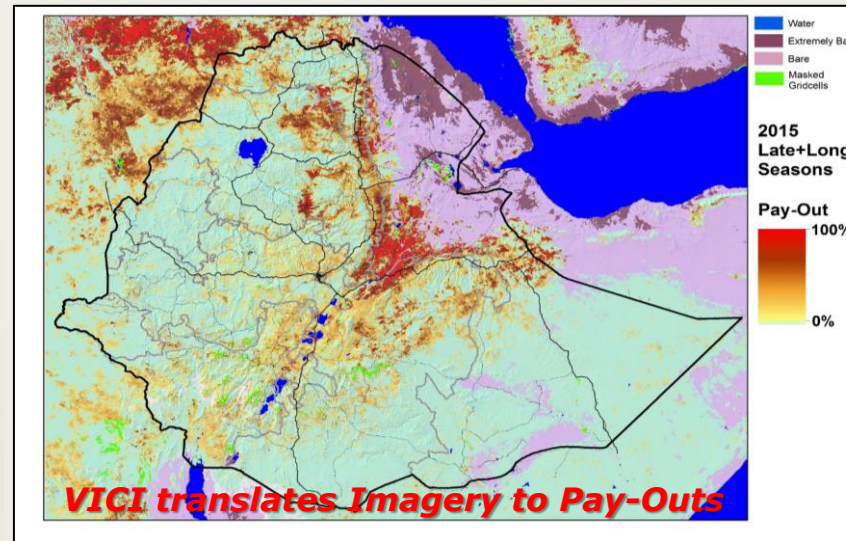


VICI – a Remote Sensing based method to insure farmers against the peril drought

Kees de Bie & Andy Nelson
ITC, University Twente.



a 'Systematic and Synergetic' approach

What is the societal problem that VICI aims to address?

1. Farming is a risky business
2. One major risk is drought
3. Droughts cause risk avoidance behaviour

One intervention to mitigate the impact of drought risk is a well-designed insurance scheme, to ...

- protect farmers against their potential inability to repay credit
- increase smallholder access to finance
- enable better use of inputs for higher productivity
- stabilize income



A single-peril approach



So, how do we develop an insurance product that ...

1. Is efficient and cheap.
2. Aligns with government strategies associated with rural finance.
3. Does not insure the farmer's business model.
4. Ideally is bundled with existing credit and advisory schemes.
5. Provides sufficient historical records for building a sound model.
6. Scalable technology.

VICI is the first (still only) State Bank approved Agri. Insurance scheme



Smallholder Farmers (SHFs)

1. SHFs-Pain: Weather Risk (drought), low access to credit, low productivity
2. SHFs-Gain: a well-designed Credit-linked Vegetation Index Insurance
3. Promise: [by using Insured Credit]
 - Transfer risk of loss due to drought
 - Access to finance and inputs
 - Use of recommended inputs
 - Increase in productivity

These were the challenges we considered when developing the **V**egetation **I**ndex **C**rop **I**nsurance (**VICI**) product for rainfed small holder farmers.

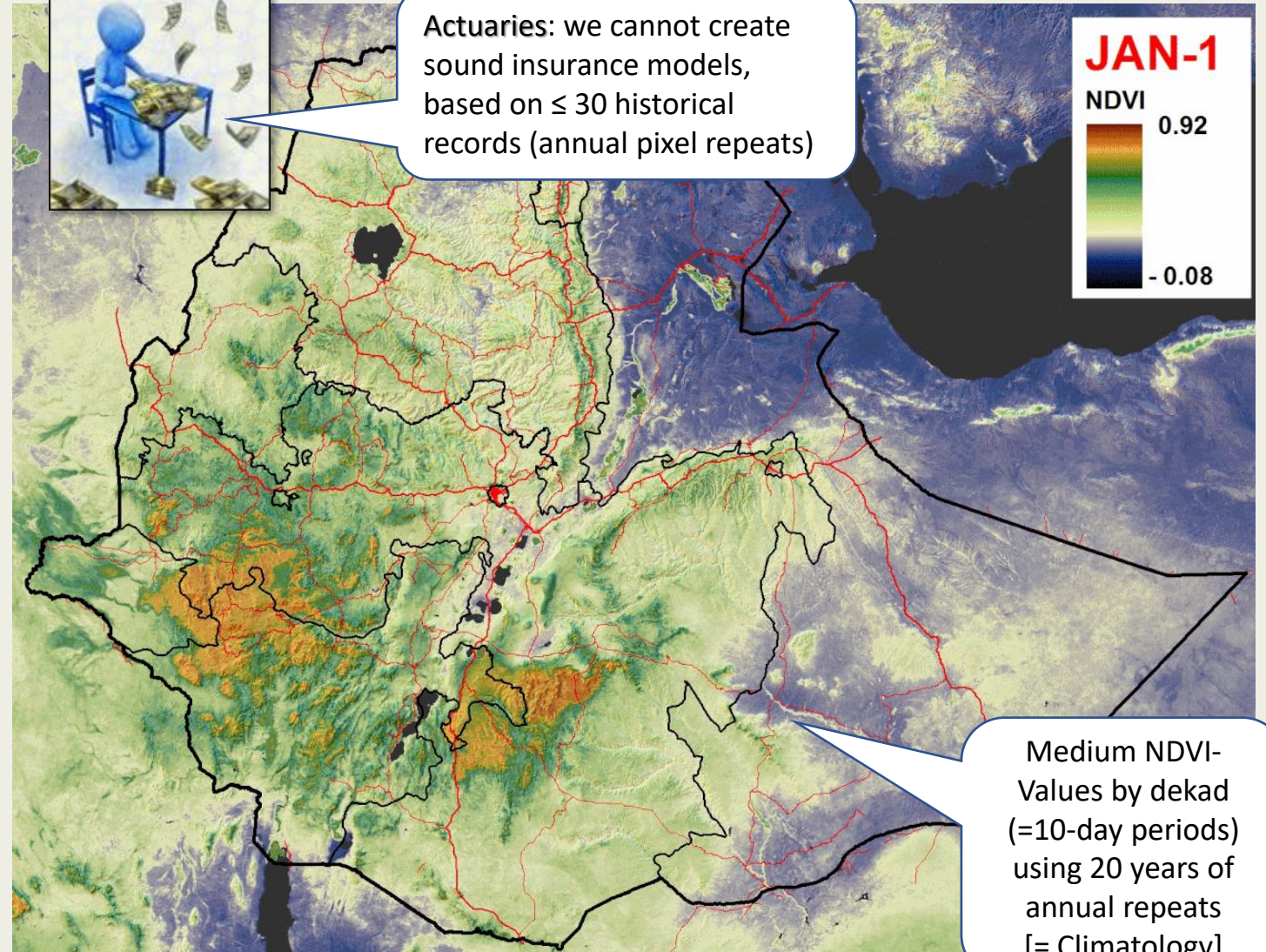
Our technical solution: Regular & reliable Earth observation data

- Time series of **Normalised Difference Vegetation Index (NDVI)** data from ESA satellites.
- NDVI provides an excellent representation of vegetation response to drought.
- NDVI threshold values can quantify the impact of drought resulting in an insurance pay-out being triggered.

But ...



Actuaries: we cannot create sound insurance models, based on ≤ 30 historical records (annual pixel repeats)



Medium NDVI-Values by dekad (=10-day periods) using 20 years of annual repeats [= Climatology]

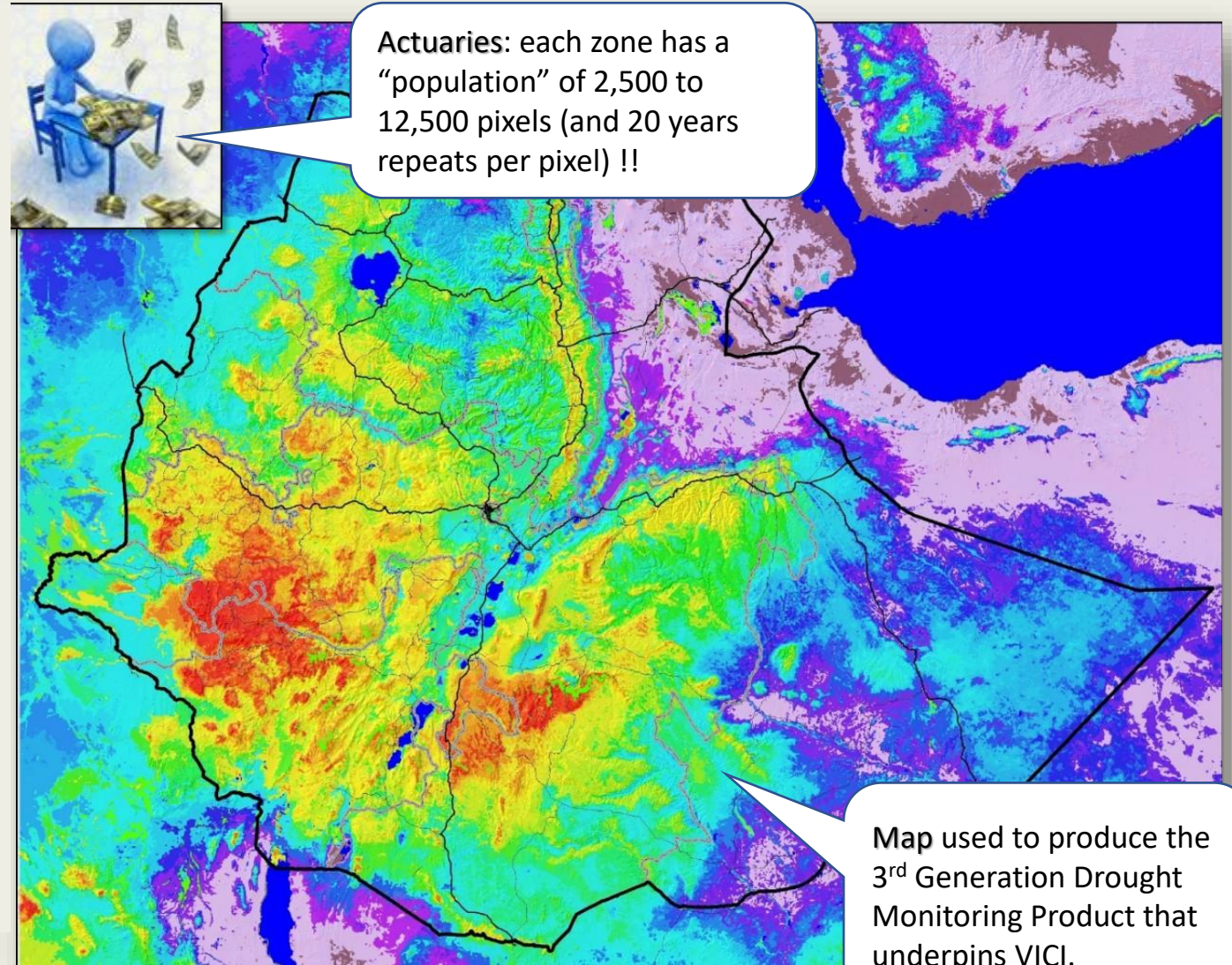
Our technical solution: Robust statistics on drought occurrence

and:

- Droughts are extreme events, requiring information at the tail end of the distribution.

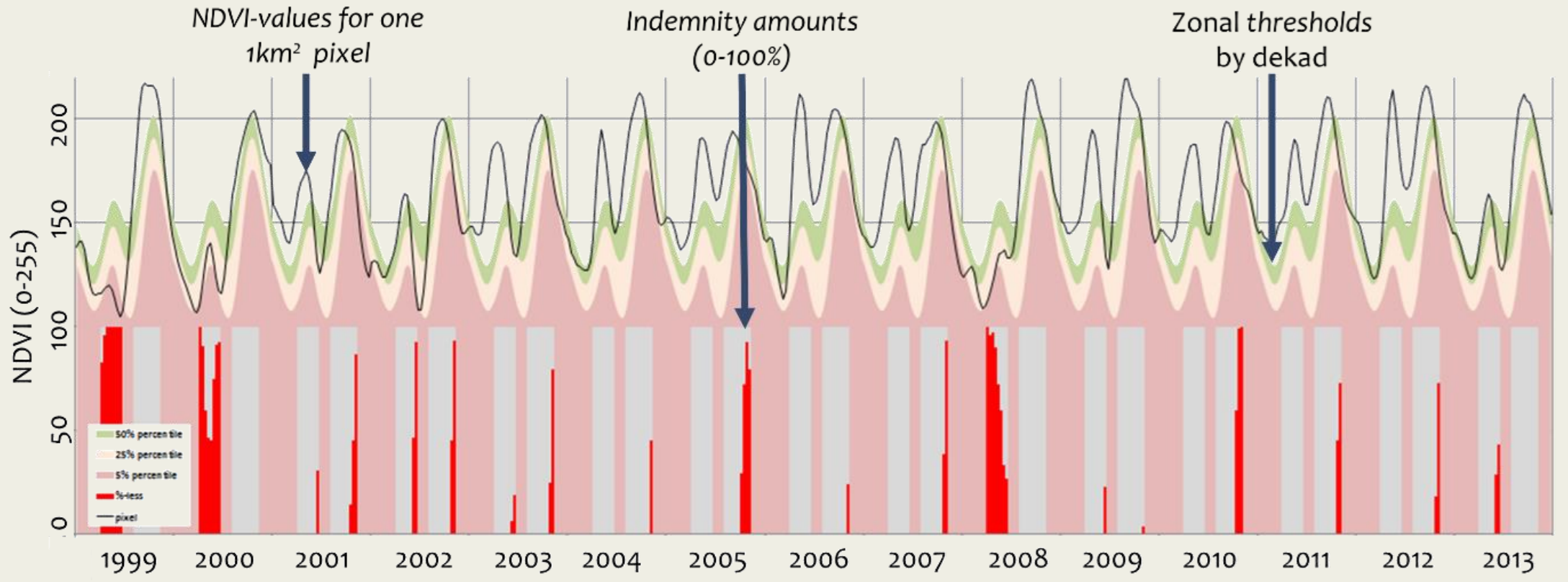
thus:

- The NDVI thresholds need to be based on population statistics instead of sample statistics.
- Unsupervised classification of the NDVI timeseries provides zones for population statistics.



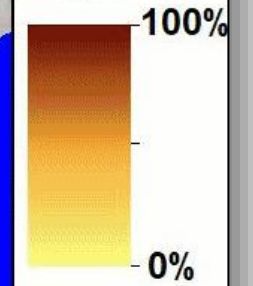
Geodata + population statistics = reliable payouts

- Each zone has 2,500 – 12,500 pixels.
- Such large populations lead to very robust thresholds for payouts.



**%-Indemnity
for 2000**

**VICI-
Pay-Out**

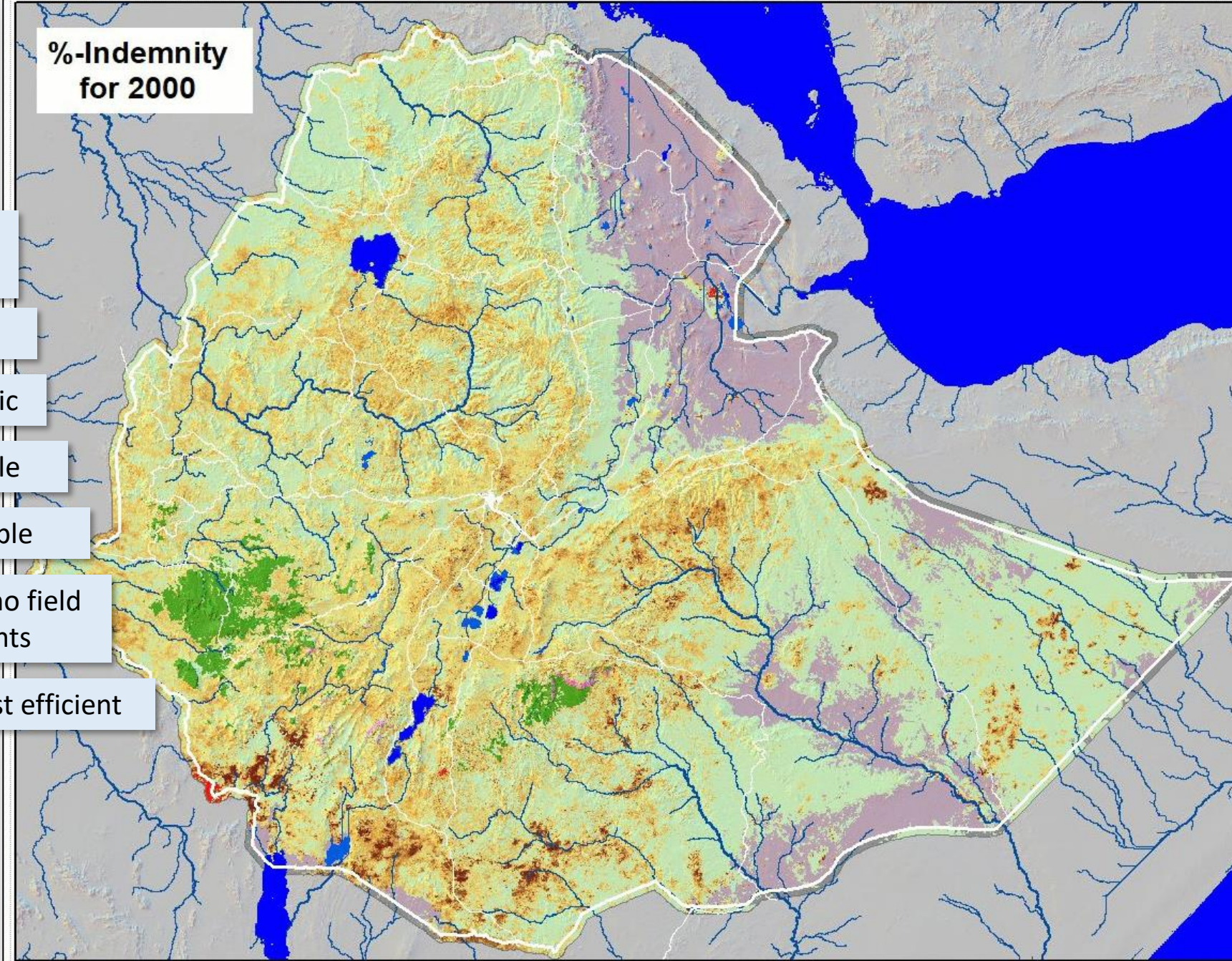


**Long &
Late
Seasons**



C.A. de Bie ©2022

- not Impact-based but exposure-based
- is area specific
- is crop a-specific
- is fully scalable
- is very flexible
- requires no field assessments
- very cost efficient



Proposed new role for VITO as a VICI service-provider

For e-Shape the following activities **could not** continue:

Transfer from ITC to Mekelle University:

- Data capturing and NDVI-imagery pre-processing,
- Permanent Index Maintenance

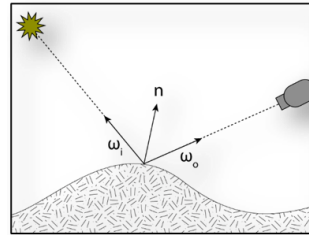


proba-v

Previous set-up



New work
in progress



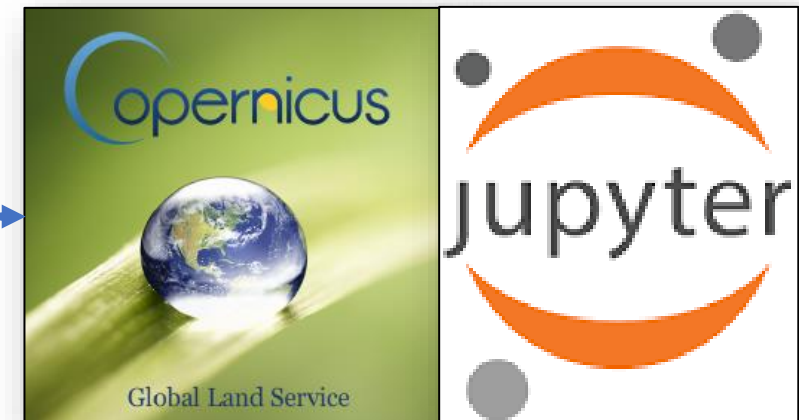
Secured data compatibility by
using BRDF-adjusted imagery
across NDVI-data sources.

Provide support to VITO in developing a VICI service:

- API-based service: VICI information is either pushed to a specific location, or requested at any time.
- Hosted on the Terrascope platform



SENTINEL 3

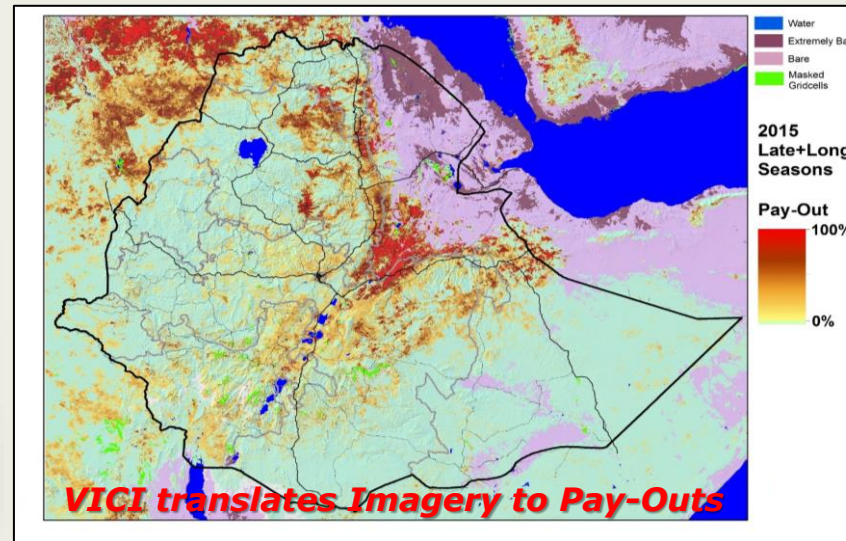


The aim are long-duration commitments and client-independency.



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A collection of logos for the partner organizations involved in the VICI project. The logos include: Copernicus (Europe's eyes on Earth), ITC, NMA, kifiya, Ethiopian ATA (Agricultural Transformation Agency), G4AW (GEODATA FOR AGRICULTURE AND WATER), Ministry of Agriculture (MINISTRY OF AGRICULTURE), IASA, Ministry of Foreign Affairs, jica, ICIP, Netherlands Space Office, FDRE Public Financial Enterprises Agency, e-shape, and the European Commission.