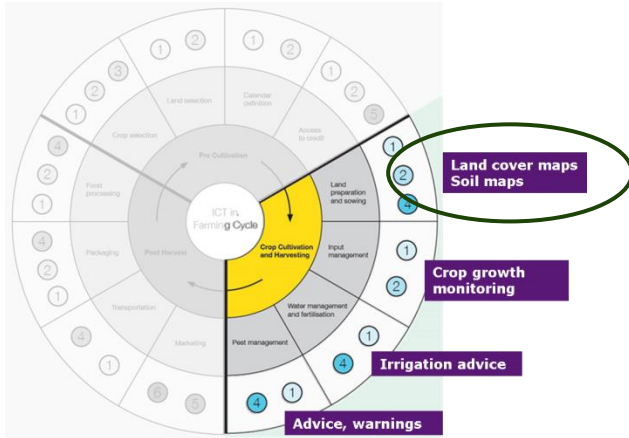
SATELLIGENCE



ITC Ph.D. study

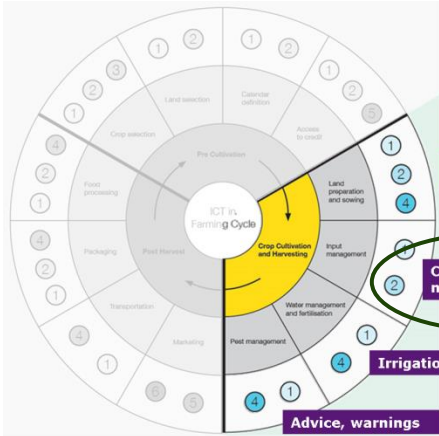


G4AW GIACIS



Plantation monitoring



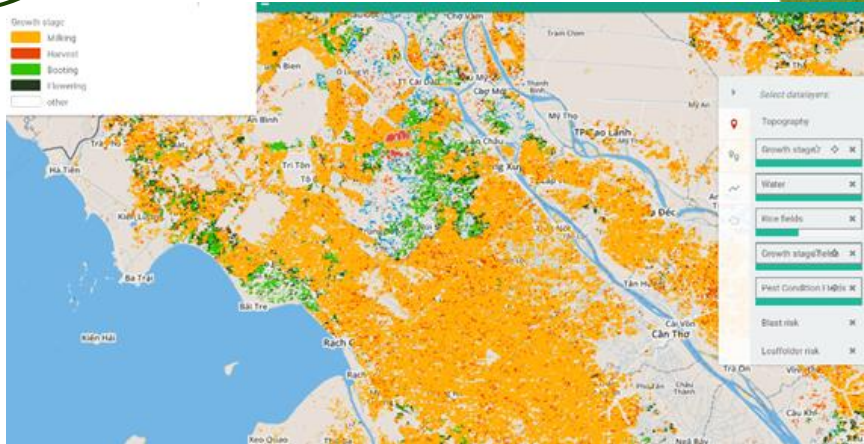


Land cover maps
Soil maps

Crop growth monitoring

Irrigation advice

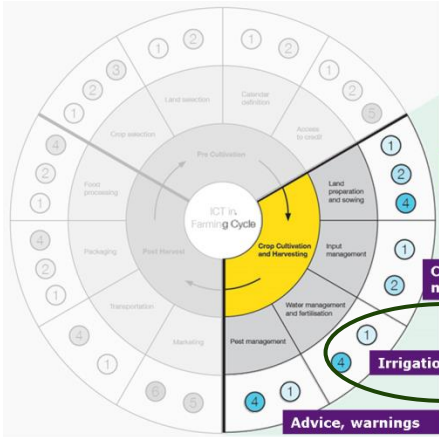
Advice, warnings



The screenshot shows a Google Form titled "Loc Troi - field form (weekly)". The form asks for the user's name, Loc Troi field code, and the date of field visit. It also includes a note about filling out the form every week and saving photos of the field to a specific email address.

G4AW Sat4Rice



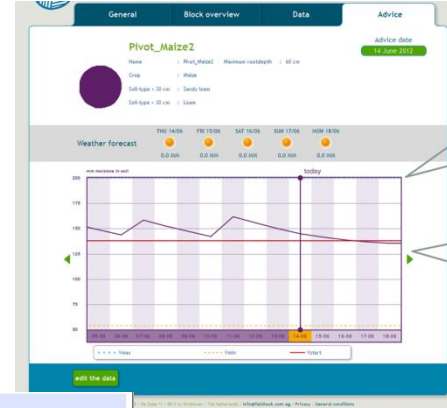
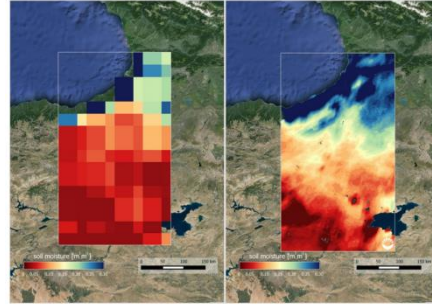


Land cover maps
Soil maps

Crop growth monitoring

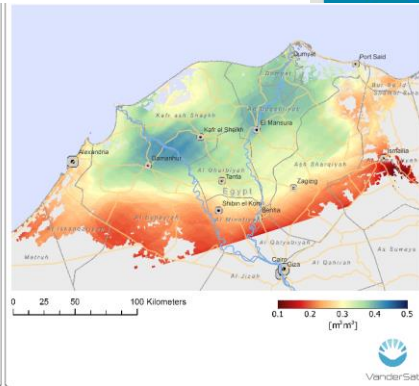
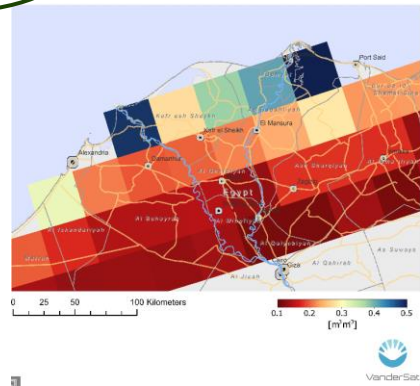
Irrigation advice

Advice, warnings

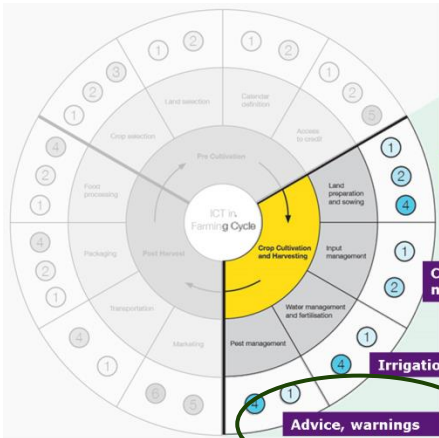


The crop has no water stress when the soil moisture is above the critical level and below the field capacity

When the soil moisture drops below the critical line, irrigation is advised



VanderSat



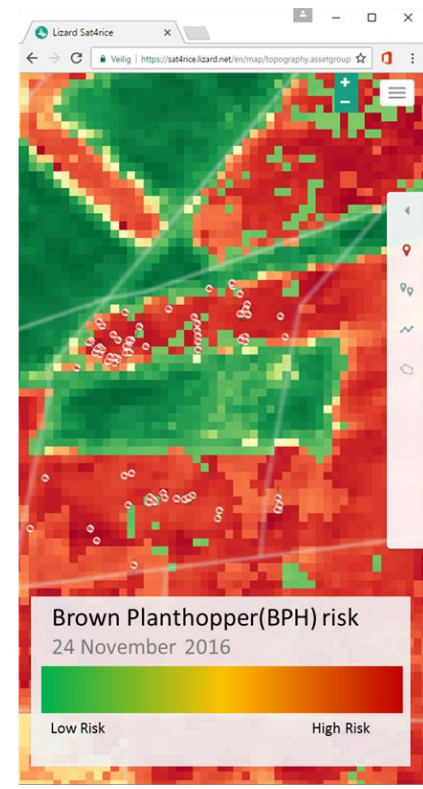
Land cover maps
Soil maps

Crop growth
monitoring

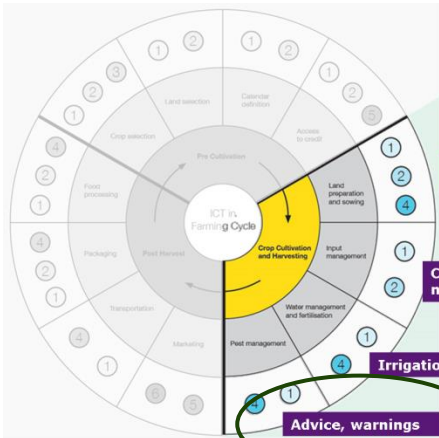
Irrigation advice

Advice, warnings

G4AW Sat4Rice



G4AW R4A

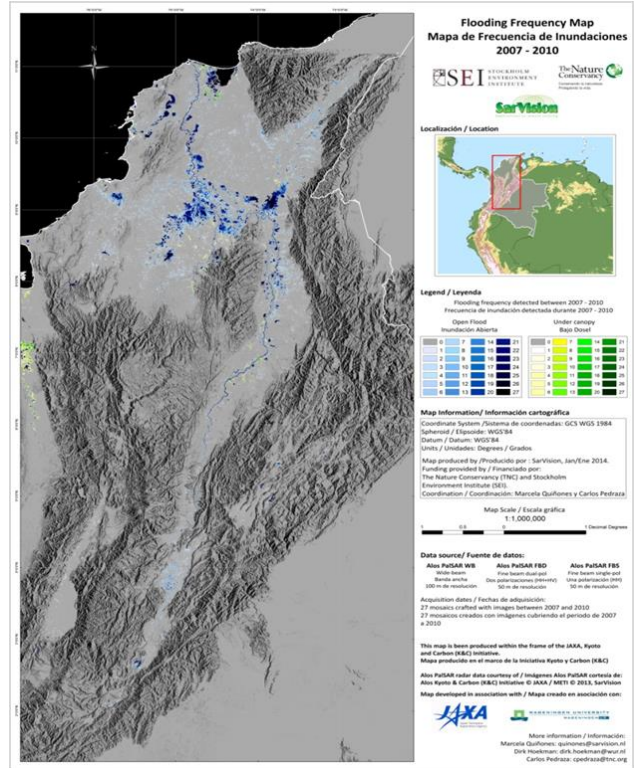
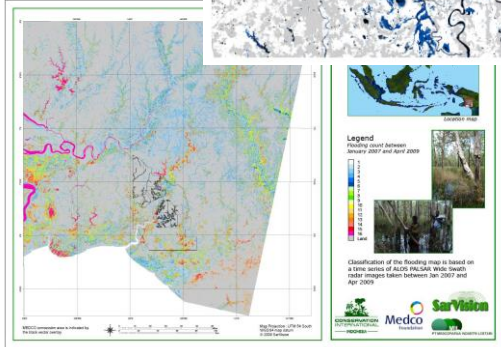
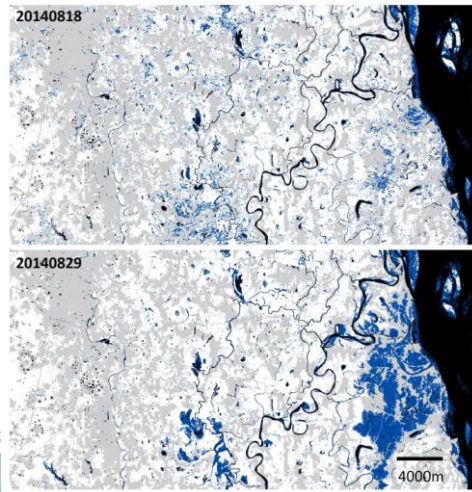


Land cover maps
Soil maps

Crop growth
monitoring

Irrigation advice

Advice, warnings



Flooding Frequency Map
Mapa de Frecuencia de Inundaciones
2007 - 2010



Legend / Leyenda

Flooding frequency detected between 2007 - 2010
Frecuencia de inundación detectada durante 2007 - 2010

Open Flood / Inundación Abierta	Under canopy / Bajo Dosel
0	1
1	2
2	3
3	4
4	5
5	6
6	7
7	8
8	9
9	10
10	11
11	12
12	13
13	14
14	15
15	16
16	17
17	18
18	19
19	20
20	21
21	22
22	23
23	24
24	25
25	26
26	27
27	28
28	29
29	30

Map information / Información cartográfica

Coordinate System / Sistema de coordenadas: GCS WGS 1984
Spheroid / Esferoide: WGS84
Datum / Datum: WGS84
Units / Unidades: Meters / Metros

Map produced by / Producido por: SarVision, Jan/Ene 2014.
Funding provided by / Financiado por: The Nature Conservancy (TNC) and MedcoHealth Environment Institute (EI).

Map Scale / Escala gráfica: 1:1,000,000

Data source / Fuente de datos:

Alias PaSAR WB	Alias PaSAR FID	Alias PaSAR F85
Wide Swath	Fixed Swath	Fixed Swath
Banda ancho	Dos parámetros (strip)	Una parámetro (strip)
100m de resolución	50m de resolución	50m de resolución

Acquisition dates / Fechas de adquisición:
27 mosaics created with images between 2007 and 2010
27 mosaicos creados con imágenes cubriendo el periodo de 2007 a 2010

This map is being produced within the frame of the JAKA, Kyoto and Carbon (KAC) Initiative.
Mapa producido en el marco de la Iniciativa Kyoto y Carbon (KAC)

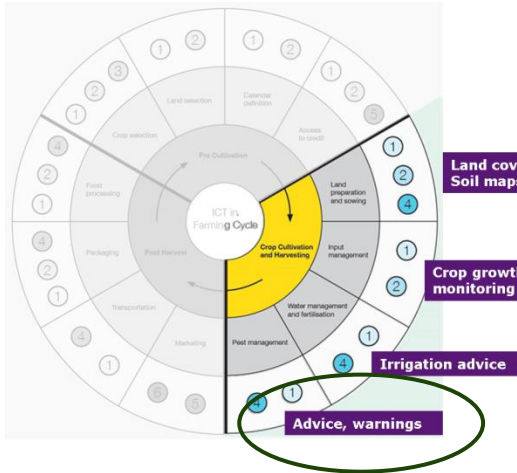
Map PaSAR radar data courtesy of / Imágenes Alias PaSAR cortesía de: Alias Kanto & Carbon (KAC) Initiative @ JAXA / JAXA © 2013. SarVision

Map developed in association with / Mapa creado en asociación con:
JAXA, NIPPON UNIVERSITY, MEDCO HEALTH ENVIRONMENT INSTITUTE

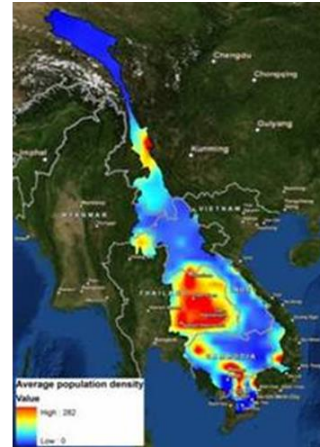
More information / Información:
Maritza Quiñones: quimartez@nature.org
Dirk Hoekman: dirk.hoekman@wvur.nl
Carlos Pedraza: cpedraza@tnc.org

G4AW:
IDSS
Sat4Rice





Vulnerability Index
Distance
to river



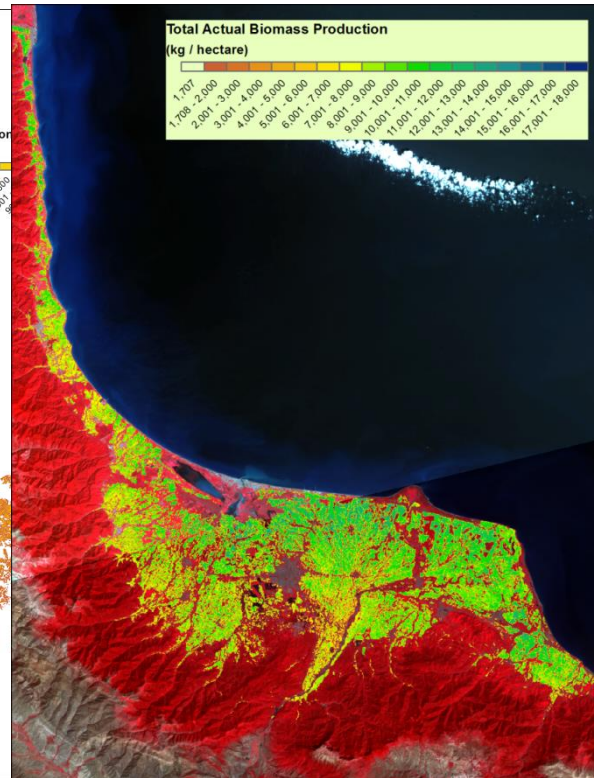
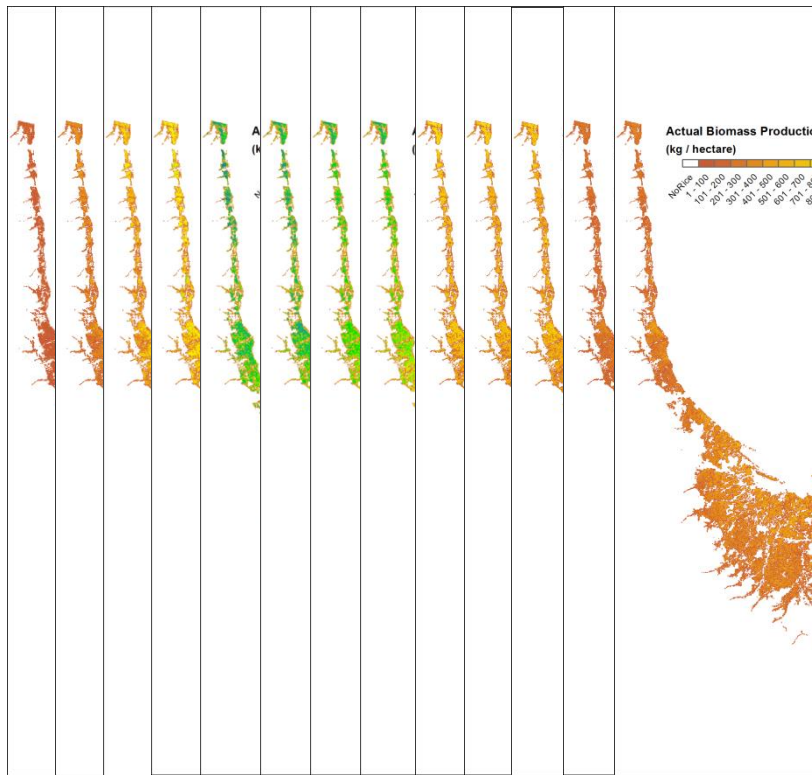
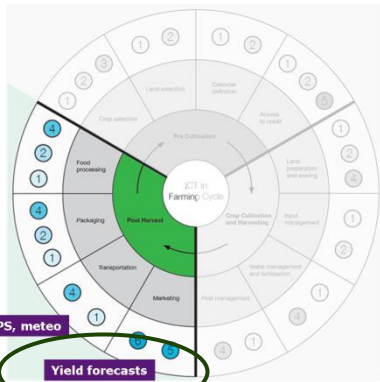
Vulnerability Index
Population density

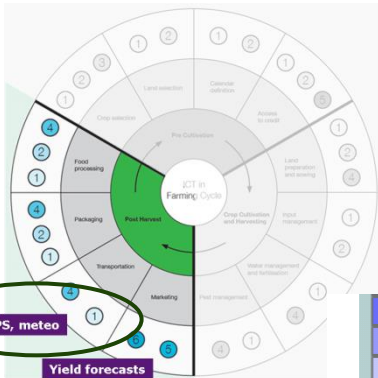


Vulnerability Index
Precipitation



Drought
Risk Map





Content Lay-out

Data source

South Africa Ecmwf Deterministic 3h

Map

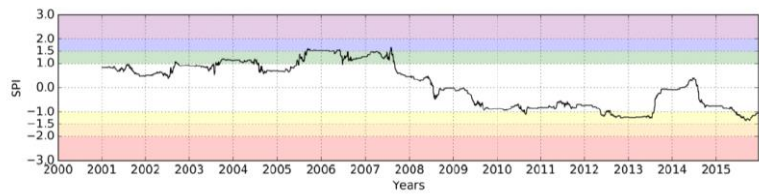
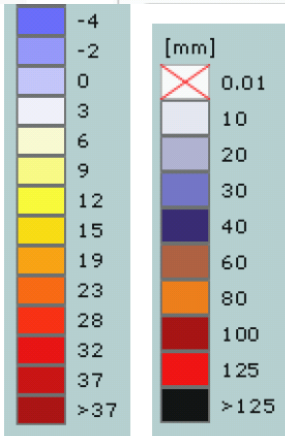
Pixels

Variable

0 - 18-07-2016 01:00



36.2	44.6	28.9	18	19.8	25.7	29.2	27.2	29.6	35.5	39.3	38	37	32.9
48.8	44	25.1	18.4	22.6	28.9	30.9	29.5	30.2	36	37.6	40.1	39.9	34.5
47.5	36.6	25.1	21.5	25.4	31	32.8	30.3	29	32.6	33.9	37.5	40.4	36.2
41.6	35	30.9	25.7	26	33	34.7	31.4	30.1	31.1	30	33.6	35.9	36.1
35.8	37.9	34.5	27.1	24.6	30.8	32.5	32.3	31.1	27.8	25.7	28.5	33.3	34.8
33	37.9	37.3	31.1	28.5	28	28.1	29.2	30.1	27.8	26.1	23.6	23.6	25.8
33	33.4	35.7	34.3	30.1	27.5	28.5	28.8	27.9	28	27	22.8	20.3	20.9
28.8	27.6	32.8	33	29	28.2	28.1	27.6	26.4	23	22.6	21.6	19.2	17.4
26.6	22.4	20.6	19.1	17.4	15.6								
23.2	21.2	19.4	17.8	15.4	15.1								
19.8	18.8	18.8	17	15.1	14								



G4AW:
CommonSense
CropMon
R4A

Weather Impact



Dutch and other interested organizations

- G4AW Directory
<http://g4aw.spaceoffice.nl/en/About-G4AW/G4AW-Directory/>
- NL Space Directory
<http://www.nlspace.nl/en/home/>



Questions?





Thank you for
your attention

G4AW is a programme
commissioned by



Contact: r.grim@spaceoffice.nl



G4AW
GEODATA FOR AGRICULTURE AND WATER

Netherlands
Space
Office