



SCIENCE AND
EDUCATION **FOR**
SUSTAINABLE
LIFE

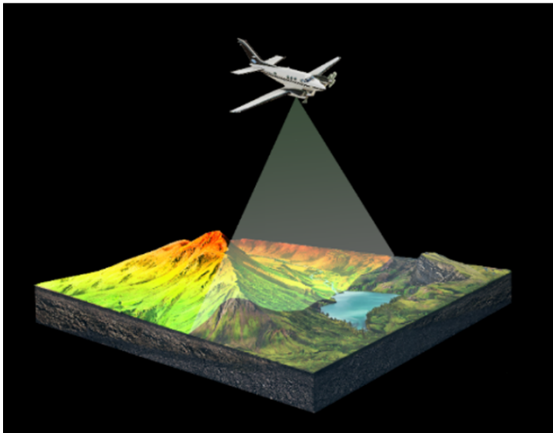
Sveriges digitala kartrevolution: Nya insikter i historisk markanvändning med helautomatiska karteringsmetoder

Anneli Ågren – Docent, Forskare, Institutionen för skogens ekologi och skötsel, SLU, Umeå



Utveckling av kartor med AI

Lidar scanning



Beräkningskraft

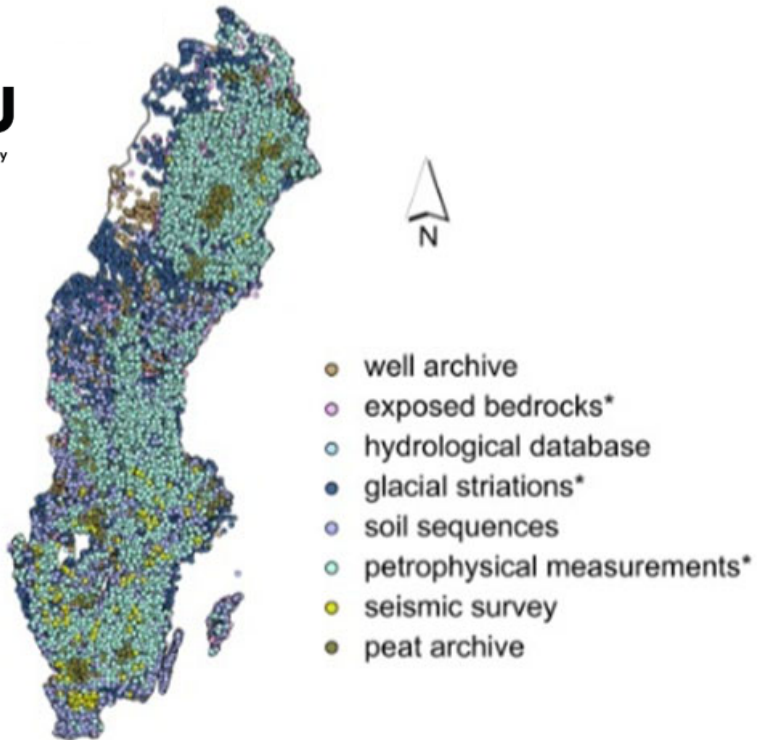


Mänsklig intelligens



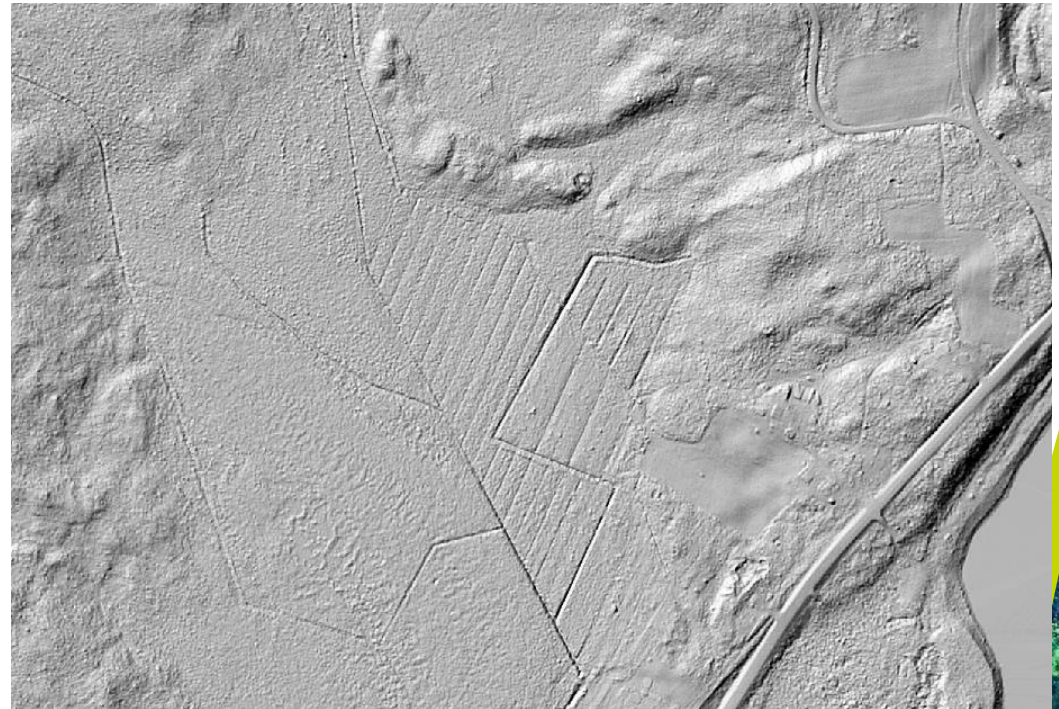
Träna/utvärdering (80%; 20%)

- Fältdata



→ 1,2 miljoner observationer

- Digitalisering



→ 1 600 km diken

AI genererade kartor

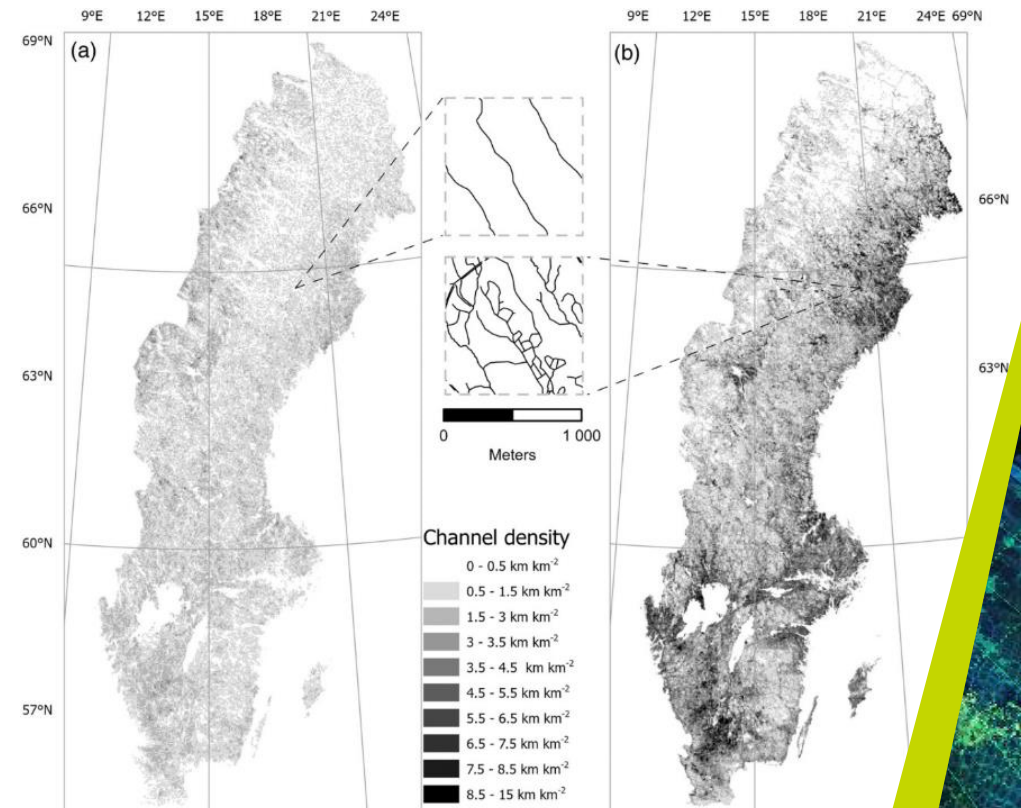
Markfuktighet

Torvmarker



Vattendrag

Diken





Bättre kvalitet med AI

Markfuktighet

36%

Torvmarker

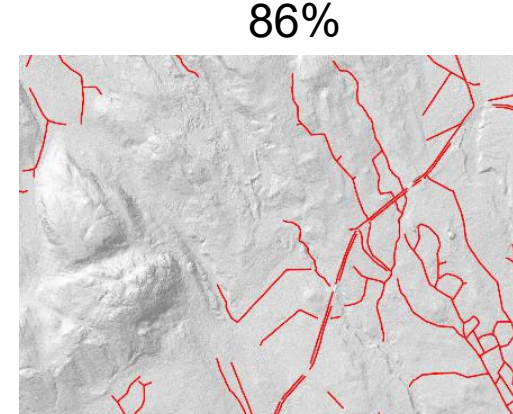
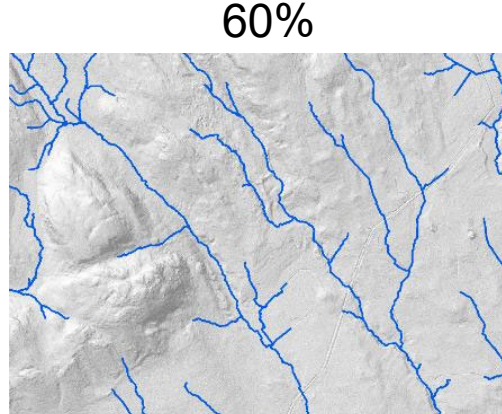
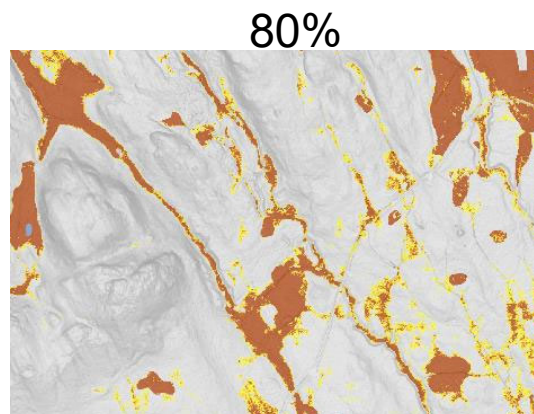
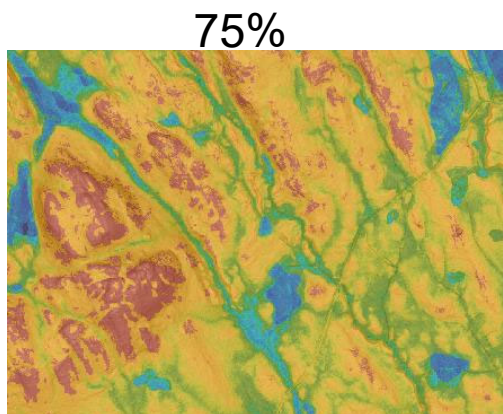
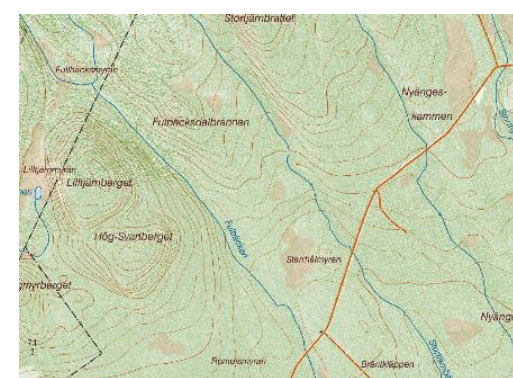
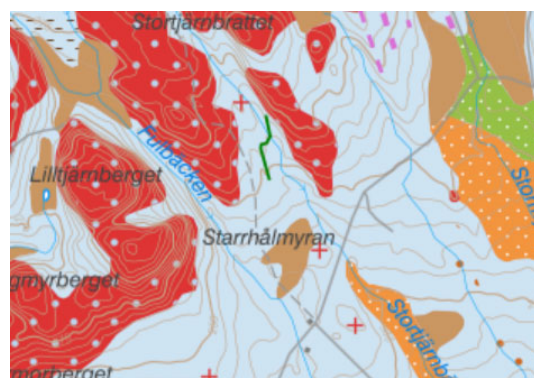
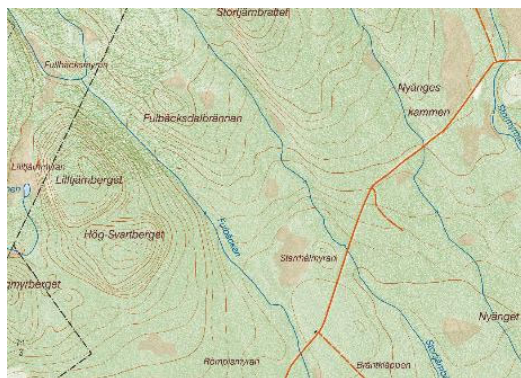
70%

Vattendrag

19%

Diken

9%



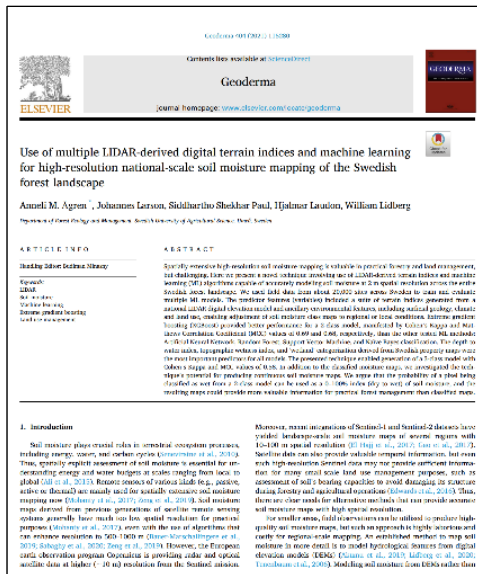
Traditionella

AI-kartor

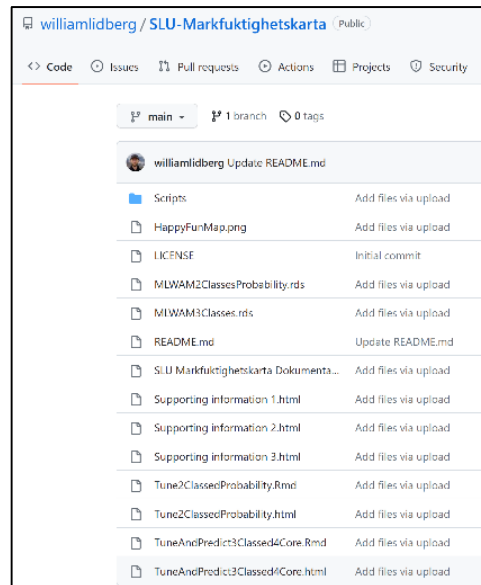


Öppna data

Artiklar



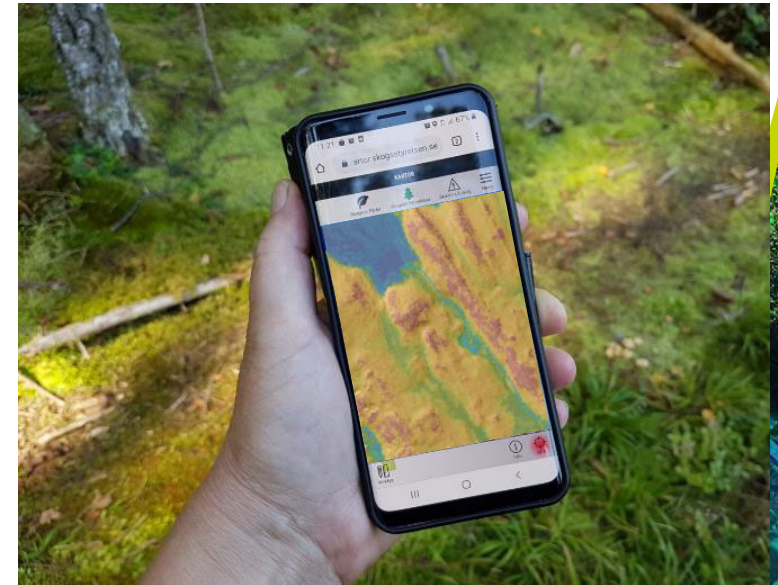
Källkod



Dataset

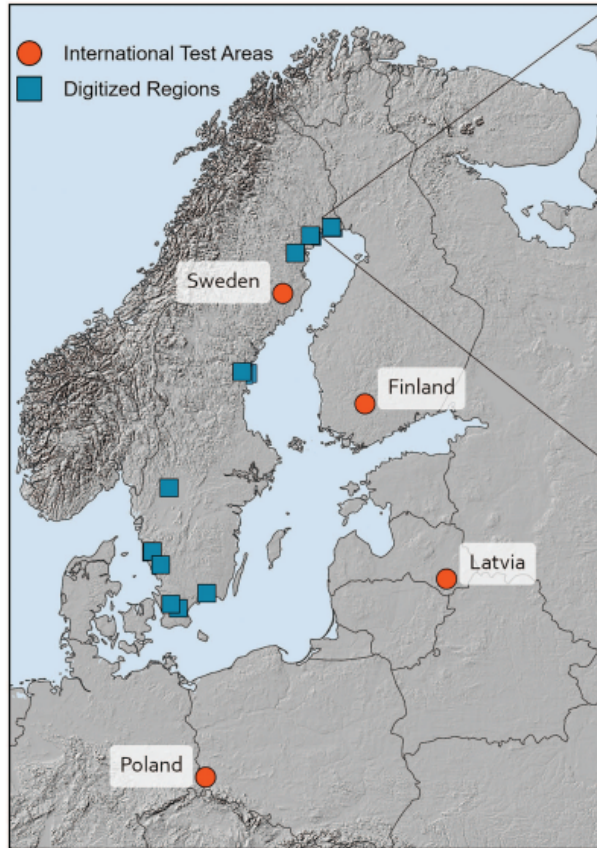


Öppna kartor

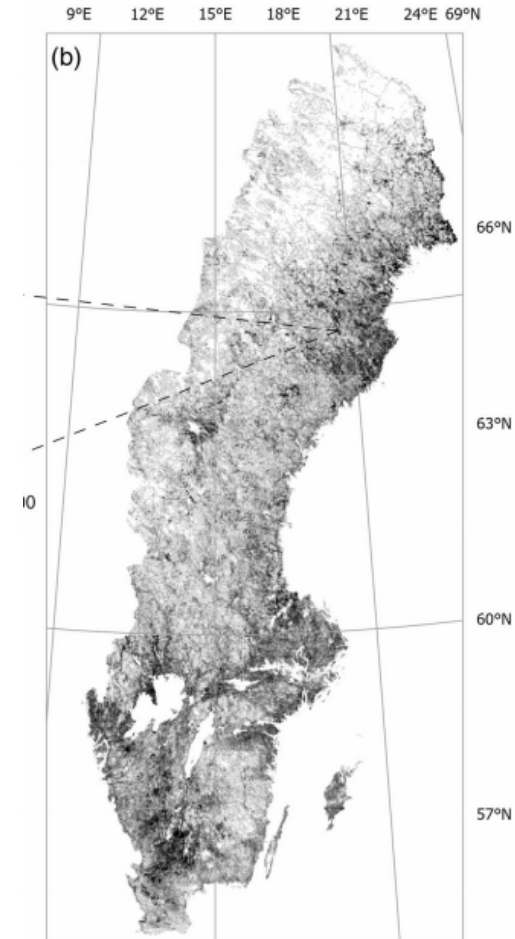


Vi sänker trösklarna för det digitala transformationen av samhället - i syfte att uppnå hållbarhetsmålen!

Kartering med AI sparar mycket tid - Diken



1 600 km



1.2 miljoner km - 28 varv runt jorden

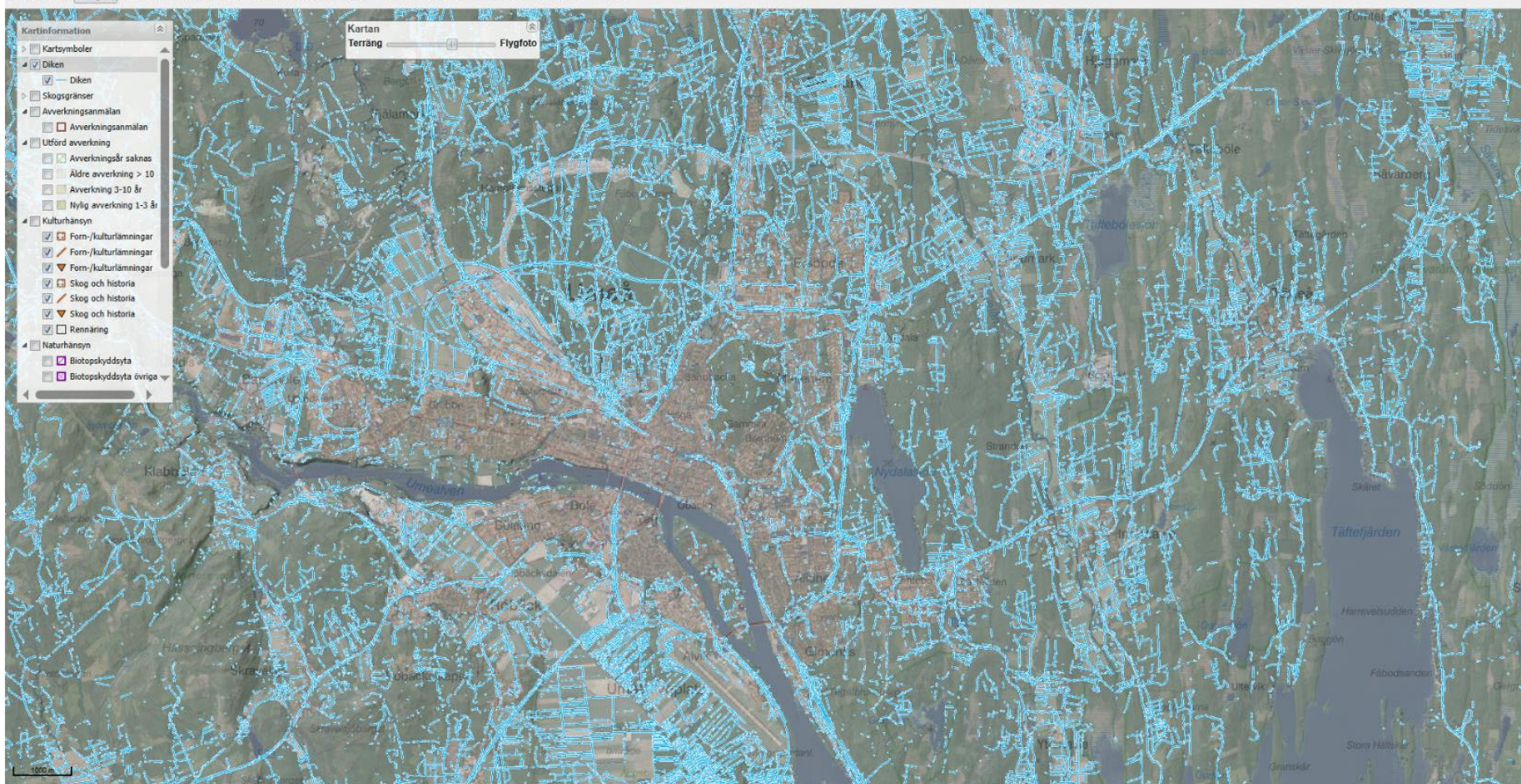


SKOGENS PARLÖR

SKOGLIGA GRUNDDATA

SKADOR PÅ SKOG

Oversiktskarta Navigera Zooma in Zooma ut Identifiera Virkesförråd Avstånd Yta Koordinater Val av karta Importera Dela



Kartering av historisk åkermark från Ekonomiska kartan

Landskapsförändringar



?

Svenska
Marktäckedata
/CORINE

Nationella
Marktäckedata

2000

2006

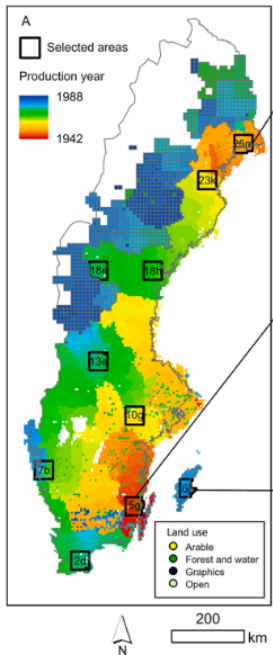
2012

2018

2023



Landskapsförändringar



Ekonomiska kartan

Svenska
Marktäckedata
/CORINE



Nationella
Marktäcke data

1942-1988

2000

2006

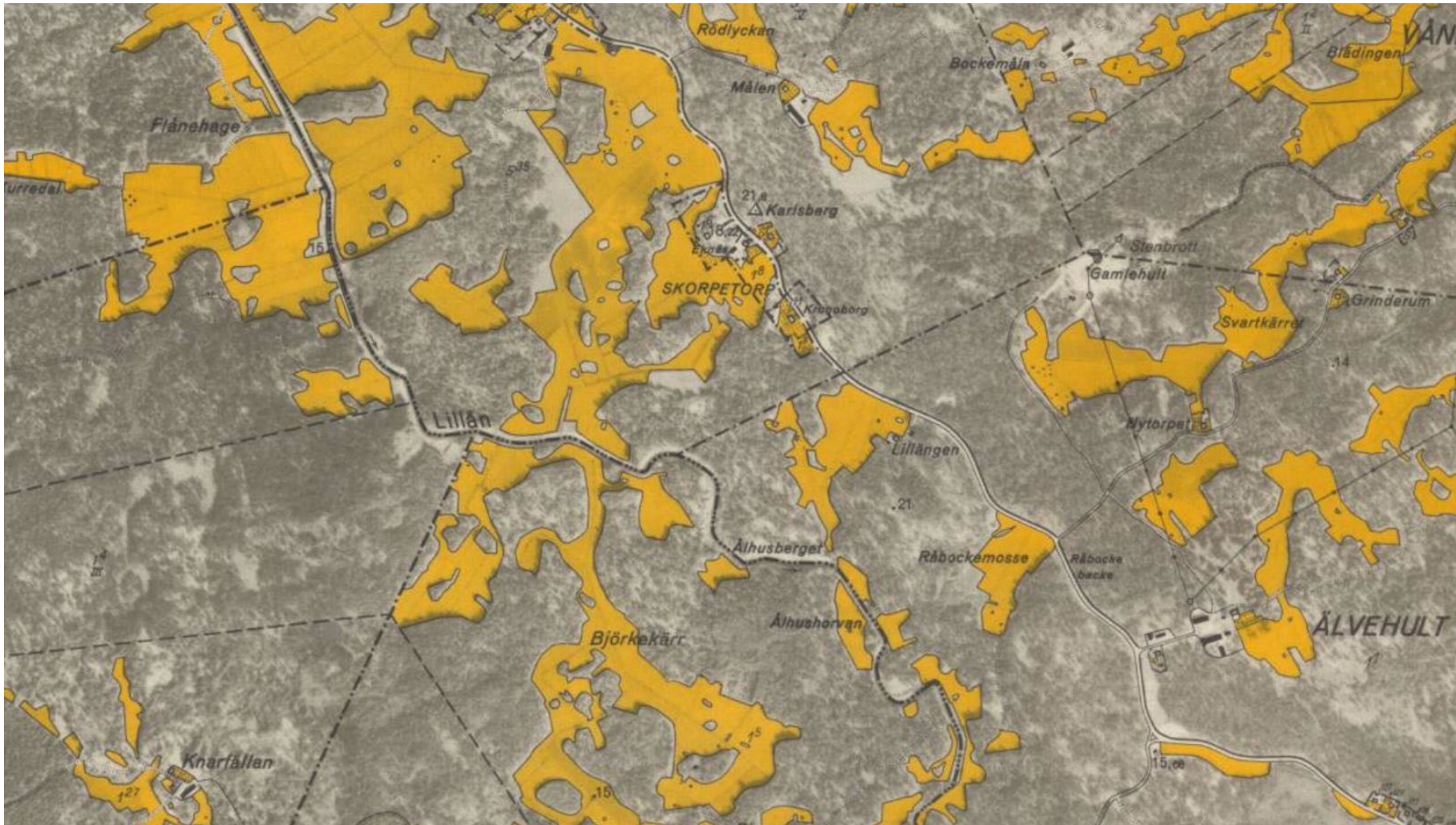
2012

2018

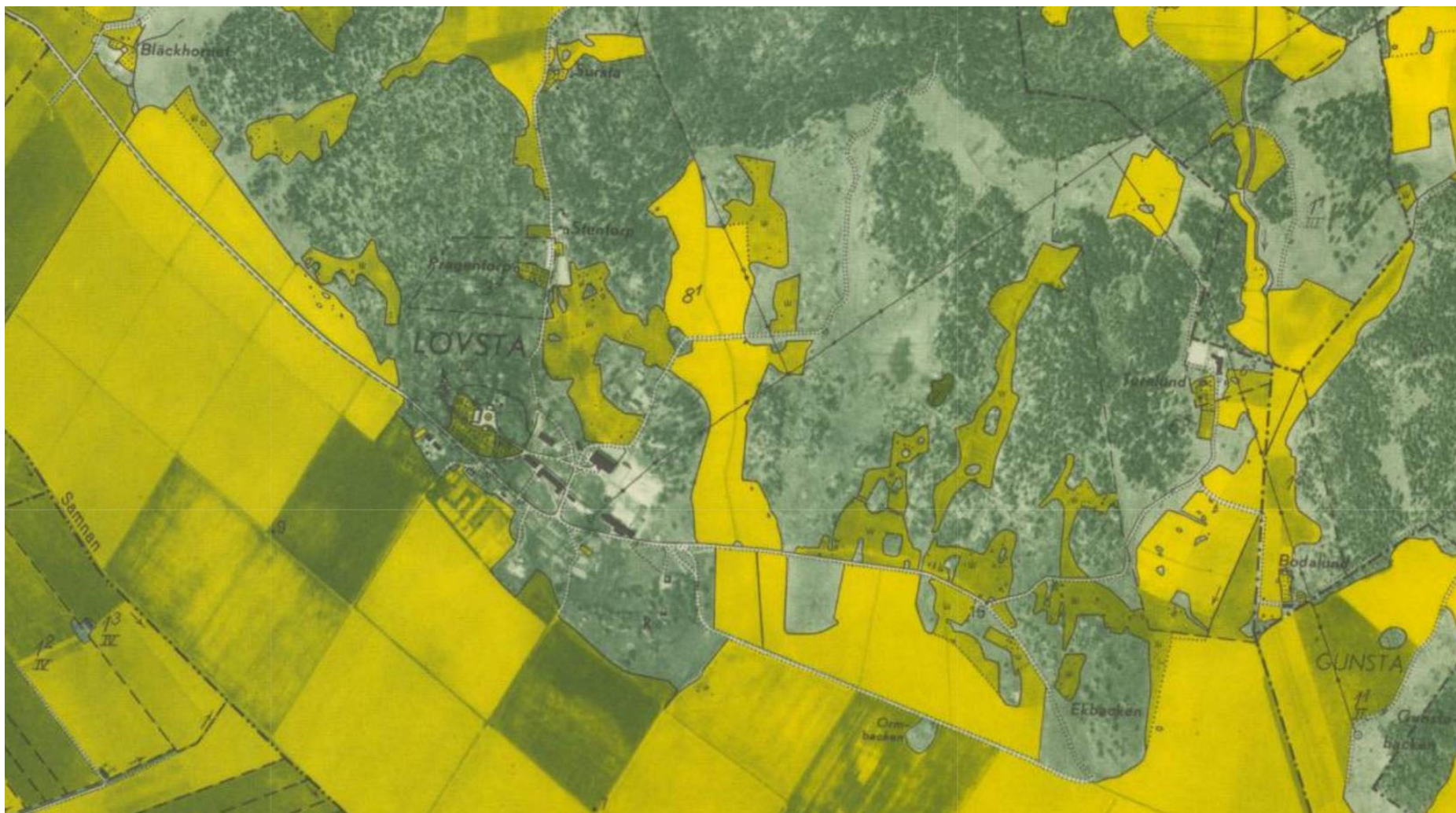
2023



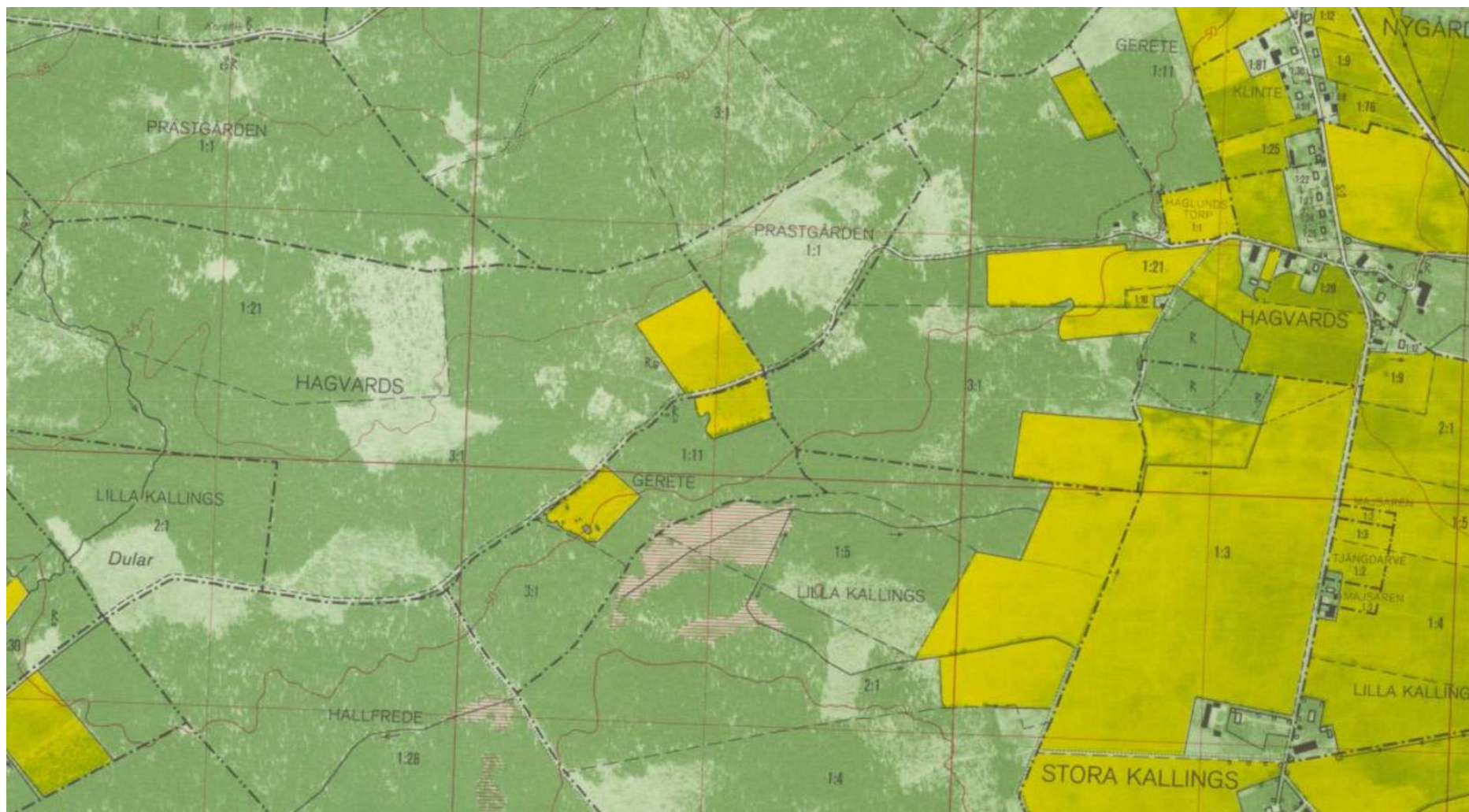
Ekonomiska kartan – scannade papperskartor



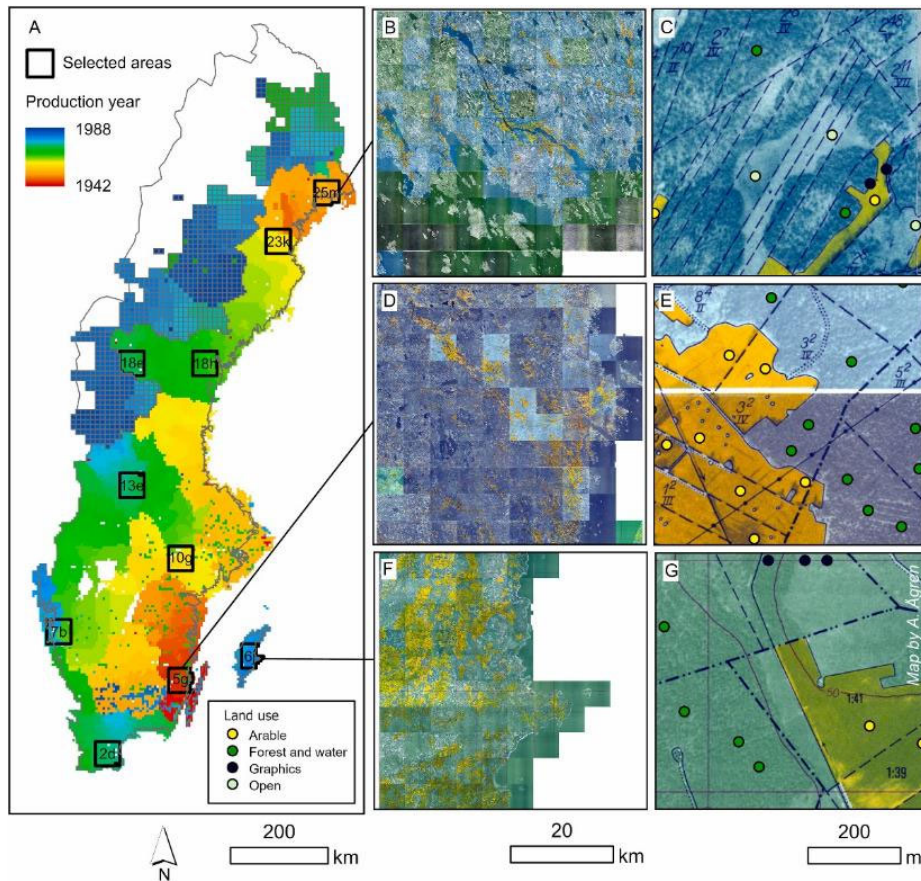
Ekonomiska kartan



Ekonomiska kartan



Extrahera markanvändning → träningsdata

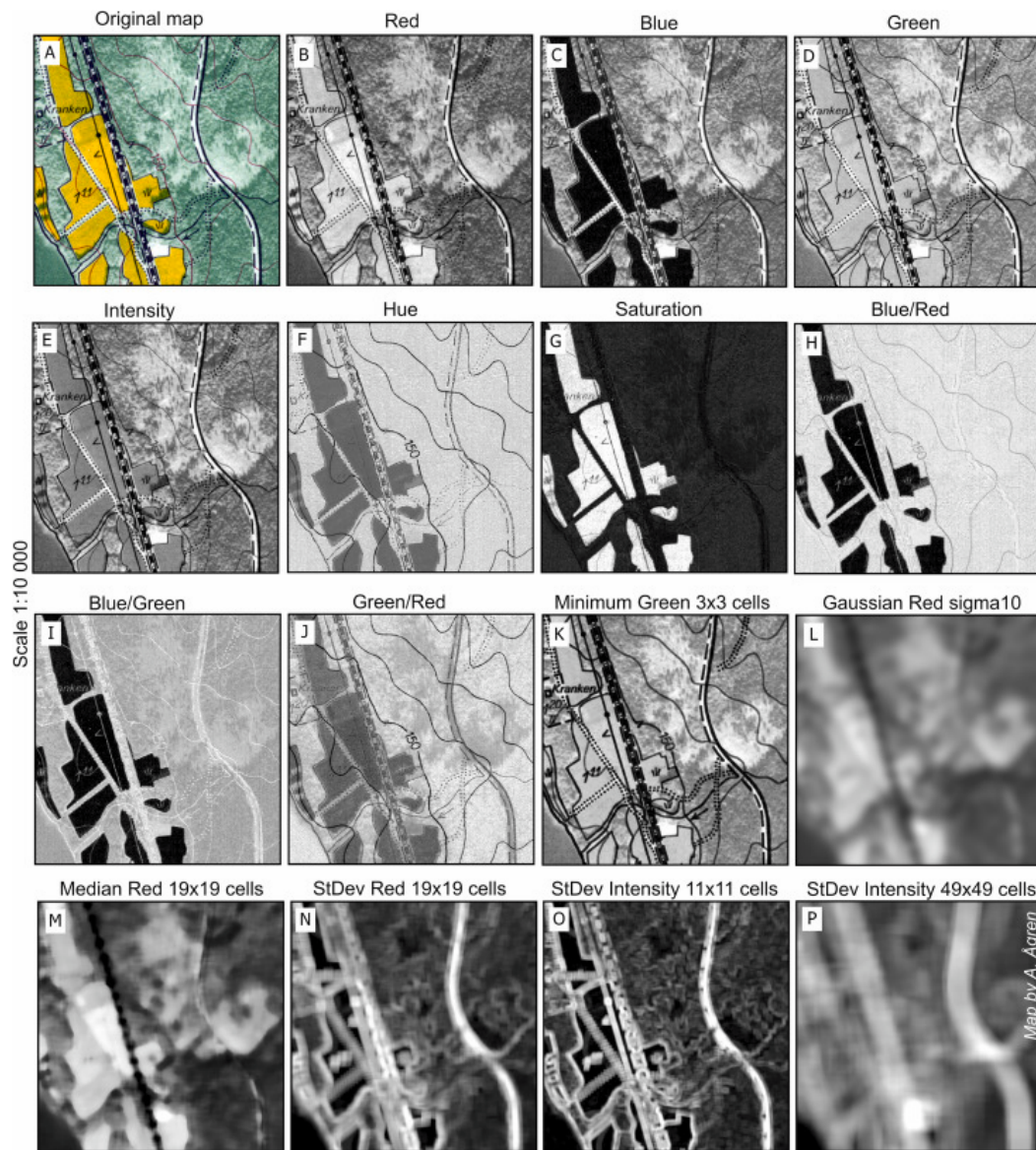


-  Odlingsmark
-  Öppen mark
-  Skogsmark
-  Grafik

10 storrutor, totalt 938 kartor
→ 16 654 klasificerade punkter

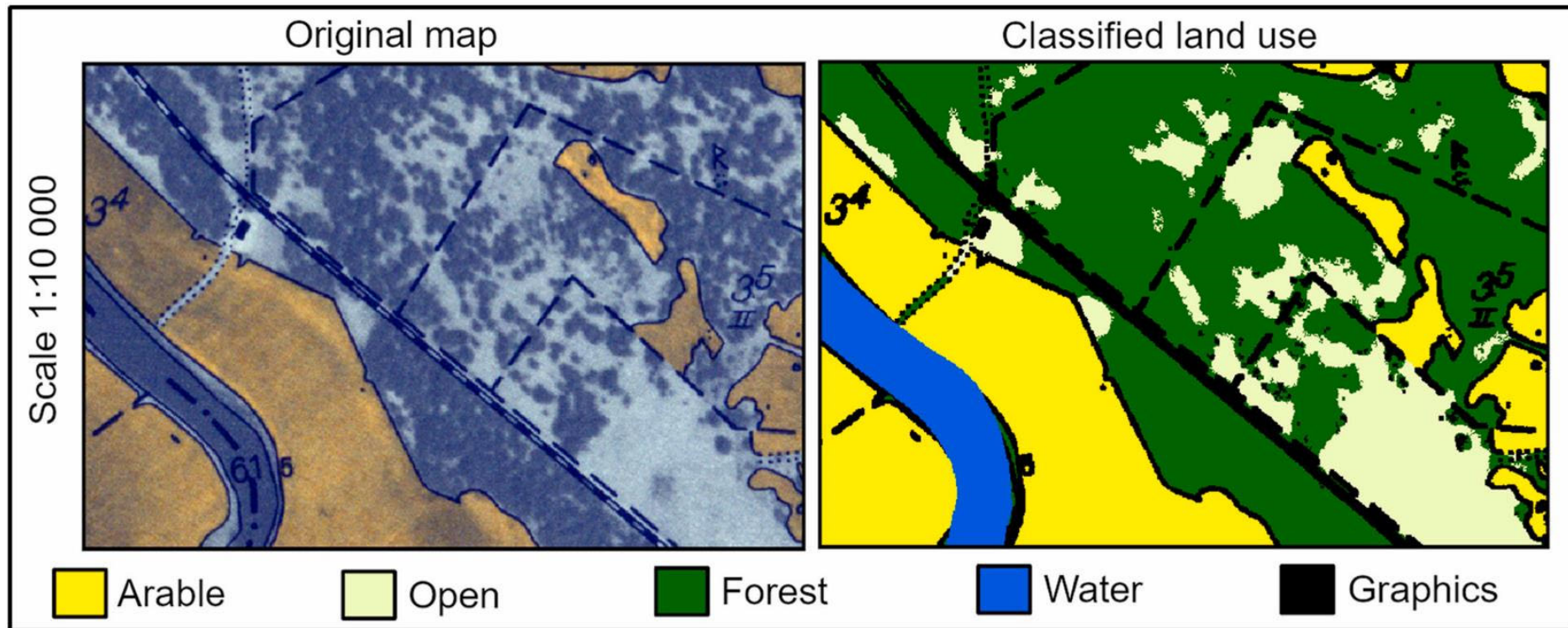
80% träningsdata,
20% utvärdering





+ Average filter for the entire map for Red, Blue, Green, Intensity, Hue, Saturation







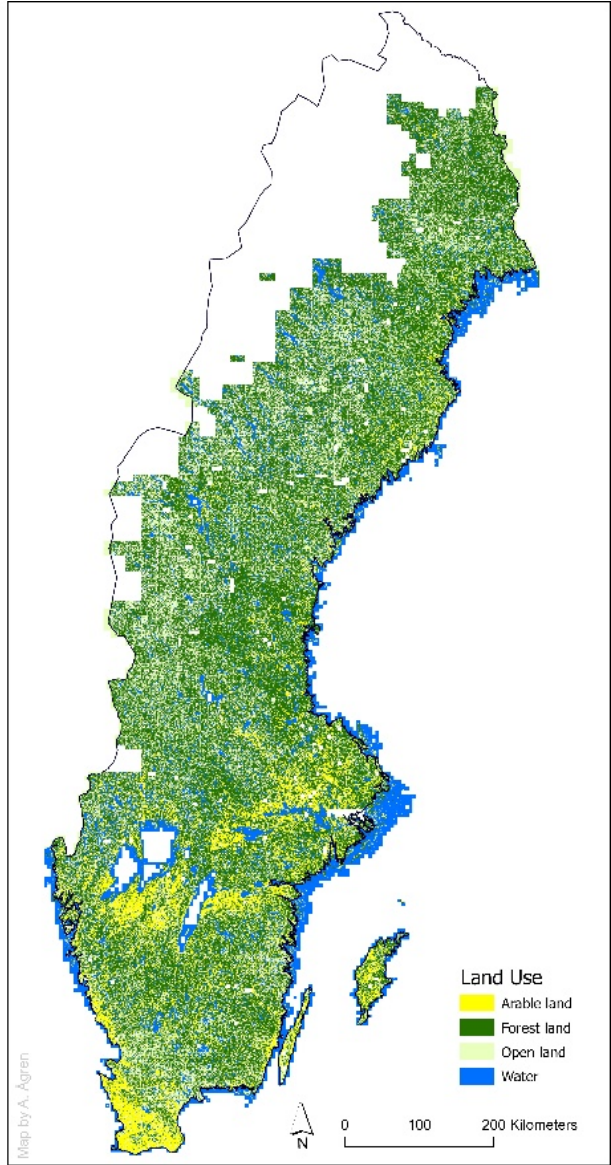
Remote Sensing Applications: Society and Environment

Volume 36, November 2024, 101349



A fully automated model for land use classification from historical maps using machine learning

Anneli M. Ågren  , Yiqi Lin



Ågren et al. 2024

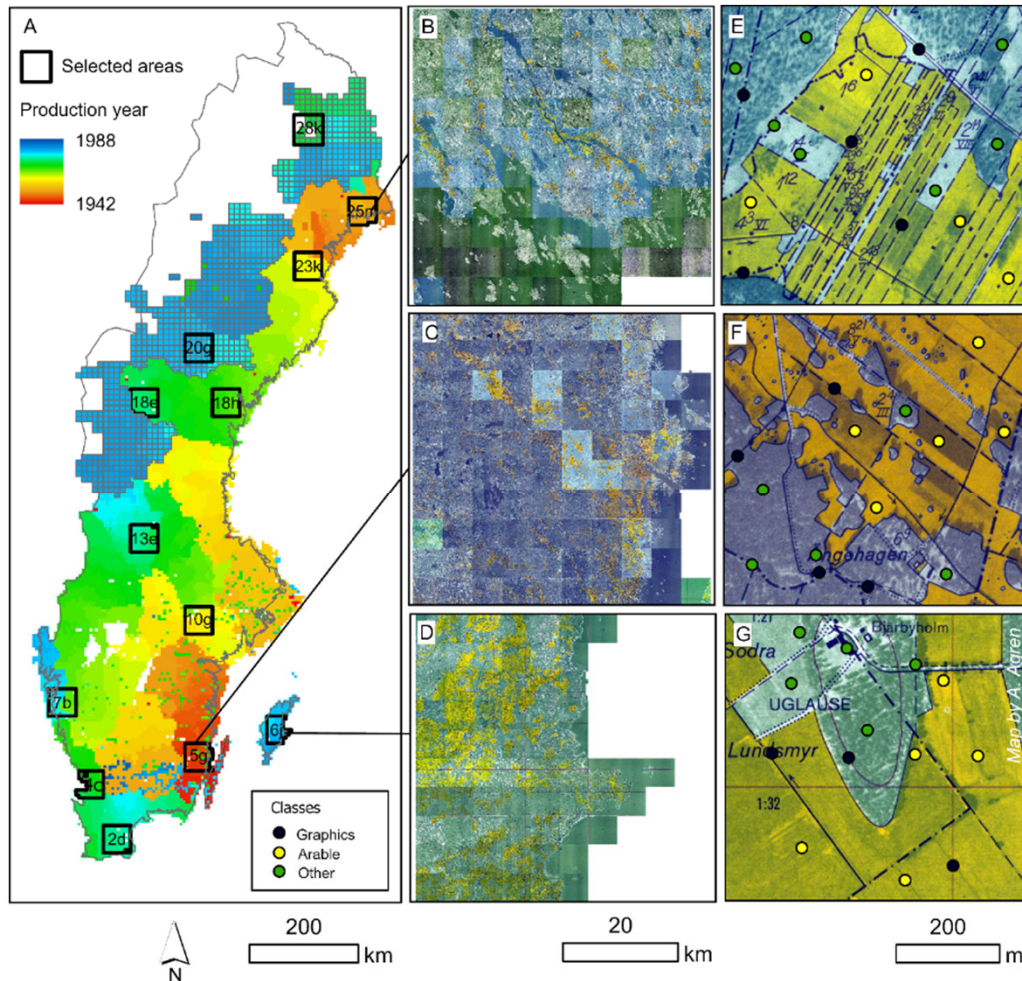
Hur bra är kvalitén då?

	Precision	Recall	F1-score	Accuracy	κ	MCC	n
Graphics	0.97	0.98	0.98				716
Arable	0.97	0.92	0.95				468
Forest	0.83	0.86	0.84				930
Open	0.88	0.86	0.87				976
Total			0.91	0.90	0.86	0.86	

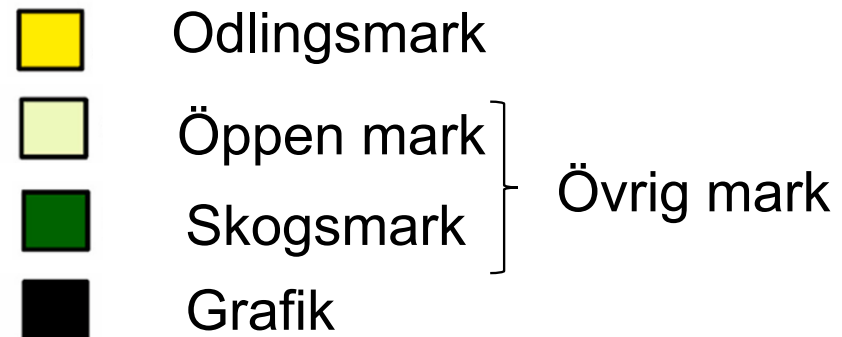
→ ortofoto



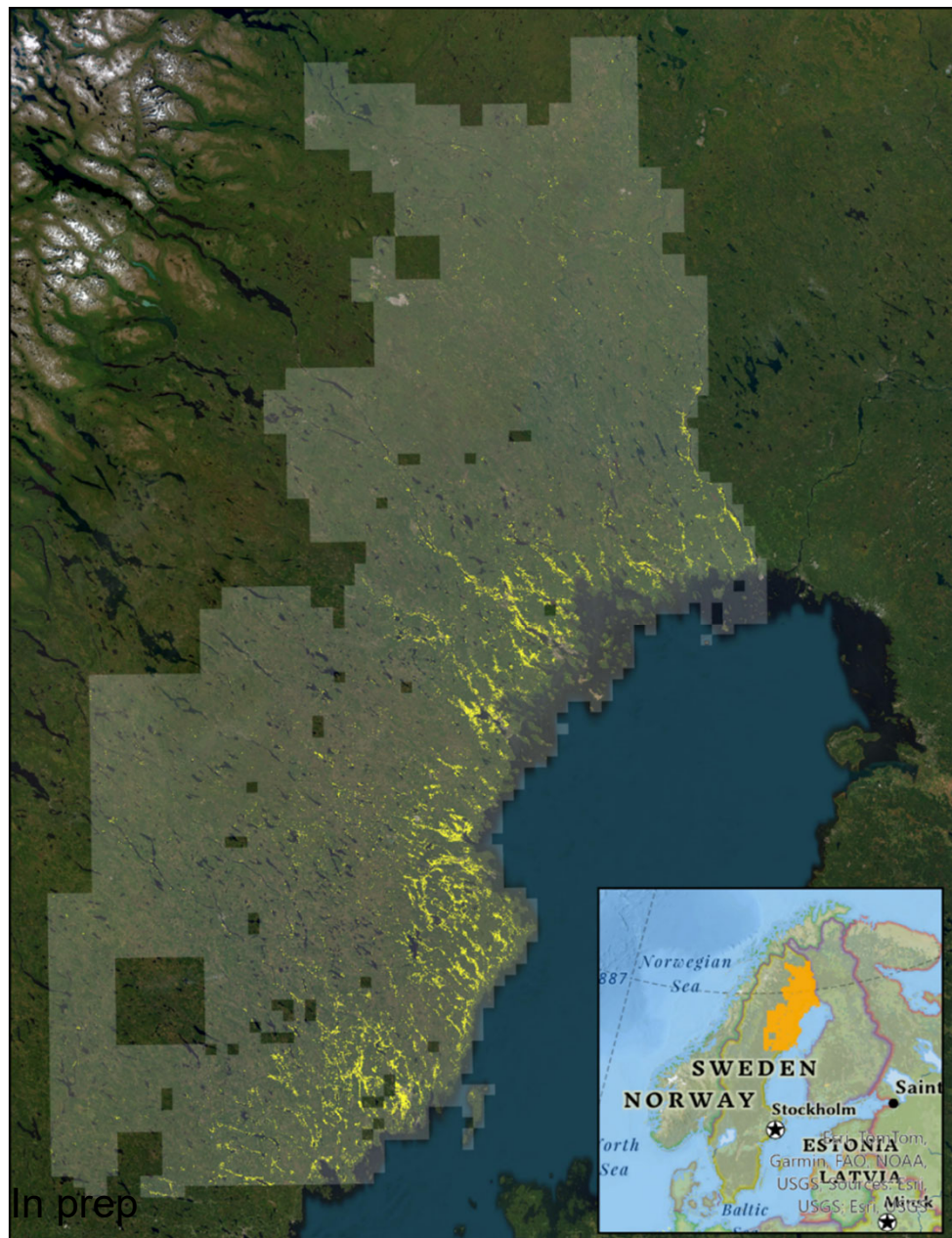
En bra karta över historisk jordbruksmark

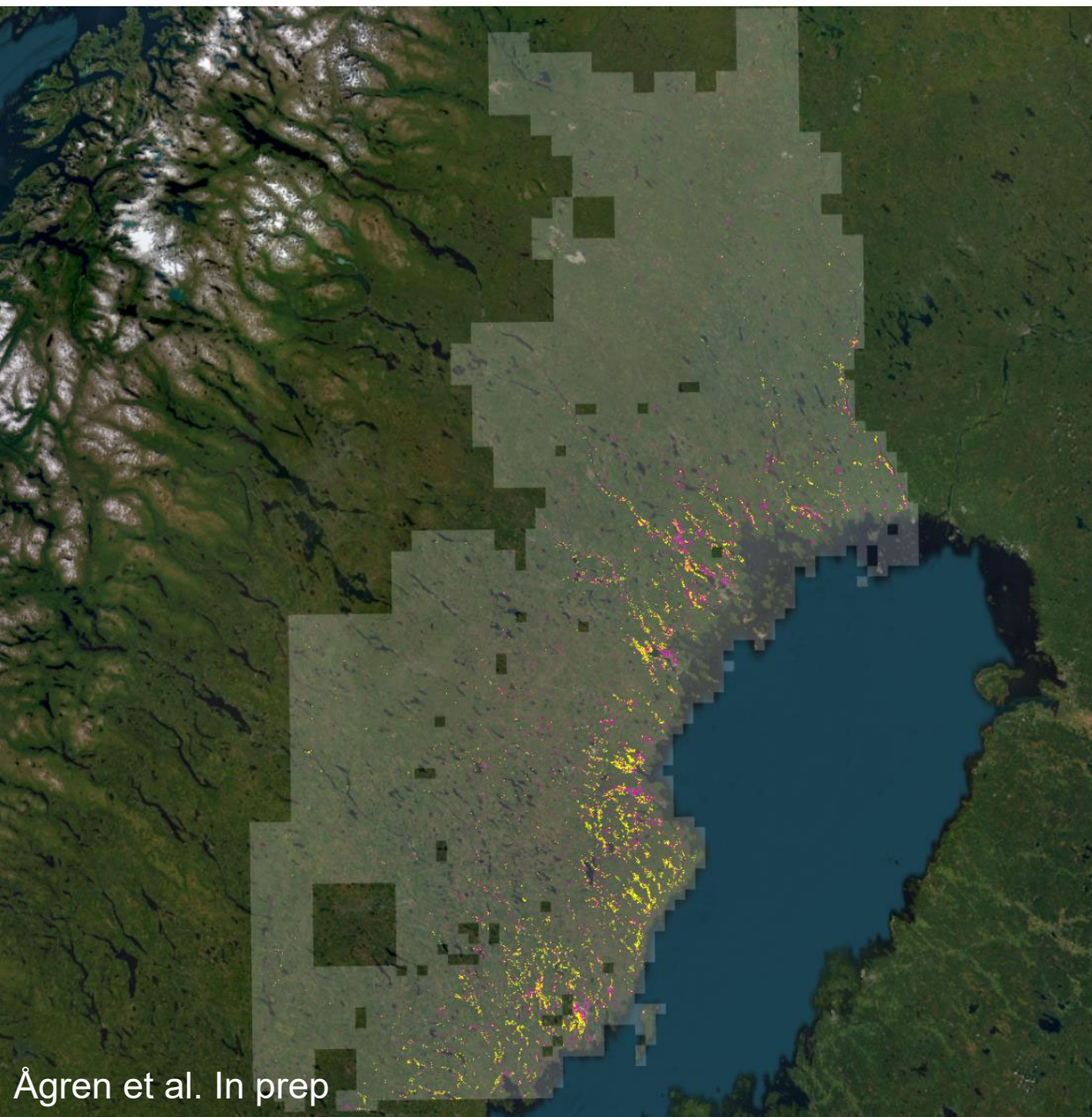


13 storrutor, totalt 1 070 kartor
→ 37 015 klassificerade punkter



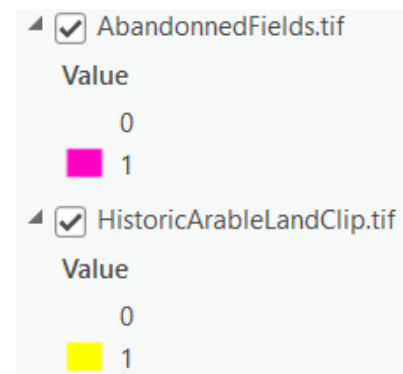
		Precision	Recall	F1-score	κ	MCC	n
Old model	Arable	0.97	0.92	0.95			468
	Graphics	0.97	0.98	0.98			716
	Forest	0.83	0.86	0.84			930
	Open	0.88	0.86	0.87			976
	Total			0.91	0.86	0.86	3,090
New model	Arable	0.99	0.99	0.99			2,091
	Graphics	0.97	0.98	0.98			944
	Other	0.99	0.99	0.99			4,243
	Total			0.99	0.99	0.99	7,278



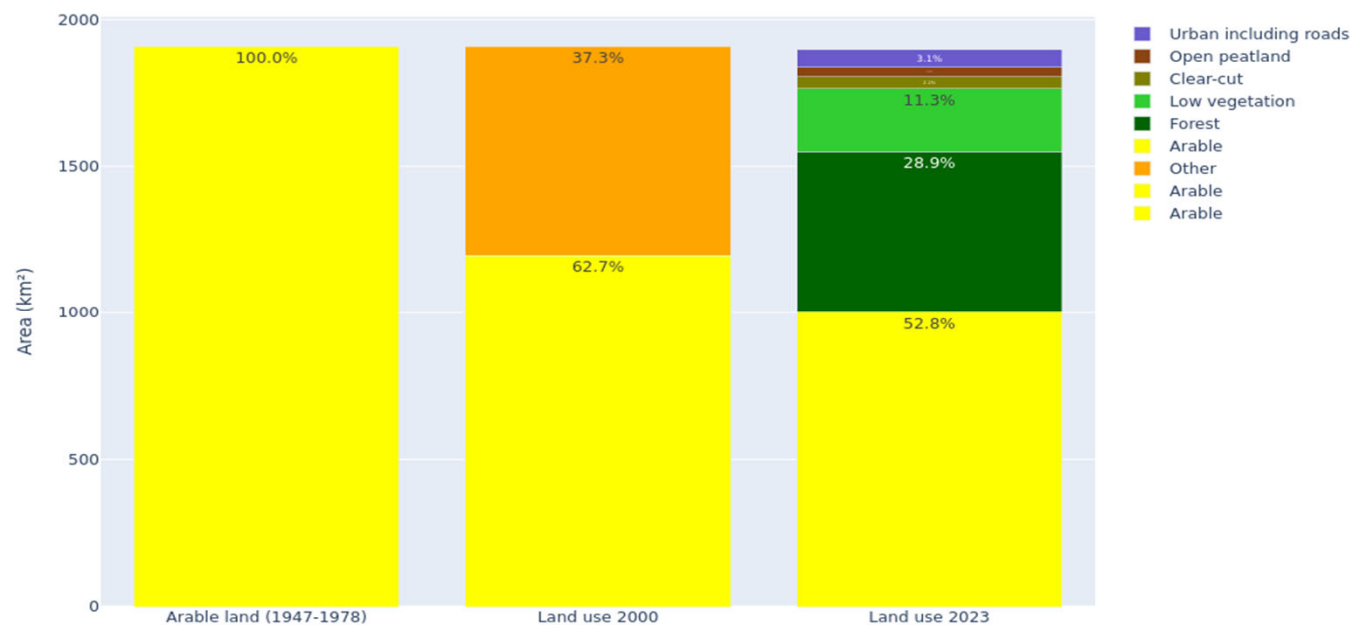


Ågren et al. In prep

Jordbruksmark



Landskapsförändringar



Ekonomiska kartan

Svenska
Marktäckedata
/CORINE

Nationella mark
täckedata

1947-1978

2000

2023







Ågren et al. In prep



Tack!

FORMAS 

Kempestiftelserna



Digital Impact North



