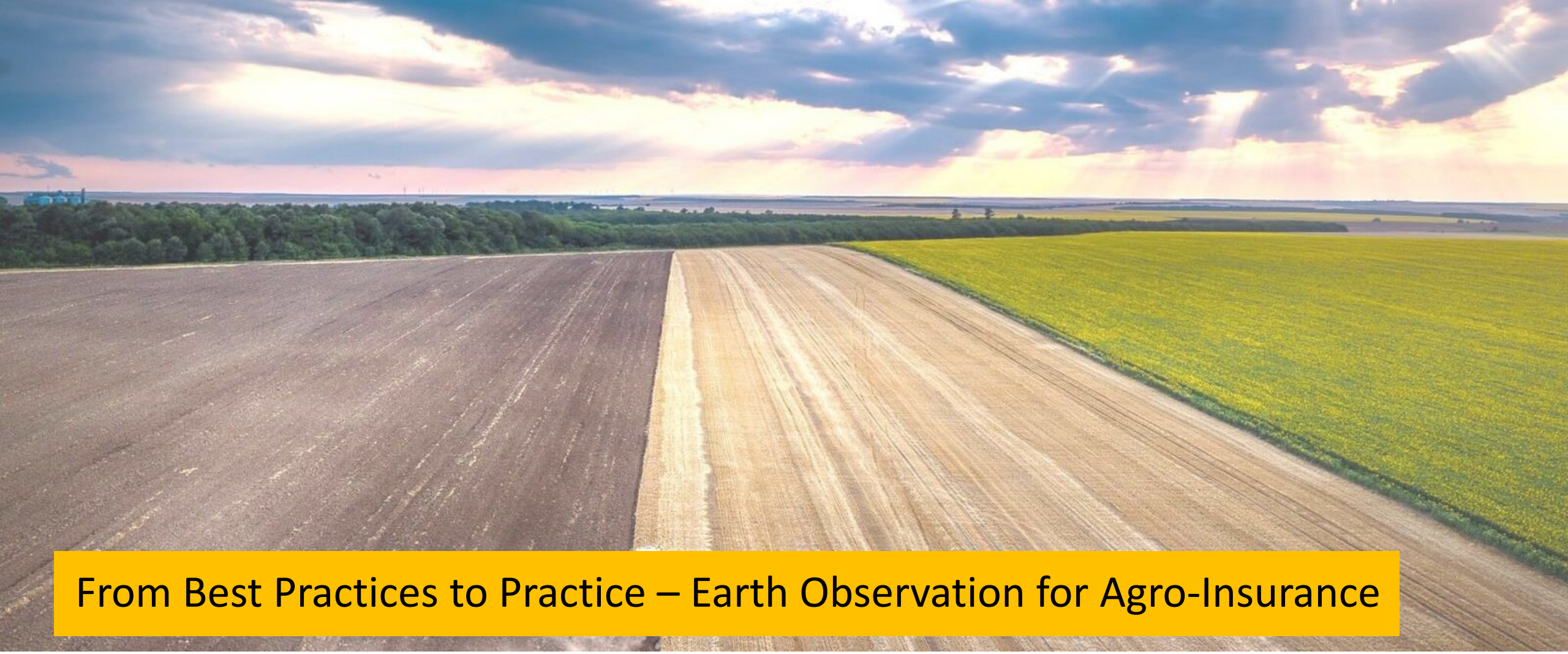

From Best Practices to Practice – Earth Observation for Agro-Insurance

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Earth Observation for Agro-Insurance – From Best Practice to Practice

Online-Workshop, 29 April 2021

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Welcome

Ralf Ryter

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Agenda (Day 2 - 29/04/2021)

09:00 – 09:15: Welcome

- Preliminary information & Poll
- Agenda
- Wrap up of yesterday

09:15 – 09:45 Discussion: From Best Practice to Practice (GeoVille)

- what services / products of EO might be necessary to improve existing or enable new products?
- What are their envisaged practical applications?
- How to present data in a useful way?

Agenda (Day 2 - 29/04/2021)

09:45 – 10:45 The future of Index Insurance (AgroInsurance Int.)

- Outline of current existing products
- challenges and benefits
- additional functionality / features of EO that can be used
- Verification of weather data from automatic weather stations
- Future available EO products/services for supporting index insurances.

10:45 – 11:00 Break

Agenda (Day 2 - 29/04/2021)

11:00 – 11:50 Third party providers for Re-Insurers (All)

- Requirements
- data, presentation, functionality (e.g. download data)
- how can images / maps contribute to a proper perception of the end-users

11:50 – 12:00 Summary of the day and final Q&A

Summary of Day 1

Presented and discussed topics:

- Short introduction to project
- Current and future EO capabilities
- Sector requirements overview & EO product usage considerations
- Use Cases of EO4I
- Technological push by Covid-19 pandemic

Summary

Most interesting discussion outcomes:

- Basically technological questions regarding EO
- (Near) real time monitoring in many business processes important
- Long-term data of importance
- New / more sensors / satellites needed to fulfill needs
- Combination of EO with other data necessary (n.b. accuracy)

Summary

Most interesting discussion outcomes:

- Covid: Business didn‘t suffer that much as expected
- Trusted data
- Tailored solutions
- Historical data + new technology can give good results
- remote sensing can help recalculate pricing of insurance products
- Colaboration and close contact between both industries needed

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From Best Practice to Practice

Kris Nackaerts

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from best practice to practice

Goal of this session: find out how EO services and products can contribute to new insurance solutions

Hypothesis 1:

Historical long-term data are the key basis for assessing risks. Thus, they contribute significantly to the development of new insurance products.

from best practice to practice

Goal of this session: find out how EO services and products can contribute to new insurance solutions

Hypothesis 2:

Satellite imagery offer a high value as they offer **systematic coverage** over large and sometimes not easy to access areas, they provide the overview, the detail we analyze in the field.

from best practice to practice

Goal of this session: find out how EO services and products can contribute to new insurance solutions

Hypothesis 3:

(near) **real-time data** is the key for new insurance-products as they help to improve monitoring and fast pay-out procedures.

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The Future of Index Insurance

Roman Shynkarenko,
Technical Director, AgroInsurance International

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TYPES OF INDEX INSURANCE

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Area–based yield index

average yield per administrative unit

Weather index insurance

Tmax, Tmin, mm, degrees above or below threshold, heat/cold units, number of days with certain values of specific weather events, etc.

Parametric index insurance

earthquake, tropical cyclone category, flood category, forestry area burnt, etc.

Satellite data-based index

vegetation/pasture index (NDVI, LAI, EVI), soil moisture, etc.

Livestock index insurance

number of animals lost within a specified period of time

Picture-based insurance

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GEOGRAPHY OF INDEX INSURANCE INITIATIVES

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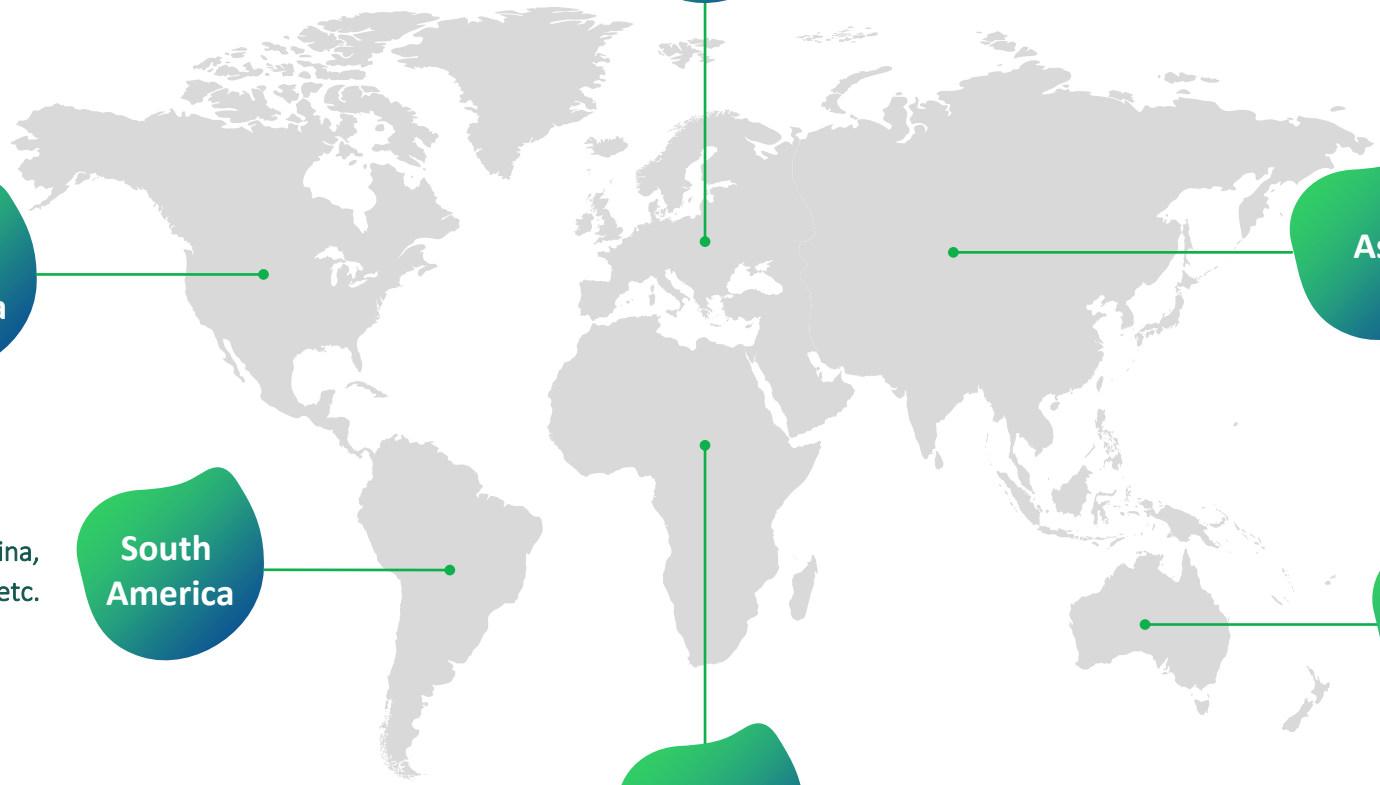

Europe
Ukraine, Romania, Turkey, Russia, Kazakhstan, Serbia, Croatia, France, Spain, Bulgaria, Slovenia

North America
USA, Canada, Mexico

Asia
India, Thailand, Philippines, Indonesia, Cambodia, Bangladesh, China, Mongolia, etc.

South America
Brazil, Argentina, Uruguay, Colombia, Chile, etc.

Pacific
Australia, Samoa, Tonga, Vanuatu, other states

Africa
Uganda, Kenya, Tanzania, Ethiopia, Senegal, Ethiopia, Mali, Malawi, Morocco, etc.

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ADVANTAGES OF INDEX INSURANCE

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Data-driven but subject to data quality. Use proxy if some data is not available

Very flexible – theoretically can insure anything against any peril through index

Very good solution for CAT level events and natural disaster recovery

Quick payouts but not for area yield index currently

No on-site or in-field loss assessment (?)

Moral hazard free (?)

Lower administration costs (?)

Higher degree of digitalization comparing with traditional insurance (mobile phones, claim e-payments and multi-channel disbursement facilities, on-line cover selection and premium payment)

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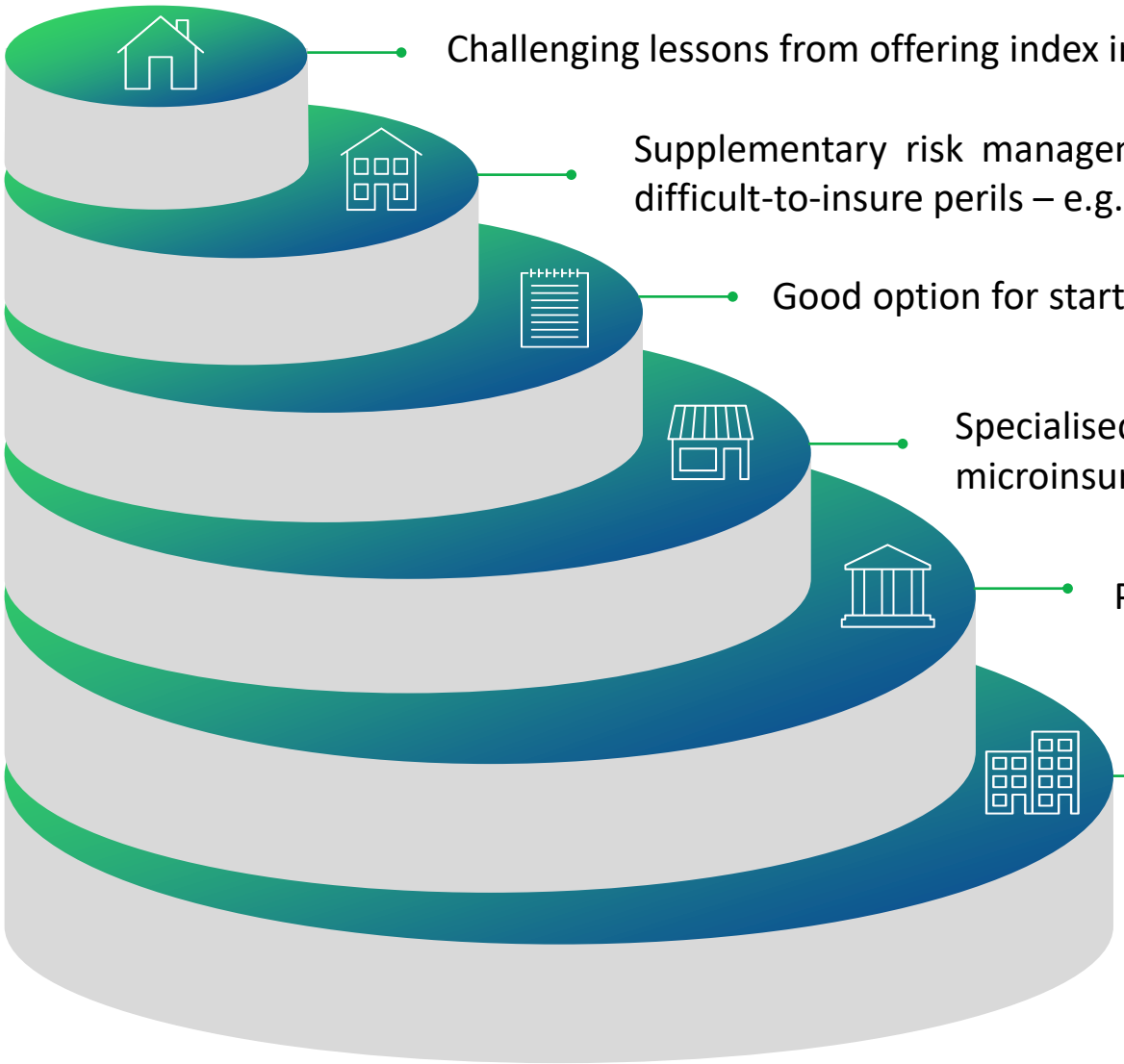
POSITIONING



Challenging lessons from offering index insurance to small and subsistence farmers in developing countries

Supplementary risk management solutions for large commercial farms (tailored covers for difficult-to-insure perils – e.g. drought @500K for 5M crop assets)

Good option for starting an agricultural insurance program

Specialised solutions for meso level – portfolio insurance by banks, microinsurance organizations, grain traders, input suppliers

Proven efficiency at macro (government) level – disaster risk recovery

Risk facilities – Caribbean Risk Insurance Facility, African Risk Capacity, Pacific Islands Climate Change Insurance Facility

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REALITY

Real uptake of index insurance is much lower than potential demand with poor and small farmers (e.g. 60+% say may buy but 20% or less actually buy)

Require premium subsidies and other types of donor/government support

Sustainable index products are often complex in structure (Canada: Corn heat unit, forage rainfall; USA: Rainfall index)

Grid ID	Index Interval	Unit	Policy Protection Per Unit
1	628	xxxxx	$1,296.00 ($21.60 x 100.0 acres x 60 percent of value x 1.00 share)
	631	xxxxx	$864.00 ($21.60 x 100.0 acres x 40 percent of value x 1.00 share)
2	628	xxxxx	$648.00 ($21.60 x 50.0 acres x 60 percent of value x 1.00 share)
	631	xxxxx	$432.00 ($21.60 x 50.0 acres x 40 percent of value x 1.00 share)
3	628	xxxxx	$1,296.00 ($21.60 x 100.0 acres x 60 percent of value x 1.00 share)
	631	xxxxx	$864.00 ($21.60 x 100.0 acres x 40 percent of value x 1.00 share)
4	628	xxxxx	$3,175.00 ($21.60 x 245.0 acres x 60 percent of value x 1.00 share)
	631	xxxxx	$2,117.00 ($21.60 x 245.0 acres x 40 percent of value x 1.00 share)
Total policy protection			$10,692

LOM Weighting Options for Silage Greenfeed Insurance

Options	May Precipitation (%)	June Precipitation (%)	July Precipitation (%)	August Precipitation (%)
A	20	40	40	0
B	15	35	35	15
C	0	20	40	40

CHU Payment Rates for Grain & Silage Corn

	Silage Corn	Grain Corn
Corn Heat Units (CHUs) Shortfall	Payment Rate (%)*	Payment Rate (%)*
0	0	0
< 20	3%	5%
< 40	6%	10%
< 60	9%	15%
< 80	12%	20%
< 100	15%	25%
< 120	18%	30%
< 140	21%	34%
< 160	24%	38%
< 180	27%	42%
< 200	30%	46%
< 220	33%	50%
< 240	36%	54%
< 260	39%	57%
< 280	42%	60%
< 300	45%	63%

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WEATHER INDEX STRUCTURES EXAMPLES

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Provinces	**Battambang; Kampong Thom; Prey Veng**
Crop (season)	Rice (wet season)
Basis	Weather Index Insurance based on daily rainfall data from 5 rainfall stations maintained by MOWRAM or from satellite data (e.g. TRMM, CHIRPS)
Risks covered	1) Early Season Dry Spell; 2) Main Season Dry Spell; 3) Early Season Excessive Rainfall; 4) Main Season Excessive Rainfall.
Automatic Rainfall Triggered Start Date (ARTSD)	Over **15th June 2018 to 14th July 2018**, if the cumulative rainfall over any **5** consecutive days is **20 mm** or more, then the insurance cover starts from the first day after the **5** consecutive days are over (e.g. if there is at least 20 mm of rainfall over 15th June to 19th June 2018, then cover starts on 20th June 2018). If this condition is not met until 14th July 2018, then the ARTSD is **15th July 2018.**
Duration of cover	The period from ARTSD to ARTSD + 120 days
Phase 1	The period from ARTSD to ARTSD + 30 days (duration of 30 days)
Phase 2	The period from ARTSD + 31 days to ARTSD + 120 days (duration of 90 days)

TERMS

Certificate:	Emergence Plus
Start Date:	15.08.2021
End Date:	30.09.2021
Measurement:	Daily Rainfall
Payout/mm:	$3.35/mm
Index:	SUM daily rain
Strike:	15mm
Max Payout:	$50/ha
Payout amount:	Max = (Strike - Index) x Payout per mm
Premium:	**$9/ha**

Policy Duration 110 days

Cover Phase	I	II	III
Duration	35 days	35 days	40 days
PUT			
Strike (mm) <	60	80	-
Exit (mm) <	10	10	-
Notional (Rs / mm)	10.00	10.00	-
Policy Limit (Rs)	1,000	1,000	-
Phase premium (Rs)	90	90	
CALL			
Strike (mm) >	-	-	240
Exit (mm) >	-	-	340
Notional (Rs / mm)	-	-	10.00
Policy Limit (Rs)	-	-	1,000
Phase premium (Rs)	-	-	110

Combined Premium (Rs) 280

Combined policy limit (Rs) 3,000

Data Source Indian Meteorological Department

Settlement Date Thirty days after the data release by IMD and verified by Insurer.

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PERILS AND COVERS

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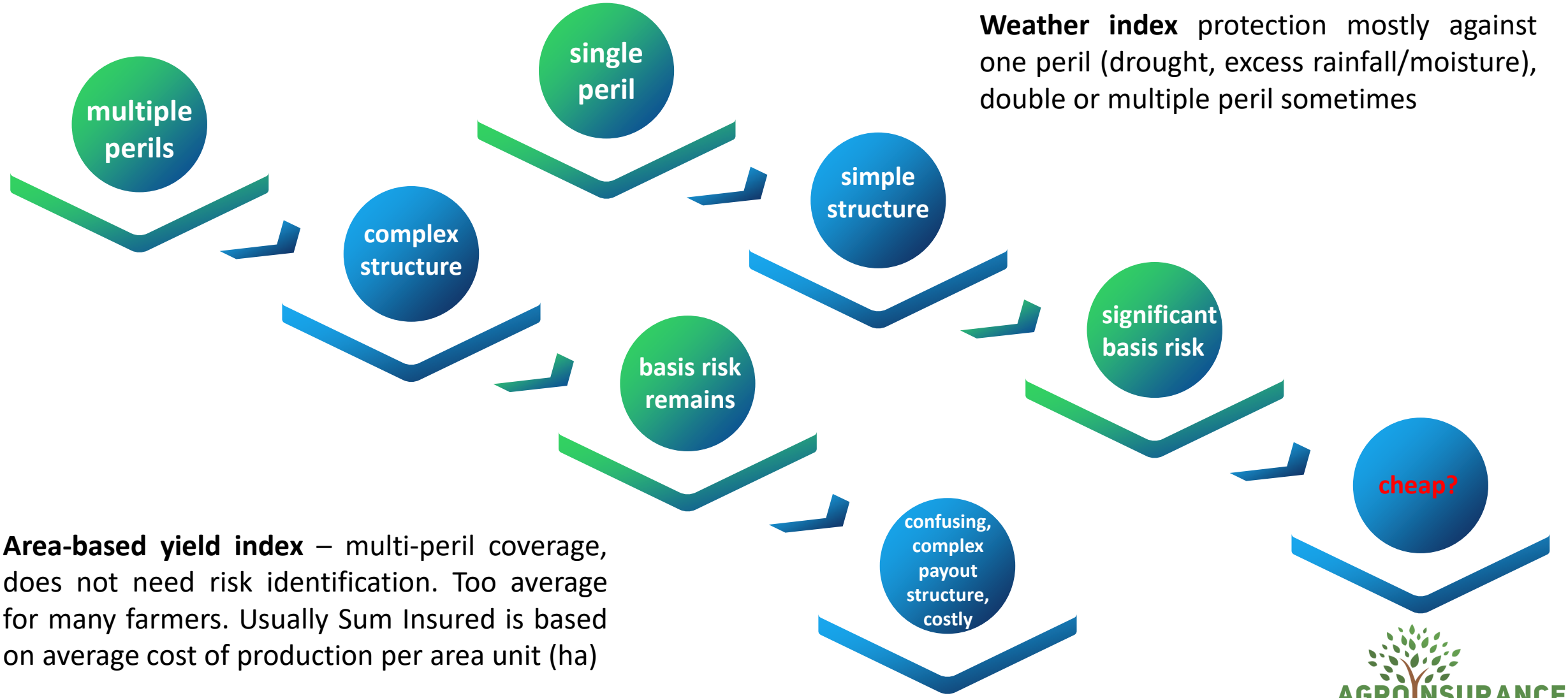
Weather index protection mostly against one peril (drought, excess rainfall/moisture), double or multiple peril sometimes



Area-based yield index – multi-peril coverage, does not need risk identification. Too average for many farmers. Usually Sum Insured is based on average cost of production per area unit (ha)

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AREA YIELD INDEX INSURANCE

Yield estimates/Crop cutting experiments for claim purposes:

- Manpower and resources
- Logistics Multi-season in certain geographies
- Standard procedures
- Randomness and number of tests
- Must be done at insured and non-insured fields for statistical representation

Challenges:

- Official yield data may have quality issues (over or under reporting)
- Participation: **low technology/cost minded** **vs** **profit target/high yields**.
  Cuts off at least 30% low tier and 10-15% best farmers
- Adverse selection possible as waiting period is too short
- High administrative costs
- Very long reporting period

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AREA YIELD INDEX INSURANCE

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EO capabilities

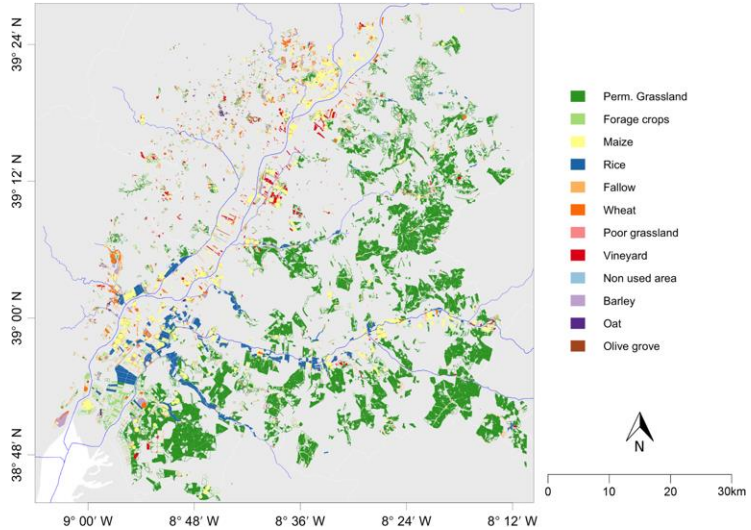
Yield estimation
Crop type identification

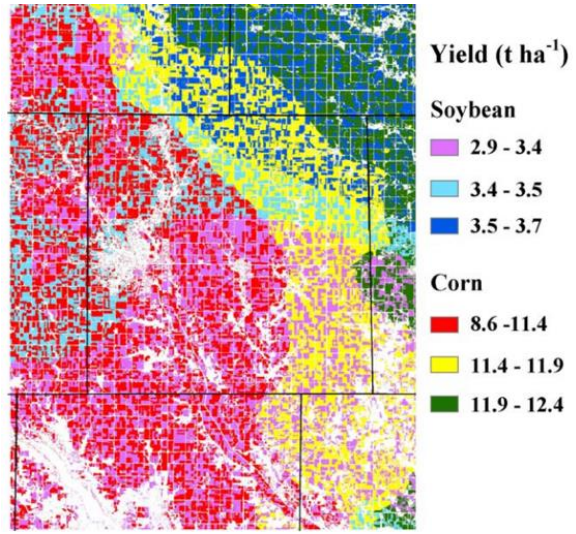
EO specifics

Technology must be cloud-free
No gaps with sensing

EO challenges

Different harvest/ripening dates due to production practice, planting decisions, variety production cycle and especially when grain is underdeveloped





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WEATHER DATA – OFFICIAL (GOVERNMENT) SERVICES

Weather data from ground-based weather stations (national weather service)

Long time historical data sets

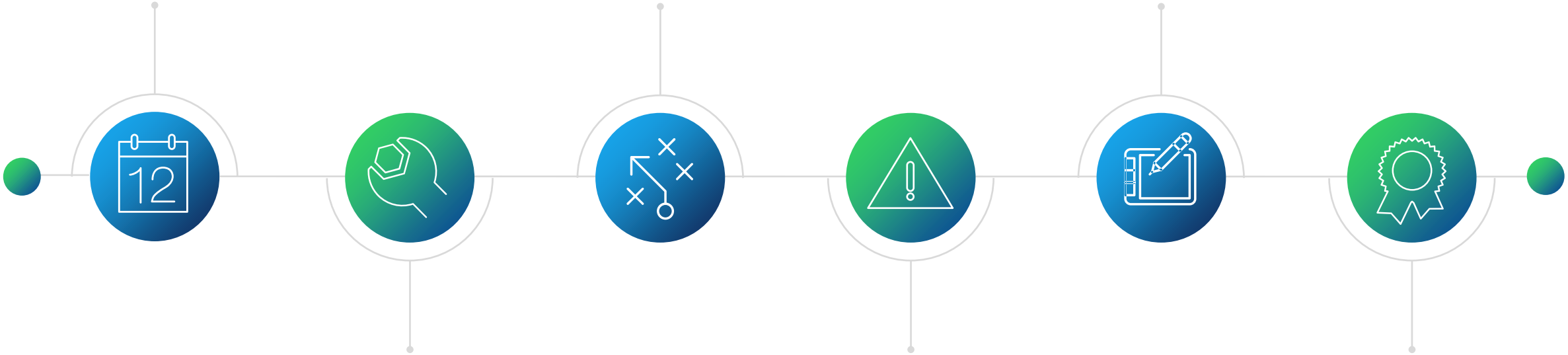
Some stations may retire, data gaps, change of equipment

Low density in rural areas (basis risk)

Weather radars may not service rural areas

Data collection protocols (every 3 hours in 24 hour cycle)

Not all stations report data according to WMO standards



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WEATHER DATA – AUTOMATIC WEATHER STATIONS

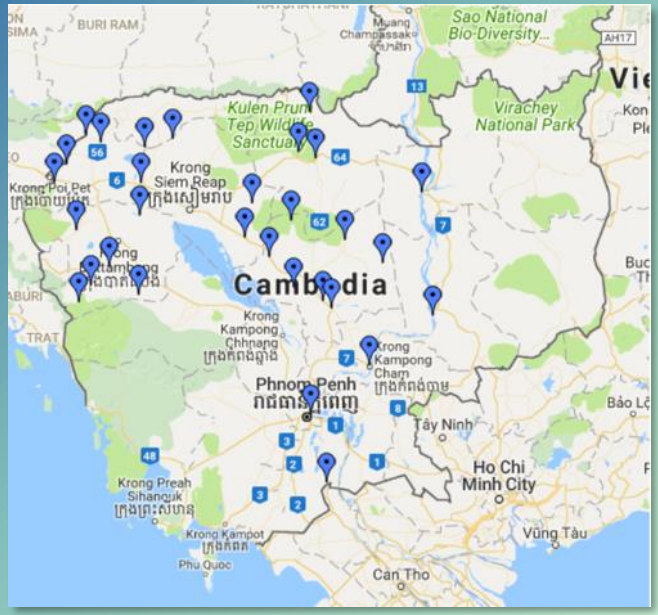
More robust data collection

Difference in design and equipment

Need servicing and sensors calibration

Site management is important

Private automatic stations may not be suitable for insurance (data quality, location, maintenance, power supply and malfunction, interference, damage, theft)



WEATHER DATA – AUTOMATIC WEATHER STATIONS

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SATELLITE WEATHER DATA

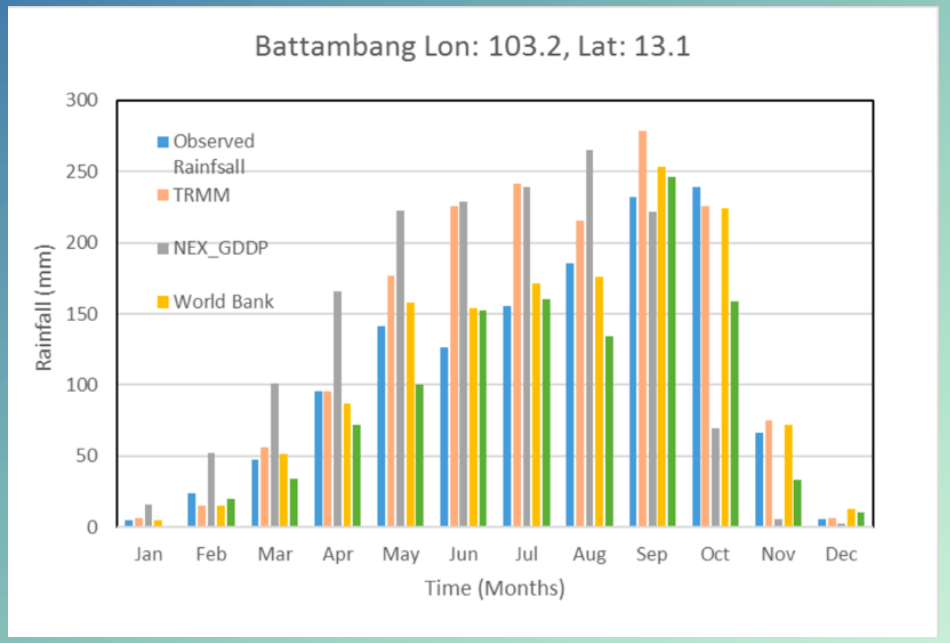
Numerous weather and climate data sets

There are differences between ground-based station data sets and satellite data

Ground-based weather data requires re-analysis due to coverage issues

Satellite weather data may be preferable for weather indexes

? Data resolution – 10x10km, 5x5 km, etc.



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EO PRODUCTS FOR INDEMNITY AND INDEX INSURANCE

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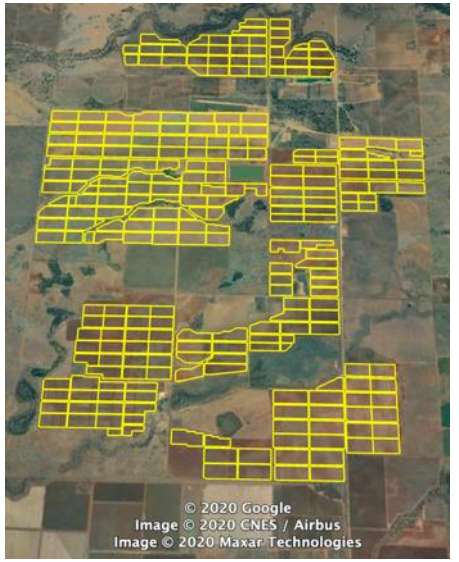
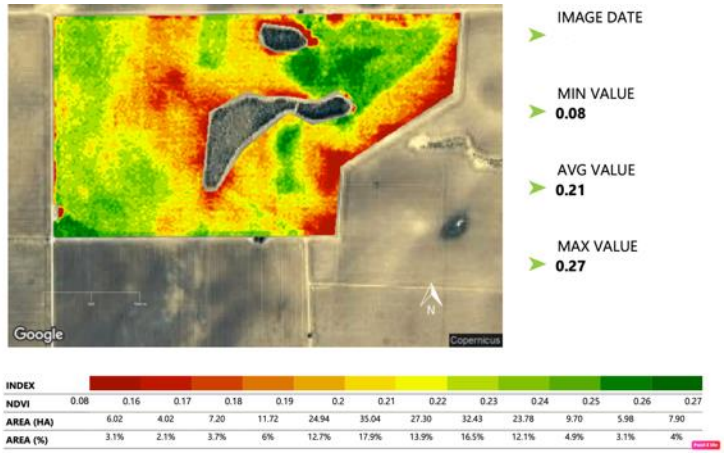
- Crop establishment – indemnity; winterkill; area yield index
- Crop identification – portfolio management, exposure assessment
- Crop damage – claim management; supplementary data; accurate damaged area estimation
- Yield estimation – early loss assessment; area-yield index enhancement





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FUTURE VISION OF USING EO FOR AG INSURANCE

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- Bundled insurance solutions combining indemnity and index insurance
- Automation of data reporting
- Move from raw data to solutions based
- EO data generate early forecast of the possible outcomes
- Remote solutions for risk acceptance and claims handling

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INTRODUCTION OF NEW TECHNOLOGIES FOR CROP INSURANCE

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Satellite remote sensing

Drones

GIS and mapping

Weather data sets

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- Research, analysis and program audit
- Product design and technical assistance
- Capacity building / training underwriters and loss adjusters
- Agricultural risk management consulting
- Customized underwriting solutions
- Loss adjustment services
- Technology introduction and support

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Third Party Providers for Reinsurers

Ian Shynkarenko, Roman Shynkarenko

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Third party providers for reinsurers

1. Advantages and challenges of satellite data

- Optical
- Radar

Third party providers for reinsurers

2. Satellite revisit time and how fast the user (ag insurer) gets the interpreted data

- practically complementing ag insurance business processes - underwriting, loss adjustment claims settlement)

- spatial resolution (insurers/reinsurers)
- regional specifics (Europe / Africa / Asia)

Third party providers for reinsurers

3. Regional specifics of RS solutions for insurers and reinsurers

- spatial/temporal resolution
- regional specifics (Europe/ Africa / Asia)

Summary

Presented and discussed topics:

- From Best Practice to Practice
- Future of Index Insurance
- Third-party providers for Reinsurers

Summary

Most interesting discussion outcomes:

- **Historical long-term data** are the key basis for assessing risks **but** costs need to be considered
- Satellite imagery offer a high value as they offer **systematic coverage –** this depends on the application and cannot be confirmed globally
- Don’t forget local knowledge of farmers.
- Data security is a big issue

Summary

Most interesting discussion outcomes:

- EO can support indemnity and index insurances for certain applications
- **Most probably combination of indemnity and index insurance in the future**
- Challenges are e.g. costs for data and infrastructure at insurance companies
- **Combining data will be the future**

Summary

Most interesting discussion outcomes:

- Optical + radar data combination
- **Don’t forget thermal data**
- Technical challenges like cloud masking, haze and **interpretation of radar data (tools needed)**
- Revisit time is of importance for monitoring; on demand within an hour would be great but depends on pricing and coverage
- Image before and after event (see whole evolution) **plus staff planning**
- Applications: Loss prevention vs. loss assessment

Agricultural area in central Spain (Albacete); Global Landcover Dynamics on landmonitoring.earth (GeoVille)

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Thank you!

For further information please contact:
Ralf Ryter (ryter@geoville.com)
GeoVille

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