European Commission

Smart Monitoring of Crop Production with High Resolution Sentinel Satellite Data

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Overview

Why do we need smart monitoring in agriculture?

Technology context: information requirements along the user pyramid

Focus on crop area and yield monitoring

Existing activities with Ukrainian partners

Future: Smart Specialization Strategies for Ukraine?

Why smart monitoring of agriculture?

Agriculture is (back) at the top of the Global Agenda: food security, biofuels, climate change, sustainable production

Complex, global processes, with multiple spatial and temporal scales, short- and long-term impacts

Counter-intuitive: why, if food demand is supposed to rise, are commodity prices at historic lows?

Many of the "old" problems persist (production factors, logistics, rural migration and poverty, environmental degradation)

Why smart monitoring of agriculture?

Technological advances in a number of relevant areas: sensor networks, including Earth Observation, data access and processing, mobile communication

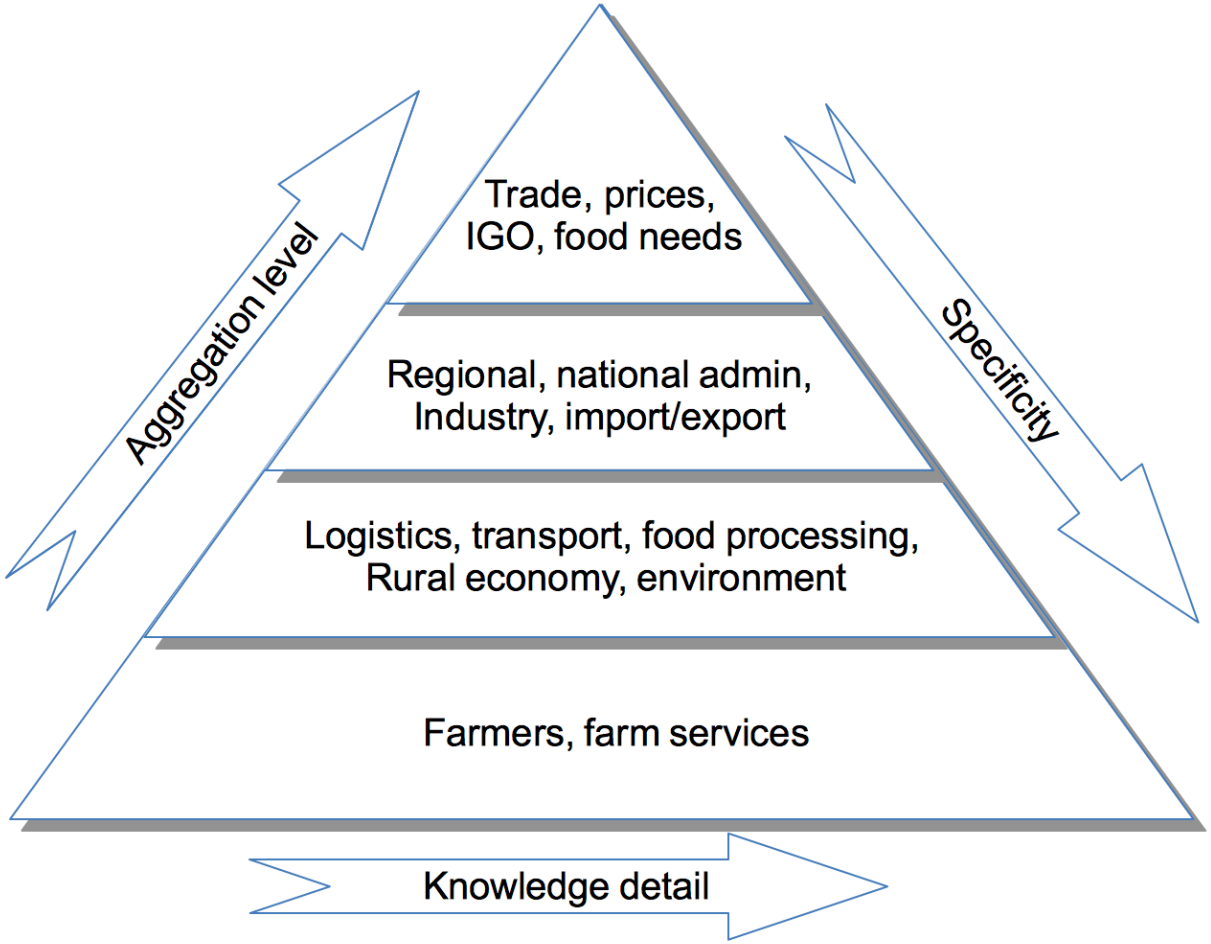
Simultaneous and advancing rapidly

Supposedly leading to gains in farm-gate profits (e.g. precision farming) and environmental impact (reduced pressure)

But take up of technology requires investment (procurement and education) in a marginal income landscape

Which elements of S3 to develop?

Technology context



Technology context

Ideally, information across the pyramid would be shared if mutual benefits are evident. Asymmetry is often a market edge, though.

Sensor data can be a catalyzer (or 'currency'), esp. since impact at different layers is greatest if enriched with information from others (e.g. insurance).

Enables different business arrangements (swaps, packaging)

Enables 'smarter' value adding at different scales and levels of the pyramid (e.g. environment).

Crop area and yield monitoring

Copernicus is the EU space programme for environmental monitoring. Sensor constellations combined with thematic services (land, maritime, climate, atmosphere, emergency).

2 years of Sentinel-1A, 1 year of Sentinel-2A

Results from single season crop classification are robust and consistent (across different countries)

S-1B and S-3A operational from October 2016

"Free and Open" model catching on (ASTER, Proba-V)

S-2B and S-3B to be launched in early 2017

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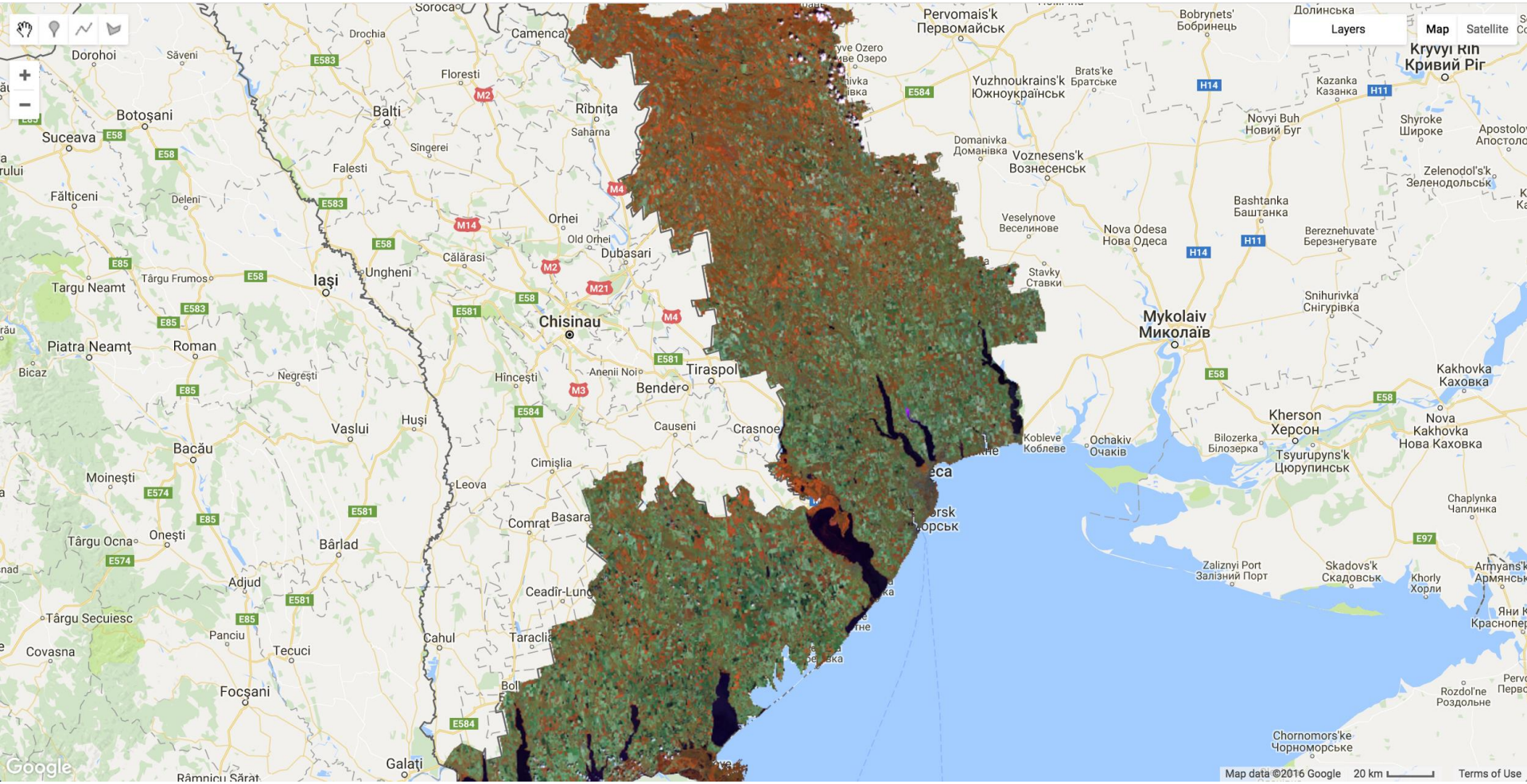

Sentinel-2A - 10 m NIR-SWIR-RED, 17 July 2016

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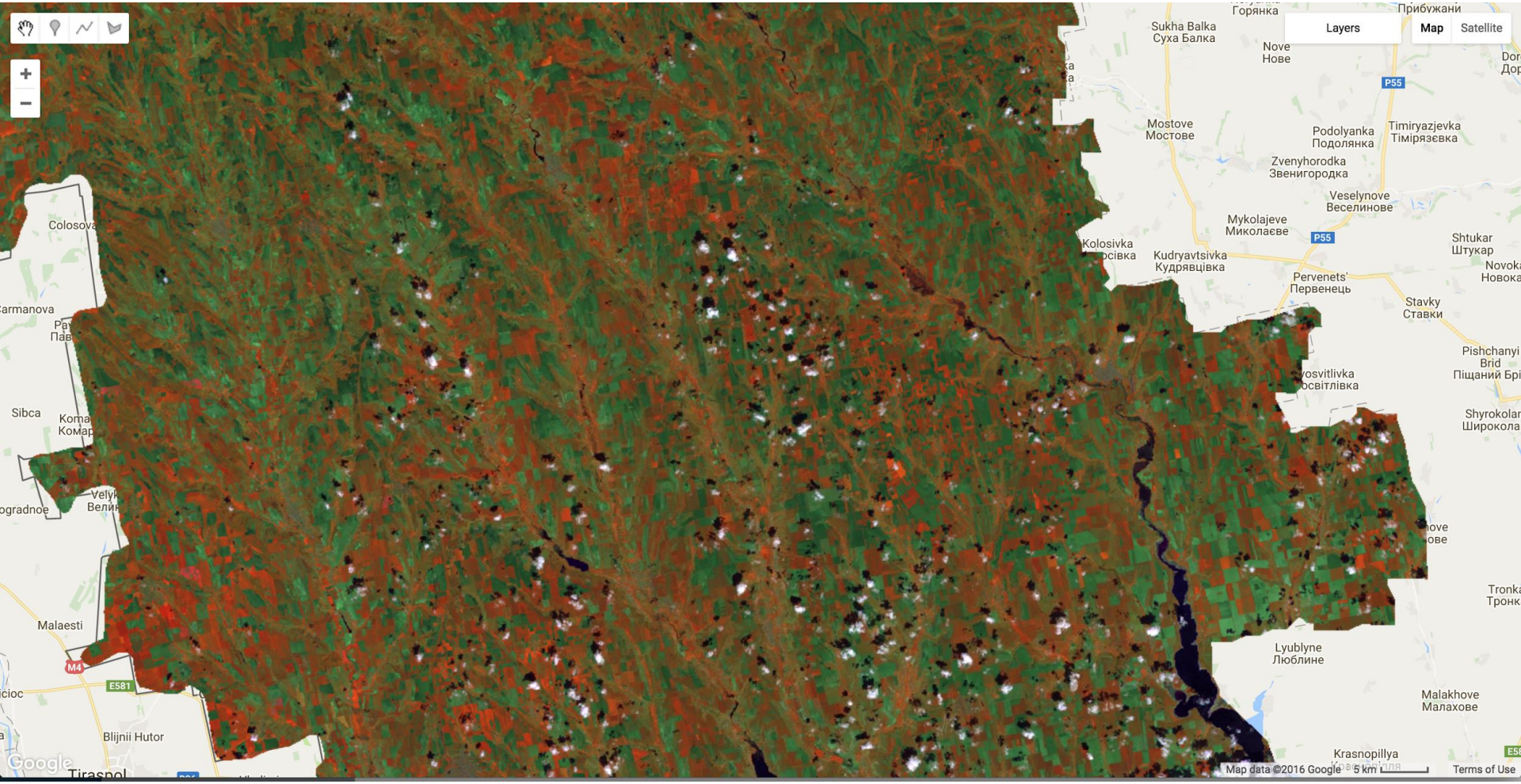

Sentinel-2A - 10 m NIR-SWIR-RED, 28 April 2016

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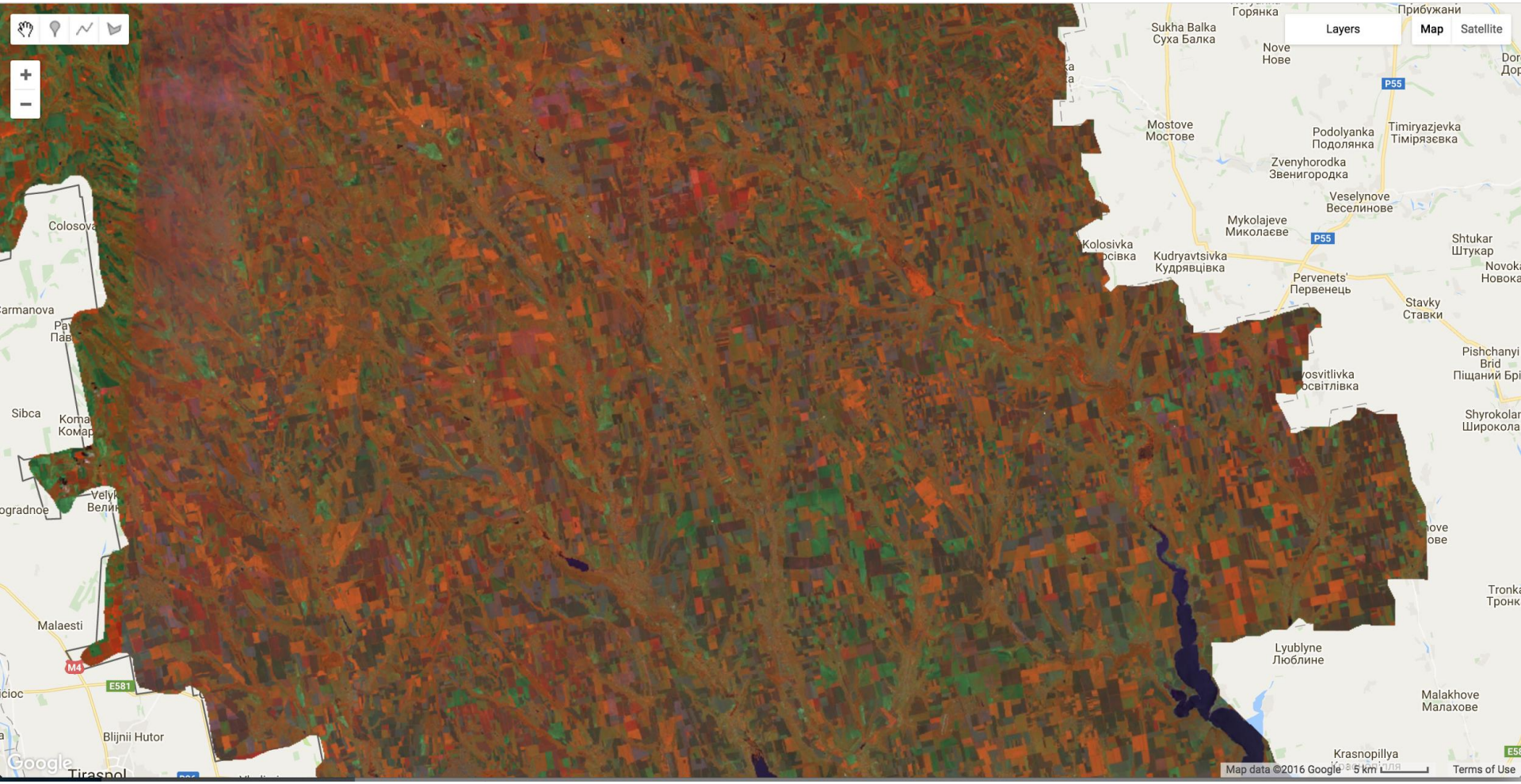

Sentinel-2A - 10 m NIR-SWIR-RED, 17 June 2016

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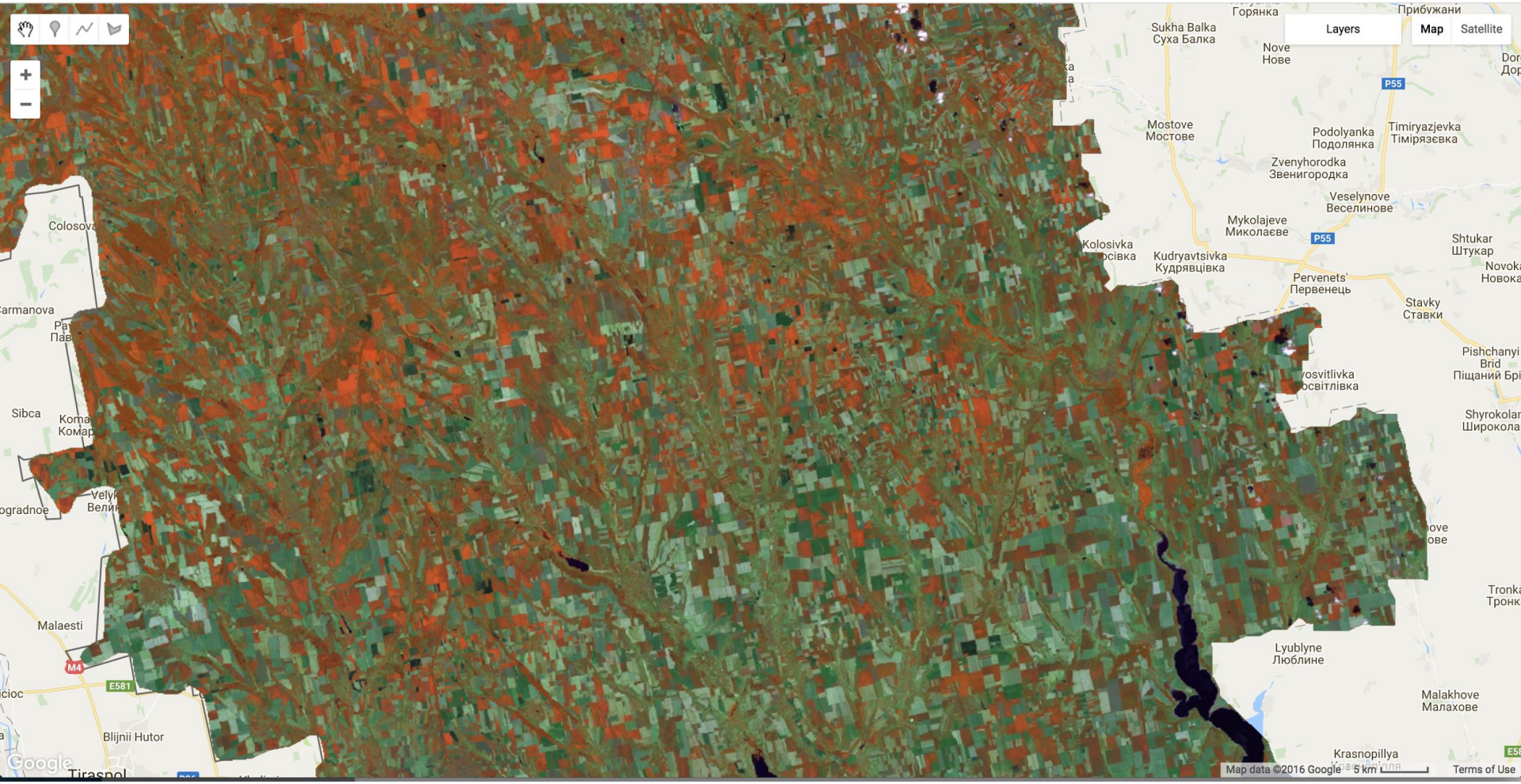

Sentinel-2A - 10 m NIR-SWIR-RED, 17 July 2016

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Sentinel-2A - 10 m NIR-SWIR-RED, 6 August 2016

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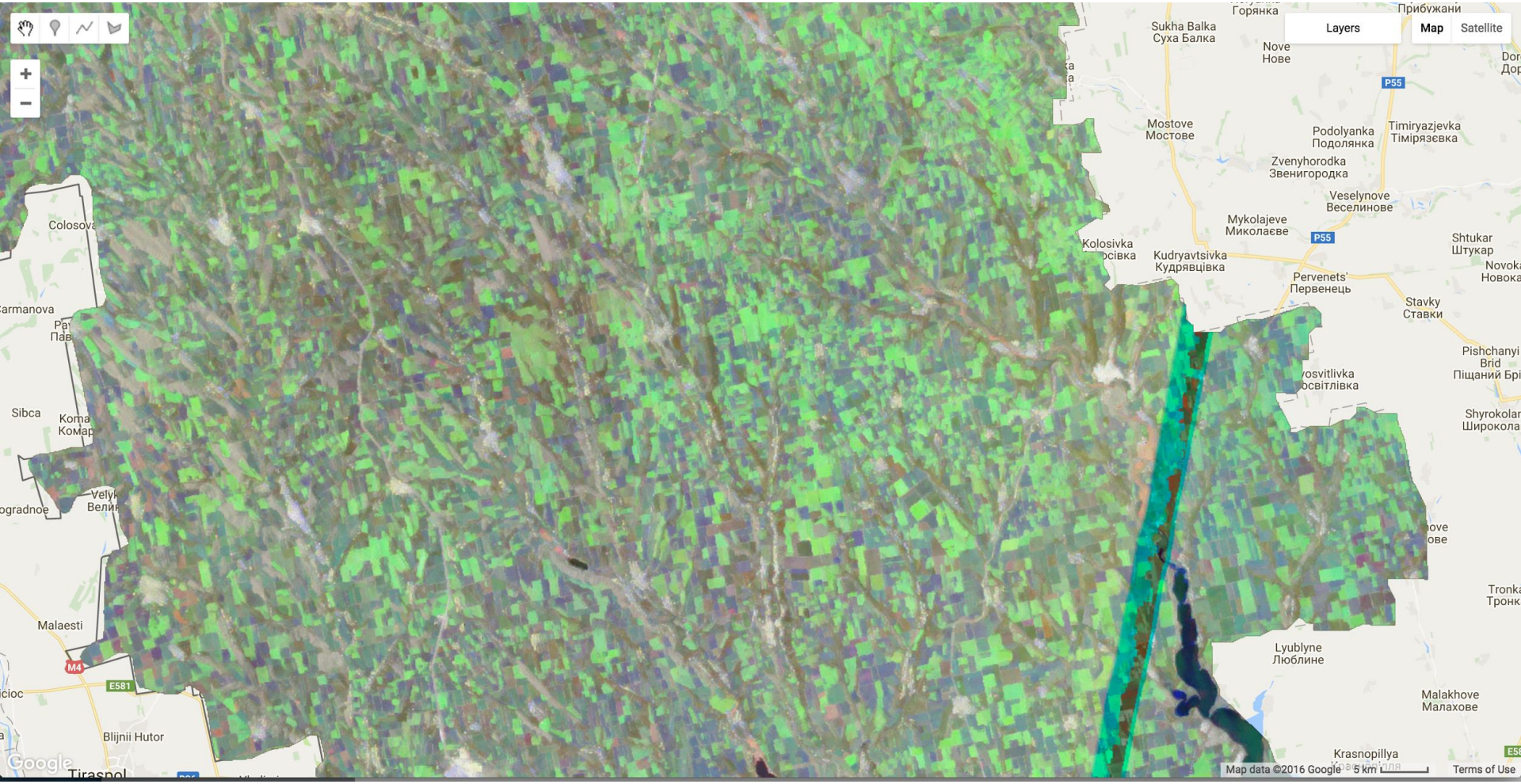

Sentinel-1A - 10 m SAR composite 2015

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Sentinel-1A - 10 m SAR composite 2016

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Crop area and yield monitoring

Step up to proof multi-year consistency of S1 and S2 time series

Smarter surveying and inference

Intra-crop differentiation of yield factors (at parcel level): cross-analysis with *in-situ* outputs

Specialisation for high value crops (precision agriculture)

Anomaly detection at parcel level, scalable to relevant production estimates

Existing activities with UKR partners

Collaboration under E&IA with partners at SRI/KPI, HydroMet service, Nat. Univ. Life and Envi Sciences.

Joint project activities with SRI/KPI under H2020 (SIGMA) and ESA's Sen2Agri

Workshop on "Information needs in Crop Monitoring" (22-23 October, 2015, Kiev)

Subscription to UkrAgroConsult Black Sea Oil & Grain report

Joint interests in "Big Data" processing, classification and machine learning.

Outlook

Ukraine has ambitious goals for increased, sustainable production, value creation through processing, extended livestock husbandry

Leading to increased information needs along the actors-pyramid

“Transposed” EU expertise in Integrated Administration and Control Systems, Rural Development, Environmental management could be highly relevant

Ukraine has a potential interest and role in monitoring its Eastern production neighbours

Sensor data could provide pivotal information across themes

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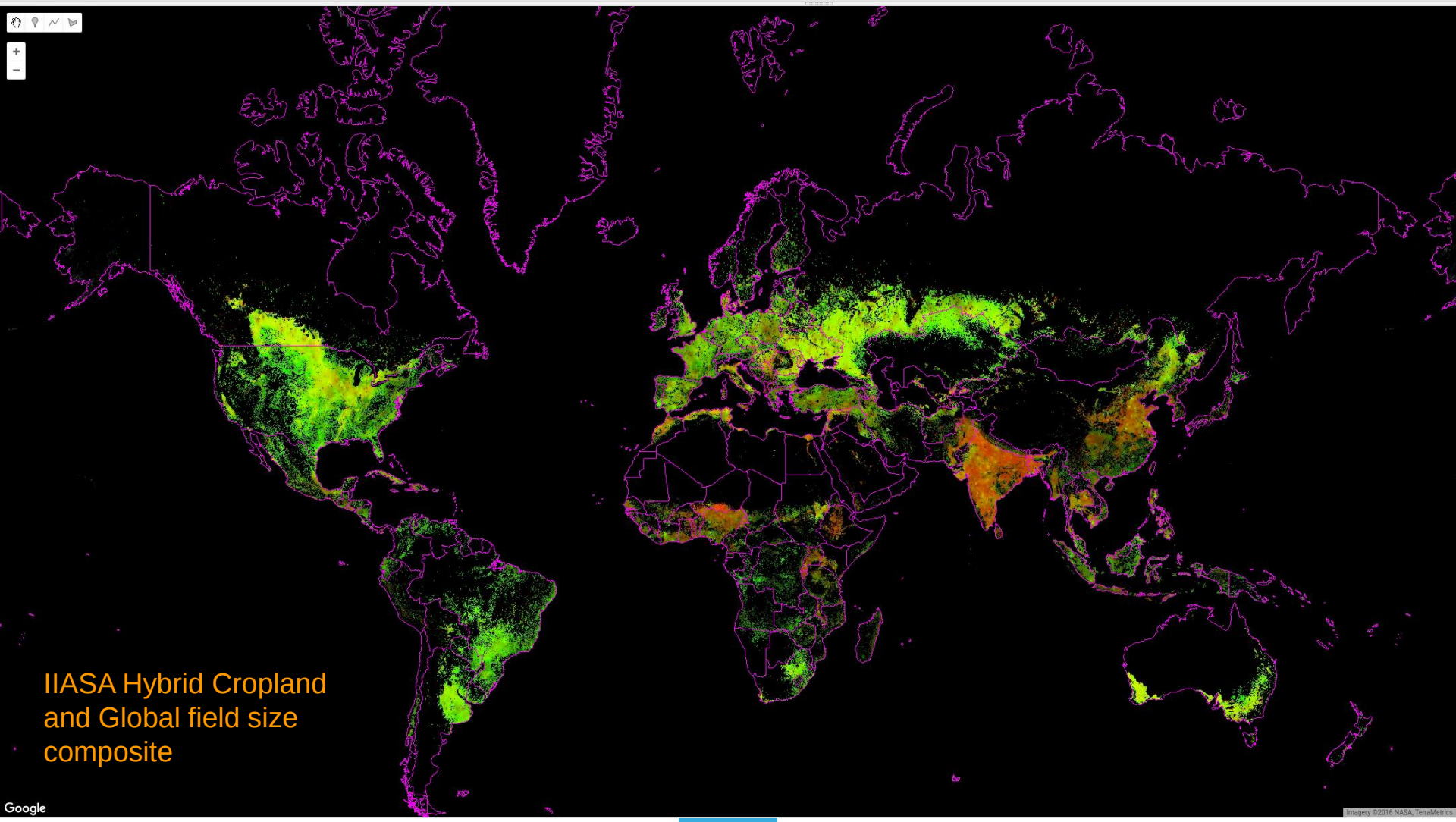
Google Earth Engine

Search places and datasets...



Thank you!

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