

Mobile Field Data Collection in the UK Vineyard

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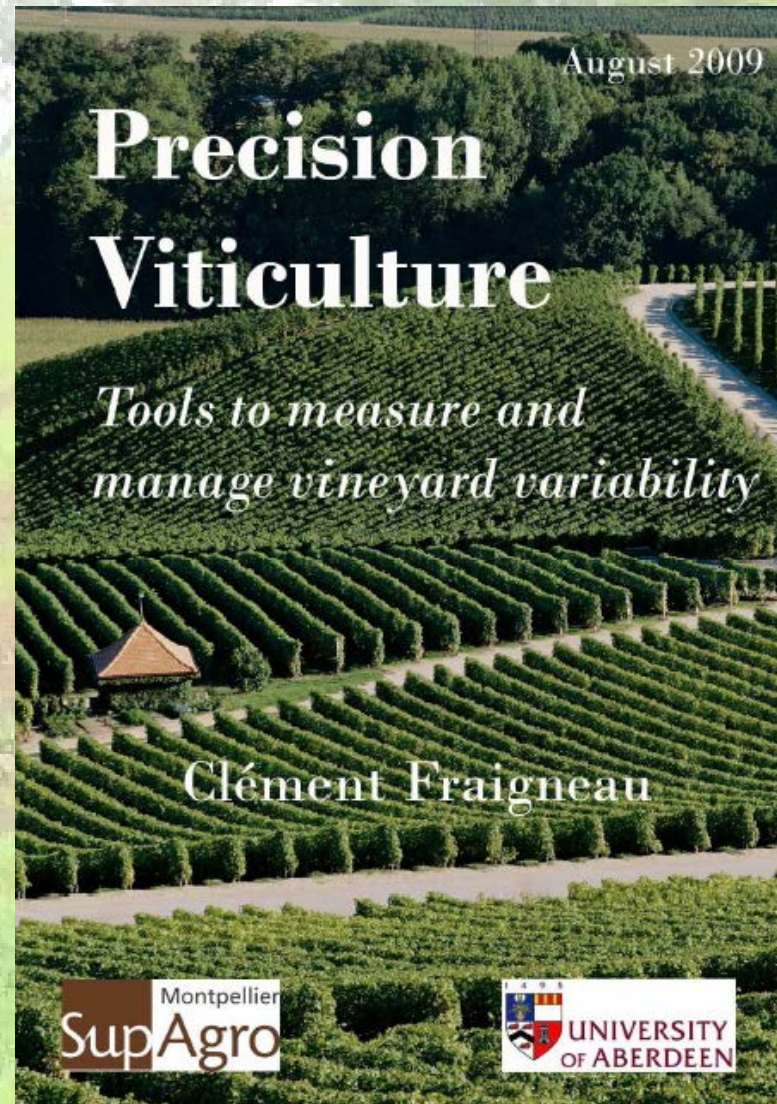


2139 Geospatial Technologies in Viticulture and Wine Production

Saturday, 2/25/2012, from 8:00 AM - 9:40 AM in Holland Suite, Hilton NY, Fourth Floor

Outline

- Introduction
- Context
- Study Areas
- Data Collection
- Analysis
- Future



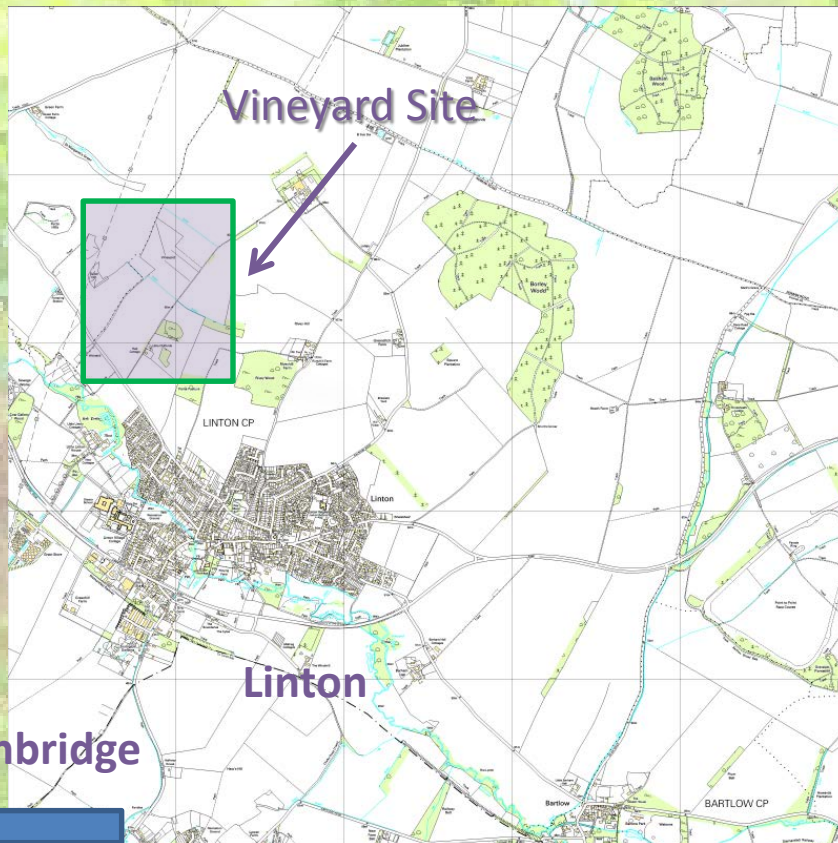
Background

- Limited use of geospatial technologies and Precision Viticulture in UK vineyards to date
- Reasons: Size of vineyards (Average = 3.2 hectares/8 acres)
- Commercial Scale
- Costs of hardware and software
- Costs / Availability of data
- Expertise / Learning Curve / Time

Study Areas

- **Two(2)** study areas
- Chilford Hall Vineyard – Linton, near Cambridge, Cambridgeshire, East Anglia
- Camel Valley Vineyard – Nanstallon, near Bodmin, Cornwall, SW England
- Two very different sites / history / locations / scale / management
- Familiarity

Chilford Hall Vineyard



To Cambridge

Chilford Hall Vineyard



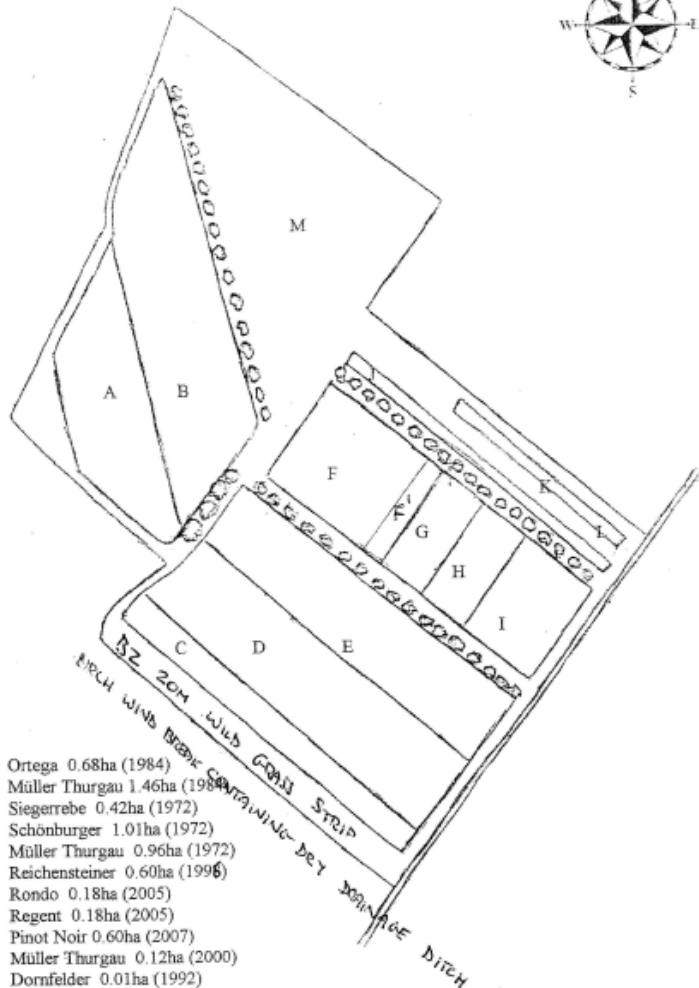
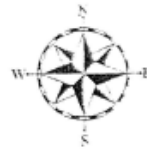
<http://www.chilfordhall.co.uk/cgi-bin/ch/index.html>

Chilford Hall Vineyard



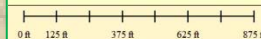
Map

Chilford Hall Vineyard 2007



- A Ortega 0.68ha (1984)
- B Müller Thurgau 1.46ha (1984)
- C Siegerrebe 0.42ha (1972)
- D Schönburger 1.01ha (1972)
- E Müller Thurgau 0.96ha (1972)
- F Reichensteiner 0.60ha (1996)
- G Rondo 0.18ha (2005)
- H Regent 0.18ha (2005)
- I Pinot Noir 0.60ha (2007)
- J Müller Thurgau 0.12ha (2000)
- K Dornfelder 0.01ha (1992)
- L Heroldrebe 0.01ha (1992)
- M Fallow 1.13ha (2006)
- F' Dornfelder 0.05ha (1996)

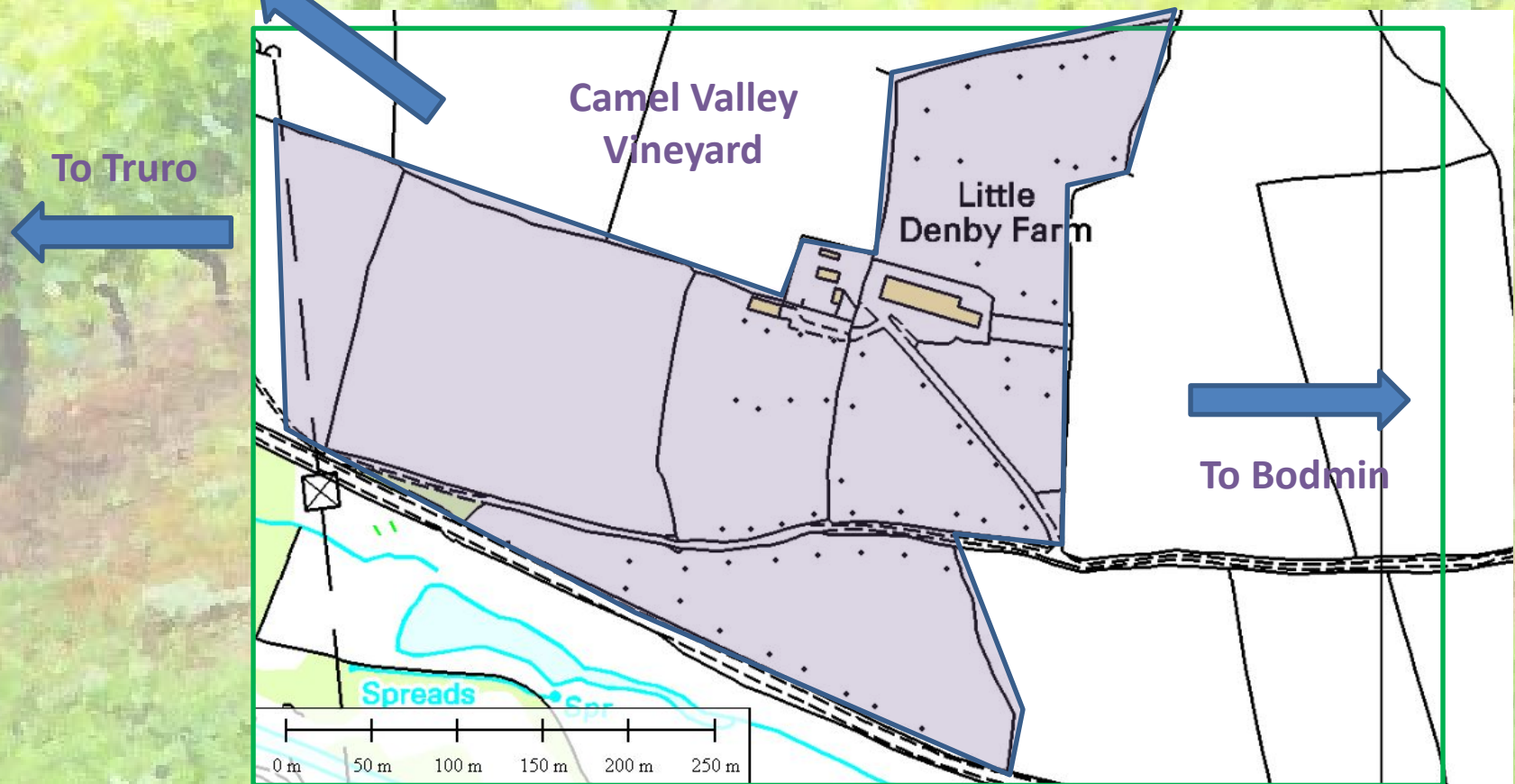
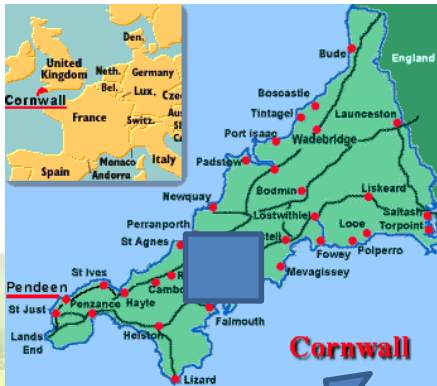
Chilford Hall Vinyard



Chilford Hall Vineyard



Camel Valley Vineyard



Camel Valley Vineyard



Camel Valley Vineyard

CAMEL VALLEY®

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Hello...

At Camel Valley, we've been producing award-winning, world-class wines in a beautiful corner of Cornwall for twenty years. What is it that makes our wines so good? It's really quite simple - an idyllic setting on sun-drenched slopes near the famous Camel River; excellent grapes that perfectly suit the soil and climate; a respect for traditional vineyard practices combined with a modern approach to wine making and, most importantly - a passion for creating wines that provide pure pleasure...

Matthew Jukes: 'Camel Valley is without a doubt the number one winery in the Country'



WINES & SHOP

[details >>](#)



AWARDS.
SAM LINDO
UK WINE
MAKER OF
THE YEAR
2007, 2010,
2011

[details >>](#)



VINEYARD
TOURS

<http://www.camelvalley.com/>

Dornfelder
 Pinot noir
 Reichensteiner
 Müller-Thurgau
 Ortega
 Schönburger
 Seyval Blanc
 Bacchus
 Triomphe

Camel Valley Vineyard

			D	E	F	G	H	I	J	K	L	M	N
			# vines	row spacing	vine spacing								
			13	1.8	1.2								
			15	1.8	1.2								
			15	1.8	1.2								
			18	1.8	1.2								
			20	1.8	1.2								
7	Bob's	6 Seyval	22	1.8	1.2								
8	Bob's	7 Seyval	23	1.8	1.2								
9	Bob's	8 Seyval	26	1.8	1.2								
10	Bob's	9 Seyval	26	1.8	1.2								
11	Bob's	10 Seyval	28	1.8	1.2								
12	Bob's	11 Seyval	29	1.8	1.2								
13	Bob's	12 Seyval	32	1.8	1.2								
14	Bob's	13 Seyval	32	1.8	1.2								
15	Bob's	14 Seyval	34	1.8	1.2								
16	Bob's	15 Seyval	36	1.8	1.2								
17	Bob's	16 Seyval	37	1.8	1.2								
18	Bob's	17 Seyval	39	1.8	1.2								
19	Bob's	18 Seyval	39	1.8	1.2								
20	Bob's	19 Seyval	42	1.8	1.2								
21	Bob's	20 Seyval	43	1.8	1.2								
22	Bob's	21 Seyval	43	1.8	1.2								
23	Bob's	22 Seyval	41	2.5	1.2								
24	Bob's	23 Pinot Earl	43	2.5	1.2								
25	Bob's	24 Pinot Earl	46	2.5	1.2								



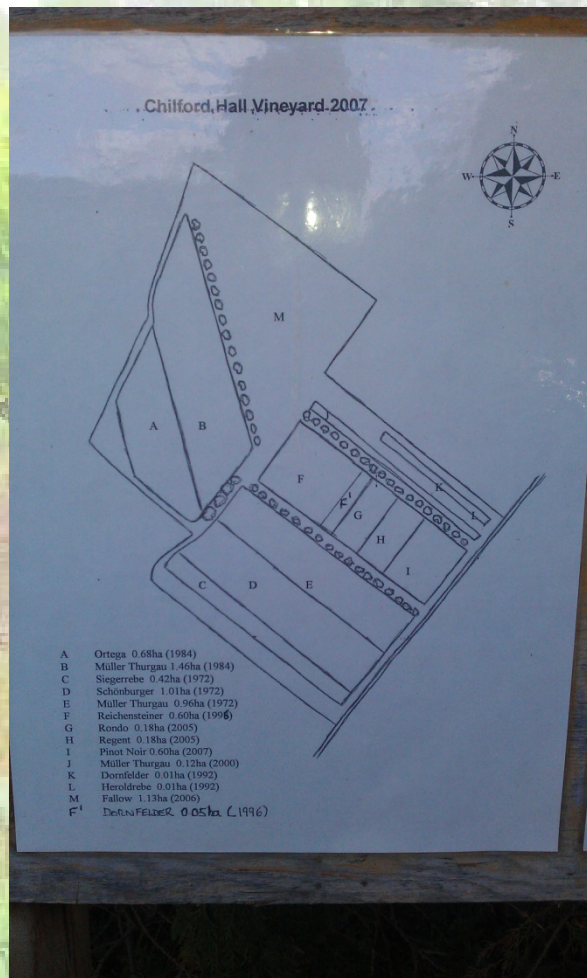
Camel Valley Vineyard



Data Sources

- Vineyard Manager e.g. Vineyard maps, vine varieties
- Ordnance Survey (OS) digital maps (vector and raster)
- Ordnance Survey (OS) DTMs
- Bluesky (Wildgoose) true colour and Colour InfraRed (CIR) imagery
- Bluesky DTMs and DSMs (Digital Surface Models)
- Soil Maps(Cranfield University - National Soil Research Institute)
- Model aircraft/helicopter imagery
- Satellite imagery
- Mobile data collection / field data collection

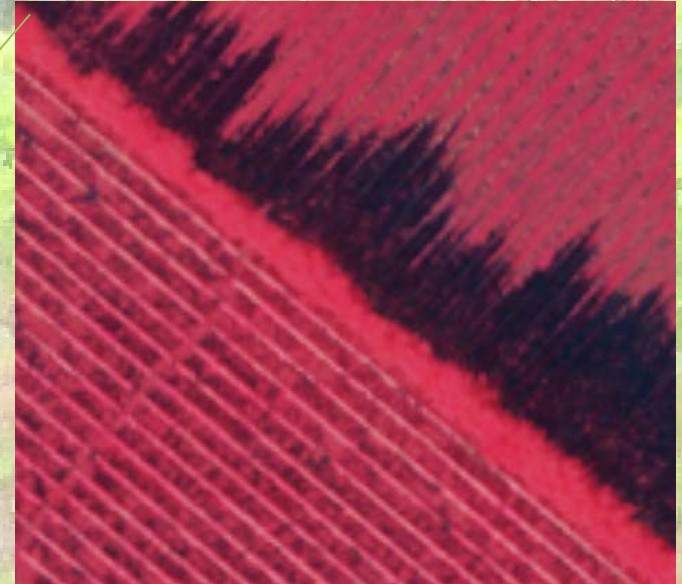
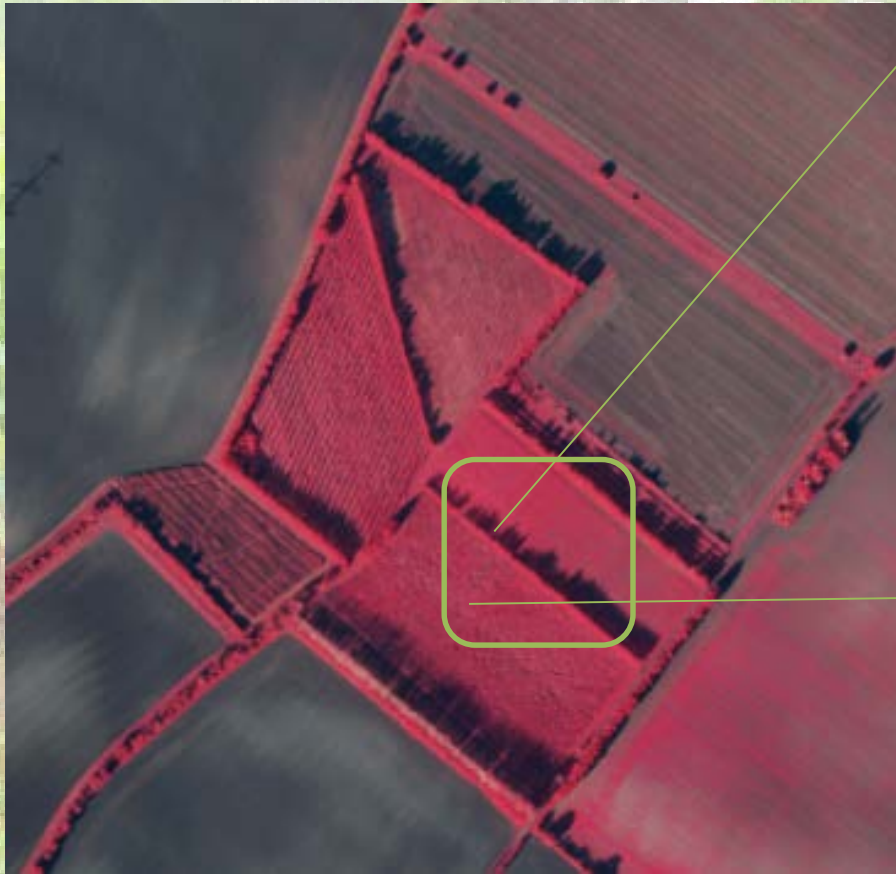
Vineyard Information



Satellite Imagery



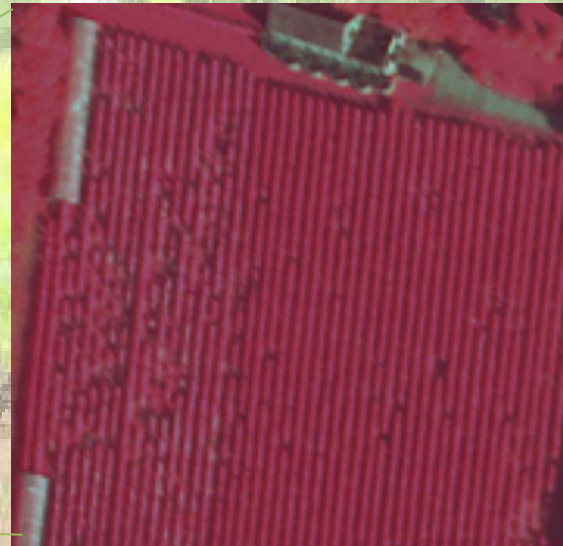
CIR Aerial Photographs



Chilford Hall Vineyard

Bluesky – Colour Infared (CIR) – 50cm

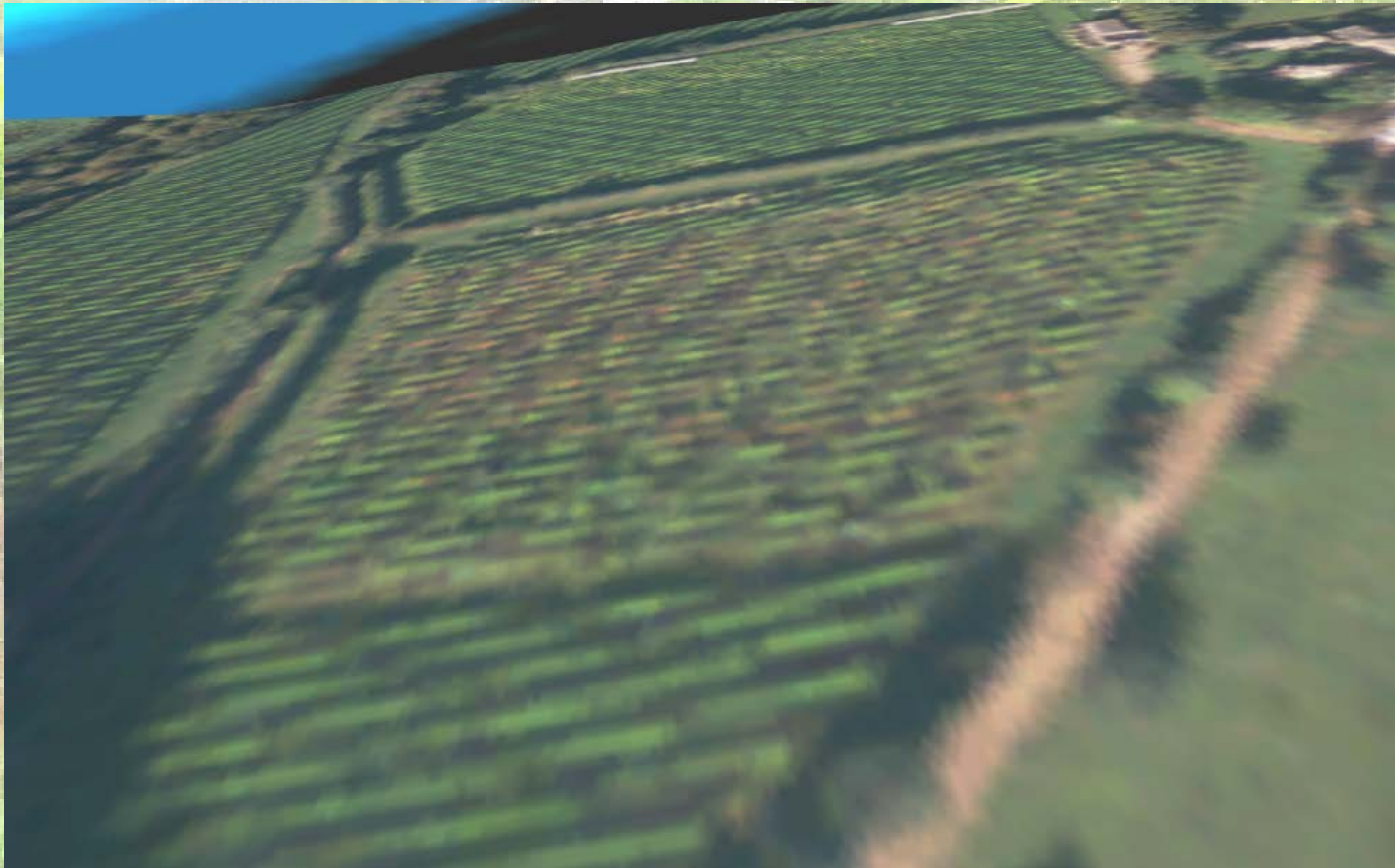
CIR Aerial Photographs



Camel Valley Vineyard

Bluesky – Colour Infared (CIR) – 50cm

DTM



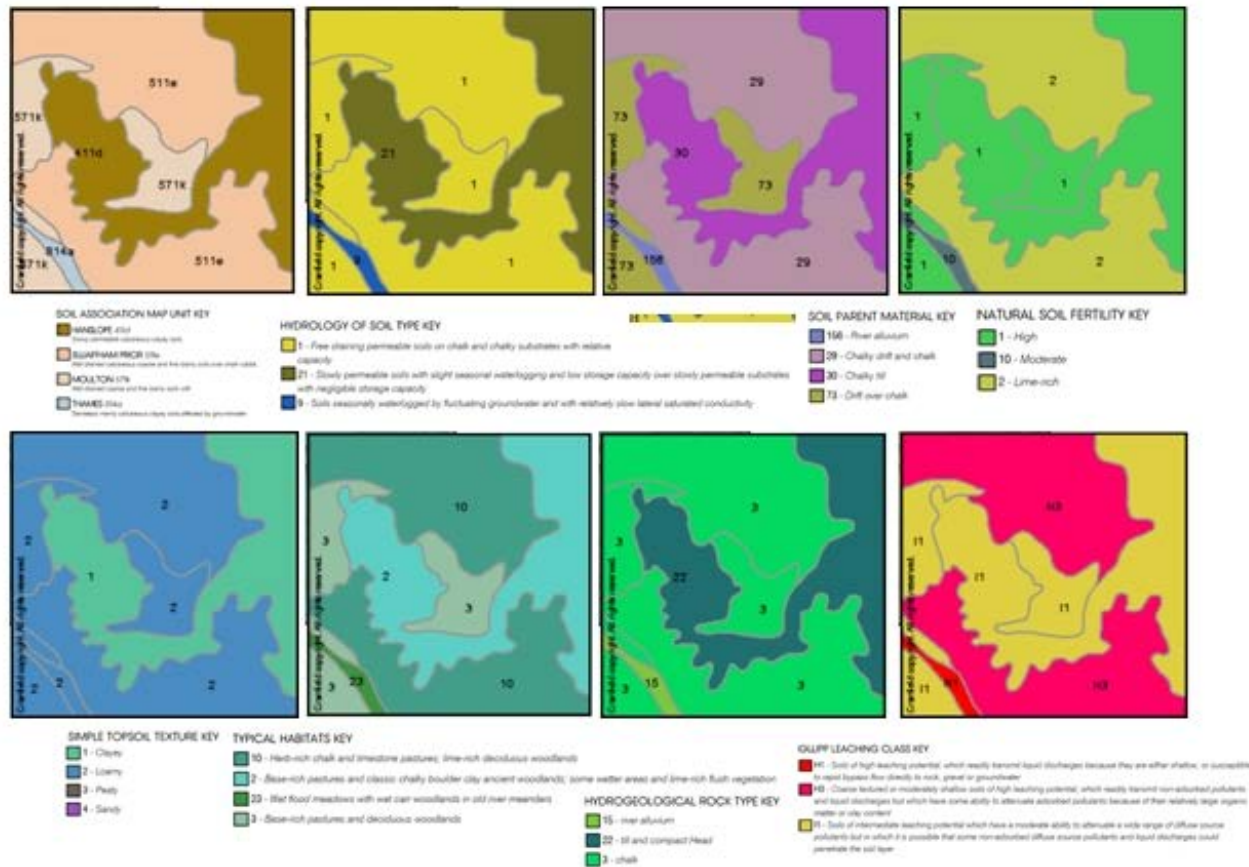
- Camel Valley Vineyard – aerial photograph draped over the DTM

DTM



Chilford Hall Vineyard – aerial photograph draped over the DTM

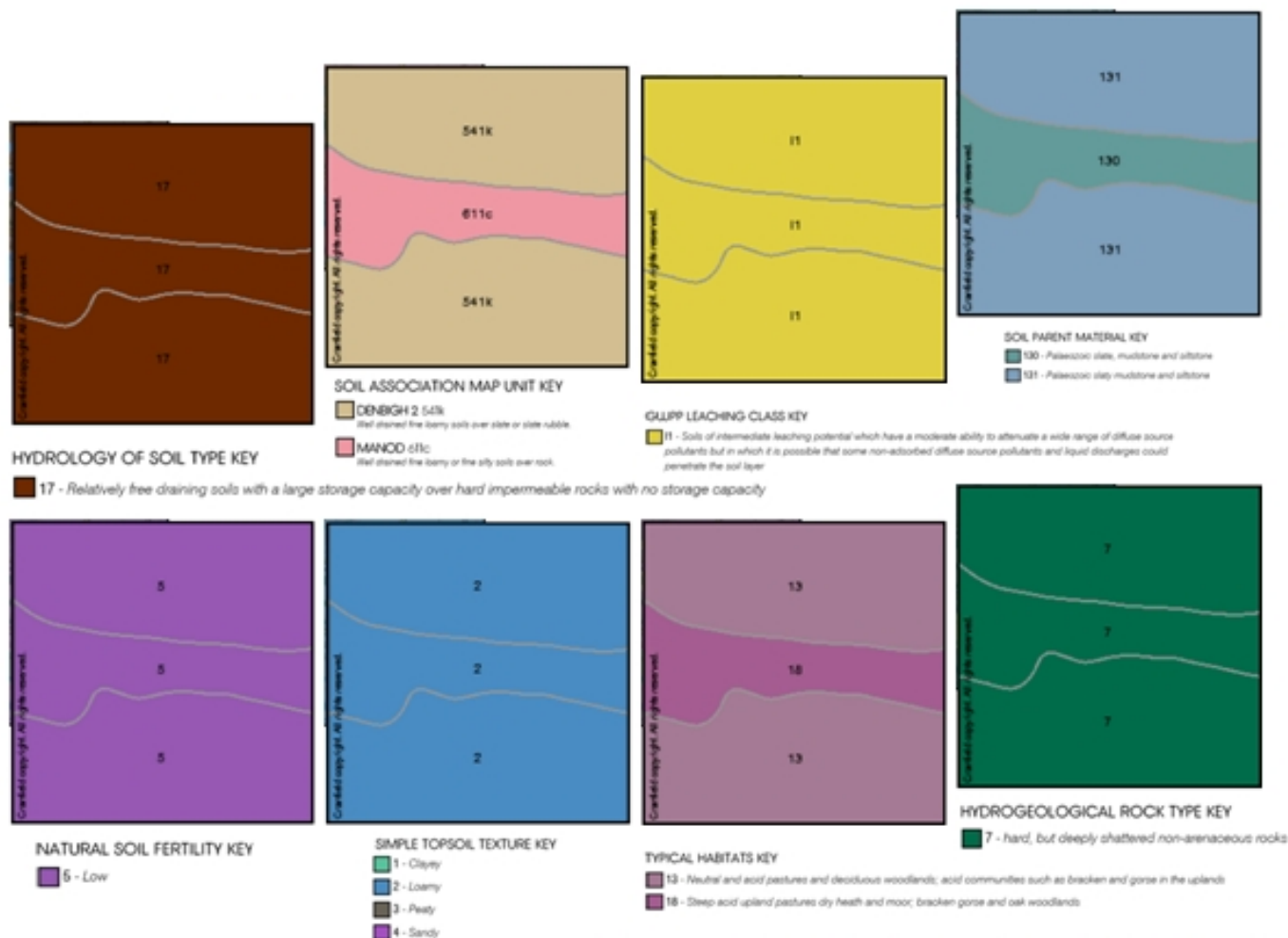
Chilford Hall Vineyard



Chilford Hall Vineyard, Cambridgeshire

National Soil Resources Institute, Soils Site Report, Undergraduate Student Report, Chilford Hall Vineyard, National Grid Reference: TL5658848517, Easting: 556588, Northing: 248517, Site Area: 3km x 3km

Camel Valley Vineyard



Camel Valley Vineyard, Cornwall

National Soil Resources Institute, Soils Site Report, Undergraduate Student Report, Camel Valley Vineyard, National Grid Reference: SX0318767686
Easting: 203187, Northing: 67686, Site Area: 2km x 2km

INSTRUMENTATION

- Hobo Data Loggers
- Mobile GIS
 - Psion Ikon Mobile Mapper running PocketGIS mobile GIS software
 - Cartomobile software (running on an Apple iPad (1) / iPod touch plus Bad Elf enhanced GPS unit)
- Laser Rangefinder (slopes, heights)
- GPS
- Tracking software on Mobile Phone

DATA COLLECTION

- Soil Samples
 - pH, soil moisture, colour (Munsell Charts), texture (both field and lab-based analysis)
- Digital photographs (mobile phone and panoramas (digital camera))
- Wind direction and speed
- Slope, height, width of rows
- Additional information.....

Chilford Hall Vineyard



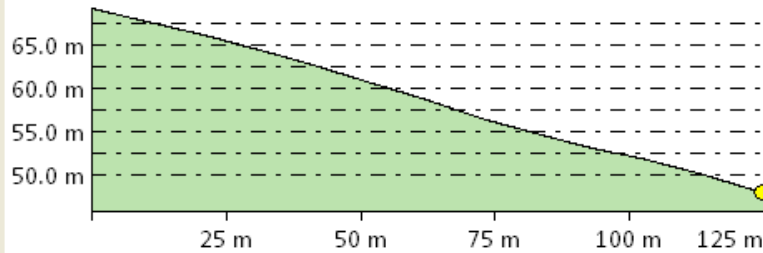
Slope, aspect and distance measurements

Camel Valley Vineyard

Cross-Sections

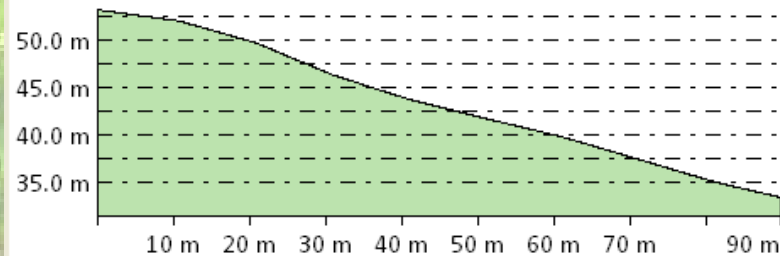
A

From Pos: 202799.569, 67846.665 To Pos: 202782.523, 67723.180



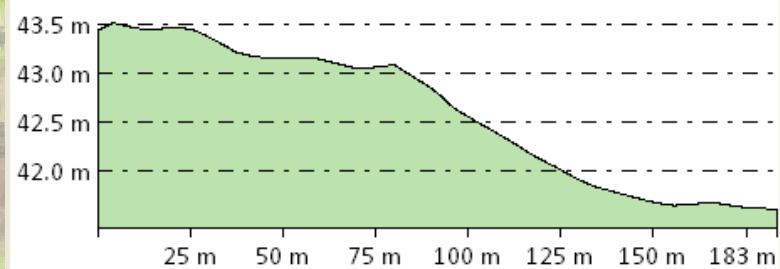
B

From Pos: 202716.415, 67765.589 To Pos: 202703.526, 67676.614



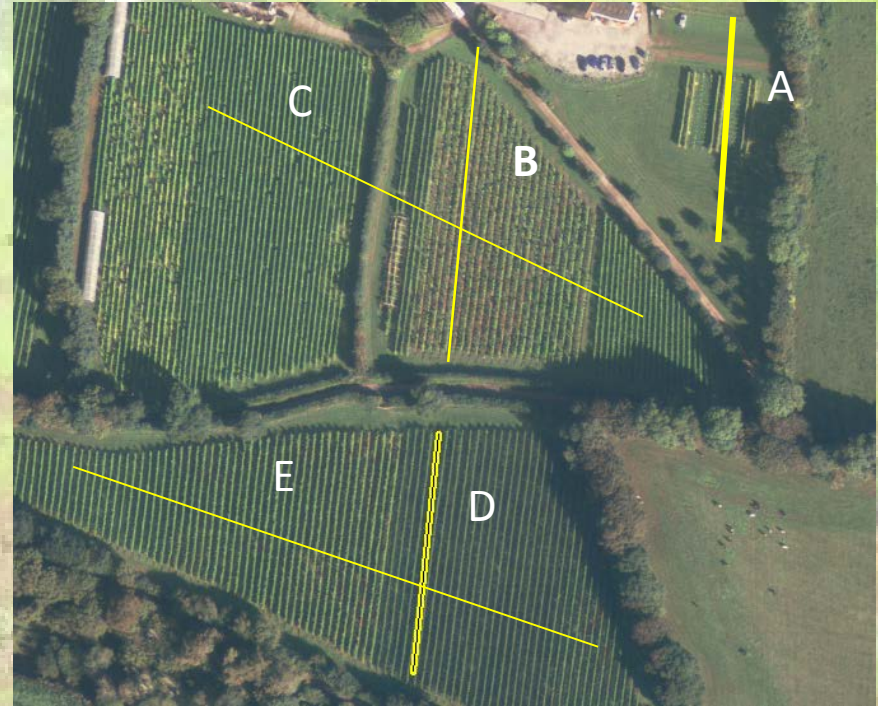
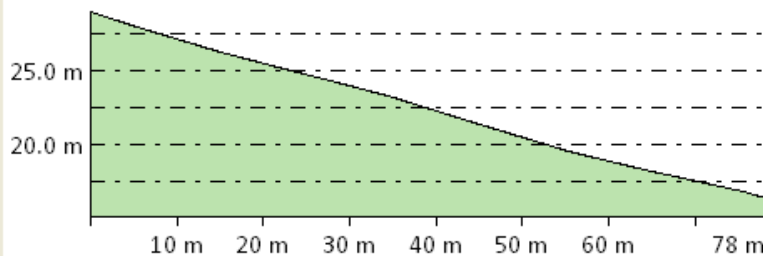
C

From Pos: 202601.246, 67762.263 To Pos: 202770.465, 67691.582



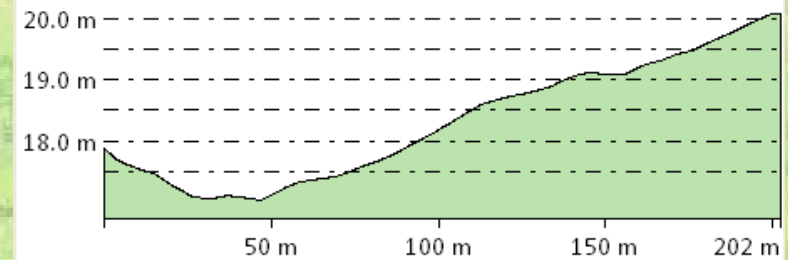
D

From Pos: 202702.279, 67650.005 To Pos: 202693.963, 67572.255



E

From Pos: 202571.311, 67642.936 To Pos: 202757.992, 67564.771

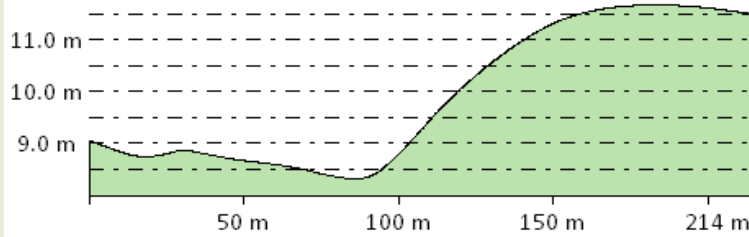


Chilford Hall Vineyard

Cross-Sections

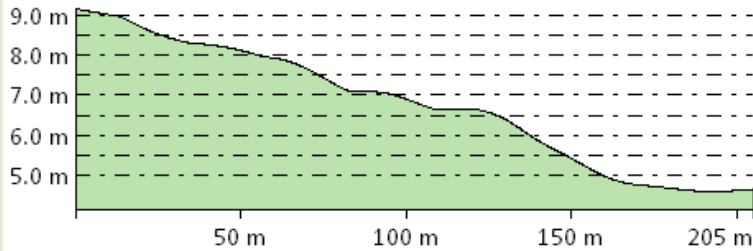
A

From Pos: 556132.064, 248448.181 To Pos: 555995.644, 248283.515



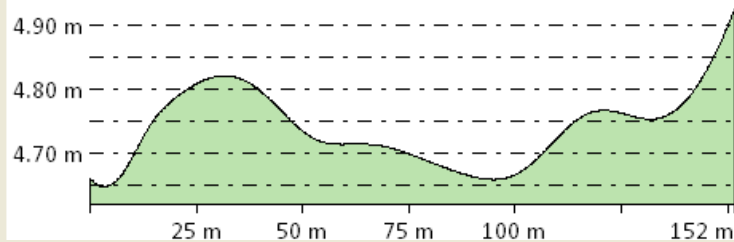
B

From Pos: 556124.930, 248414.300 To Pos: 555961.990, 248538.927



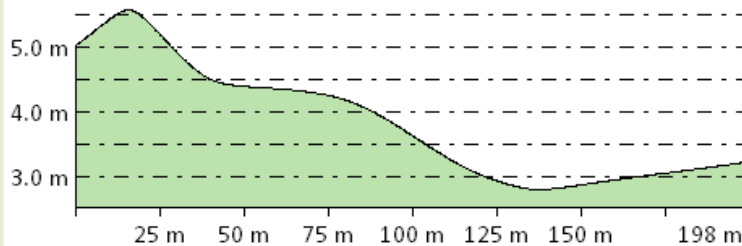
C

From Pos: 555981.822, 248522.100 To Pos: 555888.671, 248402.507



D

From Pos: 555846.604, 248644.698 To Pos: 555872.490, 248448.570



Chilford Hall Vineyard



Soil pH



Soil moisture

Chilford Hall Vineyard

	A	B	C	D	E	F	H	I
1	SOIL_ID	Location	pH	dish weight	before	after	new moisture content	Colour
2	1	Block J, Sample 1	8.9	13.687	24.926	23.312	14.361	
3	2	Block J, Sample 2	9.0	24.104	38.331	36.916	9.946	
4	3	Block J, Sample 3	9.6	14.724	16.140	16.074	4.661	
5	4	Block J, Sample 4	9.4	21.203	30.572	29.919	6.970	
6	5	Block J, Sample 5	7.7	12.253	19.025	18.526	7.369	
7	6	Block J, Sample 6	8.0	12.456	17.622	17.032	11.421	
8	7	Block J, Sample 7	9.0	13.947	27.749	26.023	12.505	
9	8	Block J, Sample 8	8.0	13.277	19.199	18.740	7.751	
10	9	Block J, Sample 9	7.0	24.242	27.291	28.186	-29.354	
11	10	Block K, Sample 1	7.0	13.780	20.926	20.182	10.411	
12	11	Block K, Sample 2	7.7	12.084	19.637	18.615	13.531	
13	12	Block K, Sample 3	8.7	18.486	29.917	28.409	13.192	Very Dark Brown 2/2
14	13	Block K, Sample 4	9.4	13.951	19.331	18.799	9.888	
15	14	Block K, Sample 5	9.1	22.188	36.393	34.601	12.615	
16	15	Block K, Sample 6	9.1	11.201	14.671	14.414	7.406	
17	16	Block I, Row 1, Sample 1	9.1	13.951	24.378	23.360	9.763	

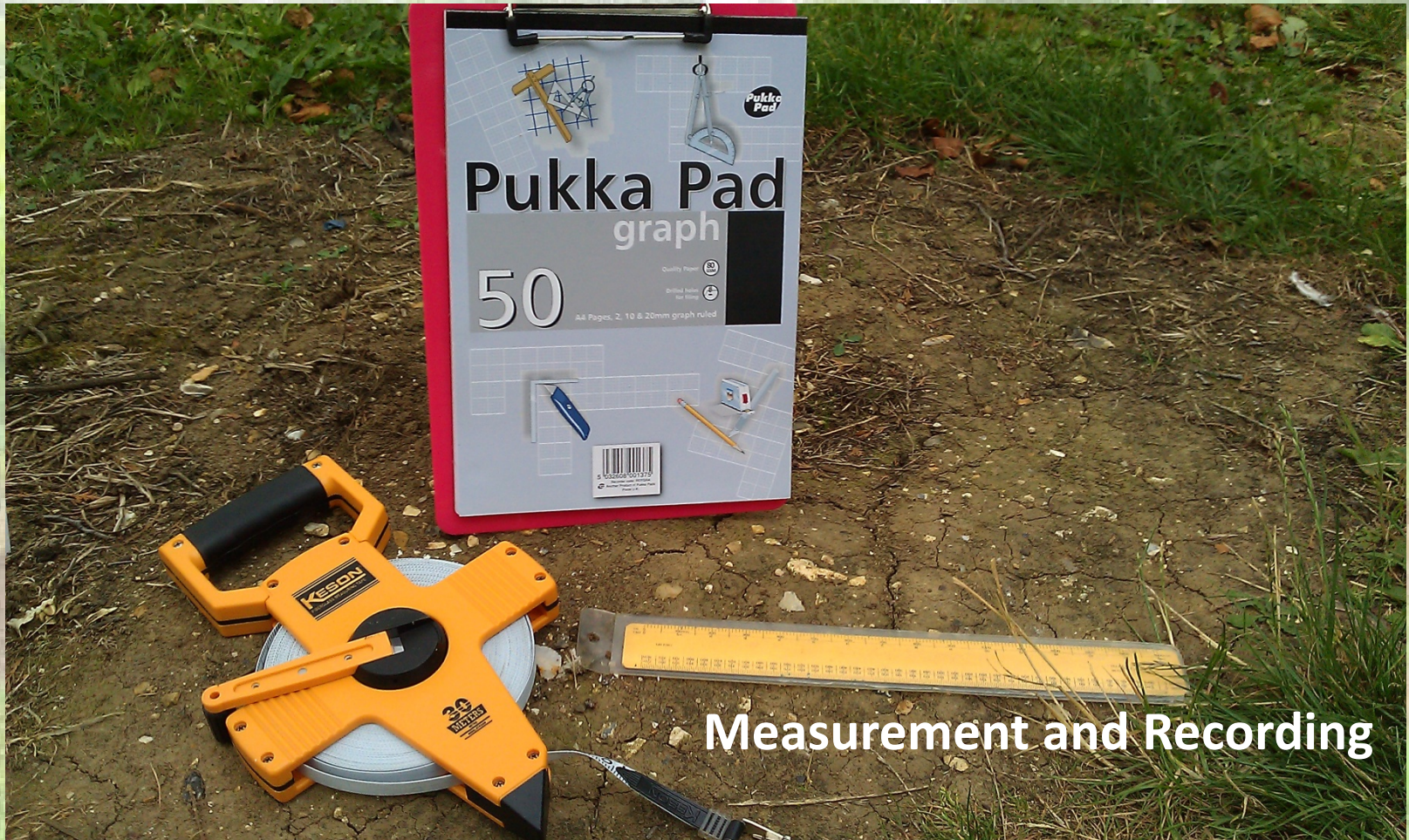
Chilford Hall Vineyard

Soil Sampling

Soil Auger and Spade



Chilford Hall Vineyard



Measurement and Recording

Chilford Hall Vineyard



Soil Colour – Munsell Colour Charts

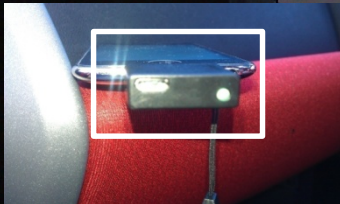
Chilford Hall Vineyard



**Psion Ikon – Mobile Mapping (GIS/GPS)
Pocket GIS Software**

Chilford Hall Vineyard

Apple iPad / Bad Elf – Mobile Mapping (GIS/GPS)
Cartomobile Software



BadElf GPS



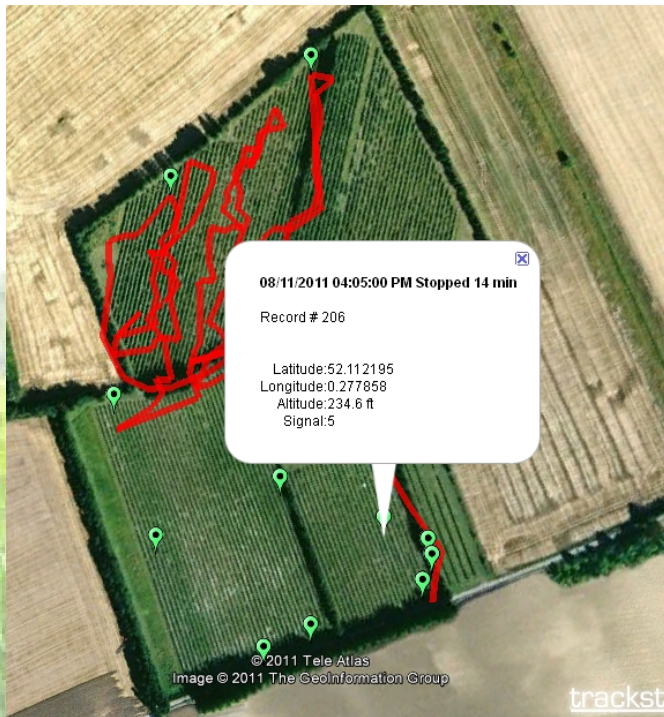
iPad



iTouch



Chilford Hall Vineyard



 **trackstickUK**.com



— Soil Sampling Track



Locations of 4 Hobo sensors

Chilford Hall Vineyard

Soil sampling



GPS
Location

Plastic bag &
Sample

White Label



Location



Chilford Hall Vineyard

Uploading data collected
with Hobo sensor onto
Panasonic CF-19 Toughbook
via USB Cable



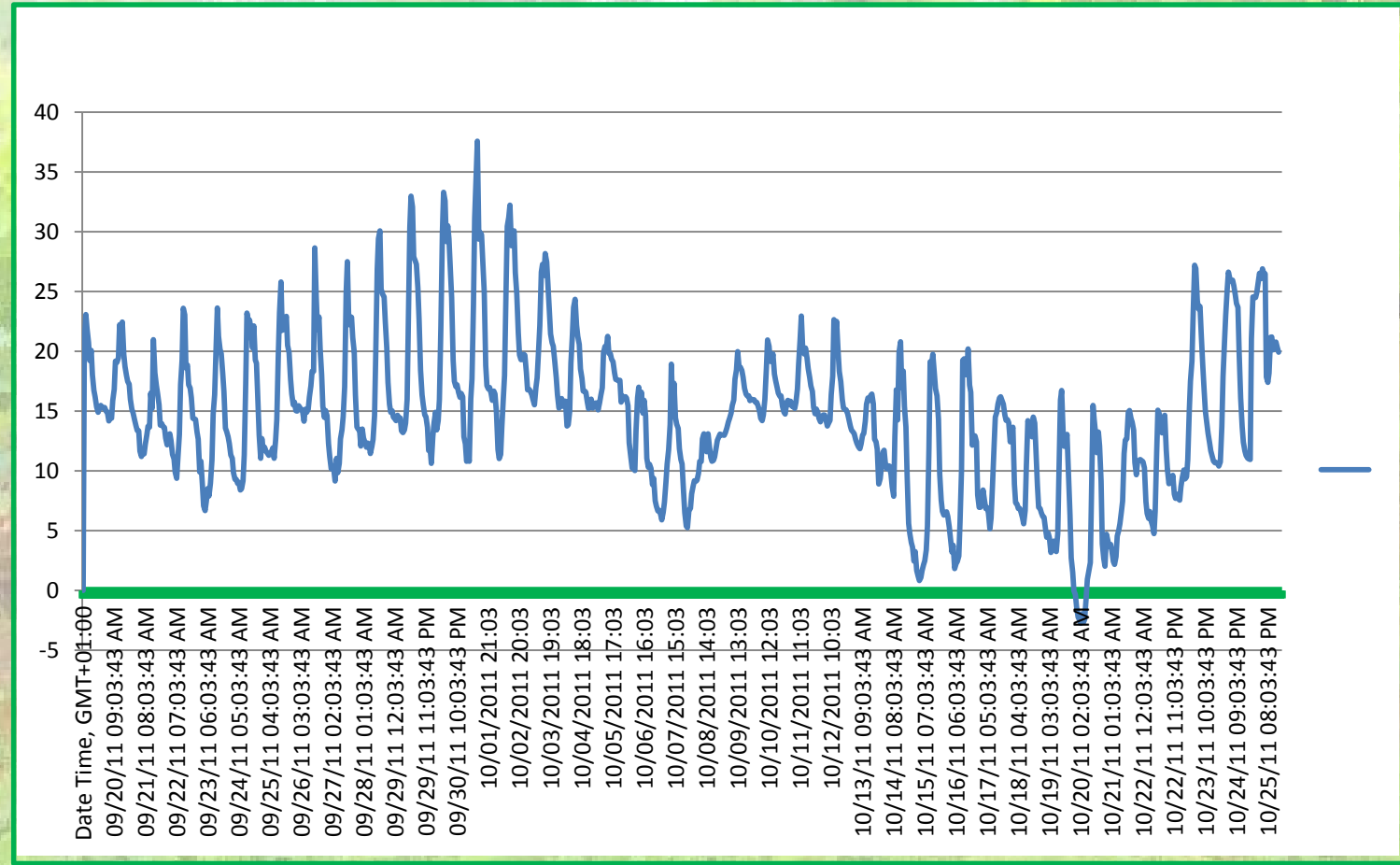
Panasonic CF-19 – Toughbook – robust and waterproof

Camel Valley Vineyard



Onsite measurements of temperature (MIN/MAX) light intensity, and relative humidity (RH) e.g. Hobo sensor

Camel Valley Vineyard





Panoramic Photographs



Model Aircraft



Fixed-Wing



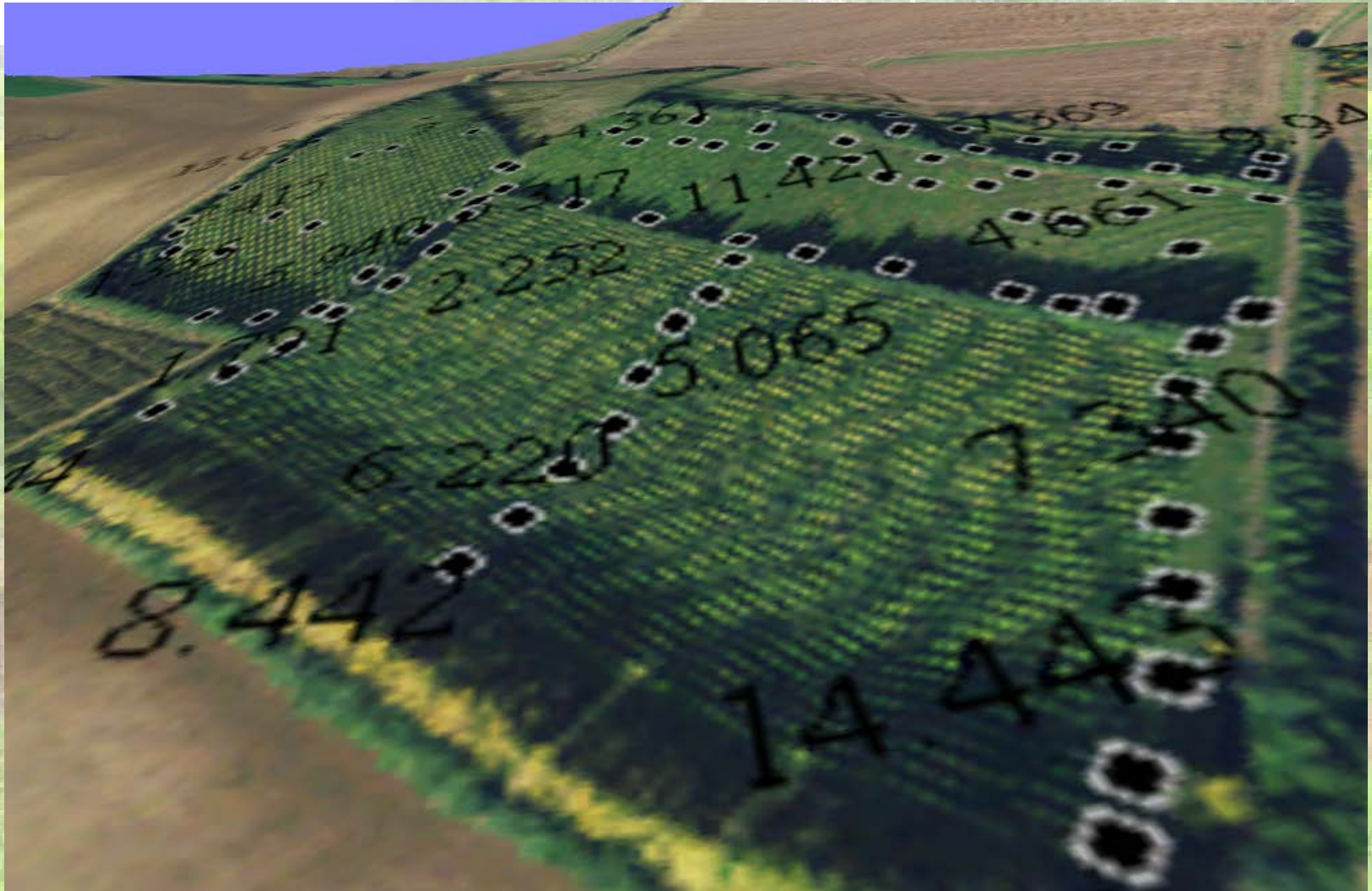
Rotary



DATA ANALYSIS

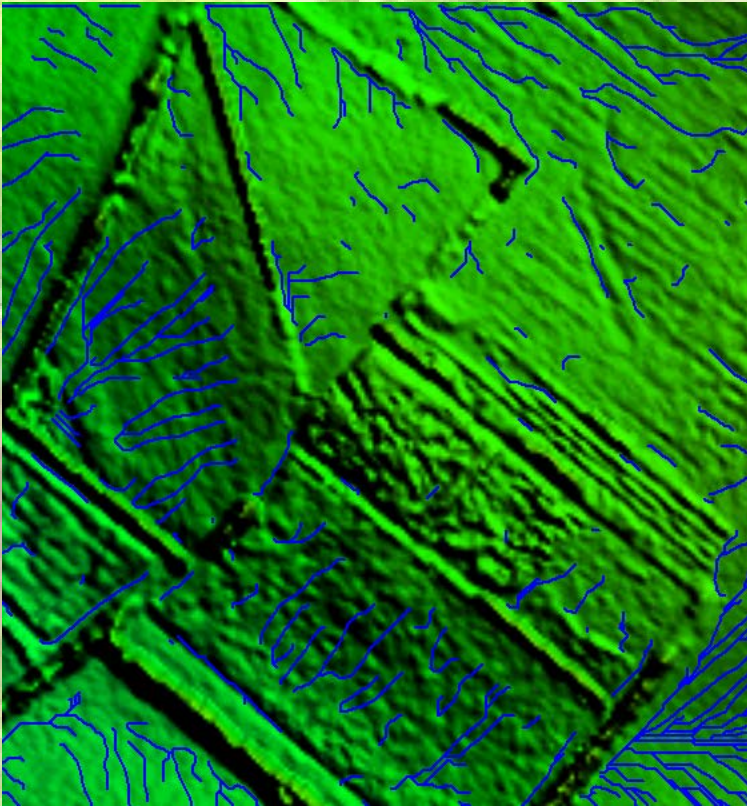
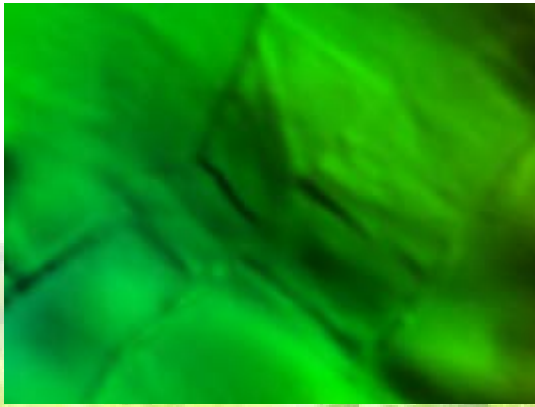
- Lab-based analysis of soil samples
- Download of the data logger data from the 8 data loggers (light intensity, temperature and relative humidity (RH))
- Attachment of the data to GPS points to create attribute database
- Mapping of the data
- Kriging e.g. Interpolated map of soil moisture and soil pH

DATA ANALYSIS



Chilford Hall Vineyard – Soil moisture draped over aerial photograph and DTM

DATA ANALYSIS



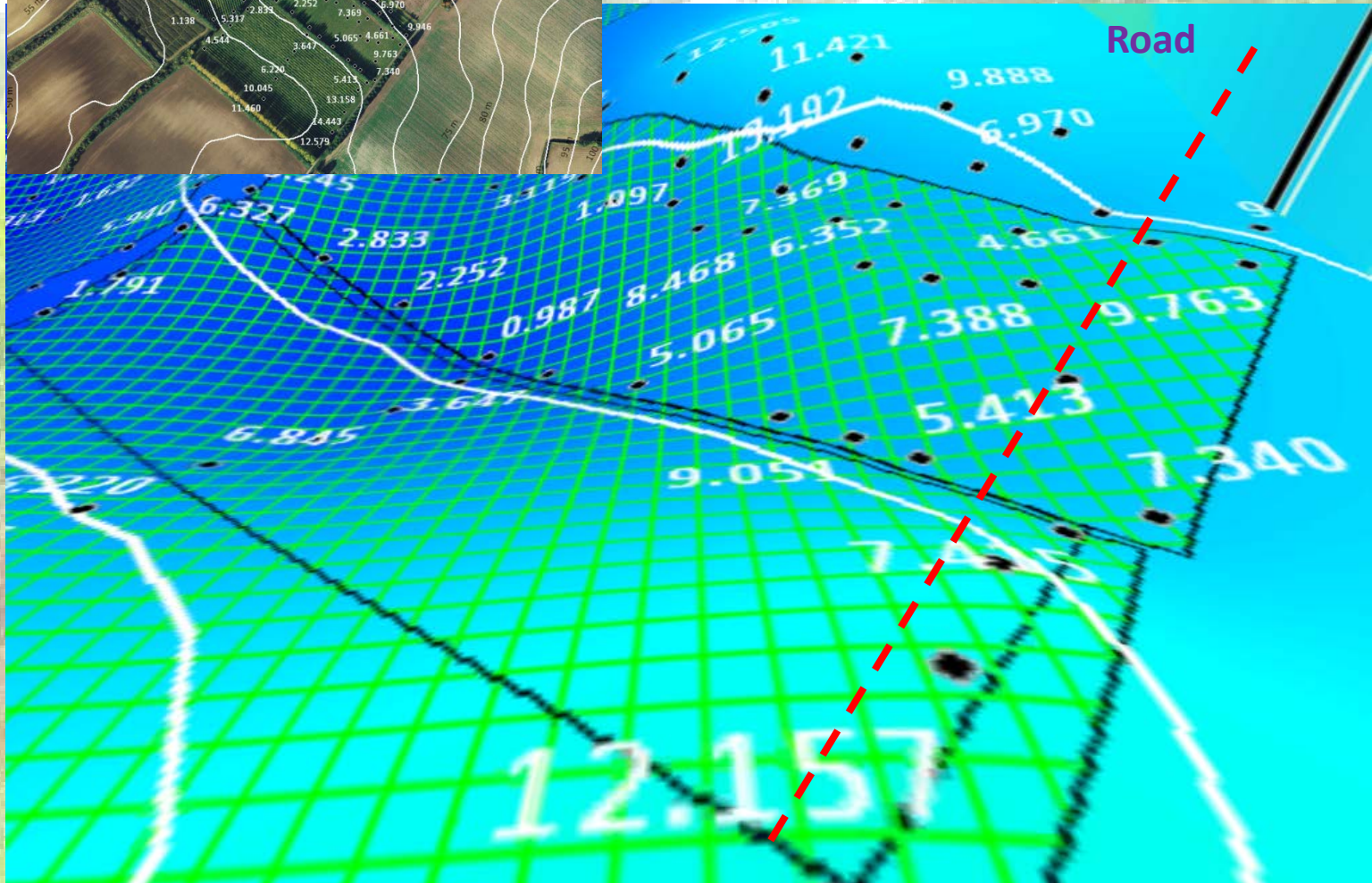
Chilford Hall Vineyard – Drainage / Air Drainage (DTM/DSM)

DATA ANALYSIS



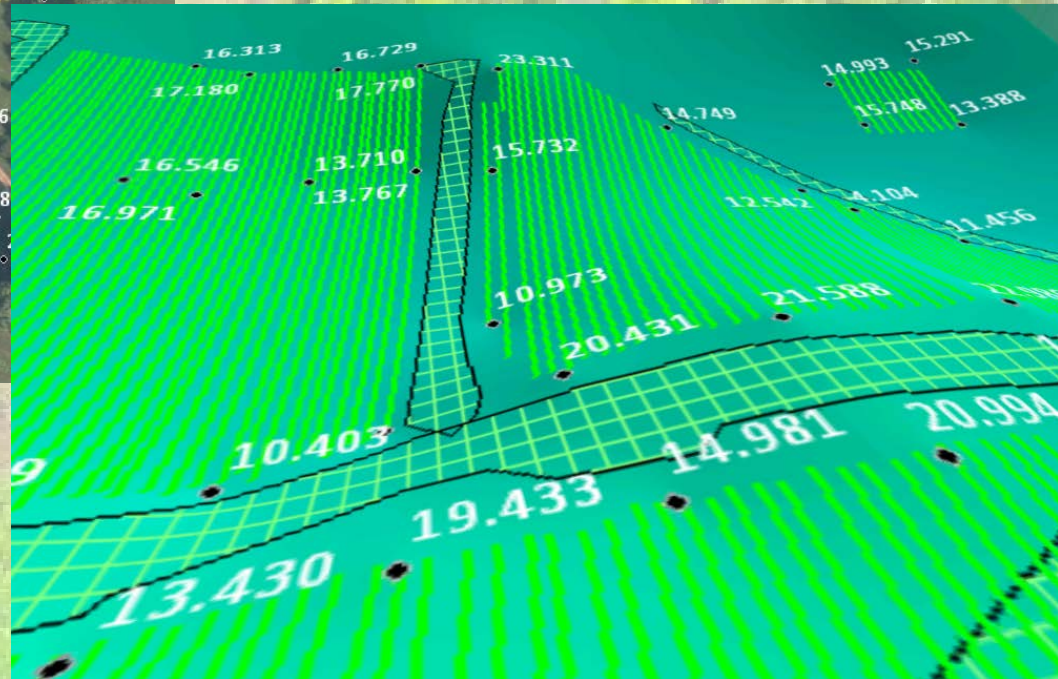
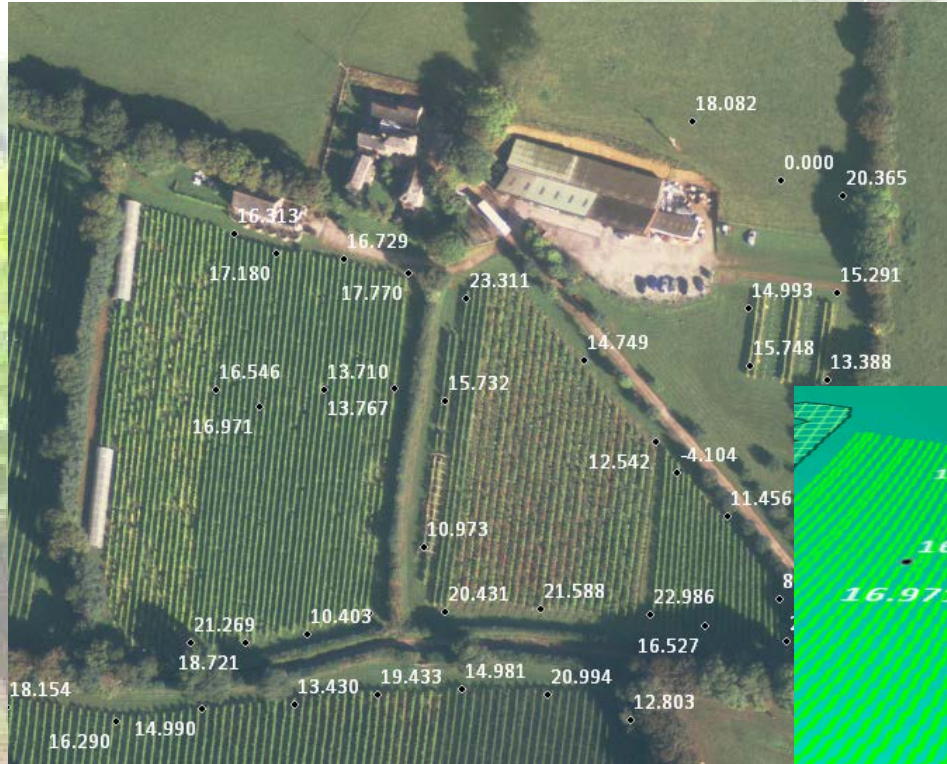
Chilford Hall Vineyard – pH

DATA ANALYSIS



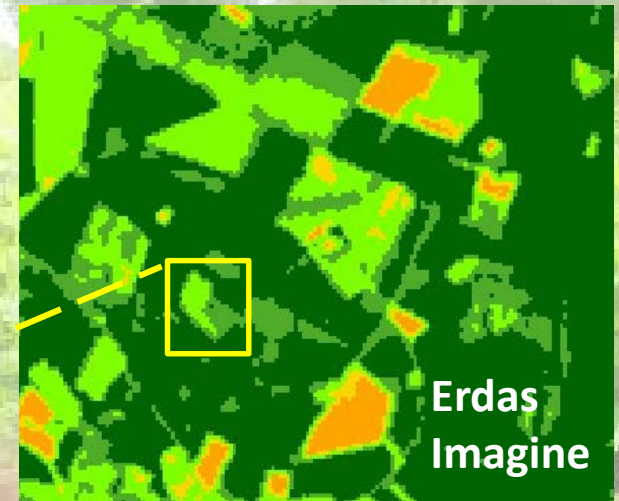
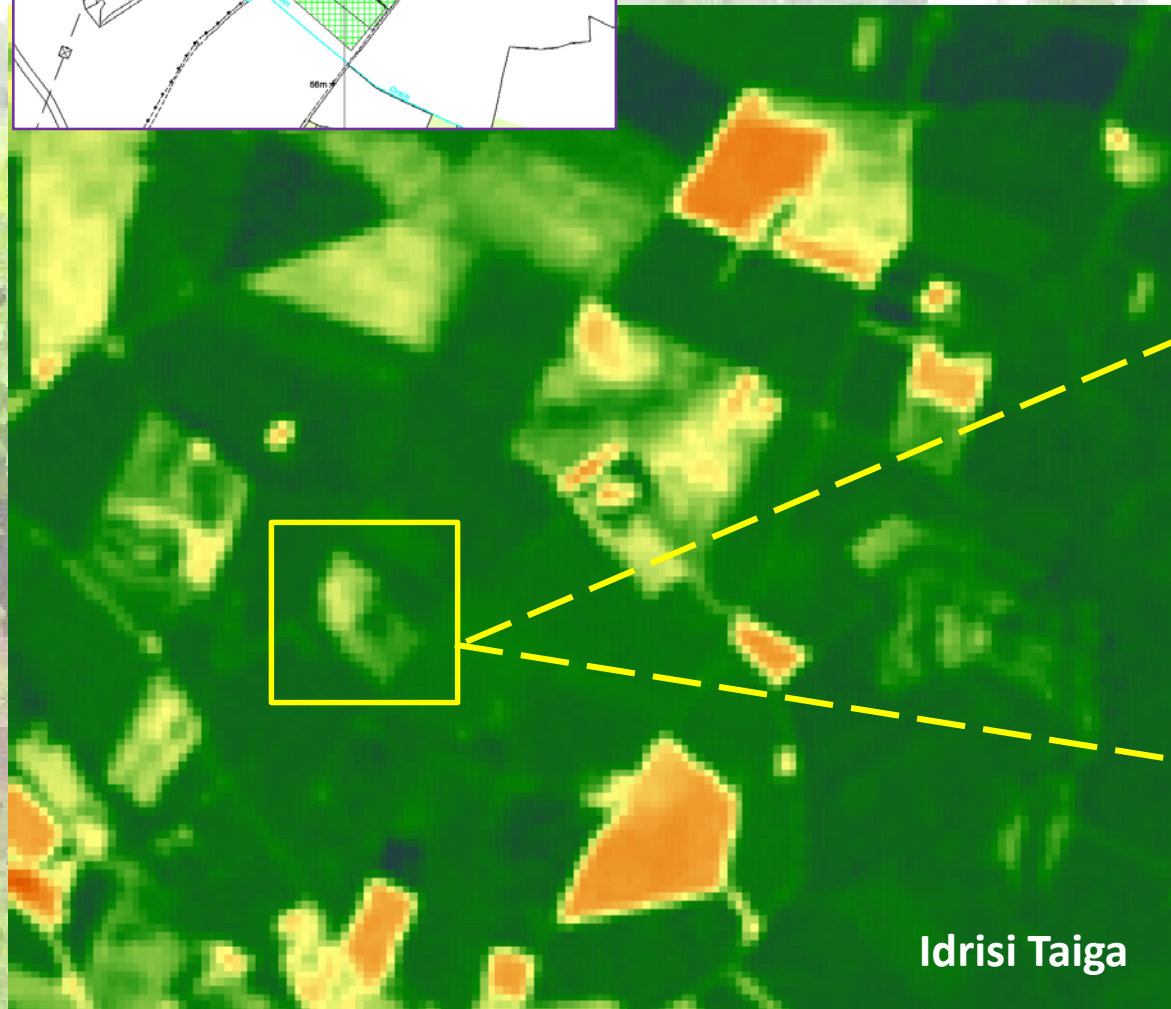
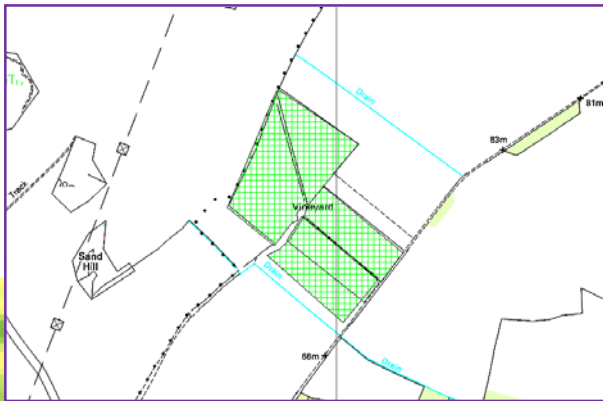
Chilford Hall Vineyard – Soil moisture draped over aerial photograph and DTM

Camel Valley Vineyard



Soil Moisture

Chilford Hall Vineyard



NDVI

Summary

- Experimental exercise
- Determine what was available and affordable
- Demonstrate potential and limitations of hardware/software
- Long-Term monitoring

Conclusions

- More work needed
- Need to add more ground sensors
- Acquire more data samples
e.g. soil and properties
- Refine aerial data collection
- More spatial analysis and correlation

Thank You



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