WCCA 2014
SAN JOSÉ, COSTA RICA

XII CONGRESS ON COMPUTERS IN AGRICULTURE AND NATURAL RESOURCES
"Reducing risk and improving sustainability"
San José, Costa Rica. University of Costa Rica
July, 27th – 30th, 2014.
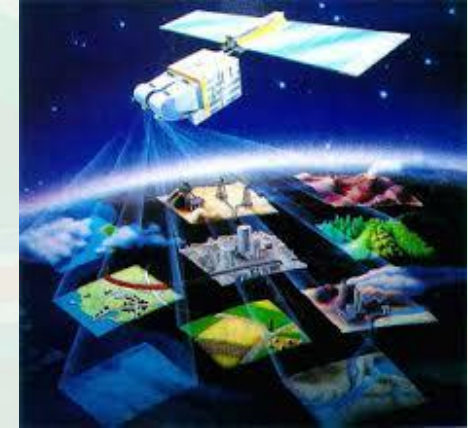
UNIVERSIDAD DE COSTA RICA

INFITA

Development of an application (indites software) that allows to integrate spatial and temporal information of a vineyard for the development of the digital terroir.

VALDIVIESO OF CHILE

INIA Ministerio de Agricultura, Gobierno de Chile

PROGAPINIA

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The current project was conducted in a commercial vineyard located in Sagrada Familia, VII Region, Chile (6,117,370 S, 278,918 E Zone 19 Sur, WGS84), during the productive seasons of 2012 and 2013. The study was carried out in a 6.4, 8.1 and 5.8 hectares plots of vineyard, Var. Carmenere, Cabernet Sauvignon and Merlot, respectively.
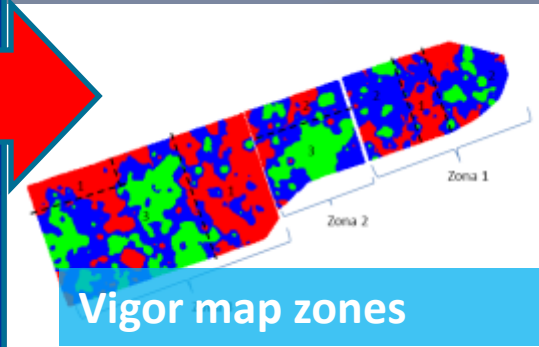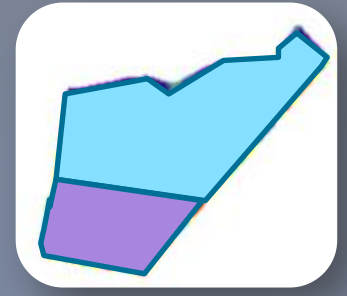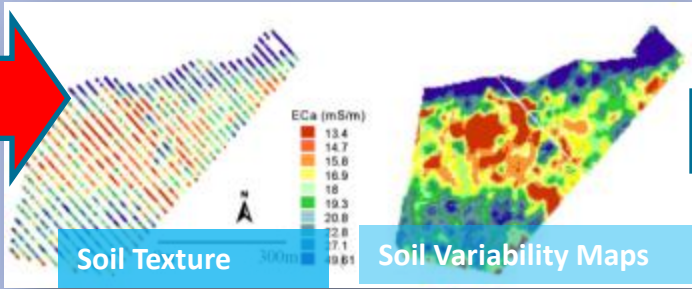
The main goal in this research was :

" To obtain an index for predicting grapes quality by developing standards associated to field variables that could define a "Digital Terroir".

This research was conducted in four stages that were:

(a) Stage   I : Implementation of monitoring systems, registration, and logistics,
(b) Stage II : Obtaining in-field empirical information and preliminary analysis,
(c) Stage III : Information Analysis. Correlation of field variables index assessed and real quality of grape measured .
(d) Stage IV   : Development of an automated digital application to develop segmented areas.

Management zones g eneration

Em-38

Soil Texture

ECa (mS/m)
13.4
14.7
15.8
16.9
18
19.3
20.8
22.8
27.1
49.61

Soil Variability Maps

Soil management zones

Plant Vigor Segmentation

Vigor Maps

Zona 1

Zona 2

Vigor map zones

An environment is an area that has similar characteristics and deserves to be handling with homogeneous inputs.

Image Analysis Application and potential use (ICAS)

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MATERIAL AND METHODS

Seasonal Changes and Effect on production and quality
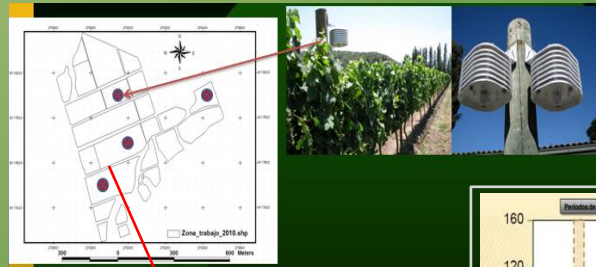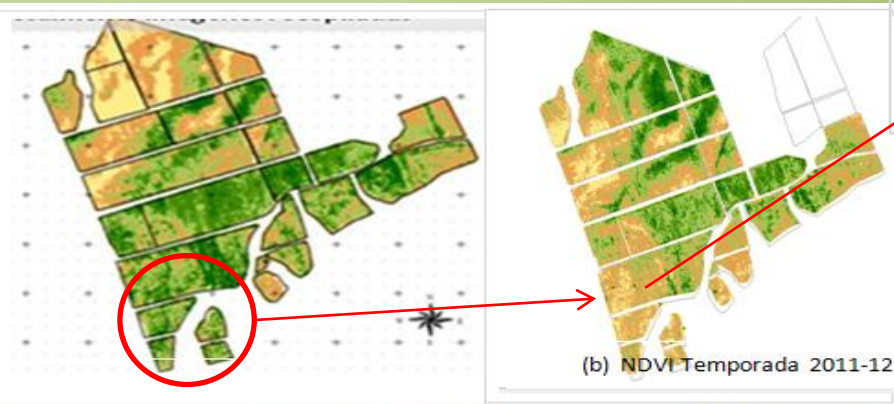
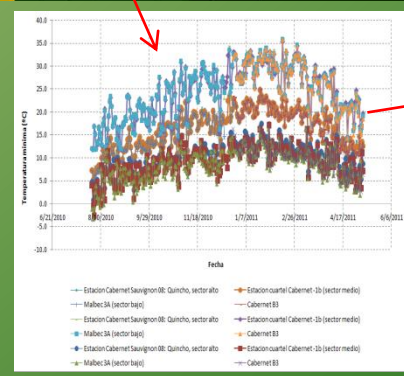Figura 6. Variación de índice NDVI para (1) análisis integrado de 3 temporadas para segmentación de predio en zonas de comportamiento similar (informe nov. 2011) y (2) análisis de NDVI para temporada 2011-12
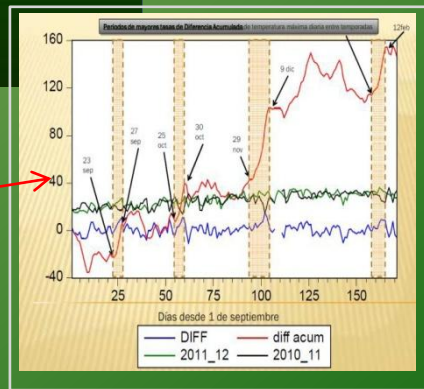
Grapes Quality Monitoring
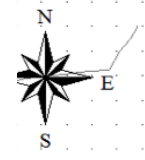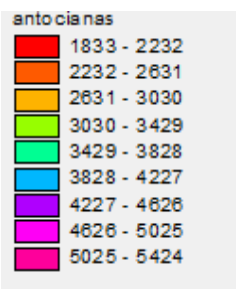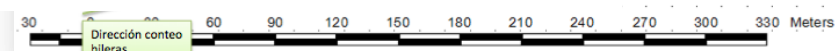
Comparative of Grapes Chemical Quality characteristics and NDVI map
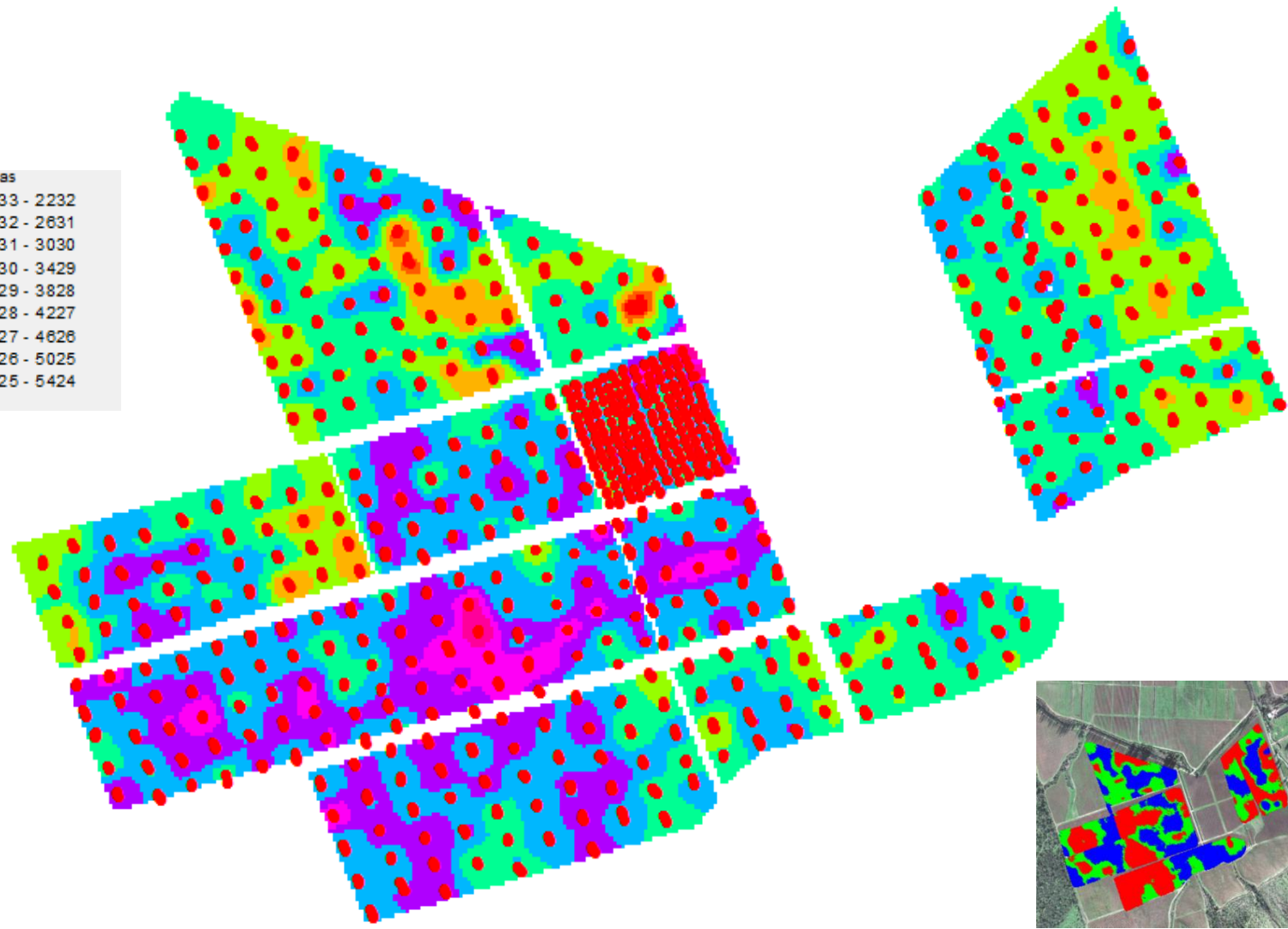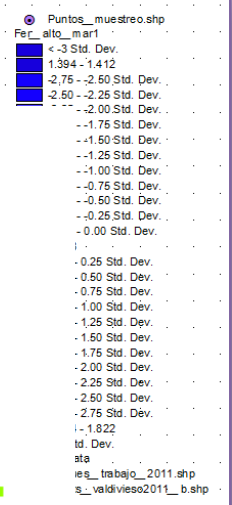
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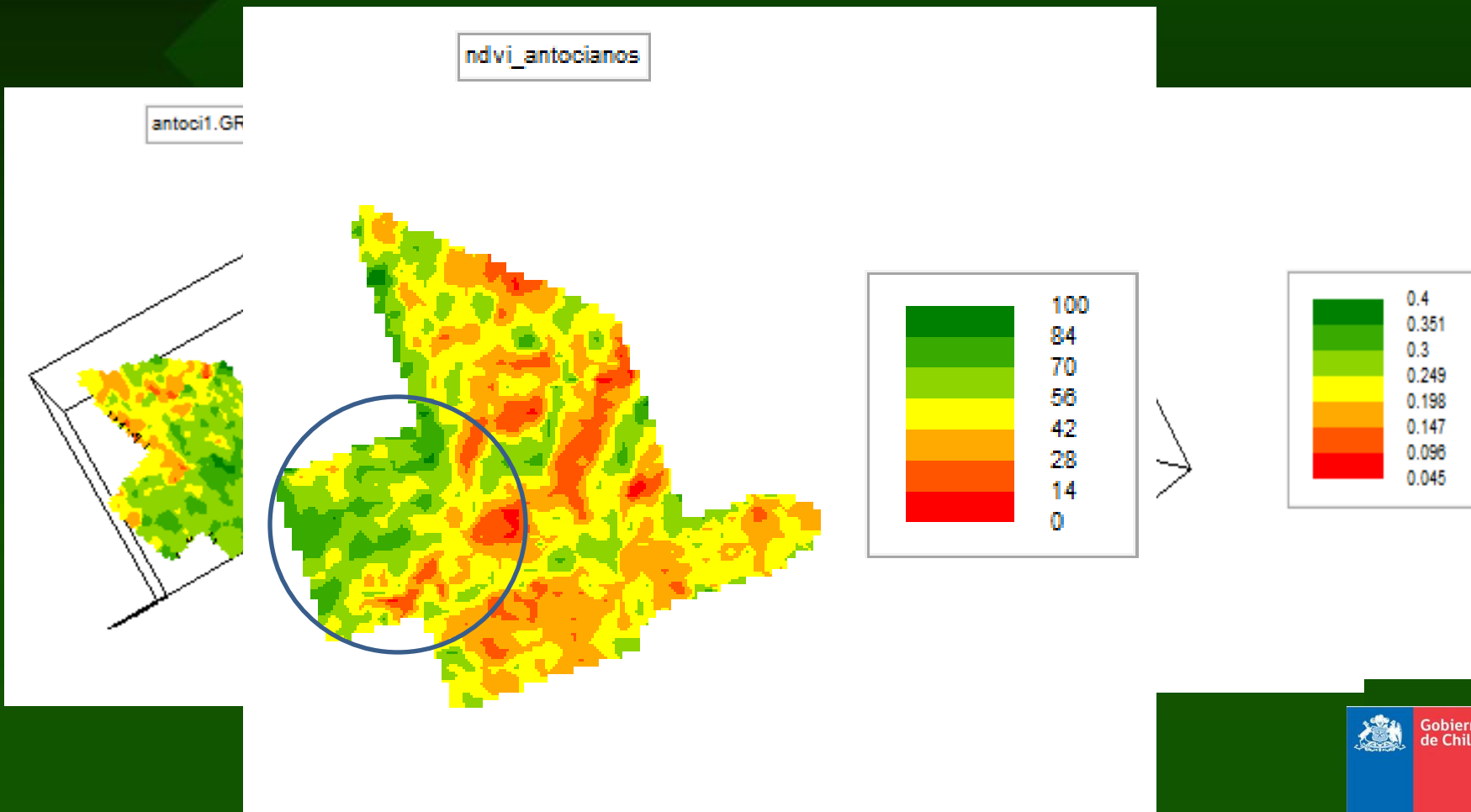
INCLUDE MORE INFORMATION THAT EXPLAIN FIELD QUALITY VARIABILITY
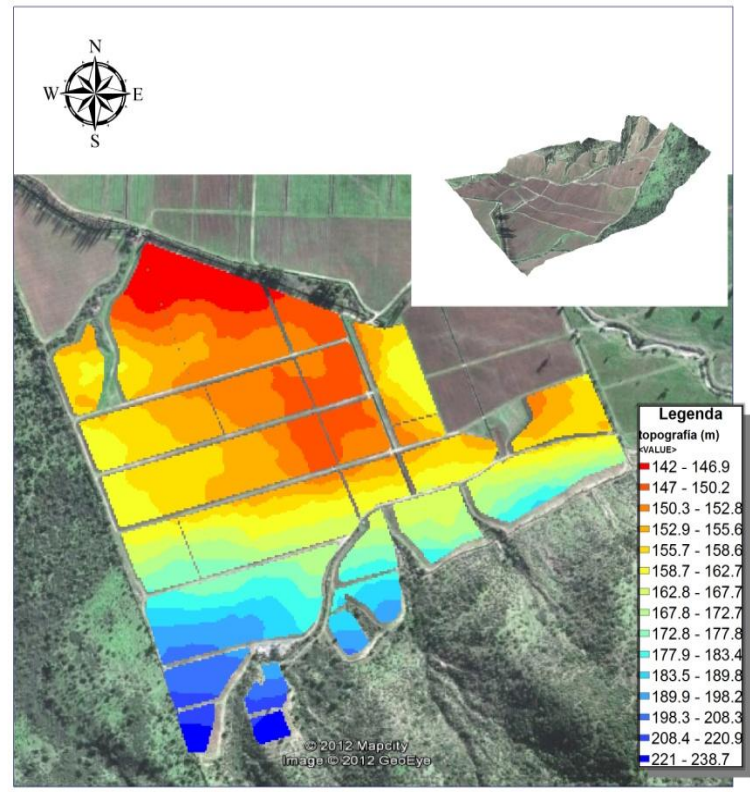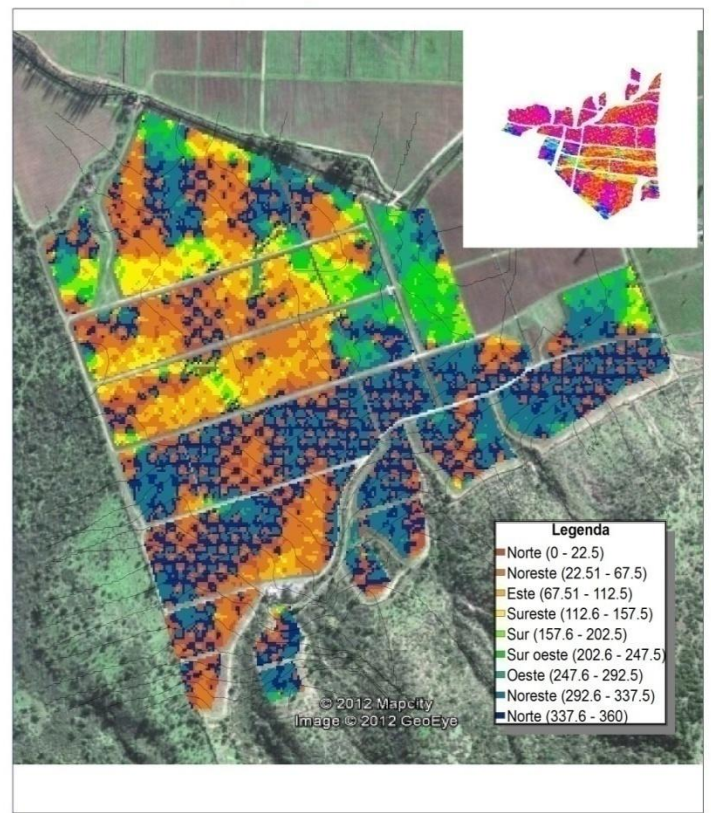
Association of soil and plant variables with grapes chemical quality characteristics

Topography   NDVI Maps   Exposure Maps   CE Maps (EM38)

Variety	High Quality	Medium Quality	Low Quality
Cabernet Sauvignon	7,01%	10,81%	2,21%
Malbec	1,89%	5,63%	3,57%
Carmenere	4,97%	6,38%	1,03%

Carmenere Variety
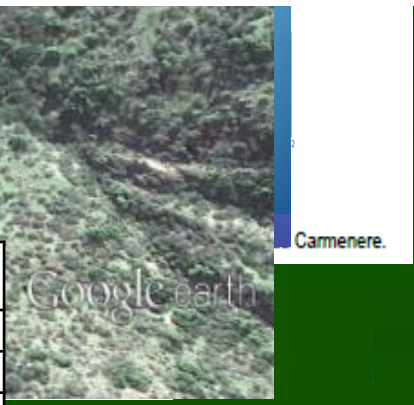
Indice Ferrari Real obtenido
Carmenere 2012

real car 2012
- 1.246 - 1.639
- 1.639 - 1.711
- 1.711 - 1.783
- 1.783 - 1.855
- 1.855 - 1.927
- No Data

90 0 90 180 Meters

Valores de índice Ferrari reales obtenidos
Carmenere 2013

Fe real 2013
- 1.4 - 1.663
- 1.663 - 1.736
- 1.736 - 1.808
- 1.808 - 1.881
- 1.881 - 1.954
- No Data

Estimación de Valores de índice Ferrari
Carmenere 2012

Fe est Car 2012
- 1.246 - 1.639
- 1.639 - 1.711
- 1.711 - 1.783
- 1.783 - 1.855
- 1.855 - 1.927
- No Data

100 0 100 200 Meters
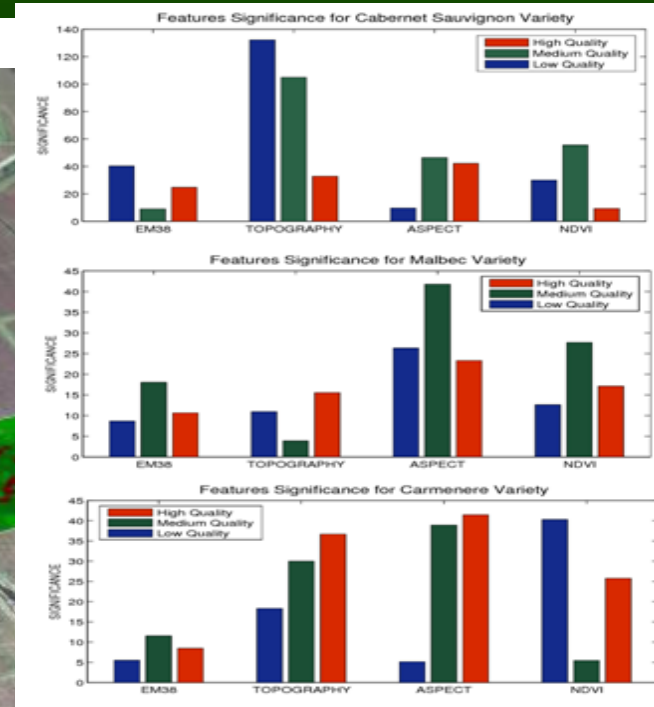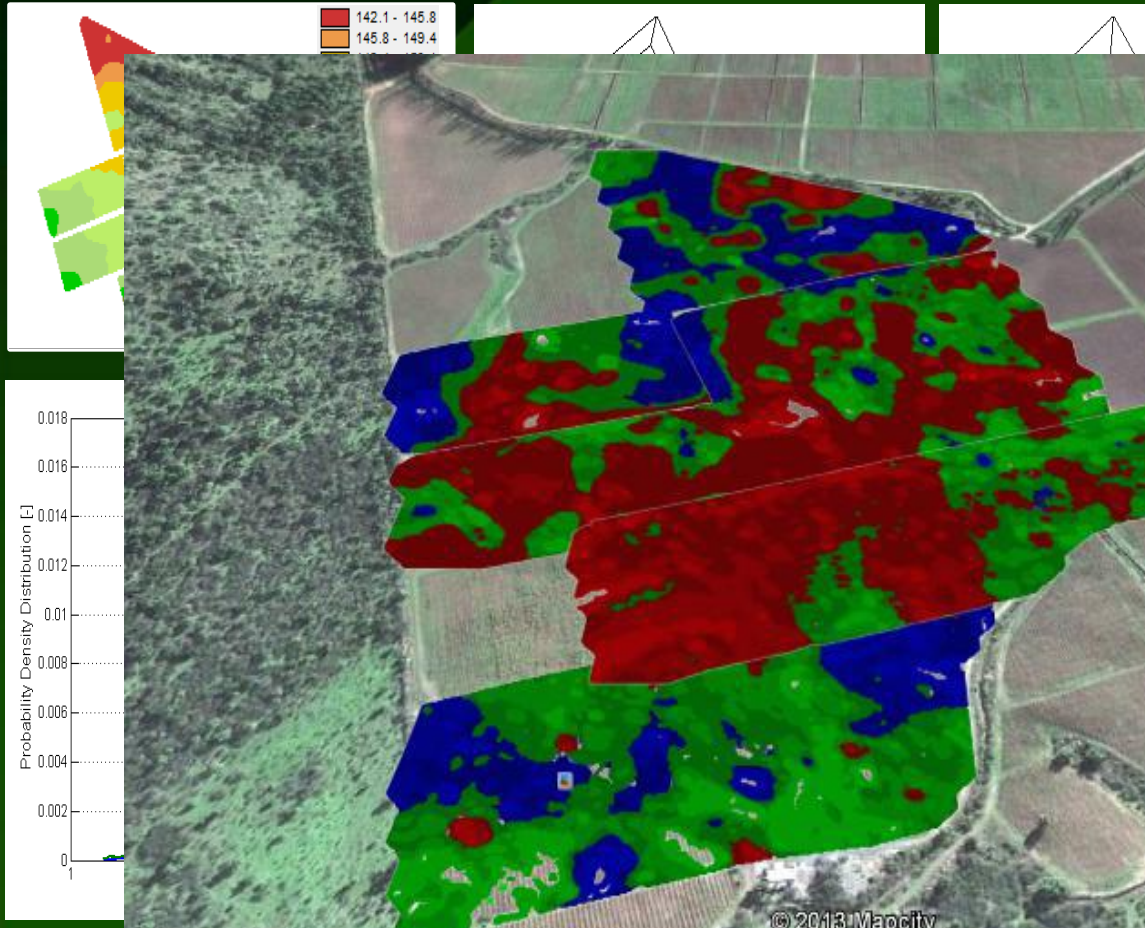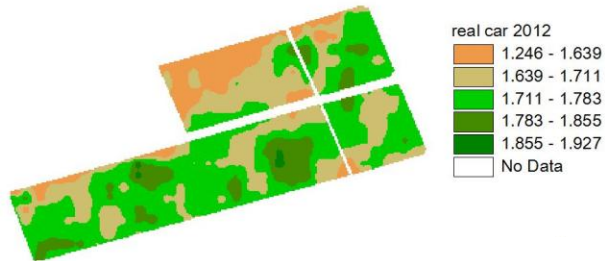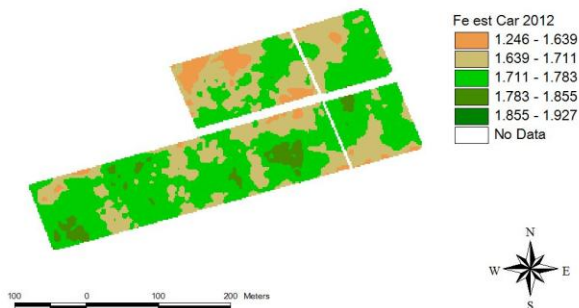
Estimación de Valores de índice Ferrari
Carmenere 2013

Fe est 2013
- 1.4 - 1.663
- 1.663 - 1.736
- 1.736 - 1.808
- 1.808 - 1.881
- 1.881 - 1.954
- No Data

00 0 100 200 Meters

Error Estimación Indice Ferrari
Carmenere 2012

Error est real 2012 (Shape)
- -31.244 - -24.417
- -24.417 - -17.59
- -17.59 - -6.56
- -6.56 - -3.936
- -3.936 - 2.891
- 2.891 - 9.718
- No Data

90 0 90 180 Meters
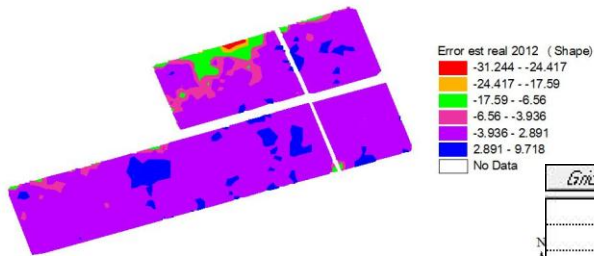
Gridcode	Sum_Hectares	% area
1	0.0140	0.22
2	0.0200	0.31
3	0.1920	3.01
4	0.3700	5.81
5	5.2730	82.78
6	0.4980	7.82

Error de Estimación de Valores de índice Ferrari
Carmenere 2013

Gridcode	Sum_Hectares	% area
1	0.0050	0.08
2	0.0360	0.56
3	0.2200	3.43
4	5.7930	90.23
5	0.3820	5.95

Error est real
- -17.59 - -13.241
- -13.241 - -8.893
- -8.893 - -4.544
- -4.544 - -0.195
- -0.195 - 4.154
- No Data

100 0 100 200 Meters
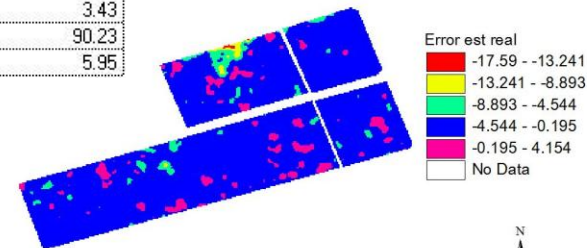
Cabernet Sauvignon Variety

Valores de índice Ferrari estimados de Campo
Cabernet Sauvignon 2013

2013Fe__est
- 1.266 - 1.529
- 1.529 - 1.661
- 1.661 - 1.727
- 1.727 - 1.859
- No Data

Valores de índice Ferrari estimados de Campo
Cabernet Sauvignon 2012

est2012
- 1.1 - 1.54
- 1.51 - 1.72
- 1.72 - 1.81
- 1.81 - 1.9
- No Data
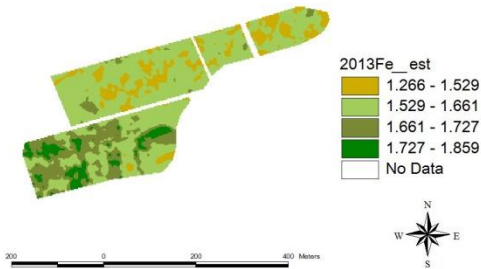
Valores de índice Ferrari reales de Campo
Cabernet Sauvignon 2013

2013Fe
- 1.266 - 1.529
- 1.529 - 1.661
- 1.661 - 1.727
- 1.727 - 1.859
- No Data

Valores de índice Ferrari reales de
Cabernet Sauvignon 2012

real 2012
- 1.1 - 1.54
- 1.51 - 1.72
- 1.72 - 1.81
- 1.81 - 1.9
- No Data

% Error de índice Ferrari estimados de Campo
Cabernet Sauvignon 2012

Error Estimación (%)
- -38.82 - -32.34
- -32.34 - -25.86
- -25.86 - -19.37
- -19.37 - -12.89
- -12.89 - -6.41
- -6.41 - 0.07
- 0.07 - 6.55
- 6.55 - 13.04
- 13.04 - 19.52
- No Data

Gridcode	Sum_Hectares	% area
1	0.0190	0.23
2	0.1040	1.27
3	0.2240	2.74
4	0.4710	5.76
5	1.2710	15.54
6	2.7810	34.00
7	2.4590	30.06
8	0.7800	9.54
9	0.0780	0.95
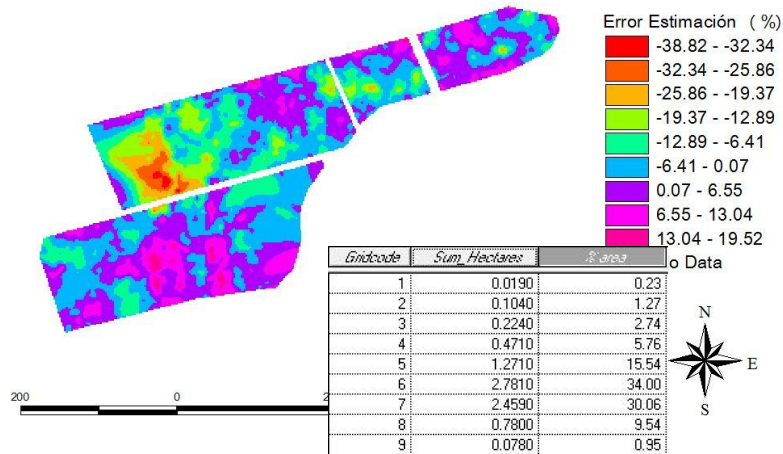
Porcentaje de Error Estimación   (%)
Cabernet Saubignon - Valdivieso 2013

Error de estimación (%)
- -17.799 - -12.143
- -12.143 - -6.486
- -6.486 - -0.83
- -0.83 - 4.826
- 4.826 - 10.483
- No Data

Gridcode	Sum_Hectares	% Area
1	0.0230	0.28
2	0.2370	2.93
3	2.7440	33.92
4	4.8810	60.33
5	0.2060	2.55
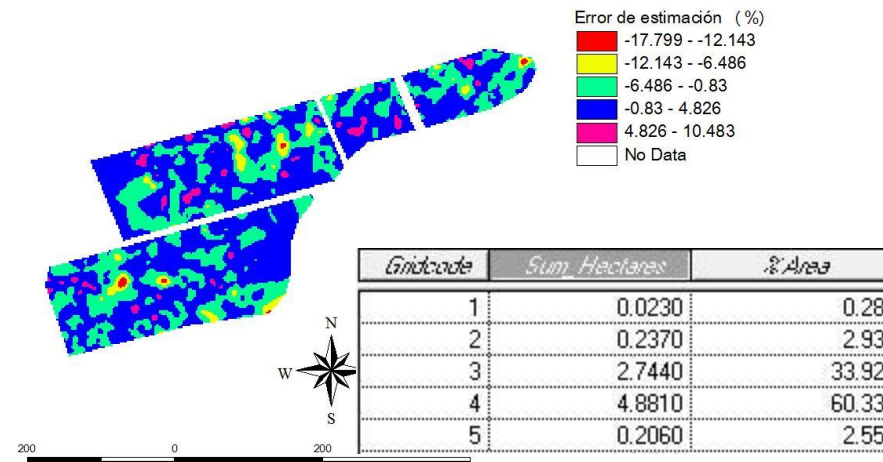
Malbec Variety

Indice Ferrari Real obtenido
Malbec 2012

Fe real 2012
- 1.052 - 1.347
- 1.347 - 1.494
- 1.494 - 1.641
- 1.641 - 1.789
- No Data
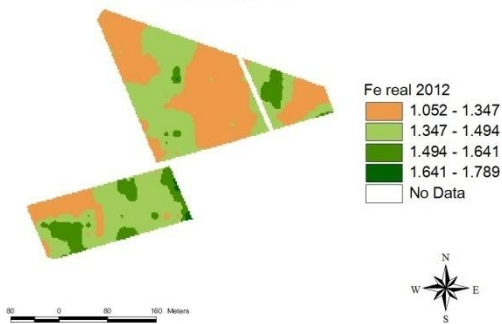
Valores de índice Ferrari reales de Campo
Malbec 2013

Fe Real 2013
- 1.584 - 1.8
- 1.8 - 1.908
- 1.908 - 2.015
- 2.015 - 2.123
- No Data

Estimación de índice Ferrari
Malbec 2012

Fe Estimado 2012
- 1.052 - 1.347
- 1.347 - 1.494
- 1.494 - 1.641
- 1.641 - 1.789
- No Data
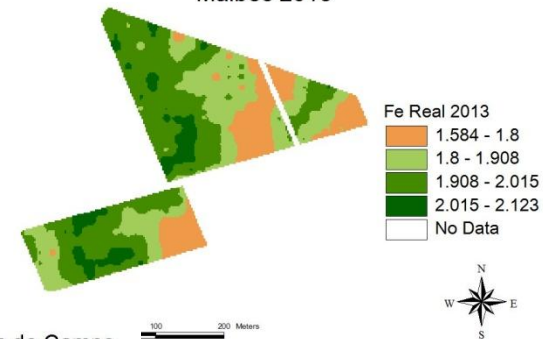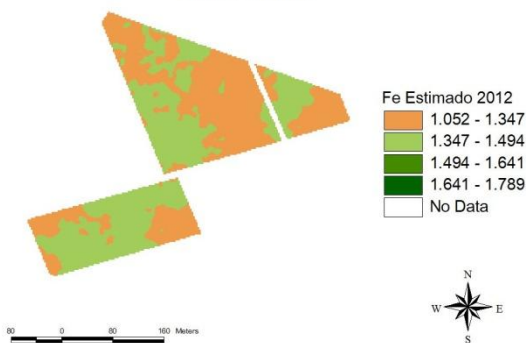
Valores de índice Ferrari Estimados de Campo
Malbec 2013

Fe Estimado 2013
- 1.584 - 1.8
- 1.8 - 1.908
- 1.908 - 2.015
- 2.015 - 2.123
- No Data

Error de Estimación de Valores de índice Ferrari
Malbec 2013

Error Est. __ Malbec
- -19.432 - -13.216
- -13.216 - -6.999
- -6.999 - -0.782
- -0.782 - 5.435
- 5.435 - 11.651
- No Data

Gridcode	Sum_Hectares	% area
1	0.0420	0.72
2	1.3370	22.93
3	3.3430	57.34
4	1.0850	18.61
5	0.0180	0.31

Error Estimación de índice Ferrari
Malbec 2012

Error Estimación Fe (%) (Shape)
- -22.537 - -12.825
- -12.825 - -3.113
- -3.113 - 6.599
- 6.599 - 16.312
- 16.312 - 26.024
- No Data
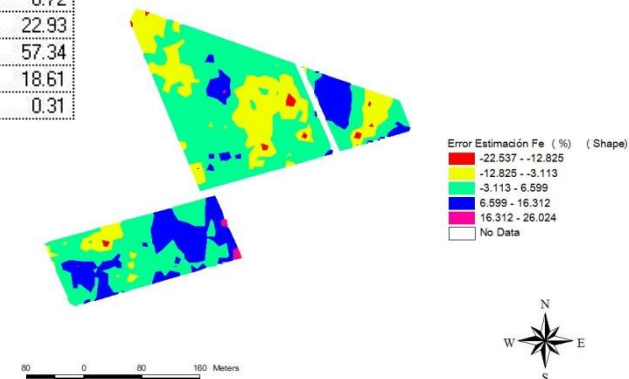
Gridcode	Sum_Hectares	% area
1	0.0130	0.22
2	0.5070	8.64
3	1.5750	26.83
4	3.1490	53.65
5	0.6270	10.68

✓ The integration of digital information both spatially and temporally could help to understand changes on field productivi.

✓ The model developed performs an acceptable estimated of grapes quality with errors less than 10% as an average but in most cases was lower than the 5 % which it is very good from production point of view.

✓ INDITES platform help to information integration between seasons for generation of the sectors whose has a common pattern or similar terroir (digital) which could be useful to define a differential harvest.

✓ More over, much work must be done to validate the model developed, however, this research demonstrates that the wine zoning must be made with more than one variable such as has been done until to date.

Thanks