

Navigating the EU Regulation on Deforestation-free Products (EUDR):

Testing and Dataset Creation for Compliance



Original thinking... applied





### **Speakers**

### Navigating the EUDR – Testing & Dataset Creation for Compliance









Joe Humphreys Business Development Manager Fera Science Limited Helen Grundy Science Lead – Food Authenticity Fera Science Limited Katharina Heinrich Senior Scientist Fera Science Limited Victor Deklerck Director of Science World Forest ID





## **Understanding the Regulation**

#### **REGULATION (EU) 2023/1115 on deforestation free products**

**Purpose:** Designed to prevent deforestation, environmental harm, and human rights violations linked to key commodities.

**Scope:** Applies to companies sourcing, trading, or using high-risk commodities in their supply chains.

#### **Key Requirements:**

- Businesses must conduct due diligence to ensure products are not linked to deforestation or illegal land use.
- Mandatory reporting and documentation of supply chain practices.
- Non-compliant goods may be restricted from sale or import into regulated markets.

#### Jurisdictions & Enforcement:

- Enforced by government agencies with penalties for noncompliance.
- Regulations align with global sustainability goals (e.g., EU Deforestation Regulation, UK Environment Act).

#### Implications for the Food & Drink Industry

**Sourcing Challenges:** Companies must verify commodity origins and assess supplier compliance.

**Operational & Financial Impact:** Additional costs for monitoring, reporting, and supplier verification.

**Reputational & Legal Risks:** Non-compliance can lead to fines, import restrictions, and loss of consumer trust.





### **Importance of Transparency**

#### Why Supply Chain Visibility Matters

**Regulatory Compliance:** 

- Ensures businesses meet legal due diligence requirements.
- Helps avoid fines, trade restrictions, and reputational damage.

#### **Risk Mitigation:**

- Identifies potential issues like illegal deforestation, unethical labour practices, or fraud.
- Reduces exposure to supply disruptions and financial penalties.

#### **Consumer & Stakeholder Expectations:**

- Growing demand for ethically sourced products.
- Investors and retailers prioritizing sustainability commitments.

#### **Traceability Solutions & Best Practices**

Technology-Driven Tracking:

- Blockchain & Digital Ledgers: Provide immutable records of product origins.
- Satellite Monitoring & Al Analysis: Detects deforestation risks in real time.
- **QR Codes & RFID Tags:** Enables real-time tracking of shipments.

Supplier Audits & Certification Programs:

- Roundtable on Sustainable Palm Oil (RSPO) Sustainable palm oil certification.
- Forest Stewardship Council (FSC) Responsible timber sourcing.
- Rainforest Alliance & Fairtrade Ethical cocoa, coffee, and other commodities.
- GRSB (Global Roundtable for Sustainable Beef) Responsible cattle production.





## **Importance of Transparency**

### **Challenges & Opportunities**

#### Challenges

- Complexity of global supply chains with multiple intermediaries.
- High costs for small and mid-sized businesses to implement tracking systems.
- Data reliability and supplier cooperation issues.

#### Opportunities

- Competitive advantage through transparent and sustainable sourcing.
- Strengthening brand trust and consumer loyalty.
- Access to green financing and sustainabilitylinked investment opportunities



Original thinking... applied

# Methods for geographical origin testing

Helen Grundy

Science Lead in Food Authenticity





## **Global Supply Chain**

Heavy reliance on trust for food and feed integrity

Product certification, remote sensing, auditing

Due diligence testing, enforcement testing

Protect reputation from fraud, unethical practices and penalties







## 1. Stable Isotope Ratio Analysis (SIRA)

- Longstanding, recognised method
- The isotope signals from the bio-elements (H, C, N, O, S) present in local feed, soil and water transfer to the plant and animal tissue.
- Relies heavily on databases and modelling, reference materials.
- Up-to-date db needed to account for seasonal variation, climate change etc.





### **Stable Isotopes**

Stable isotopes of Hydrogen: <sup>1</sup>H and <sup>2</sup>H. Stable isotopes of Oxygen: <sup>16</sup>O, <sup>17</sup>O and <sup>18</sup>O.

Occur naturally in waters and biological materials.

<sup>1</sup>H, <sup>2</sup>H <sup>16</sup>O, and <sup>18</sup>O are abundant and can be measured by SIRA mass spectrometry.





# Isotopic tracers in geographical origin and diet reconstruction studies

Isotope ratio	Fractionation mechanism	Informs on
<sup>2</sup> H/ <sup>1</sup> H	Evaporation, precipitation	Geography (hydrology)
<sup>18</sup> O/ <sup>16</sup> O	Evaporation, precipitation	Geography (hydrology)
<sup>13</sup> C/ <sup>12</sup> C	C3 and C4 plants	Diet / plant PS type
<sup>15</sup> N/ <sup>14</sup> N	Trophic level, marine and terrestrial plants, fertiliser	Plant geography, animal diet
<sup>34</sup> S/ <sup>32</sup> S	Bacterial sedimentary sulphides/organic matter	Geography (marine environment sea spray to soil)
<sup>87</sup> Sr/ <sup>86</sup> Sr	Beta decay of 87Rubidium	Geology of a location



### SIRA

### Underpinned by robust databases

Improved classification with other analytical techniques e.g. trace elements, fatty acids, NMR

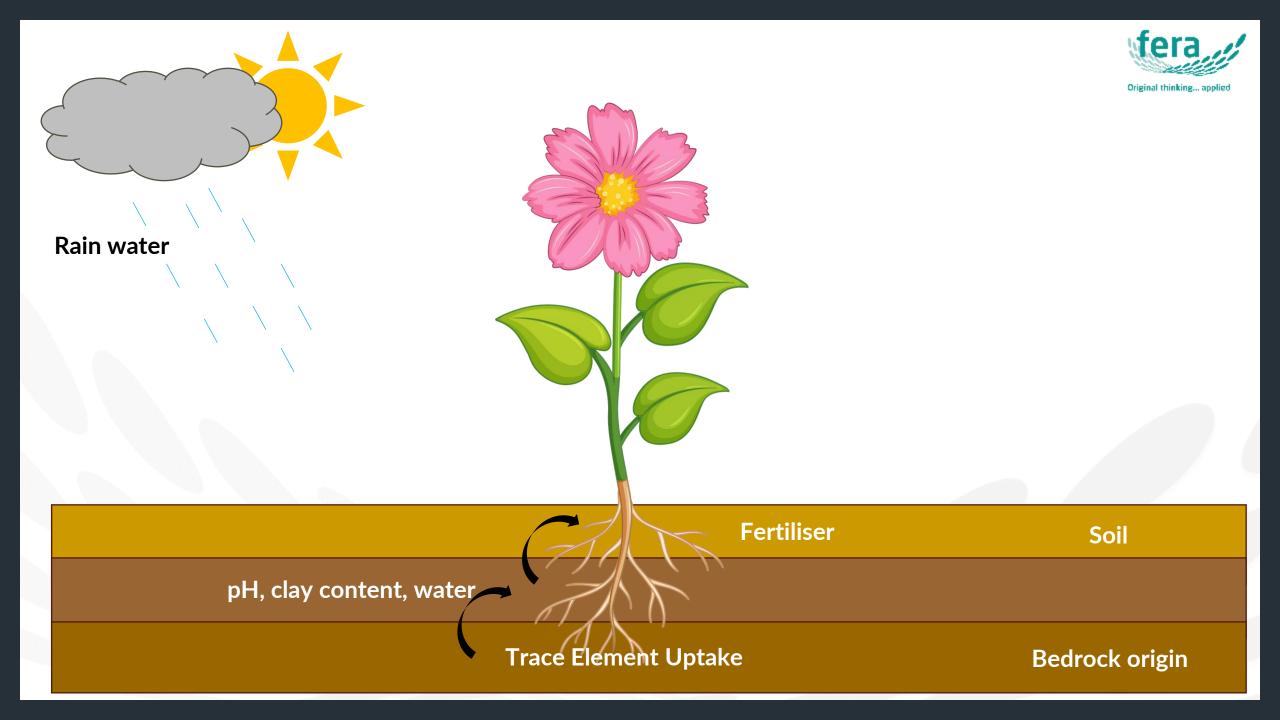


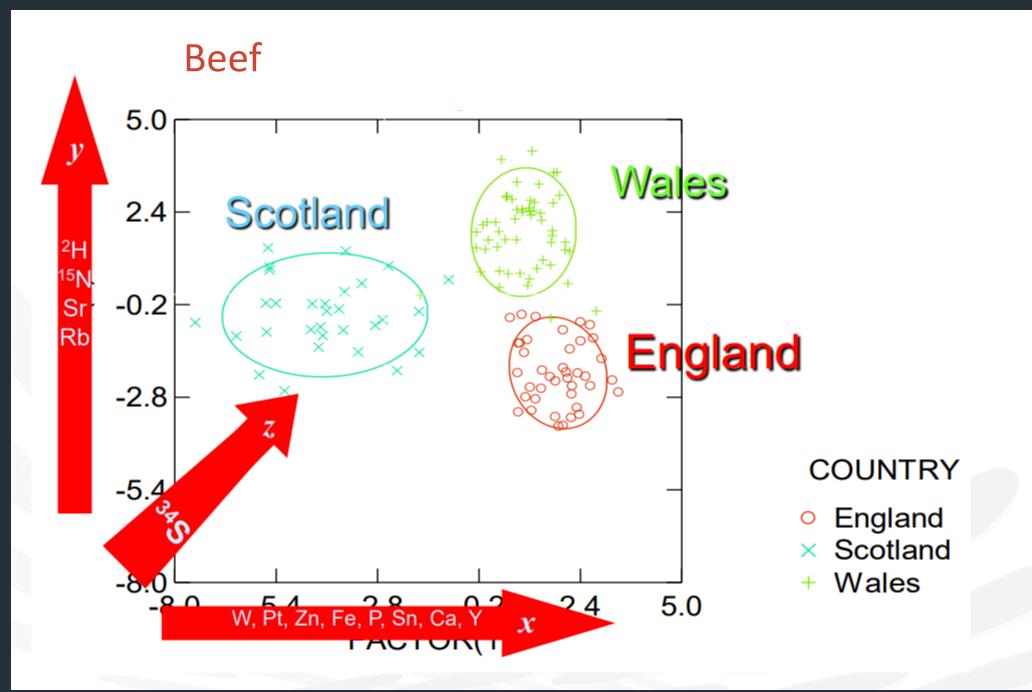


## 2. Trace Element Analysis

- e.g. Li, Cu, Mg, Na, Se, Fe, Co, Cr, K, Be.....
- Reflects uptake of elements from the environment.
- Not stand-alone indiscriminate tool for global origin.
- Accuracy increases when combined with SIRA data.







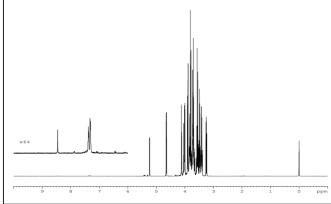




### 3. Metabolomics and profiling

- Non-targeted can be hundreds of biomarkers.
- Reflect climate, geology, feedstuff, fertilisers, etc.
- e.g. sugars, organic acids, fatty acids, polyphenols, etc.
- Data fusion from multiple analytical sources.
- Access to metadata valuable additives, clarifying agents.
- Can determine if steel, wood chips used during vinification.









## 4. Niche applications - Genomics

- e.g. Plant cultivar genomics
- Added value in combined approaches
- e.g. Panxian ham genomics + metabolomics
- e.g. Portuguese wine genomics + <sup>87</sup>Sr/<sup>86</sup>Sr





### Most promising technologies per commodity





### Research

#### **Research projects**

July 30, 2024 BST

### Review of Capability of Methods for the Verification of Country of Origin for Food and Feed

<u>Helen H. Grundy, Hez J. Hird, Rosario Romero, Katharina Heinrich, Mark Harrison, Adrian J. Charlton,</u> <u>Emma L. Bradley</u>

 Regulating the changing food system
 Methods
 Emerging challenges and opportunities
 Food authenticity

 Food crime
 Food not of animal origin
 Products of animal origin

 CCBY-4.0
 https://doi.org/10.46756/sci.fsa.p1e720



Scan to read

Department for Environment Food & Rural Affairs



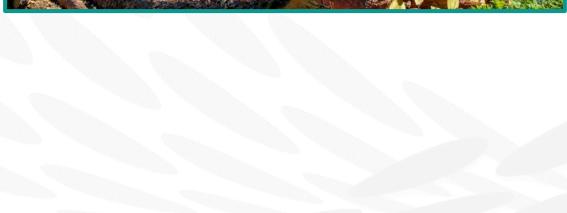


### **Due Diligence**









### Sustainable, deforestation-free agriculture





# Regulation (EU) 2023/1115 on deforestation-free products



#### What do we know?

- Under the Regulation, any operator or trader who places these commodities, or their derivatives, on the EU market, or exports from it, must be able to prove that the products do not originate from recently deforested land or have contributed to forest degradation.
- > 30 December 2025 for large and medium companies
- > 30 June 2026 for micro and small enterprises.

PROTECT YOUR REPUTATION WITH DUE DILIGENCE



### **Regulation (EU) 2023/1115 on deforestation-free** products

















Coffee

Cattle

Palm Oil

Soybean

Cacao

Rubber

Timber







Original thinking... applied

## The Role of Scientific Testing in Compliance

### Katharina Heinrich

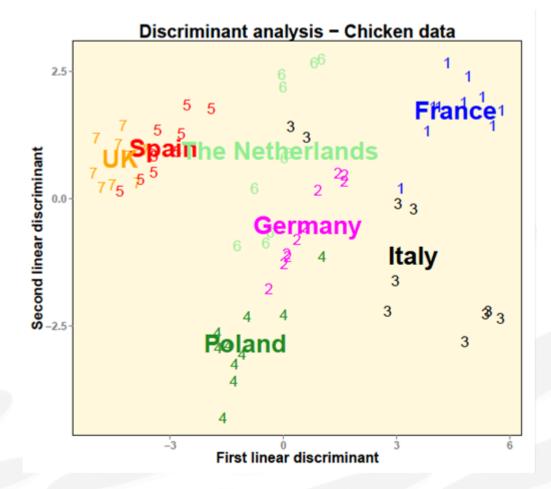
Senior Scientist in Geographical Origin Testing





# Scientific Data and Testing as tools for safeguarding operations

- What is scientific data?
- Scientific data vs paper trail?
- Potential testing scenarios
- Examples of SIRA past and present





### What is scientific data?

#### Data which can be measured using a device

- Derived following standard operating procedures for high quality data
- Working to a quality assurance standards, e.g. ISO9001 or ISO17025
- Can be turned into statistical models for interpretation of results

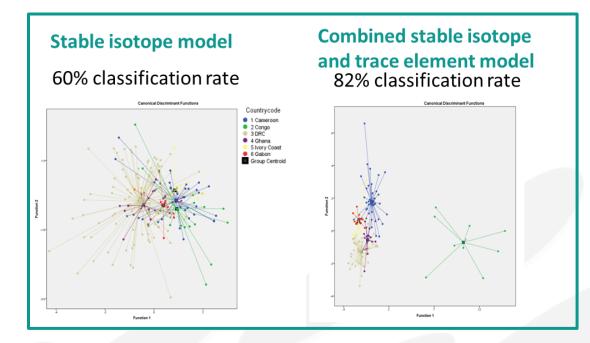
Data which should be able to be repeated using equivalent terminology elsewhere

Data provides/supports evidence for compliance of regulations



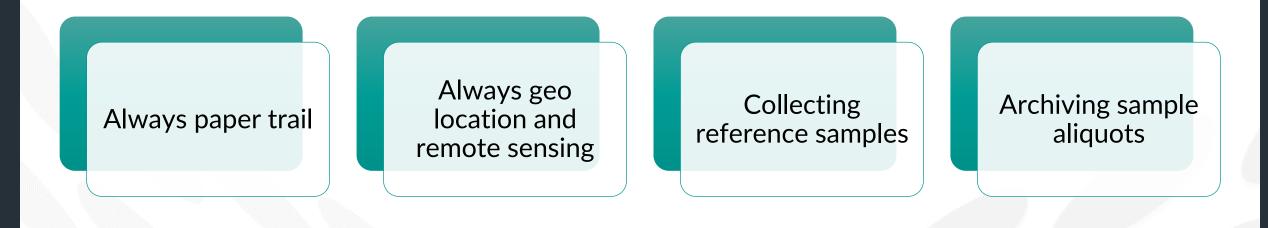
## Scientific data and/or paper trail?

- Best of both worlds for high level of due diligence
- Direct and indirect interpretation of scientific data
   = backing paper trail/tracing, which can be tampered with or source labels be lost
- Testing as verification of origin + deterrent of non-compliance





### Potential testing scenarios - 1





### **Potential testing scenarios -2**

#### TESTING

- Location/supply chain
  - Origin of product
  - During transit
  - Final destination

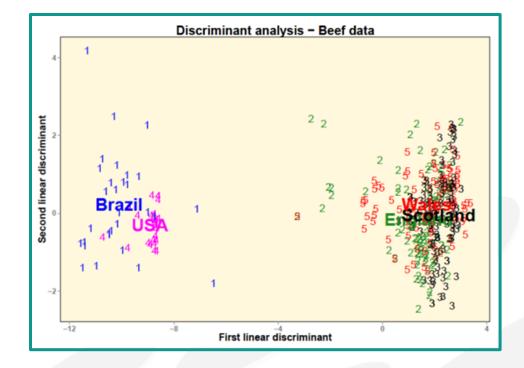
#### FREQUENCY

- Intensely at the beginning: every, every other, weekly shipment/consignment
  - Less frequently, but regular intervals: monthly > quarterly > yearly



### Examples of the past at Fera, which used SIRA

- Authenticity (geographical origin or substitution of components)
  - EU wine database (NRL for wine) until BREXIT
  - Honey cane sugar or corn syrup addition
  - Beef (grassfed)































4

# Examples of the present at Fera, which use SIRA and TE











# Examples of the present at Fera, which use SIRA and TE

Authenticity of EUDR commodities in conjunction with customers:





## **Enforcement**

Local authorities (LAs) are responsible for enforcing food law in the vast majority of food businesses, including those in the retail and catering sector.

The FSA produces the statutory Food Law Code of Practice (FLCoP) and associated Practice Guidance establishing a set of expectations for the activities LAs are responsible for under food law and how these are to be delivered. This is supported by a range of training, advice and guidance to help food officers discharge their functions.

The FLCoP encourages LAs to adopt a risk-based approach to targeting premises and carrying out interventions, and to ensure any enforcement action is reasonable, proportionate, risk-based and consistent with good practice.

Where non-compliance is identified, decisions on appropriate enforcement action remain at the discretion of the LA, and LAs are expected to take a proportionate and risk-based approach when dealing with contraventions in line with the FLCoP. Cases may be escalated in line with individual LA enforcement policies and procedures.

It is ultimately the responsibility of individual businesses to ensure their compliance with the law. Businesses with specific queries may wish to seek the advice of their local enforcement agency, which in England and Wales will usually be the trading standards or environmental health department of the local authority or port health authority. In Northern Ireland it will be the environmental health department of the local district council.



## Original thinking... applied

Helen Grundy Katharina Heinrich Joe Humphreys <u>joe.Humphreys@fera.co.uk</u> Fera Science Ltd.

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# Global Reference Collection for Stable Isotope and Trace Element Origin Modelling

#### Dr Victor Deklerck - Director of Science







**COLLECTION & ANALYSIS** 

DATA MODELING

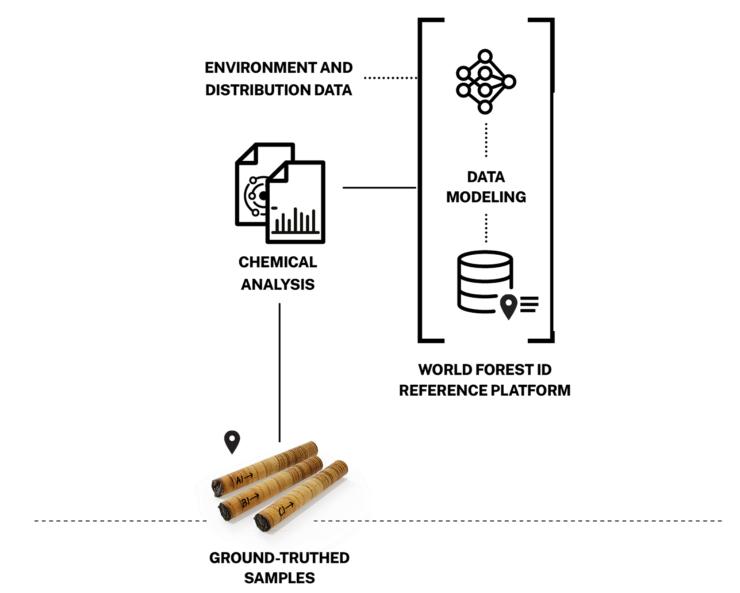
COMPARISON

Our mission World Forest ID is an independent US-based nonprofit with a growing global set of scientific partners.

Leveraging geo-located plant chemistry, environmental data and state of the art modelling to enable traceable and accountable global supply chains.

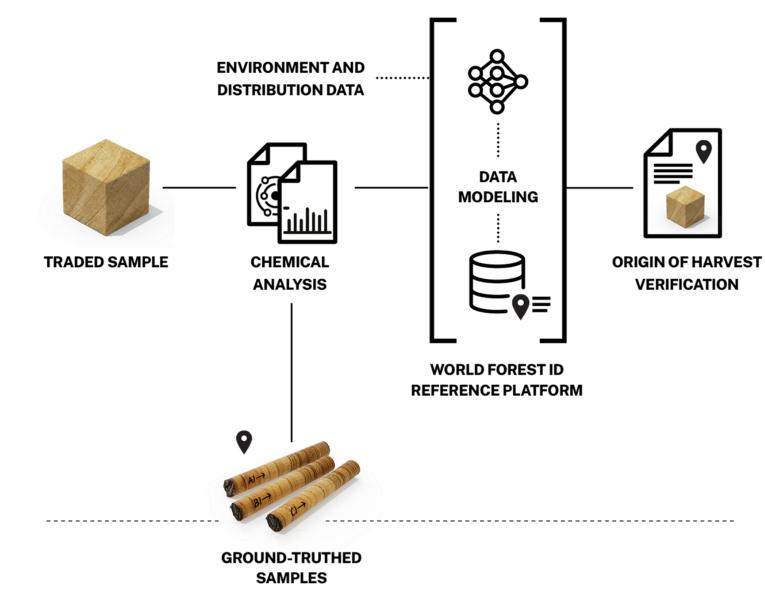


## The World Forest ID Pathway



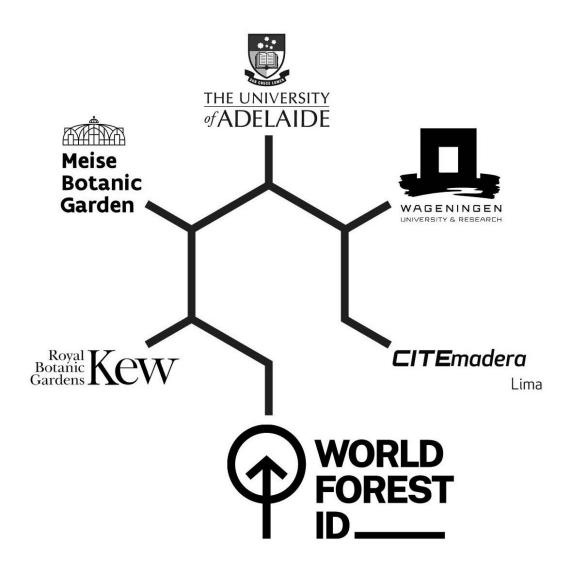


## The World Forest ID Pathway



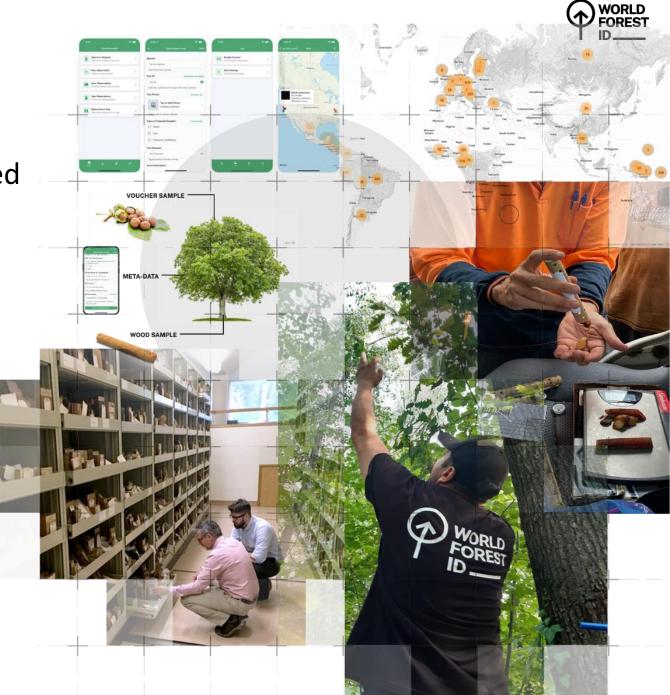


## The (growing) World Forest ID Consortium



# Collected in the field with fully documented chain of custody

All collectors are trained to follow strict protocols. Our sample collection app ensures that the geolocation and transport of samples is documented at all stages of the process.



## Collection

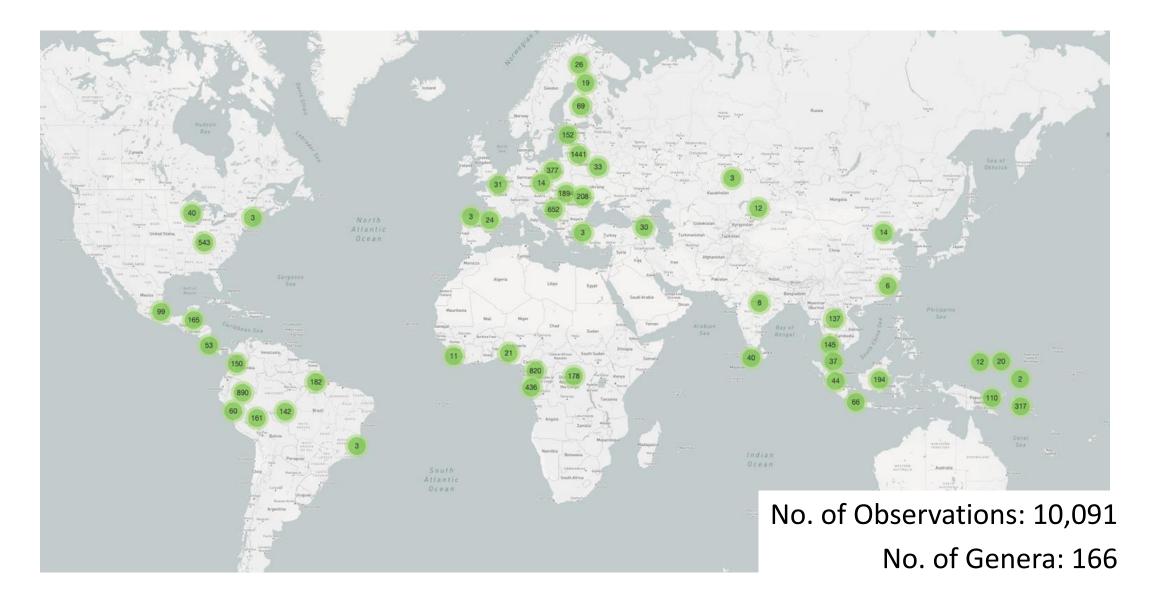
World Forest ID timber samples are collected to ensure we obtain the bark, cambium, sapwood, and heartwood





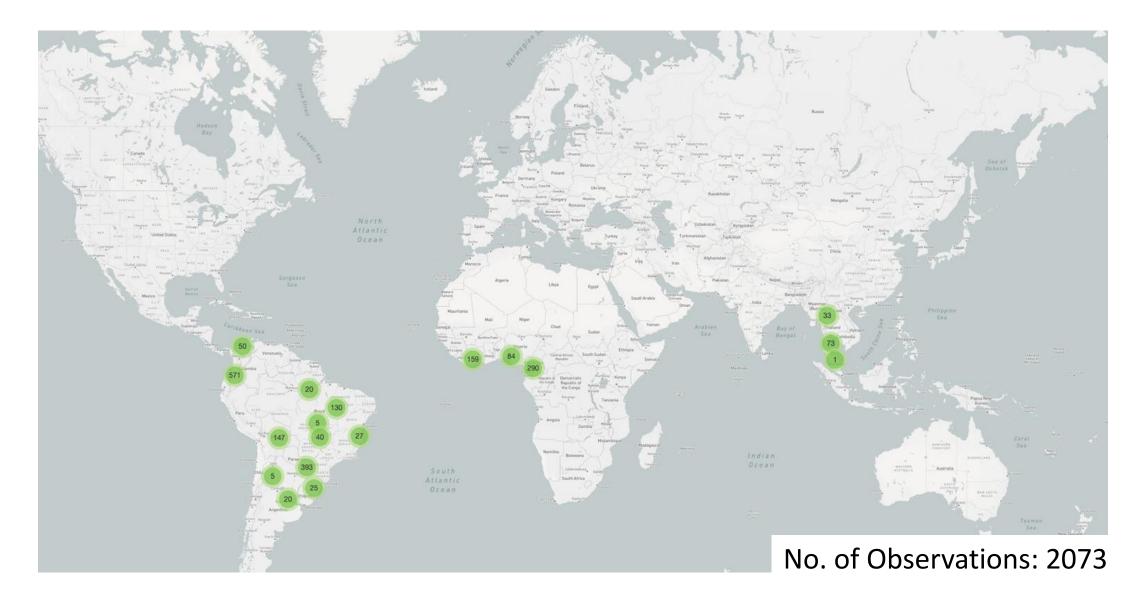


## Sampling - Timber





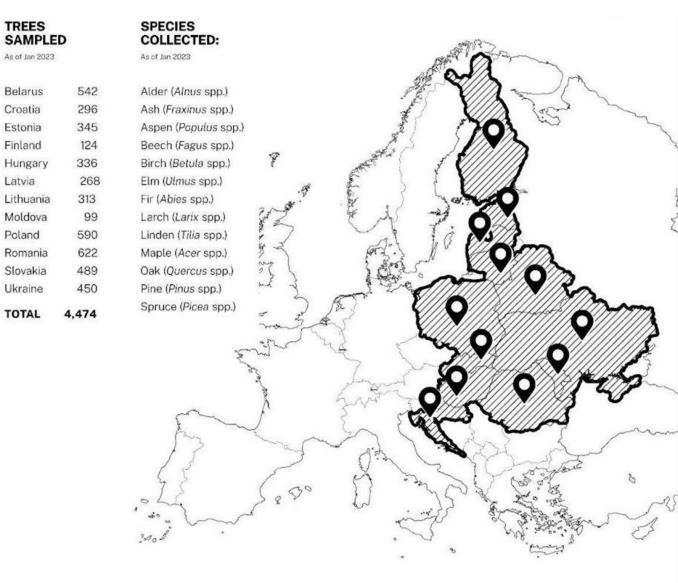
Sampling - FRC





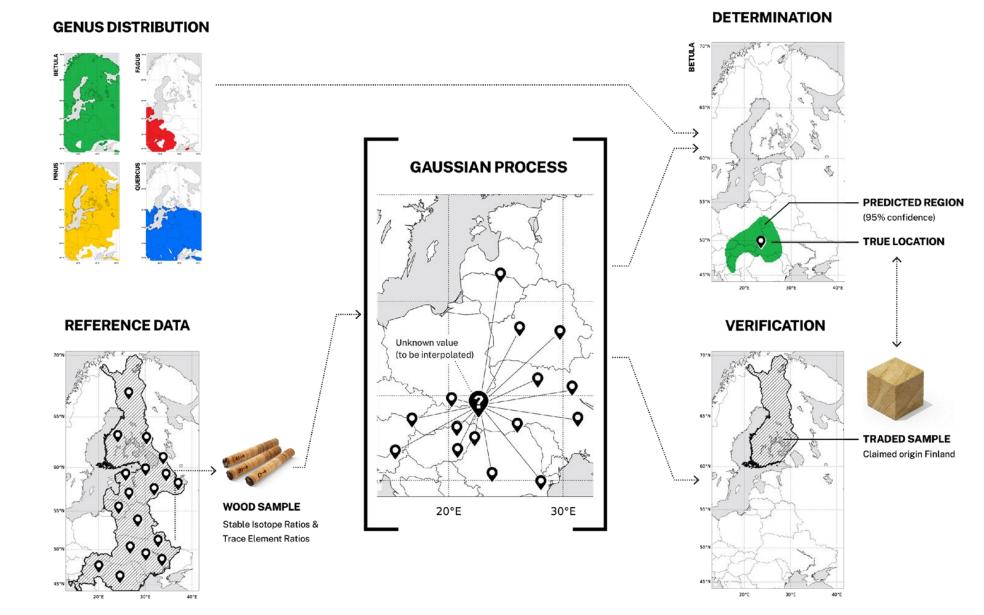
## Eastern European Timber Supply Chains Project

**AMBITION:** To create reference material, pilot data modeling, and layering of techniques to increase the accuracy of tools to determine geolocation of harvest.





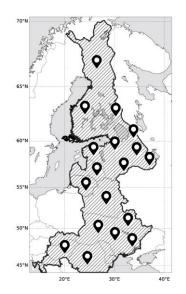
## 'Origin' Modeling



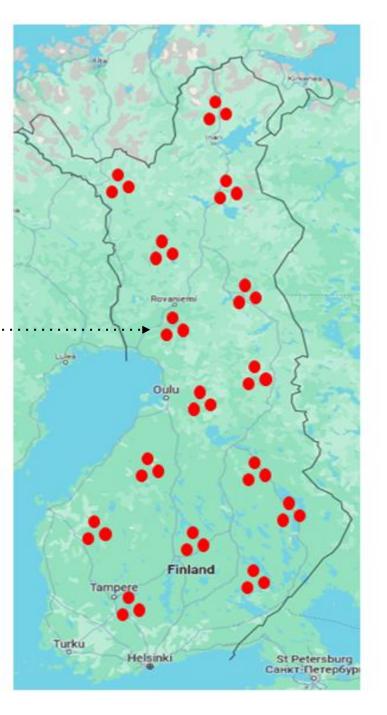
Sampling



#### **REFERENCE DATA**



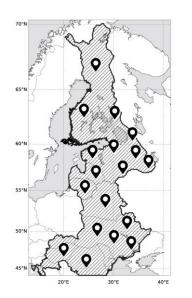
## Sampling



WORLD FOREST

仚

#### **REFERENCE DATA**



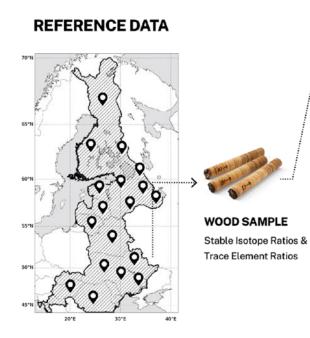
SPATIAL SAMPLING

3 trees in a circle of 50 km

Next cluster 100 to 250 km away

Measurements





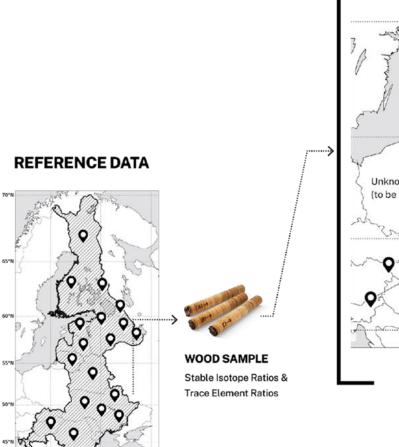


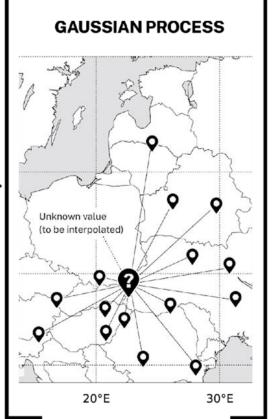
## Modeling

20°E

30°E

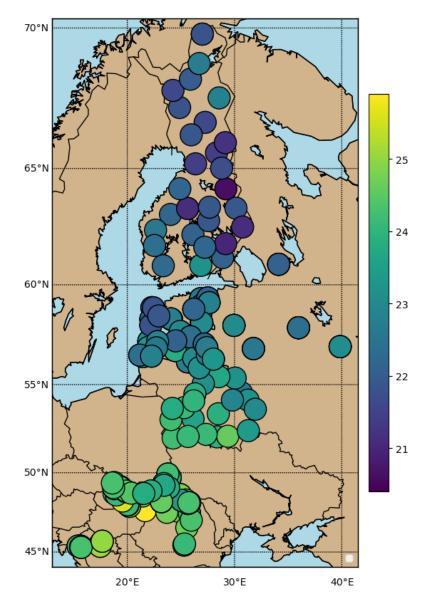
40°E





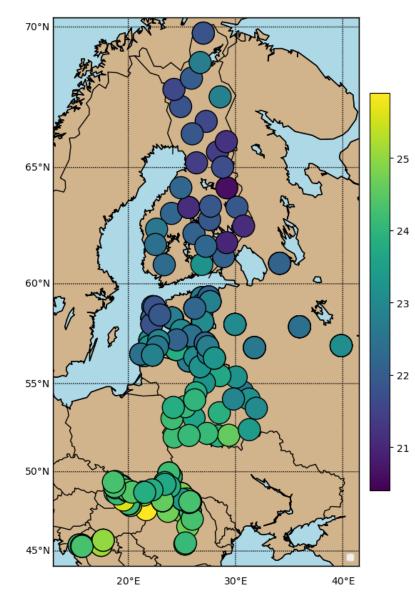


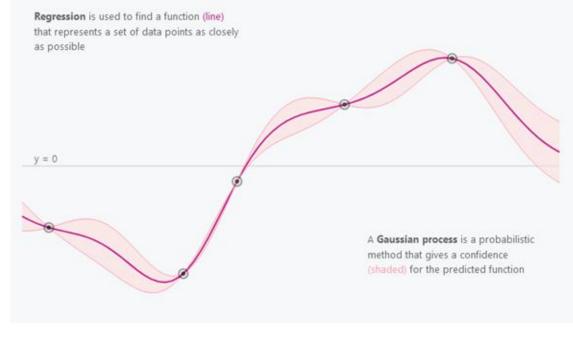
## **Gaussian Process**





## **Gaussian Process**

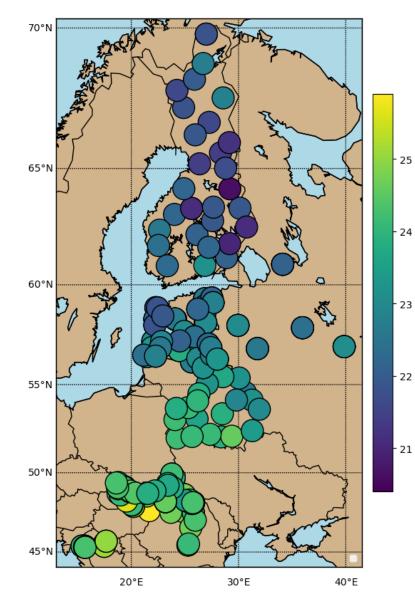


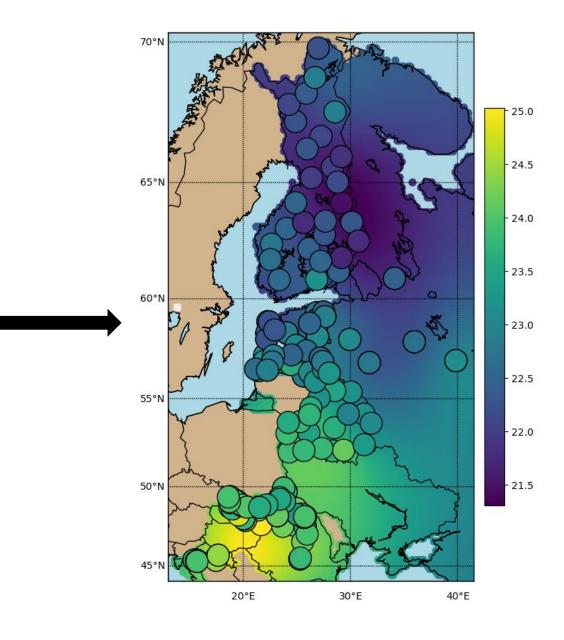


Distill.pub



## **Gaussian Process**





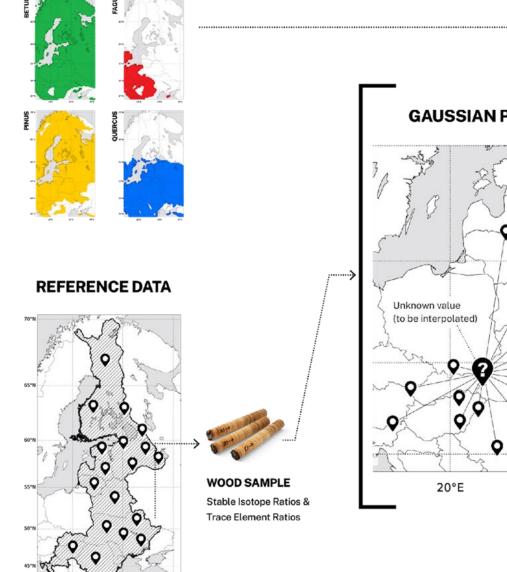


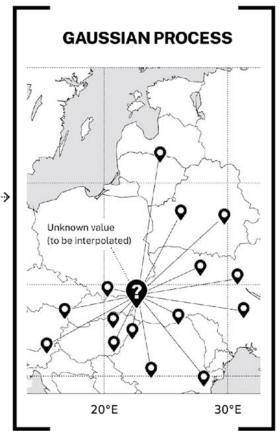
#### **GENUS DISTRIBUTION**

20°E

30°E

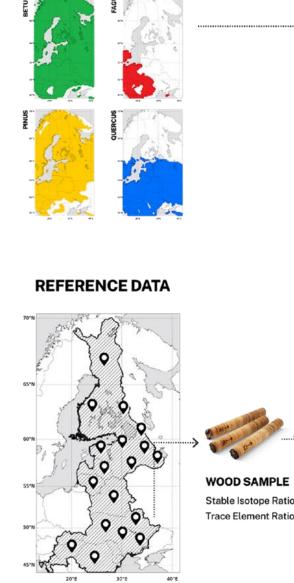
40°E

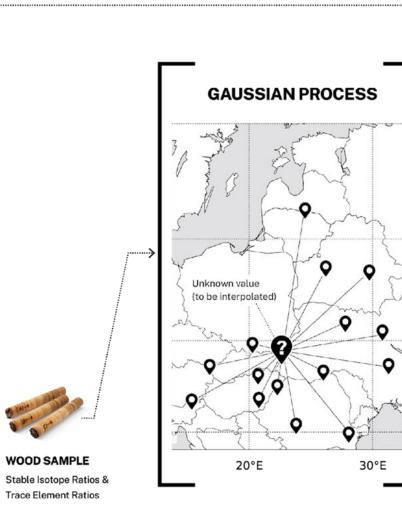


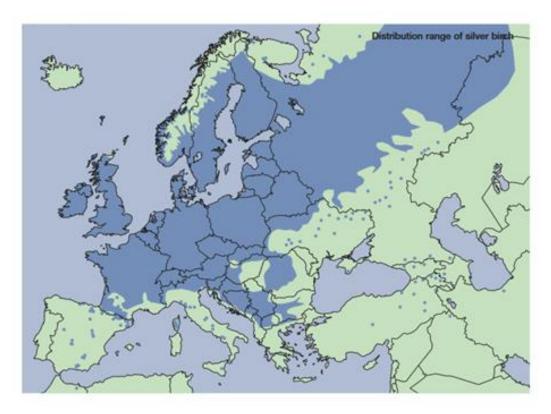


#### 

#### **GENUS DISTRIBUTION**







#### **GENUS DISTRIBUTION**

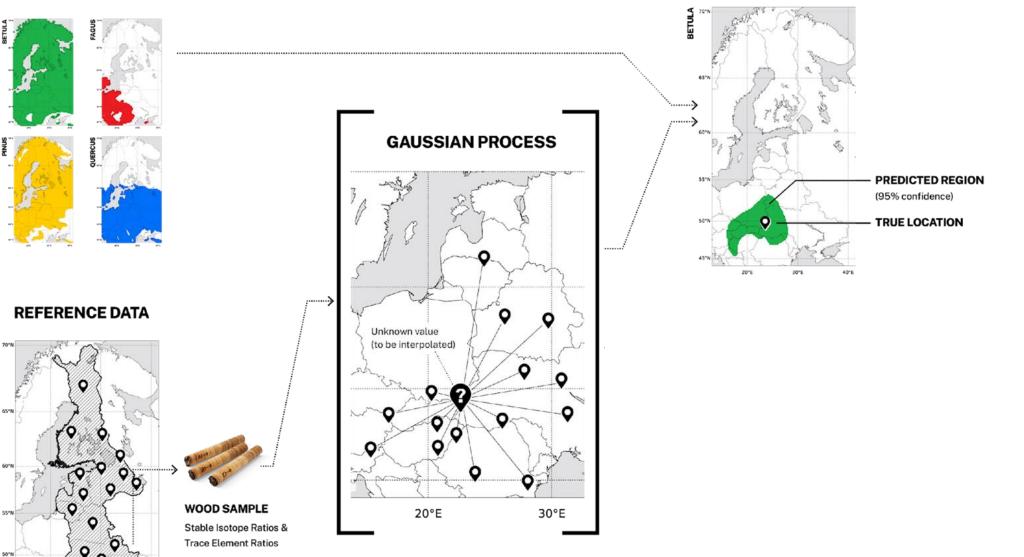
20°E

30°E

40°E

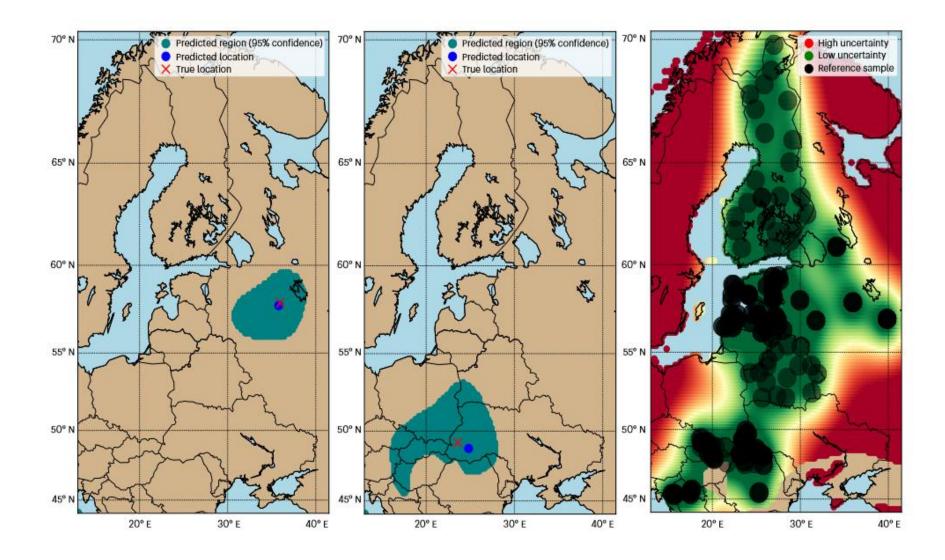
#### DETERMINATION







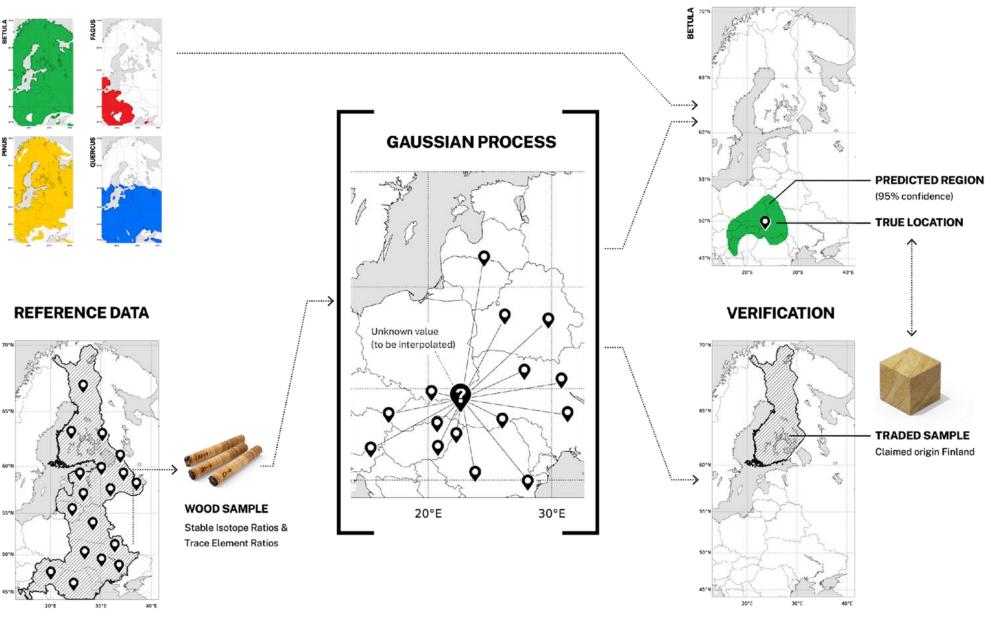
## Determination Birch (Betula)



#### **GENUS DISTRIBUTION**

#### DETERMINATION







## Verification Birch (*Betula*)

Claim - South Estonia, Betula pendula,

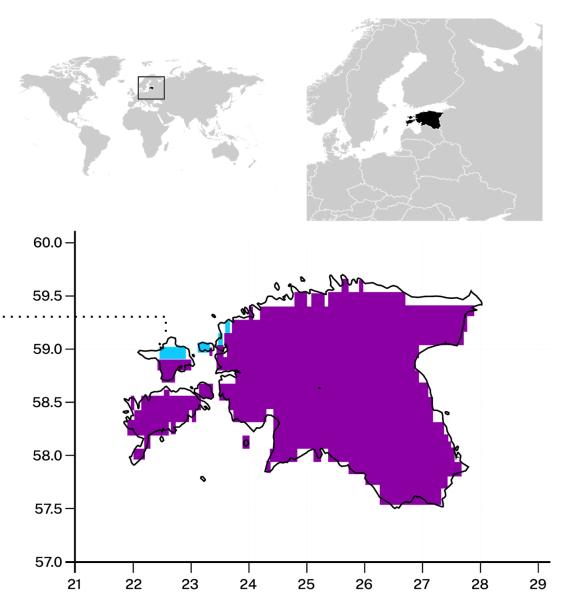
solid timber. 4 Stable Isotope Ratio (SIR) values

given.

Blue areas are the only areas we cannot reject as potential origin.

Our model indicates the claim of

South Estonia is not plausible.





# Transparent, peer reviewed science for **impact**

#### nature plants 9 Article https://doi.org/10.1038/s41477-024-01648-5 A framework for tracing timber following the **Ukraine invasion** Received: 30 October 2023 Thomas Mortier<sup>1,2,12</sup>, Jakub Truszkowski<sup>3,4,12</sup>, Marigold Norman<sup>1</sup>, Markus Boner<sup>5</sup>, Bogdan Buliga @ 6.7, Caspar Chater @ 8.9, Henry Jennings<sup>8</sup>, Jade Saunders<sup>1</sup>, Accepted: 6 February 2024 Rosie Sibley<sup>6</sup>, Alexandre Antonelli @<sup>3,4,8,10</sup>, Willem Waegeman<sup>2</sup> & Victor Deklerck @ 18.11 Published online: 11 March 2024 Check for updates Scientific testing including stable isotope ratio analysis (SIRA) and trace element analysis (TEA) is critical for establishing plant origin, tackling deforestation and enforcing economic sanctions. Yet methods combining SIRA and TEA into robust models for origin verification and determination are lacking. Here we report a (1) large Eastern European timber reference database (Betula, Fagus, Pinus, Quercus) tailored to sanctioned products following the Ukraine invasion; (2) statistical test to verify samples against a claimed origin; (3) probabilistic model of SIRA, TEA and genus distribution data, using Gaussian processes, to determine timber harvest location. Our verification method rejects 40-60% of simulated false claims, depending on the spatial scale of the claim, and maintains a low probability of rejecting correct origin claims. Our determination method predicts harvest location within 180 to 230 km of true location. Our results showcase the power of combining data types with probabilistic modelling to identify and scrutinize timber harvest location claims. Russia's invasion of Ukraine sparked global responses designed to (https://ec.europa.eu/eurostat/comext/newxtweb/). While there penalize Russia and thwart continuing aggression. The UK and the is emerging evidence of companies seeking replacement markets, European Union announced economic sanctions packages, including a demand for birch, beech (Fagus spp.), pine (Pinus spp.) and oak han on the direct imports of wood products from Russia and Belarus<sup>12</sup>. (Quercus spp.) products remains high<sup>6</sup>. As a result, there has been a The USA increased tariffs on wood imports from both countries (https:// rise in trade through secondary markets, suggesting efforts to disguise hts.usitc.gov). These interventions, combined with bans by the Forest origin (location of harvest) to evade sanctions or tariffs<sup>6</sup>. Stewardship Council and the Programme for the Endorsement of Forest Origin misdeclaration undermines the policy intent of sanctions/ Certification<sup>3,4</sup>, transformed timber products harvested in Russia and tariffs but also violates existing environmental laws, including the Belarus into 'conflict timber' in western markets<sup>5</sup>. European Union Timber Regulation and UK Timber Regulation<sup>78</sup>. Companies operating in the UK, European Union and USA have Enforcement officials implementing both timber import regulations long relied on timber imports from Russia and Belarus, particularly and sanctions need scientific tools to interrogate location of harvest birch (Betula spp.), for construction<sup>6</sup>. By weight, 12% of all European claims (national, sub-national or even concession level). Checking Union 2021 wood product imports under Chapter 44 of the Har-timber harvest location claims can be done in two ways: (1) verification, monized Tariff Schedule were imported from Russia and Belarus an assessment based on reasonable doubt over the claimed origin (for <sup>1</sup>World Forest ID, Washington, DC, USA. <sup>2</sup>Department Data Analysis and Mathematical Modelling, Ghent University, Ghent, Belgium. <sup>3</sup>Department of Biological and Environmental Sciences, University of Gothenburg, Gothenburg, Sweden. <sup>4</sup>Gothenburg Global Biodiversity Centre, Gothenburg, Sweden. <sup>9</sup>Agroisolab GmbH, Juelich, Germany, <sup>e</sup>Preferred by Nature, Ho Chi Minh, Vietnam, <sup>7</sup>University Stefan cel Mare Suceava, Suceava, Romania, <sup>®</sup>Royal Botanic Gardens Kew Richmond UK, <sup>9</sup>Plants Photosynthesis and Soil, School of Biosciences, University of Sheffield, Sheffield, UK, <sup>10</sup>Department of Biology, University of Oxford, Oxford, UK. "Meise Botanic Garden, Meise, Belgium, "These authors contributed equally: Thomas Mortier, Jakub Truszkowski, e-mail: victor.deklerck@worldforestid.org Nature Plants | Volume 10 | March 2024 | 390-401 390



# Global Cocoa Production

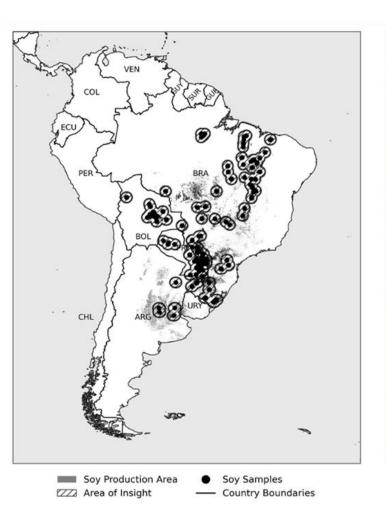
We have sample coverage across countries producing 66% of cocoa globally, including Côte d'Ivoire, Cameroon, Nigeria and Ecuador. In Côte d'Ivoire our area of insight represents 80.1% of the cocoa production. Combined, our total cocoa sample set spans over 188 million hectares of cocoa-producing landscapes and smallholder farms.





## Latin American Soy Supply Chains

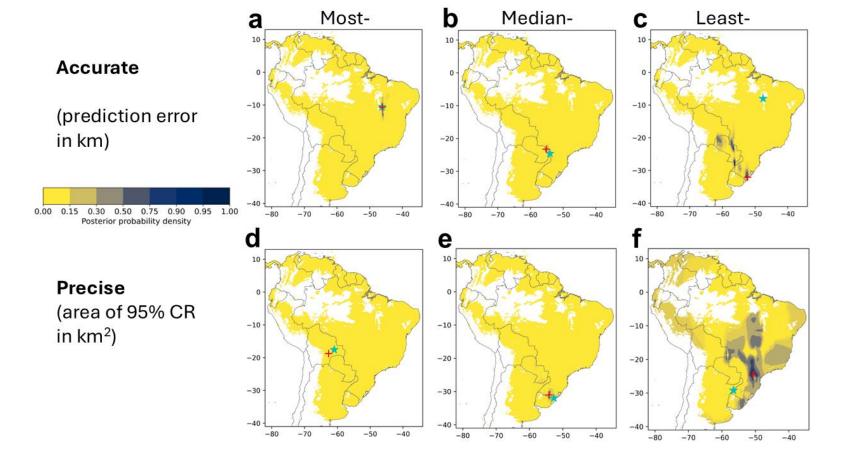
Our sample area of insight covers the growing range of soy across all major producers in Latin America, including 45.6% of Brazil's production area, 23.7% of Argentina's, 99.4% of Paraguay's, and 98.5% of Bolivia's. This spans over 201 million hectares, providing critical data to address deforestation risks in soy supply chains.





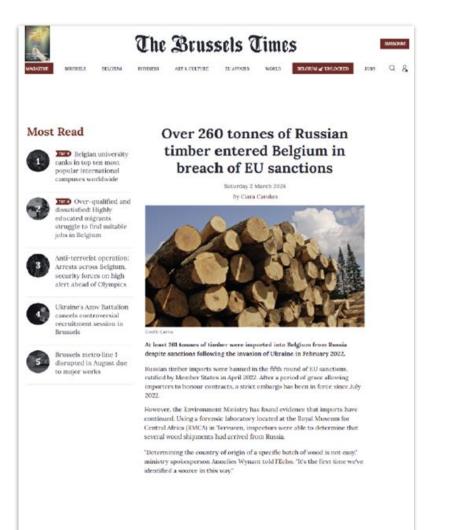


# Latin American Soy Supply Chains





### Cases





Valsts meža dienests piemēro sodu par augsta riska bērza saplākšņa importu

Publicets: 04.07.2024.



2024. gada maijā Valsts meža dienests piemērojis 10 000 eiro naudas sodu uzņēmumam, kurš veicis augsta riska bērza saplākšņa importu un plānojis importu no Turcijas. Uzņēmums saņēmis arī paplīdsodu – aizliegumu uz gadu izmantot tiesības laist tirgu bērza saplāksni. Sods piemērots par ES Kokmateriālu regulas prasībām neatbilstošām likumības pārbaudēm, pieļaujot risku, ka tirgū tiek laisti Krievijas izcelsmes kokmateriāli.

Valsts meža dienests atgādina, ka joprojām nav atļauts importēt kokmateriālus vai koka izstrādājumus, kuru ražošanā izmantoti Krievija vai Baltkrievijā iegūti izejmateriāli. Šadu produktu importēšana nozīmē pārkāpt ES Kokmateriālu regulas prasības, jo izejmateriāliem nav iespējams mazināt risku līdz "maznozīmīgam", lai tos drīkstētu laist Eiropas Savienības (ES) tirgū. Savukārt kokmateriāli un koka izstrādājumi, kuri ražoti Krievijā val Baltkrievijā un uz kuriem attiecas ES noteiktās sankcijas, uzskatāmi par nelikumīgi iegūtiem.

Ja uzņēmums grasās importēt augsta riska produktu, kāds šobrid ir, piemēram, bērza saplāksnis, tam jāizslēdz jebkura varbūtība, ka saplāksnis ražots vai kokmateriāli legūti Krievijā vai Baltkrievijā. Tāpat, ja tiek importētas, piemēram, mebeles no Ķīnas vai kādas citas trešās valsts, kuras ražotāji varētu izmantot Krievijas vai Baltkrievijas izcelsmes kokmateriālus, jāizslēdz iespējamība, ka tās var saturēt šo valstu izejmateriālus.

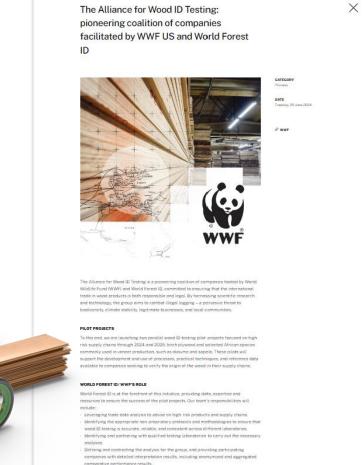
Ká to paredz ES Kokmateriálu regulas prasības, risku mazināšanai ir jābūt efektīvai un piemērotai konkrētajiem riskiem. Tādu dokumentu kā, piemēram, izcelsmes sertifikātu un ciršanas atļauju uzrādīšanu Valsts meža dienests neuzskatīs par atbilstošu risku mazināšanas pasākumu, ja augsta riska produkts tiek importēts no augsta riska valsts. Šādi dokumenti neatspoguļo visu piegādes



## The Alliance for Wood ID Testing

The Alliance for Wood ID Testing is a coalition

of companies and NGOs who share a commitment to making the international trade in wood products responsible and legal.









Australian Government **Department of Agriculture**, **Fisheries and Forestry** 





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# Thank you. Any questions?

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#### NATIONAL GEOGRAPHIC

The 'timber detectives' on the front lines of illegal wood trade

#### The New York Times

New Method That Pinpoints Wood's Origin May Curb Illegal Timber

### ВВС

Is your wood from a legal source? This test can tell