



Food and Agriculture Organization
of the United Nations

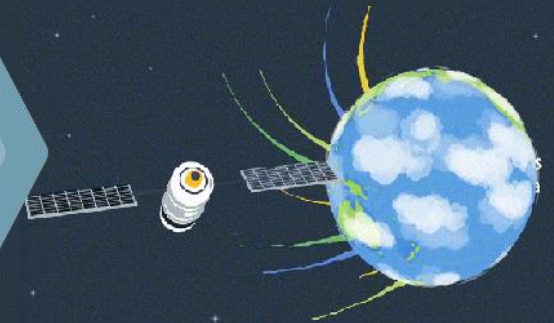
UNITED NATIONS
Office for Outer Space Affairs

UN-SPIDER
www.un-spider.org



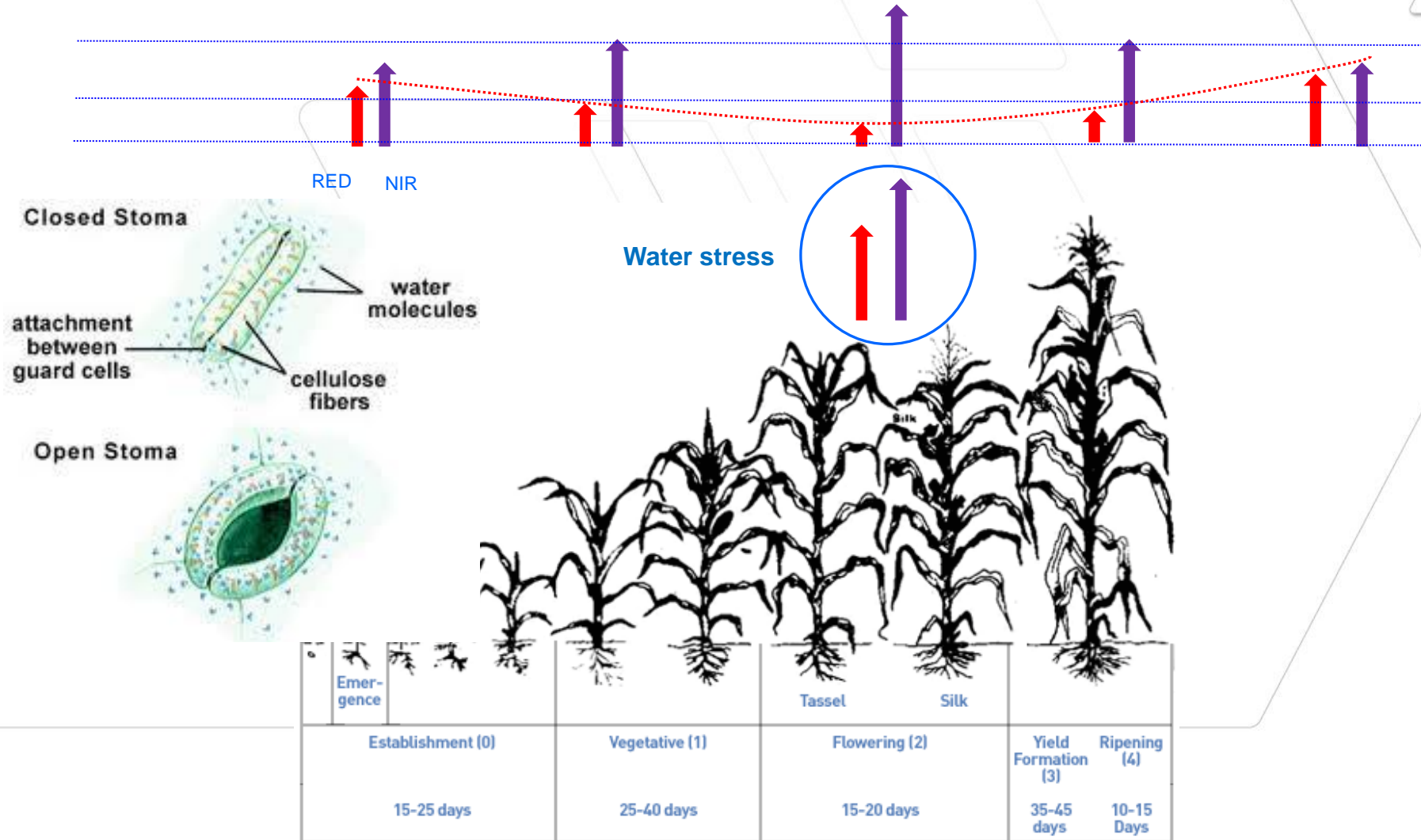
FAO-AGRICULTURE STRESS INDEX SYSTEM (ASIS)

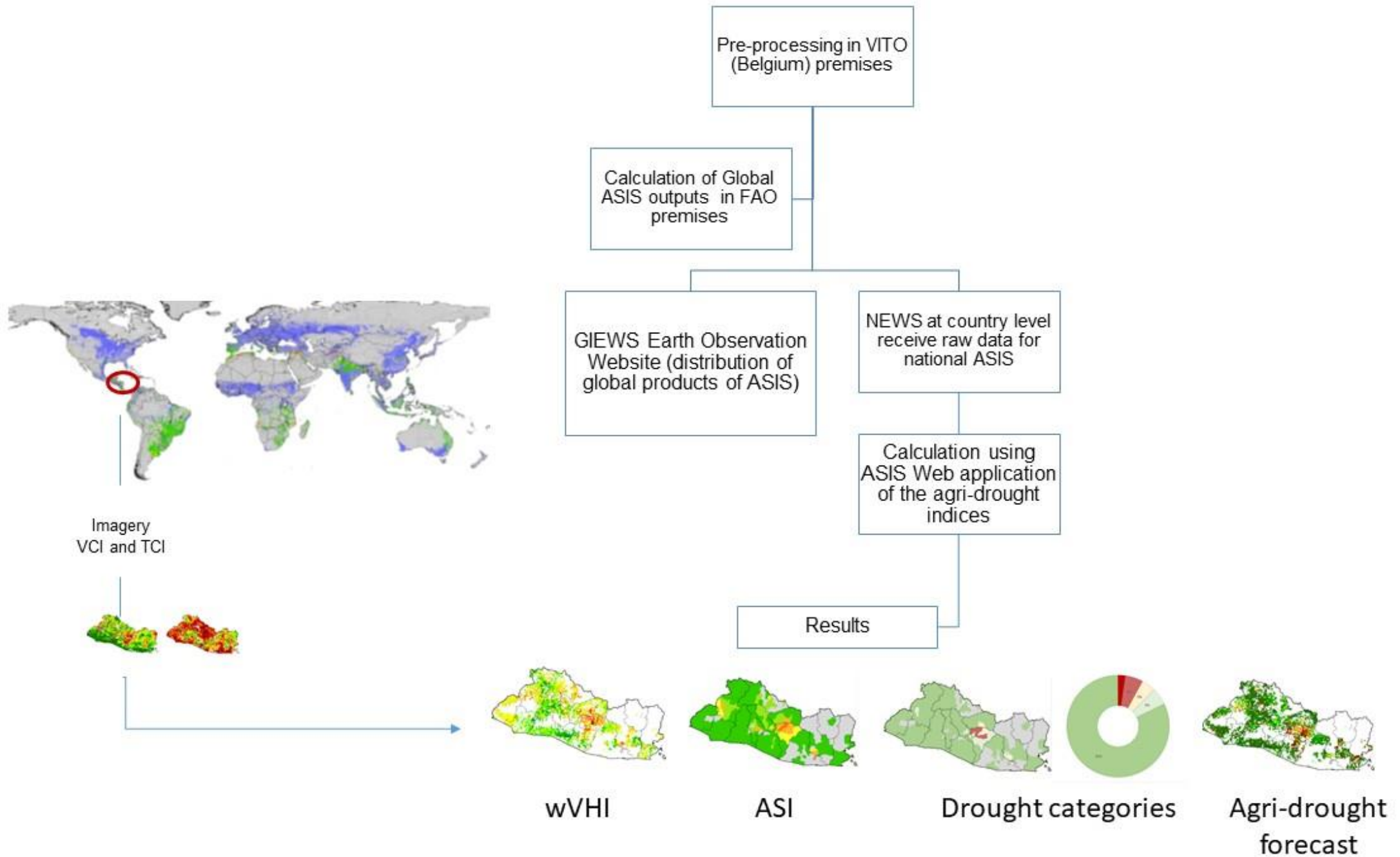
FOR AGRICULTURAL DROUGHT MONITORING AND EARLY WARNING



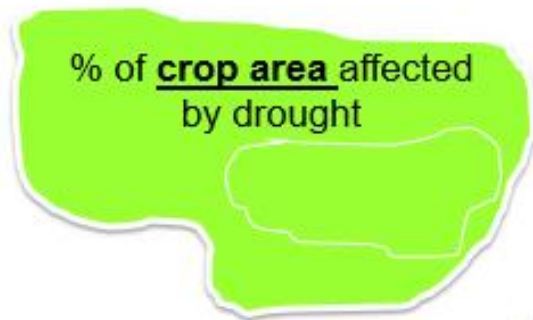
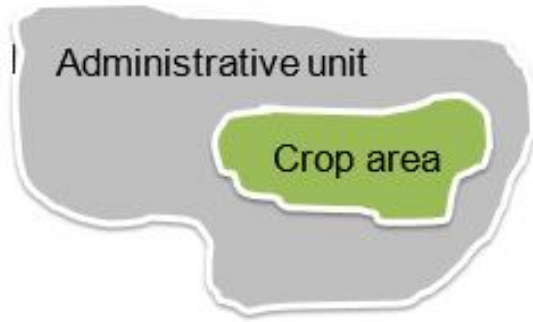


ELECTROMAGNETIC ENERGY RECORDED BY THE SENSOR

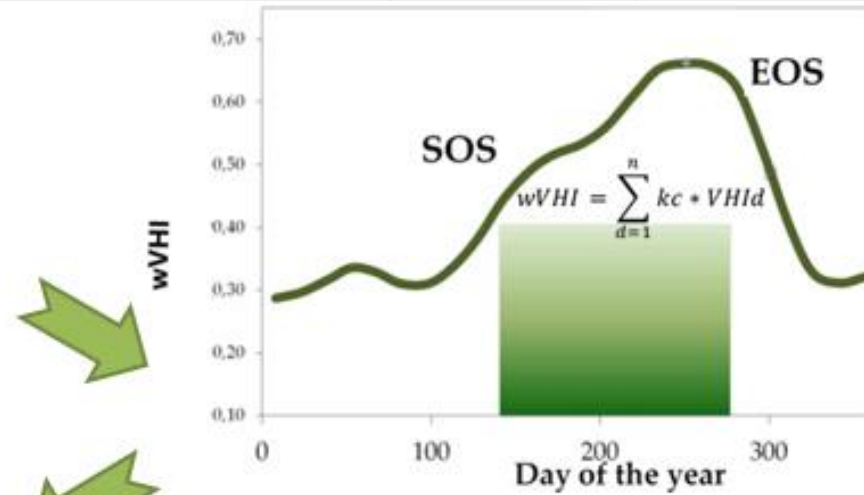
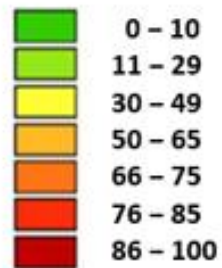




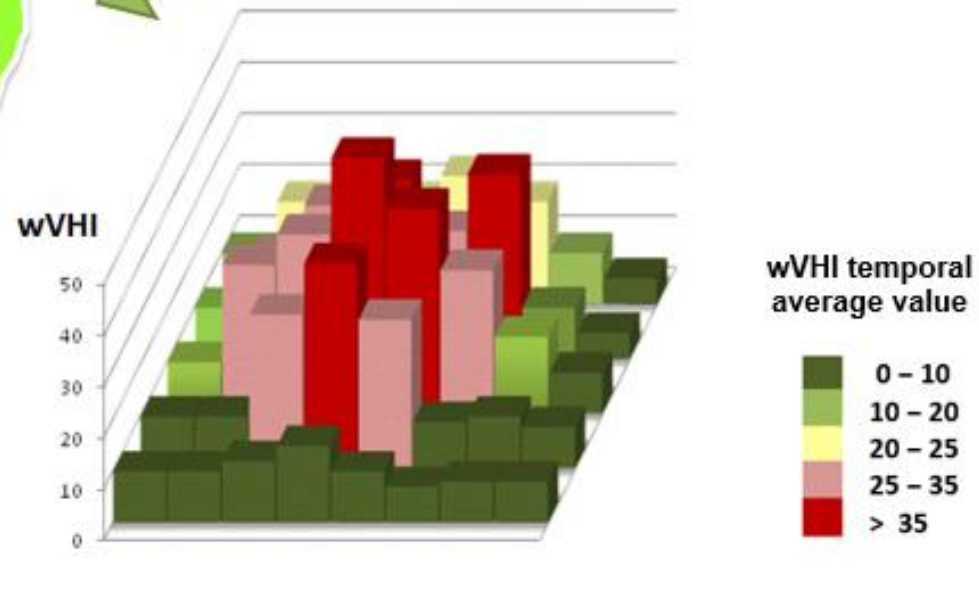
**Introduction of
Crop mask from
land use studies**



Percentage of the agriculture area affected by drought

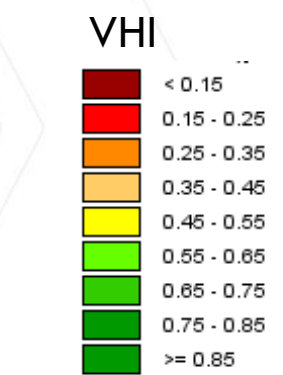
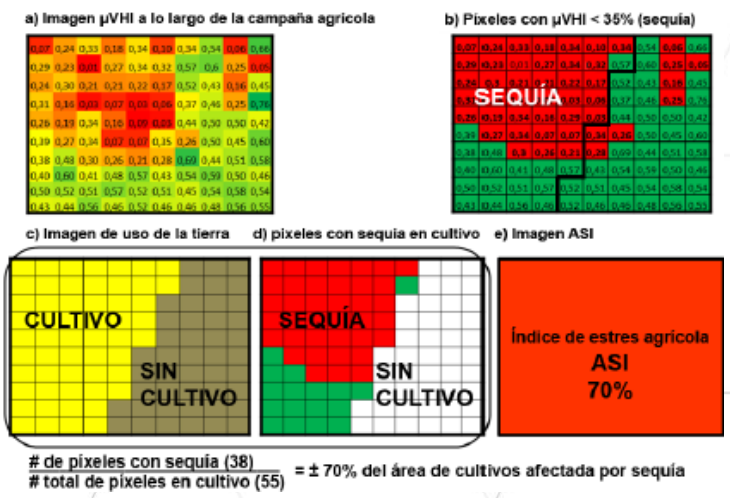
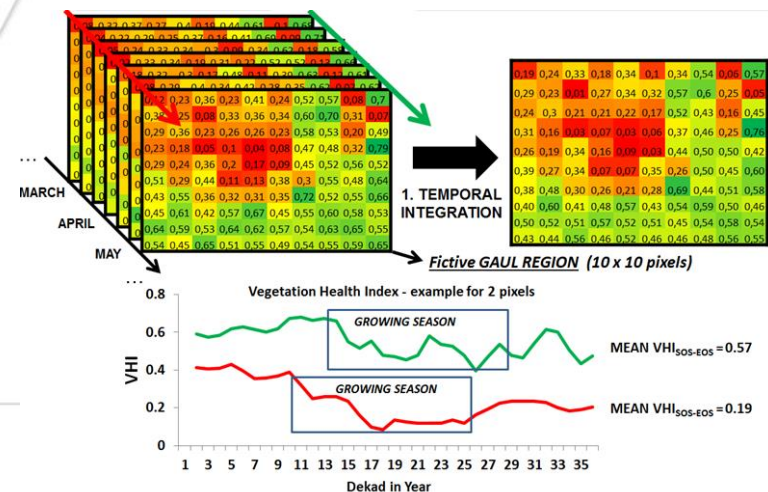


**Introduction of
the kc**

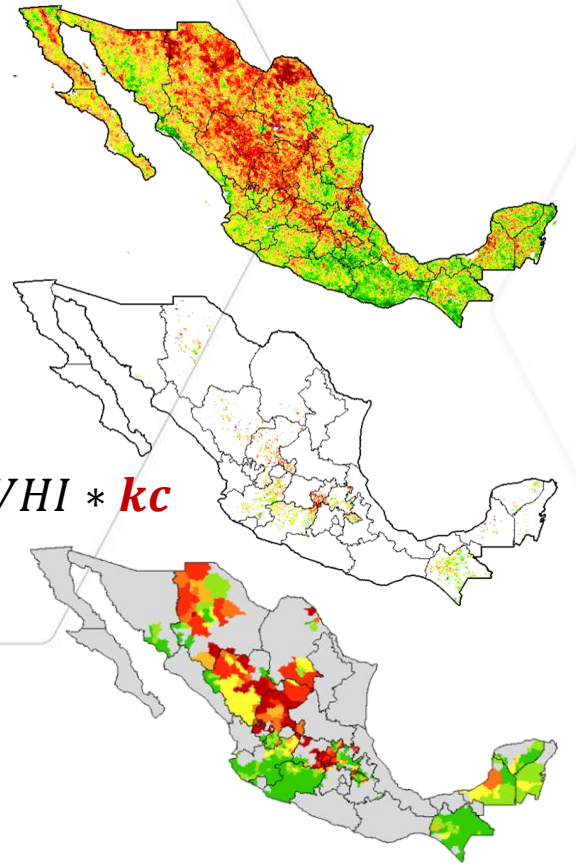
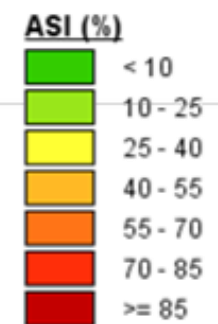


NEXT GENERATION ASIS, WHAT DOES IT OFFER?

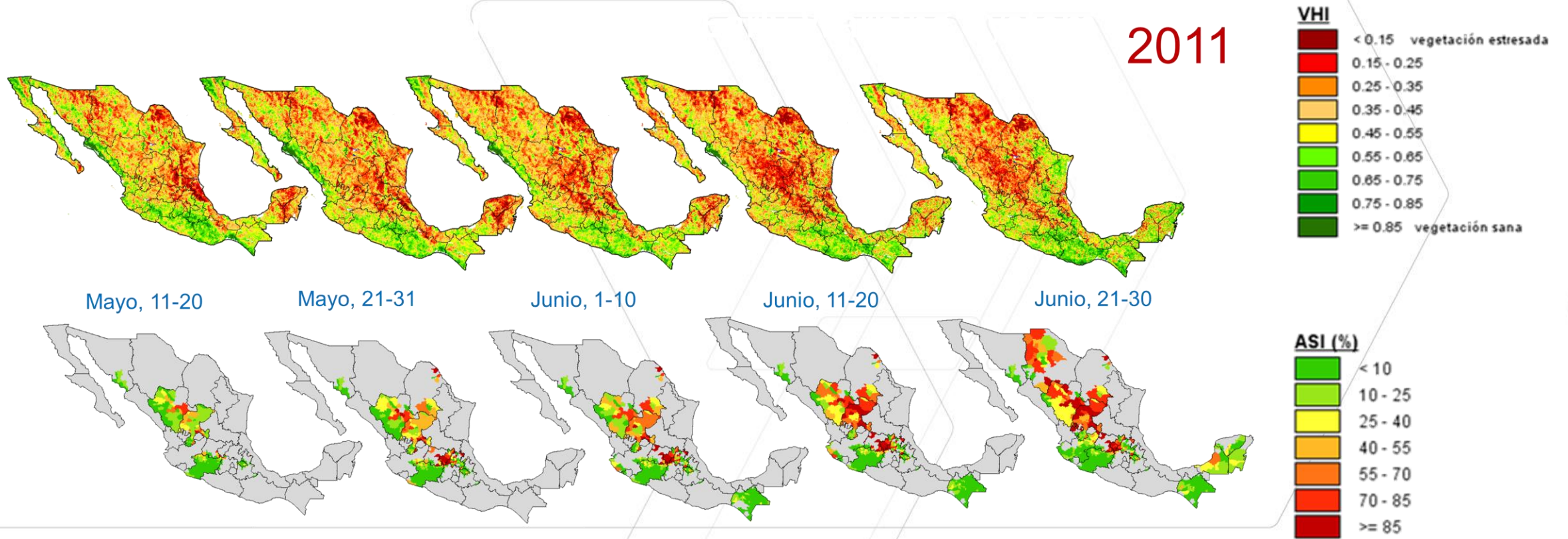
- Calibration to national conditions: crop specific mask, crop coefficients (kc) for phenological phases, SOS and EOS from ground information, number of crop seasons...
- Temporal and spatial integration (annual summary)



$$wVHI = \sum_{SOS}^{EOS} VHI * kc$$



NEXT GENERATION ASIS, WHAT DOES IT OFFER?





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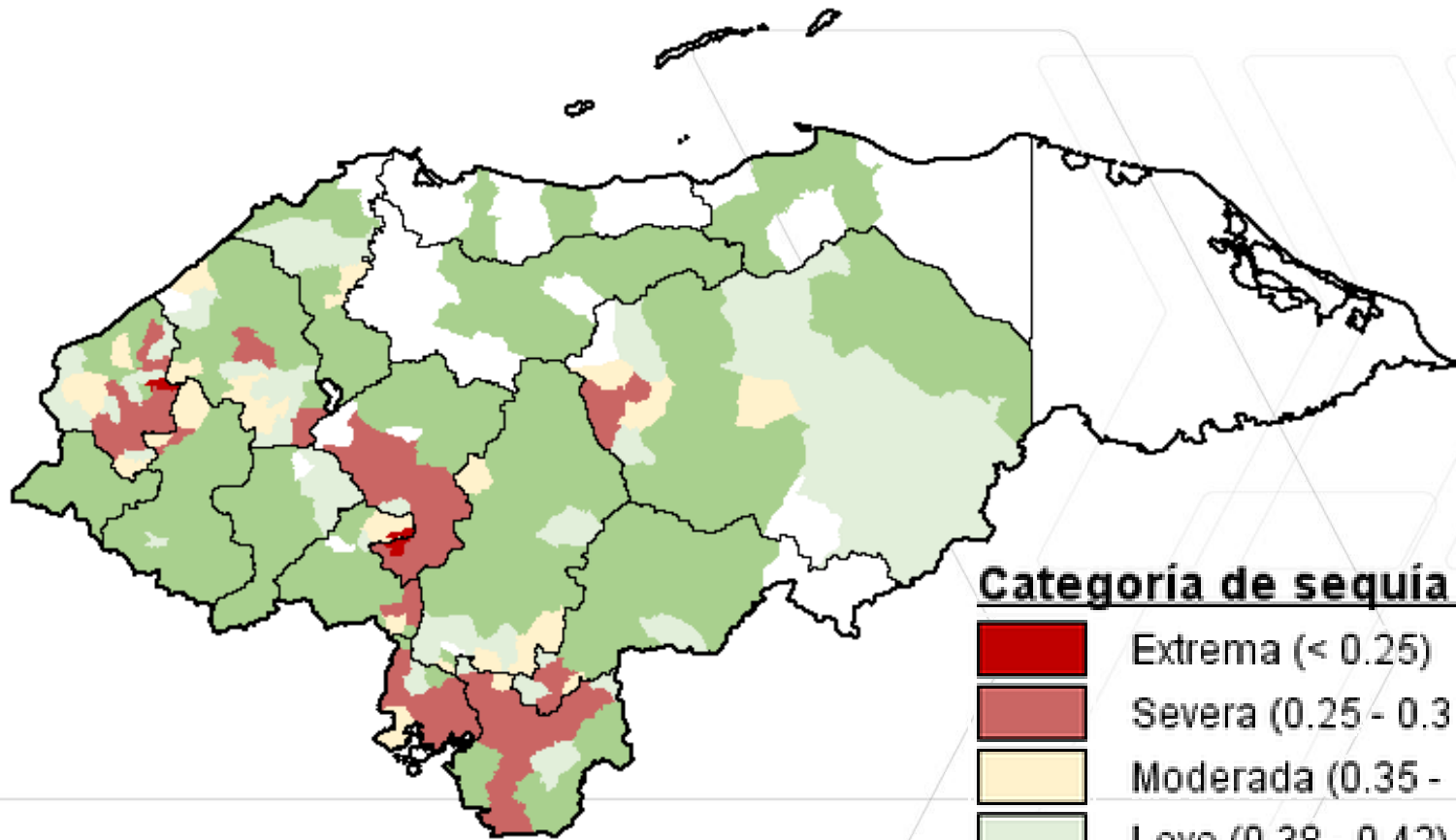


Guatemala:

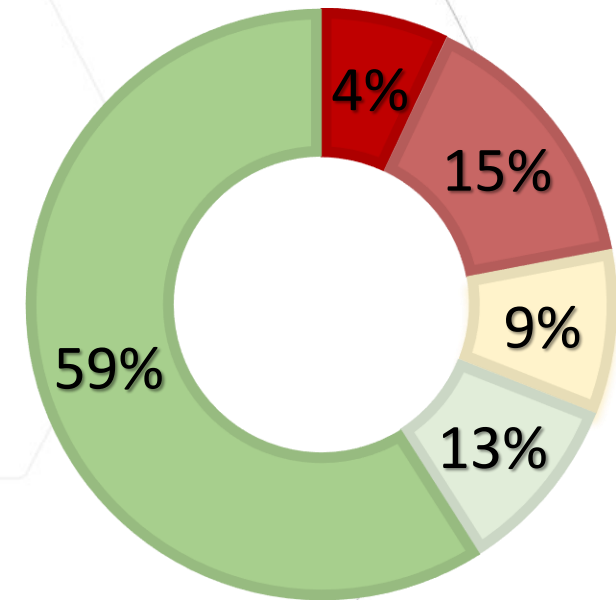
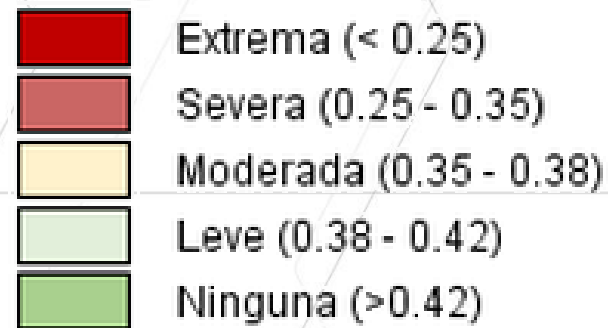
<http://svsa.insivumeh.gob.gt/>

DROUGHT CATEGORIES. HONDURAS, 2015

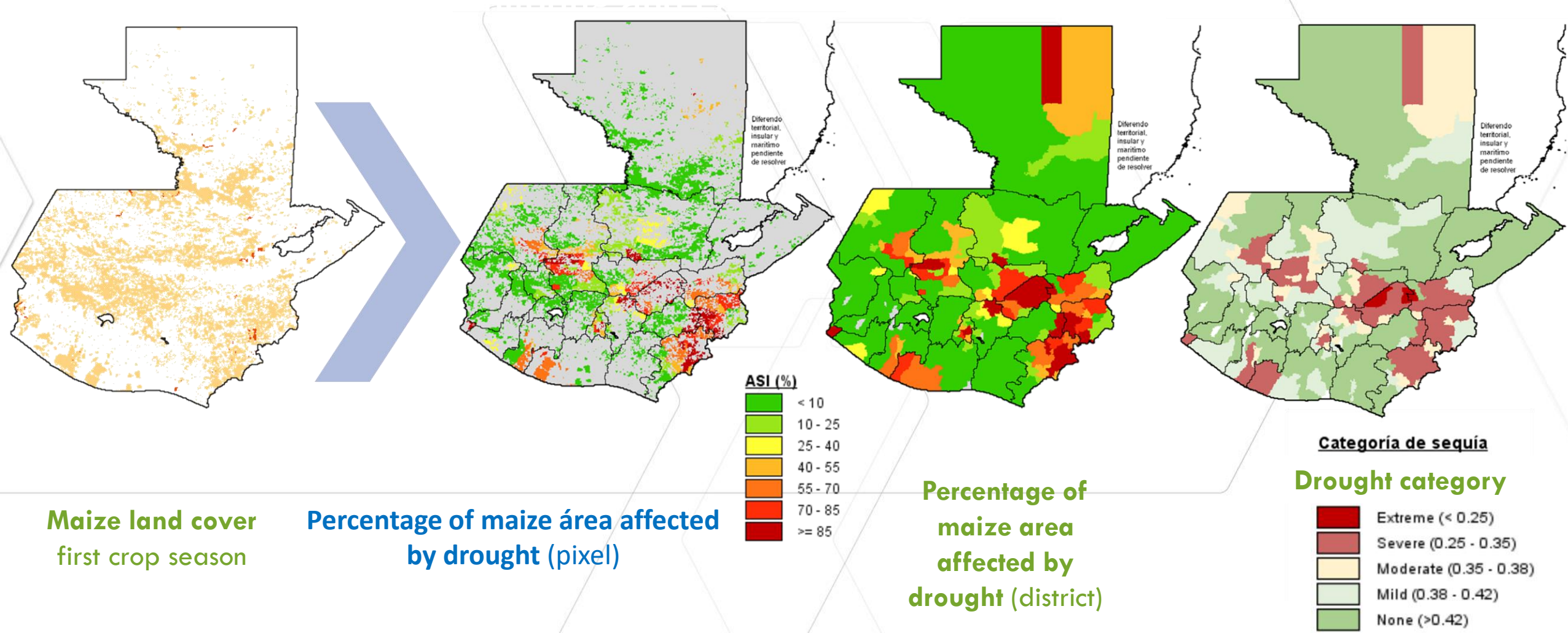
FIRST CROP SEASON OF MAIZE



Categoría de sequía



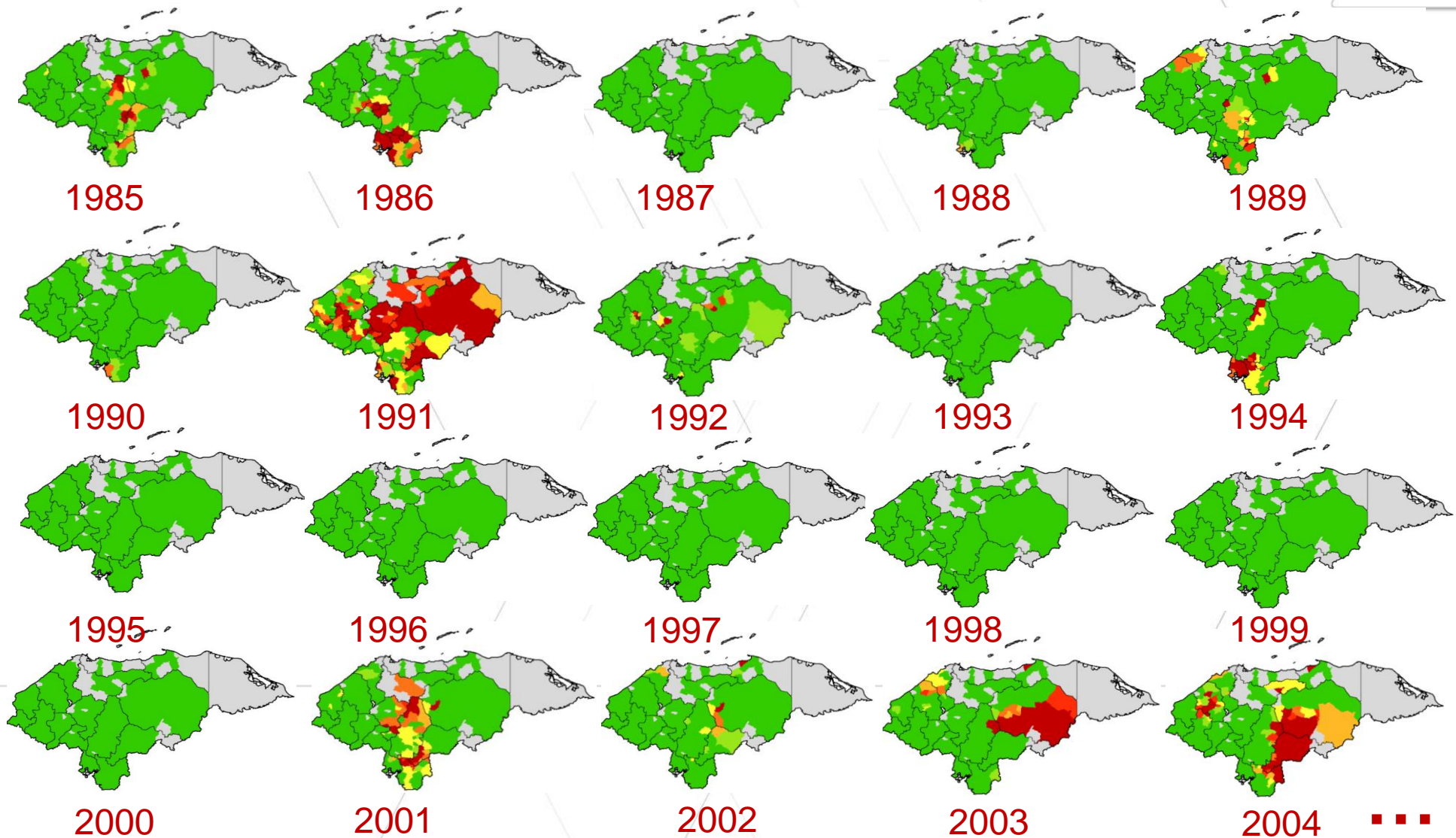
NEXT GENERATION ASIS, WHAT DOES IT OFFER?



NEXT GENERATION ASIS, WHAT DOES IT OFFER?

Honduras

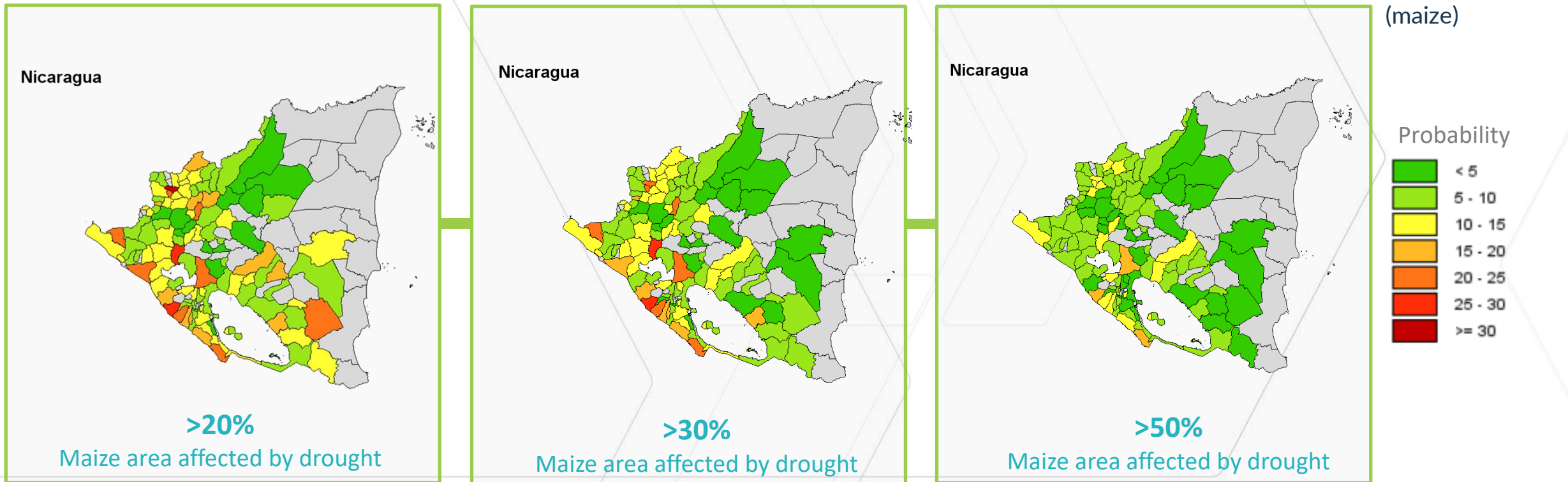
Database of annual average agricultural drought hot spots starting in 1985



NEXT GENERATION ASIS, WHAT DOES IT OFFER?

Nicaragua

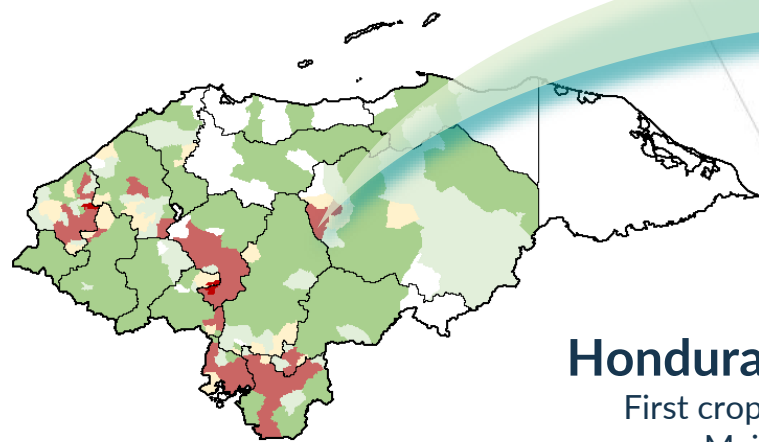
Historical agricultural drought probability based on 30+ years



Knowing the administrative units with highest probability of drought (1984-2020) allows to guide the **public investments** and prepare **financial proposals** for the development of district/municipalities.

Next Generation ASIS, What does it offer?

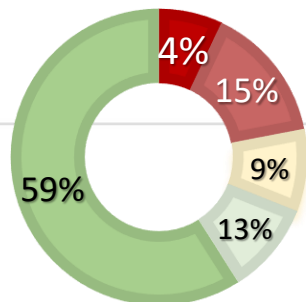
Integration of ASIS with National Plan of Drought Mitigation and Early Action



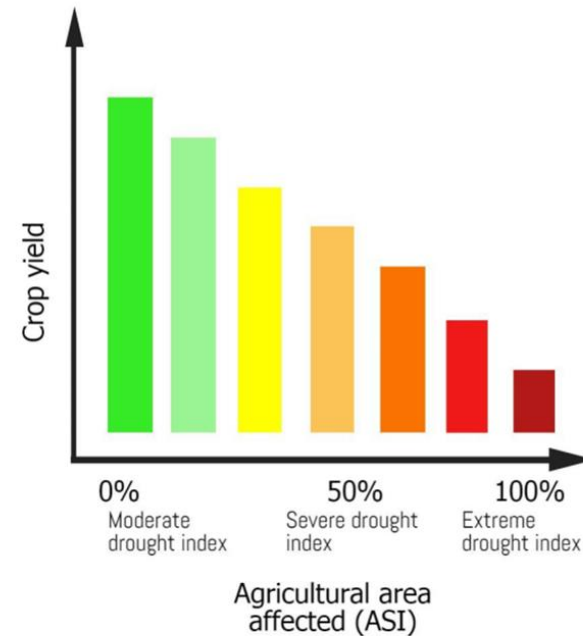
Honduras, 2015
First crop season
Maize

Categoría de sequía

- Extrema (< 0.25)
- Severa (0.25 - 0.35)
- Moderada (0.35 - 0.38)
- Leve (0.38 - 0.42)
- Ninguna (>0.42)



Agroclimatic Information System for supporting decision making



Planning

- Monitoring
- Forecasting
- Public policy revision
- Investment planning



Early warning - prevention

- Dissemination
- Hazard monitoring and tracking



Contingency plan activation

- Risk reduction actions
- Water storage
- Drought resistant crops
- Short cycle crops

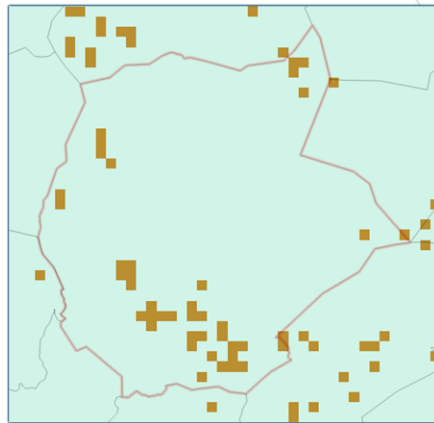


Emergency response

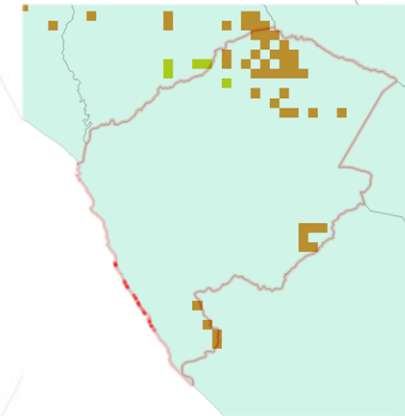
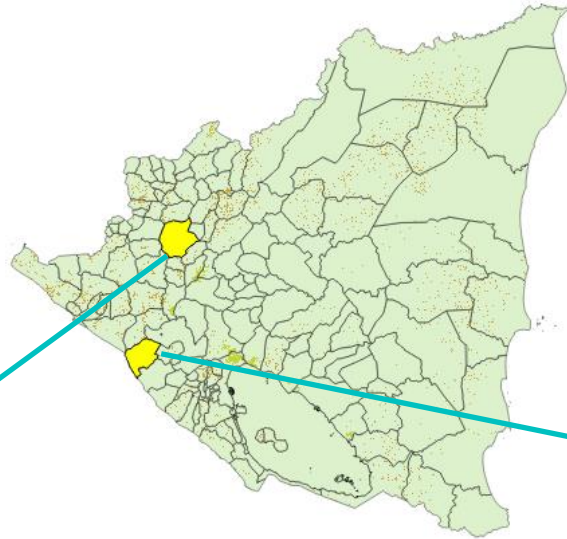
- Catastrophe fund implementation
- Access to contingent credit lines
- Insurance payments
- Livelihoods rehabilitation

Next Generation ASIS, What does it offer?

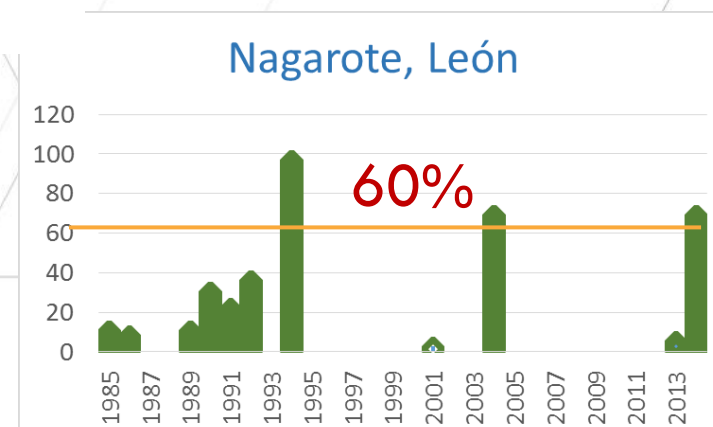
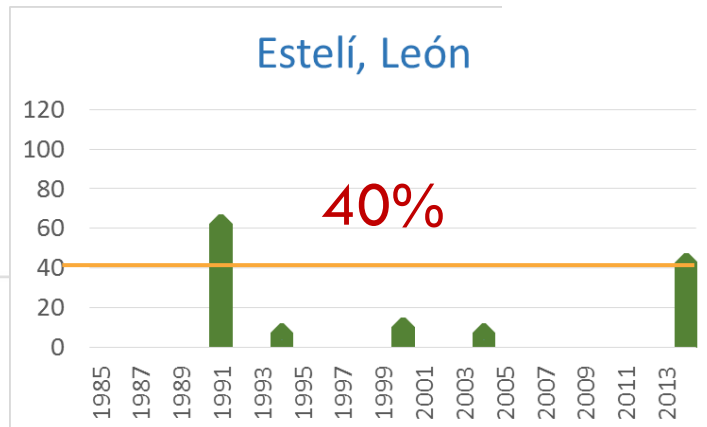
TRIGGER FOR AN INDEXED CROP INSURANCE BASED ON GEOSPATIAL DATA (1984-2020)



Fuente: INETER, 2017



Fuente: INETER, 2017

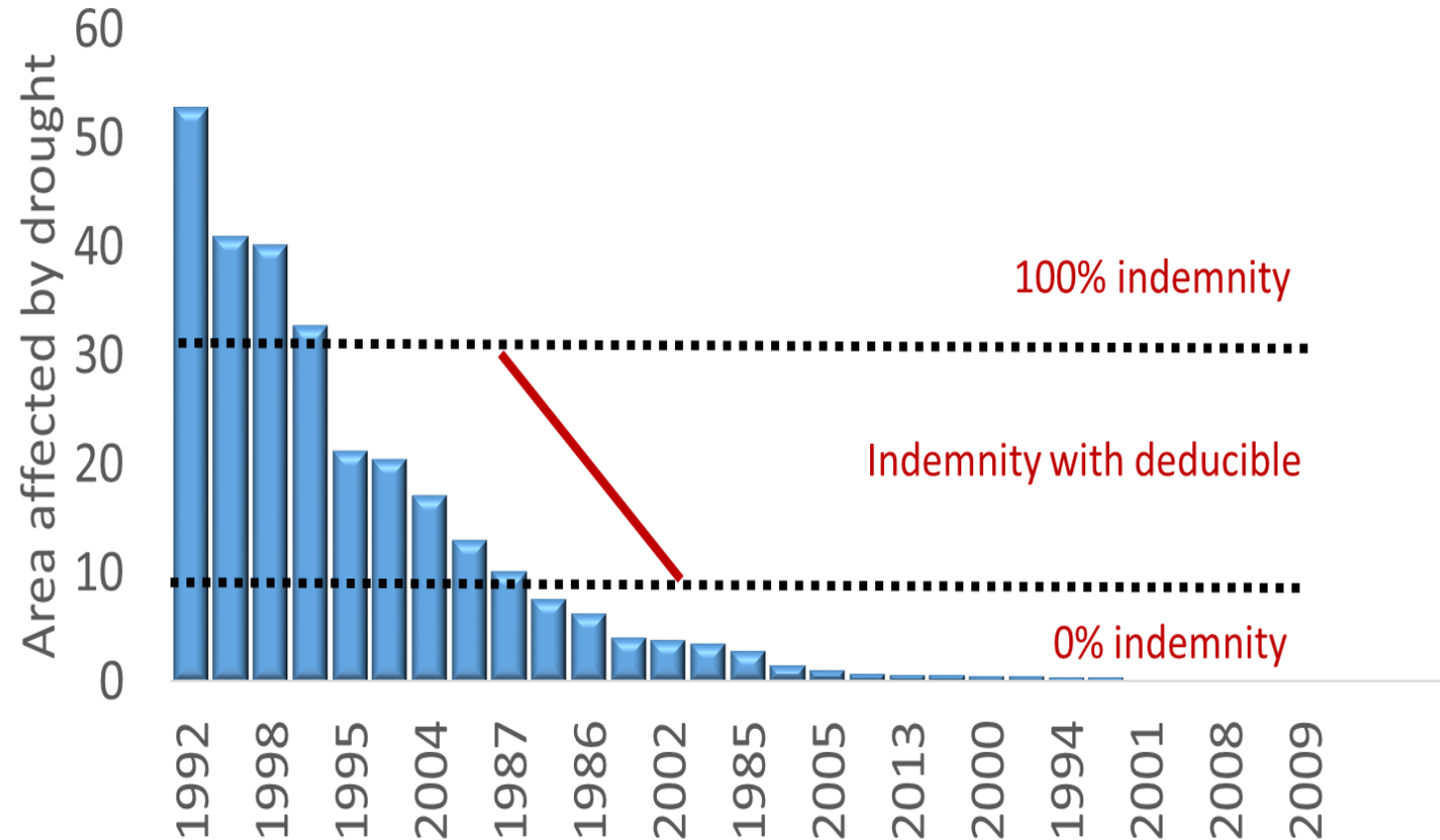


Next Generation ASIS, What does it offer?

TRIGGER FOR AN INDEXED CROP INSURANCE BASED ON GEOSPATIAL DATA (1985-2014)

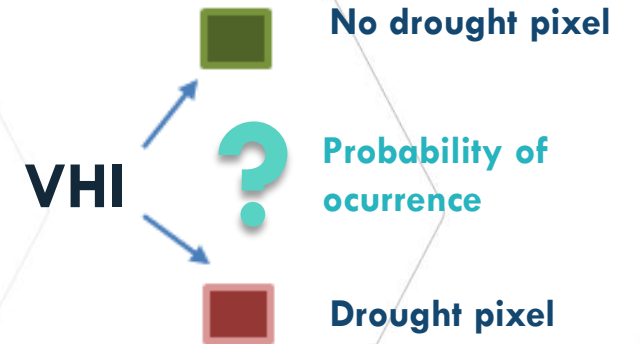
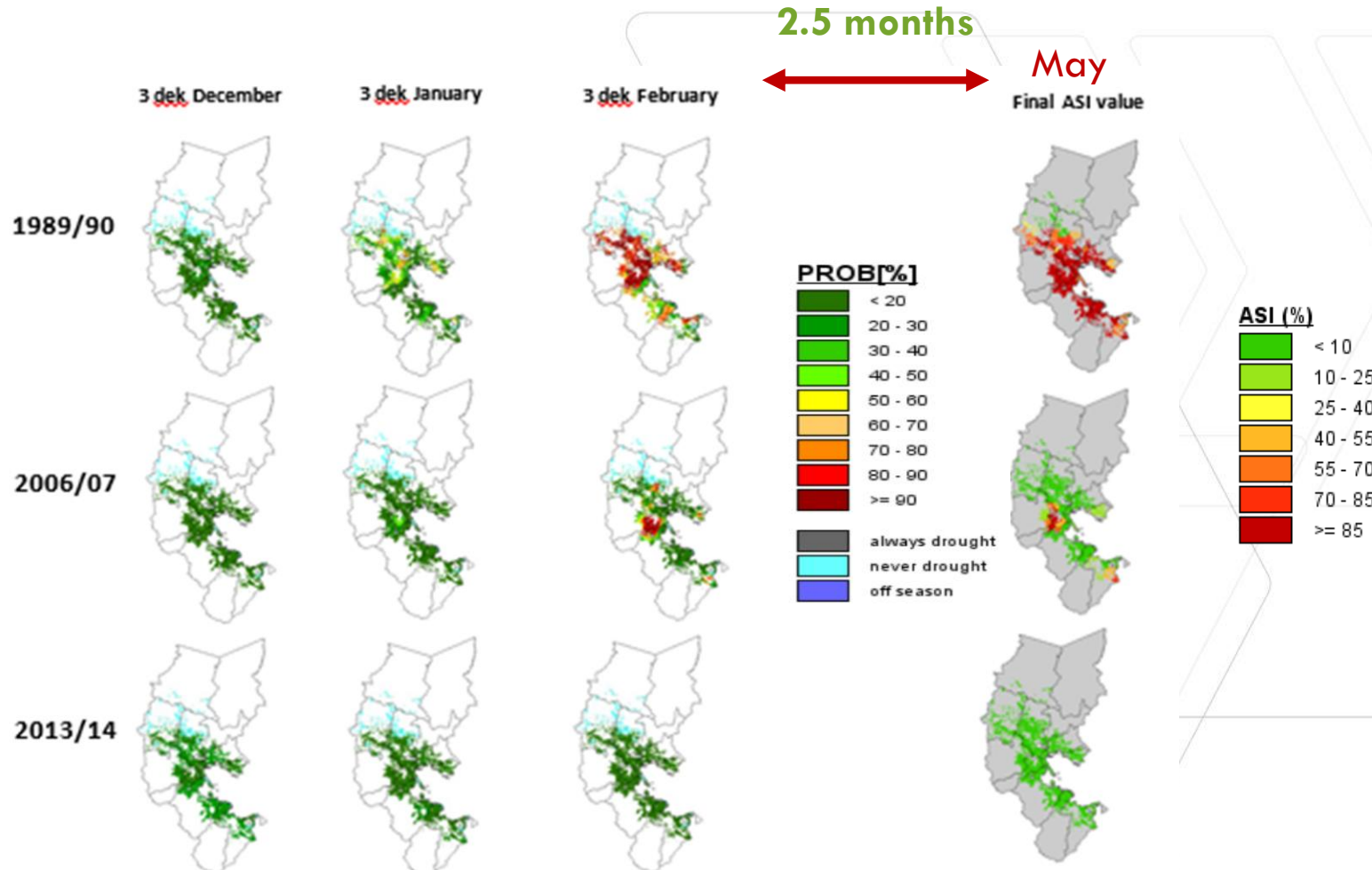
INTRODUCTION OF A DEDUCIBLE

Example of parametric crop insurance with deductible for rice during second crop season in the Philippines



Next Generation ASIS, What does it offer?

Agricultural Drought Forecast

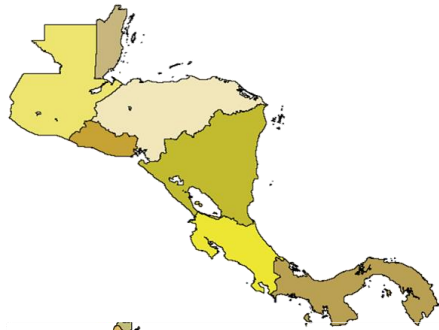


Meroni, M. et al. 2014. Early detection of biomass production deficit hot-spots in semi-arid environment using FAPAR time series and a probabilistic approach. *Remote Sensing of Environment* 142 (2014) 57–68

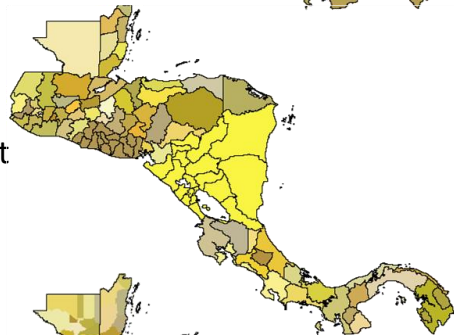
What data is needed to calibrate ASIS?

I. Administrative units

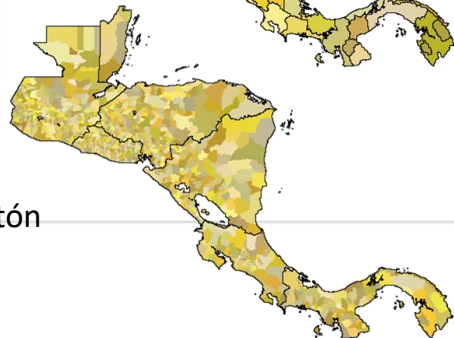
Nivel 0:
Country



Nivel 1:
Provincia/
Departament

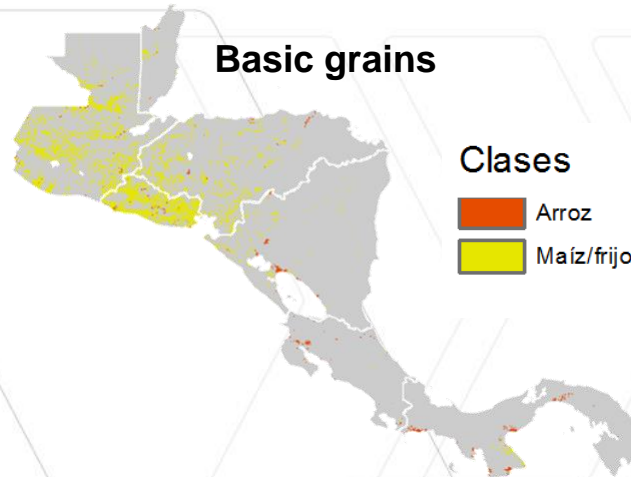


Nivel 2:
Municipio/
Distrito/Cantón

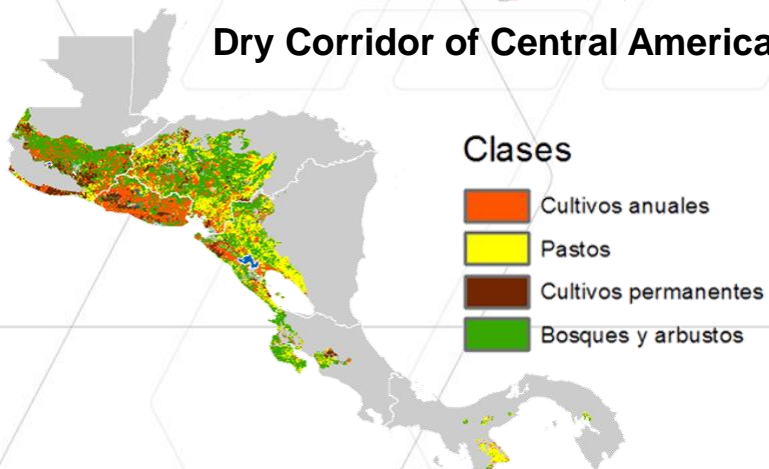


II. Land use maps

Basic grains



Dry Corridor of Central America

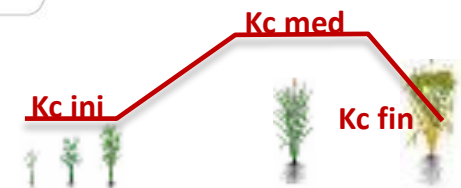


III. Phenological information

Planting dates by crop, crop season and by administrative unit

| Region_ID | Clase_ID | SOS | MOS | EOS | Clase | Municipio | Pais |
|-----------|----------|-----|-----|-----|-------|-----------|--------|
| 5910401 | 1 | 13 | 19 | 23 | arroz | Alanje | Panamá |
| 5910402 | 1 | 13 | 19 | 23 | arroz | Baru | Panamá |
| 5910403 | 1 | 13 | 19 | 23 | arroz | Boqueron | Panamá |
| 5910405 | 1 | 13 | 19 | 23 | arroz | Bugaba | Panamá |
| 5910406 | 1 | 13 | 19 | 23 | arroz | David | Panamá |
| 5910413 | 1 | 13 | 19 | 23 | arroz | Tole | Panamá |

- ✓ Fechas expresadas en décadas (agrupación de 10 días: 1 a 36)
- Inicio de cultivo
- Máximo de la etapa del cultivo (NDVI máximo)
- Madurez fisiológica
- ✓ Kc, coeficiente de cultivo



ASIS 'S CONTRIBUTION

- 1.** Automatic-system fed by pre-processed imagery from VITO that guarantee the sustainability of the system
- 2.** Temporal-spatial integration (including Kc), normally not take into consideration for most of the systems on agricultural monitoring based on remote sensing data
- 3.** Unique time series (>30 years) a 1 km resolution that guarantee the long term memory of the pixel of having an extreme drought event



THANK YOU

OSCAR ROJAS, NATURAL RESOURCES OFFICER, OCB, FAO

MARCH, 2024

