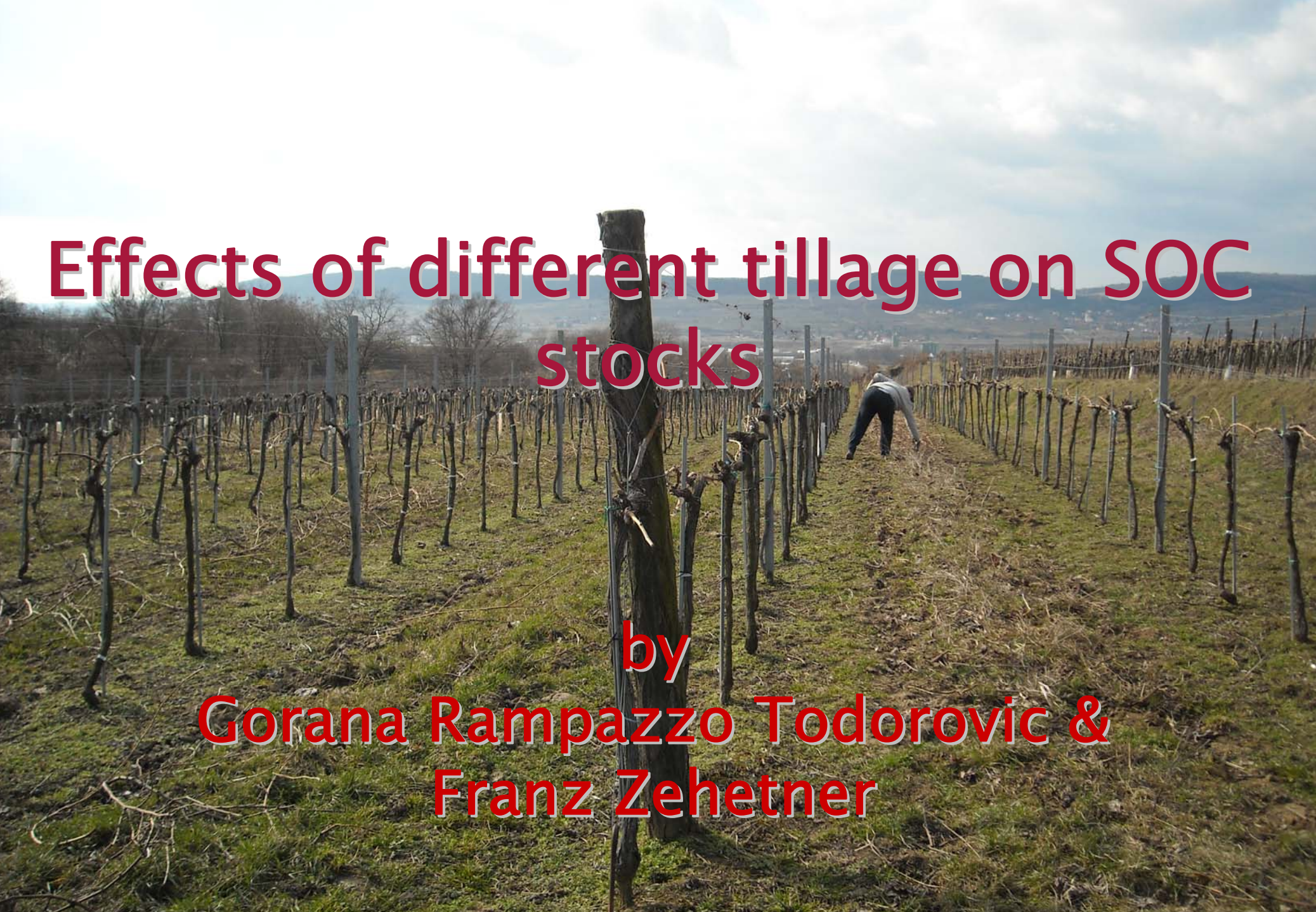

Effects of different tillage on SOC stocks

by

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Franz Zehetner

Weinklim project Objective:
Identification of measures that can be implemented in the short term and to raise the awareness for the importance of a sustainable grape and wine production.

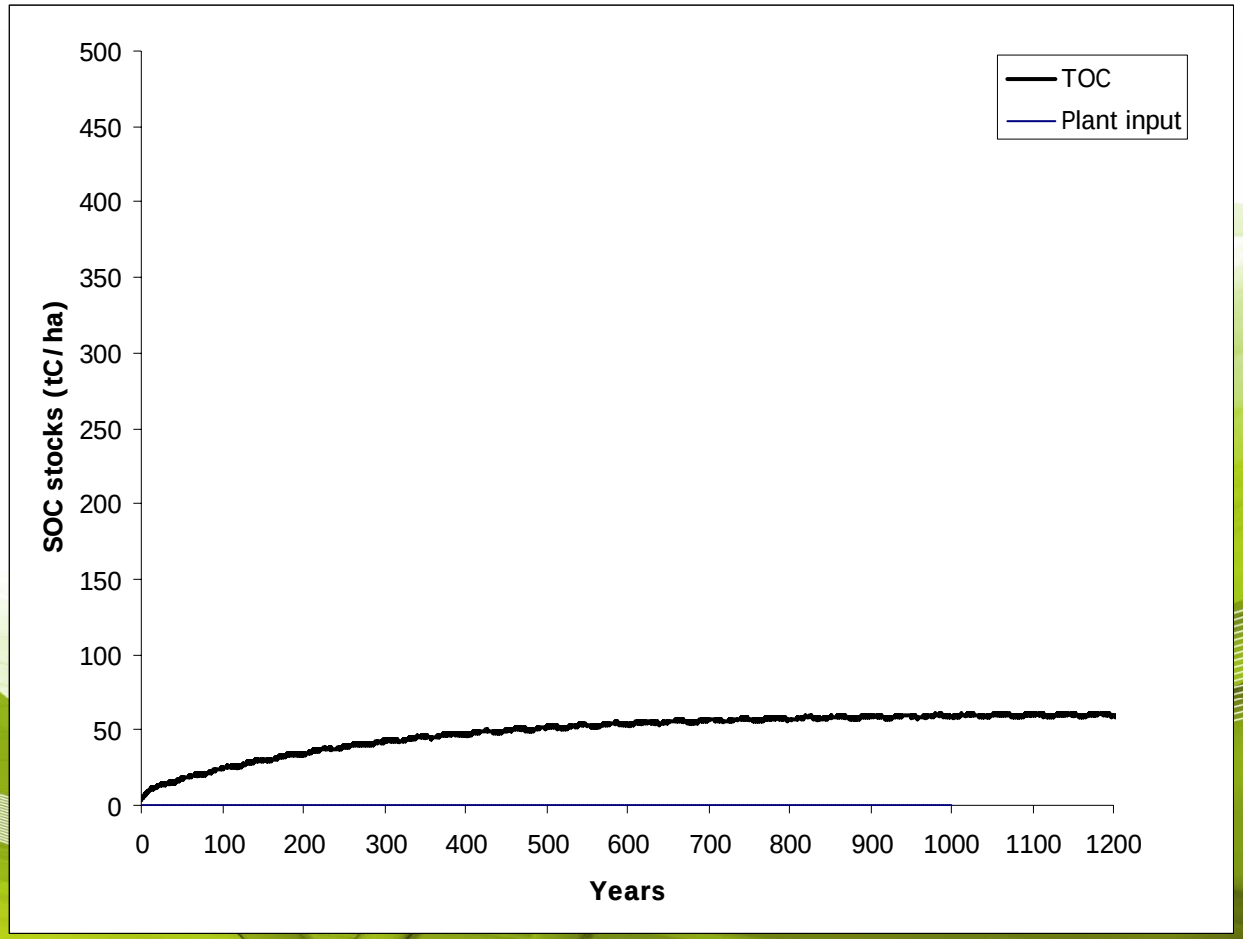
Aim of my work in the project:
To model the effect of different tillage, management and soil characteristics on SOC stocks.

Task 1: To calibrate RothC for different tillage types based on the long-term experiment of Fuchsenbigl.

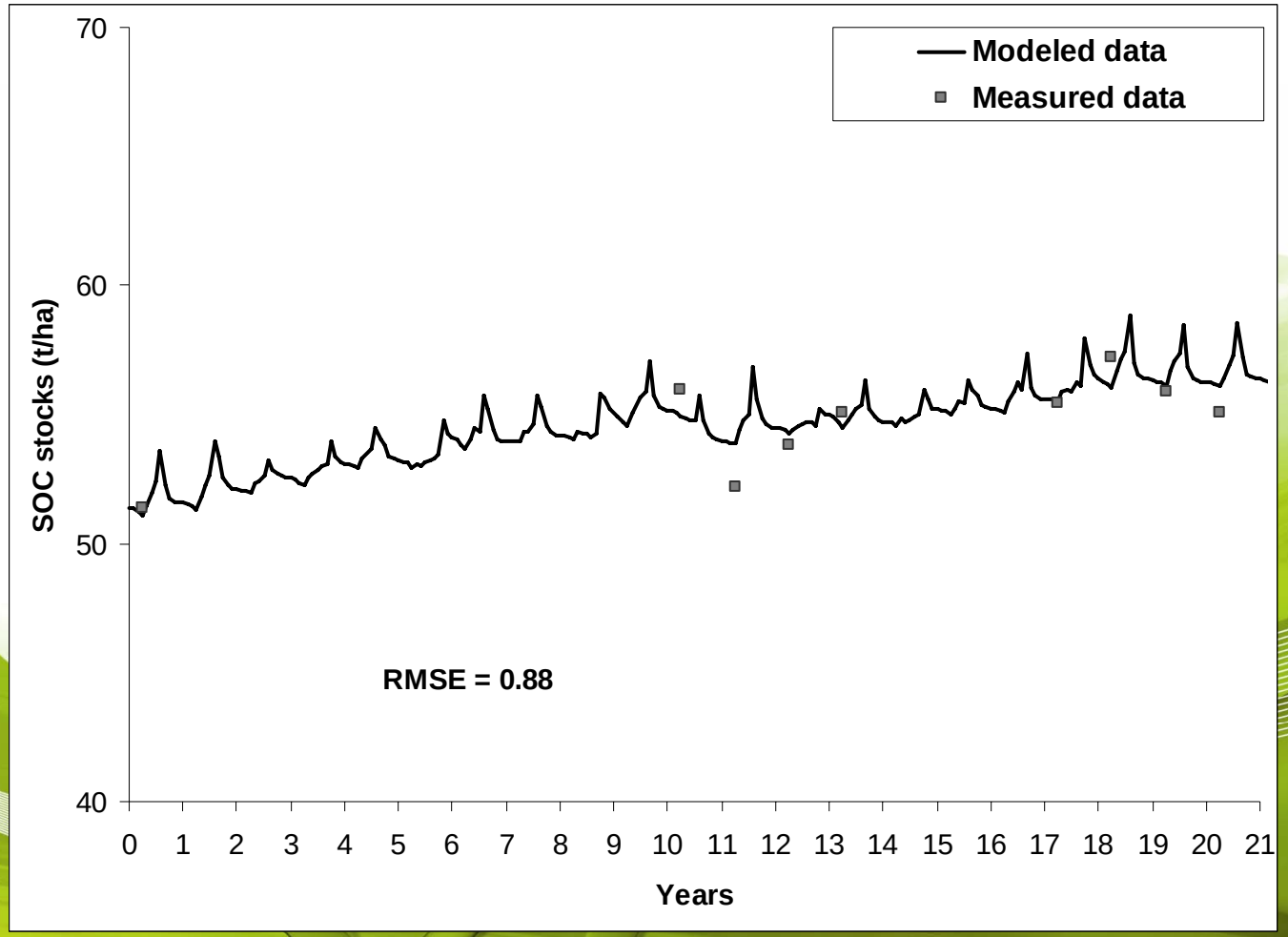
Task 2: To model different scenarios based on real data of 5 vineyards with different soil, tillage and management characteristics.

Task 3: To differentiate main drivers of SOC stocks in vine production.

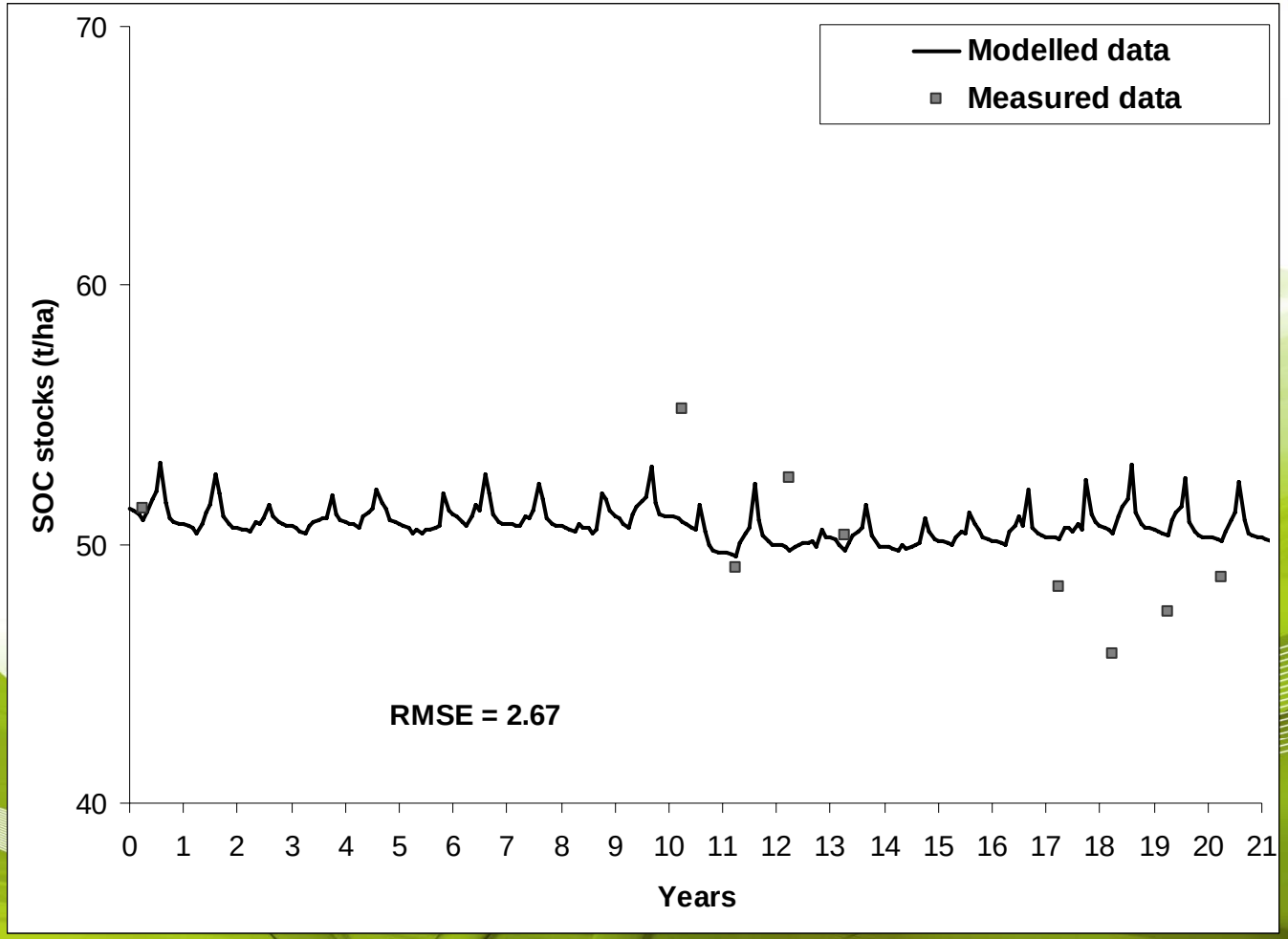
Spin-up with grass cover



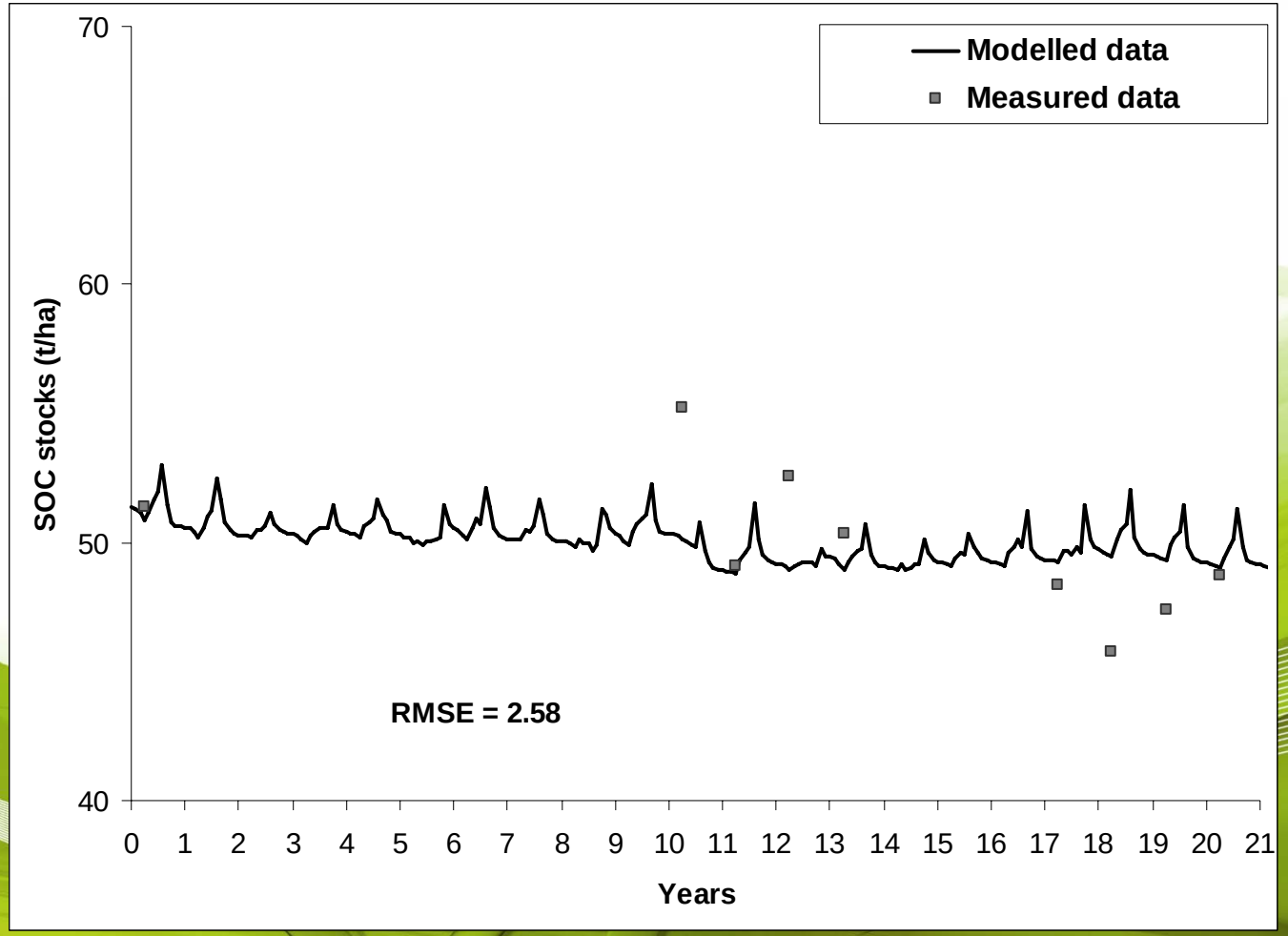
Minimum tillage



Reduced tillage



Conventional tillage

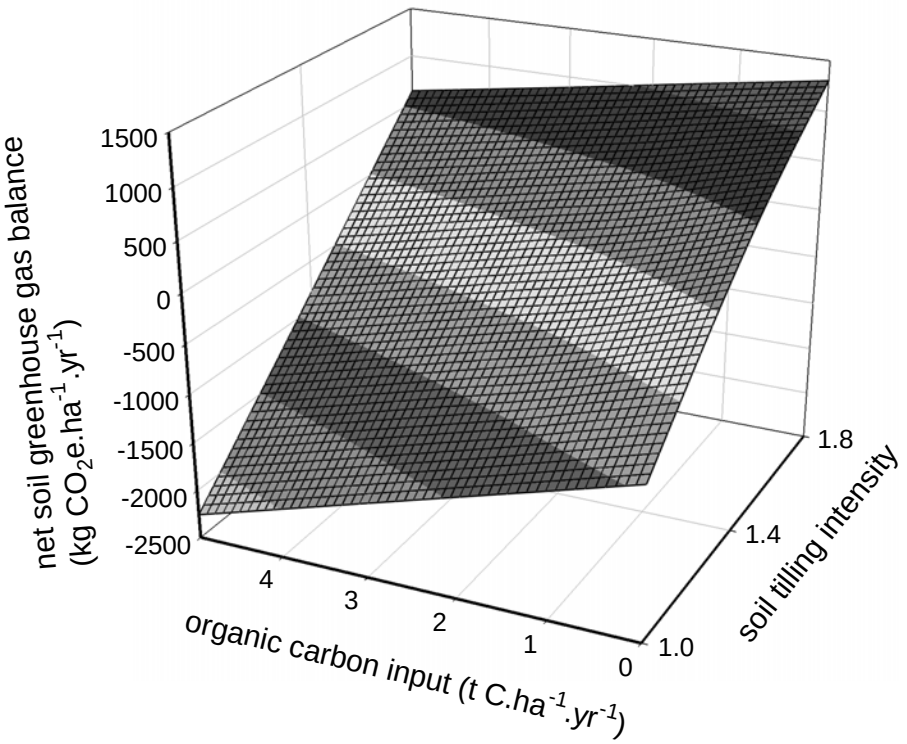


Vine-producer	Start value tC/ha	End value (after 60 years)	tC/ha/Year	Tillage type	Org. Fertilization	Grass cover	Clay content %
1. Hofman	105	82.43	-0.376	1.8	0	Active grass cover	13
5. Huber	168	156.71	-0.188	1.4	0	Grass	13.5
6. Herzinger	180	188.73	+0.146	1.0	0	Grass	8
8. Haimel	116	106.61	-0.157	1.4	0	Moderate grass cover	21
9. Dockner	162	145.89	-0.269	1.4	0	Grass	10

Modelling results for different vineyards

Start value tC/ha	End value	tC/ha/Year	tCO_2/ha/Year	Tillage	Org. Fertilization	Vine biomass input	Grass cover
168	177.37	0.25616667	0.93927778	1.0	-	+	+
168	156.71	-0.08816667	-0.32327778	1.4	-	+	+
168	141.87	-0.3355	-1.23016667	1.8	-	+	+
168	181.43	0.32383333	1.18738889	1.0	0.5 t/ha	+	+
168	193.59	0.5265	1.9305	1.0	2 t/ha	+	+
168	217.93	0.93216667	3.41794444	1.0	5 t/ha	+	+
168	144.88	-0.28533333	-1.04622222	1.8	0.5 t/ha	+	+
168	153.93	-0.1345	-0.49316667	1.8	2 t/ha	+	+
168	172.01	0.16683333	0.61172222	1.8	5 t/ha	+	+
168	175.39	0.22316667	0.81827778	1.0	-	-	+
168	140.81	-0.35316667	-1.29494444	1.8	-	-	+
168	126.48	-0.592	-2.17066667	1.8	-	+	-
168	125.41	-0.60983333	-2.23605556	1.8	-	-	-

Modelling results for different tillage and management on the same vineyard



Effect of organic amendments (organic carbon input) and soil tilling intensity on the net greenhouse gas balance of vineyard soils with permanent plant cover. Greenhouse gas balance is given in CO_2-equivalents, calculated as the sum of CO_2 modelled with the RothC-26.3-Model and N2O according to IPCC. Negative values indicate a carbon sink function of the soil (From Soja *et al*., submited).

Conclusions

The results show the main influence of soil tillage and soil cover on SOC stocks.

Short term measures by:

- decreasing the tillage intensity.
- reduction of the number of tractor transits
- the use of fuel-saving engines.

Thank you very much for your attention!