Comparison of NDVI plot sampling and Sentinel satelitte imagery

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Table of contents

List of Figures

1 Introduction

The following report compares the measures of NDVI measured with a RapidScan handheld and satelite derived NDVI from Sentinel 2, as well as assessing the importance of accurate georeferencing of plot, when doing such comparisons.

1.1 BioBasis NDVI sampling

NDVI have been measured as part of the BioBasis Nuuk sampling protocal since 2007. Measurements of NDVI have been done in c-flux plots, phenology plots and along the NERO line. NDVI measurements in c-flux plots have been done with a SpectroSence2 (REF), in phenology plots and along the NERO line it was measured with a CropCircle (REF) from 2007 - 2017). From 2018 NDVI has been measured with a RapidScan from Holland Scientific.

There are measurements from 2018-07-18 and 2024-10-11, and from a total of 113 individual days of measurements from the 20 plots.

NDVI is measured as a mean (calculated by the RapidScan) for each subsection of the phenology plot. For the comparison with Sentinel a further mean is calculate pr plot.

1.2 Sentinel 'sampling'

Sentinel derived NDVI values were extracted by Google Earth Engine and process in R. To ensure high temporal correspondence between the Sentinel derived NDVI and the plot measured NDVI only sentinel images from with in +/- 2 days from of a plot measurement were used and a cloud filter of 20 % was applied. Only one image pr measurements. If multiple image were available with in the 4 day window of the plot measurement only the one closest to the sampling day was used.

2 Comparison

There are Sentinel data available from 45 days out of 113 (39.82 %) between 2018-07-18 and 2024-10-11 with the mentioned restrictions. On average there is a 0.69 day difference between the plot measurement and the Sentinel iamge sampled.

3 Camparing RapidScan NDVI and Sentinel NDVI

There is an over all correlation between the NDVI measured with RapidScan and derived from Sentinel, but with very variation. There seem to be very good correlation for values corresponding to RapidScan NDVI between 0.375 - 0.75. For RapidScan NDVI values corresponding to 0 - 0.3 it seems that Sentinel NDVI is generally higher than RapidScan. In other words there is a lesser correspondance between the two methods at lower levels of NDVI.

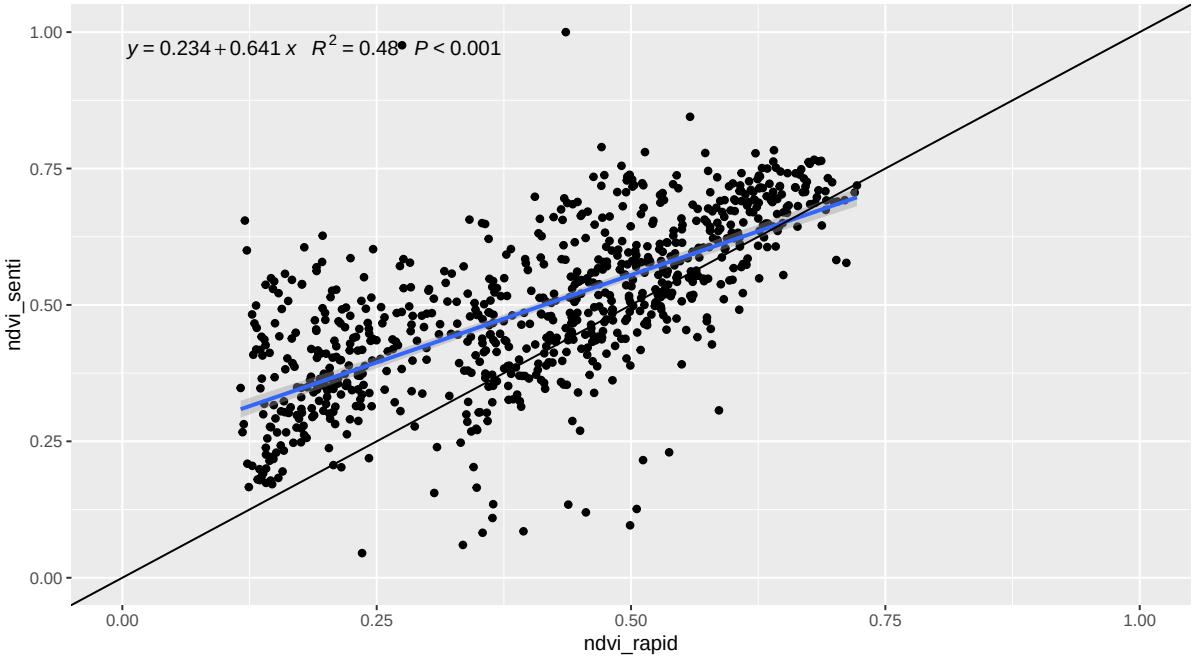

Figure 1: Correlation between RapidScan measured NDVI and Sentinel2 remotely sensed NDVI.

The big variation does not seem to stem from specific years of sampling.

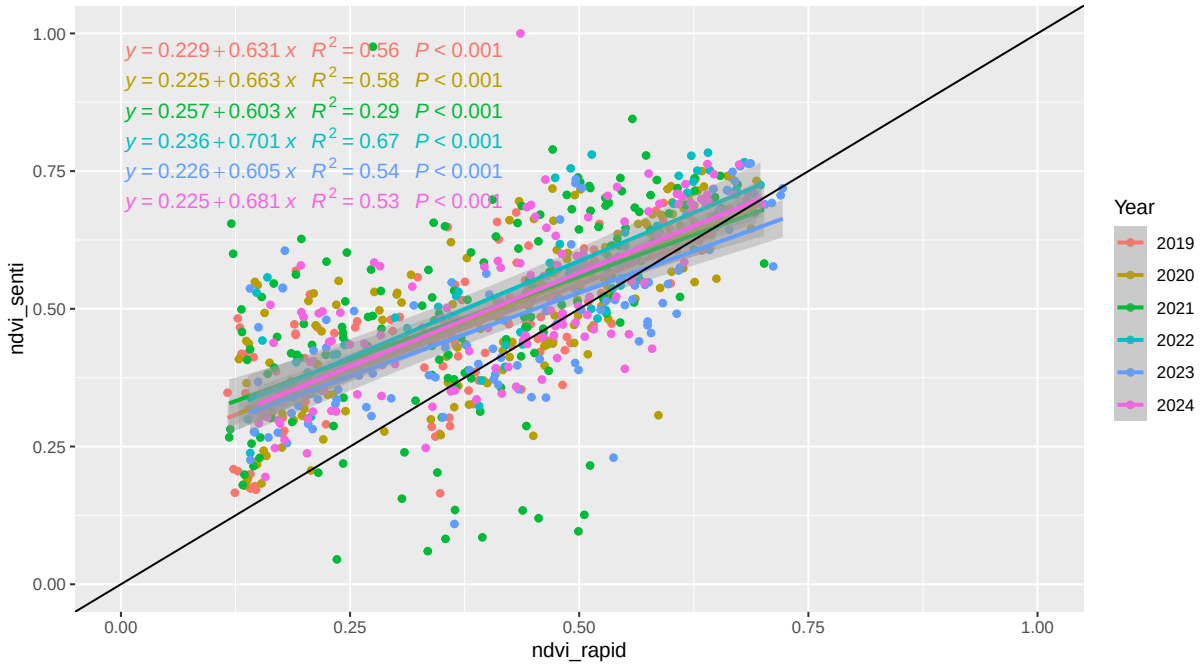

Figure 2: Correlation between RapidScan measured NDVI and Sentinel2 remotely sensed-NDVI. Regression pr. year

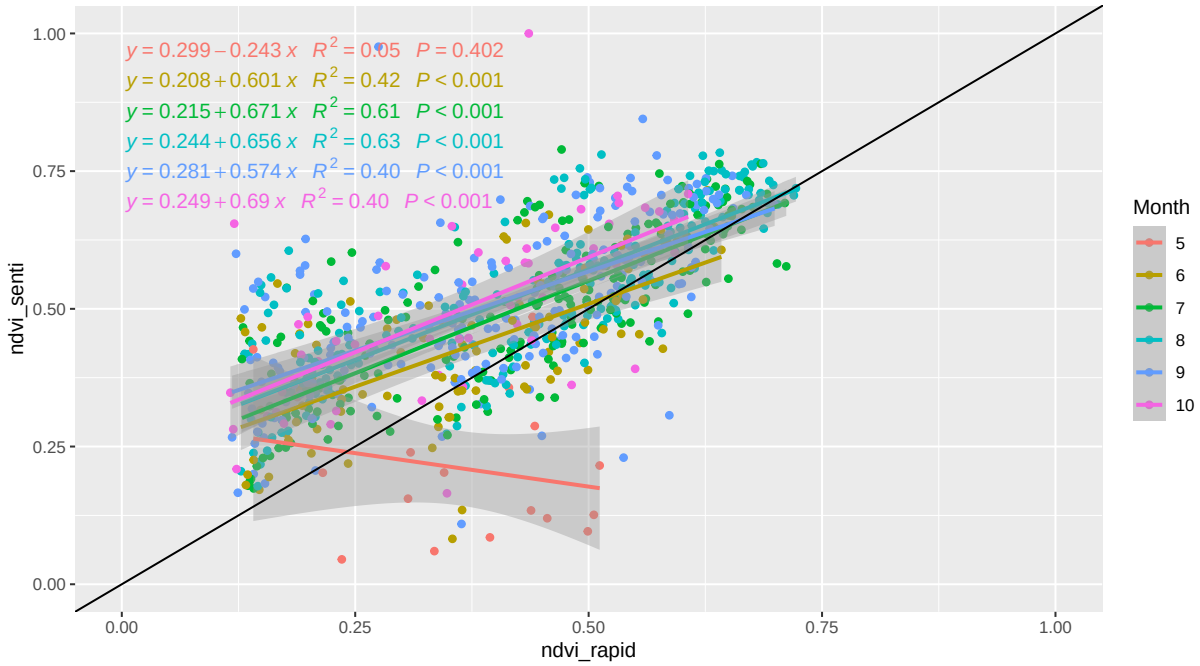

Figure 3: Ground measured NDVI compared to Sentinel2 remotely sensed NDVI. Regression made pr month.

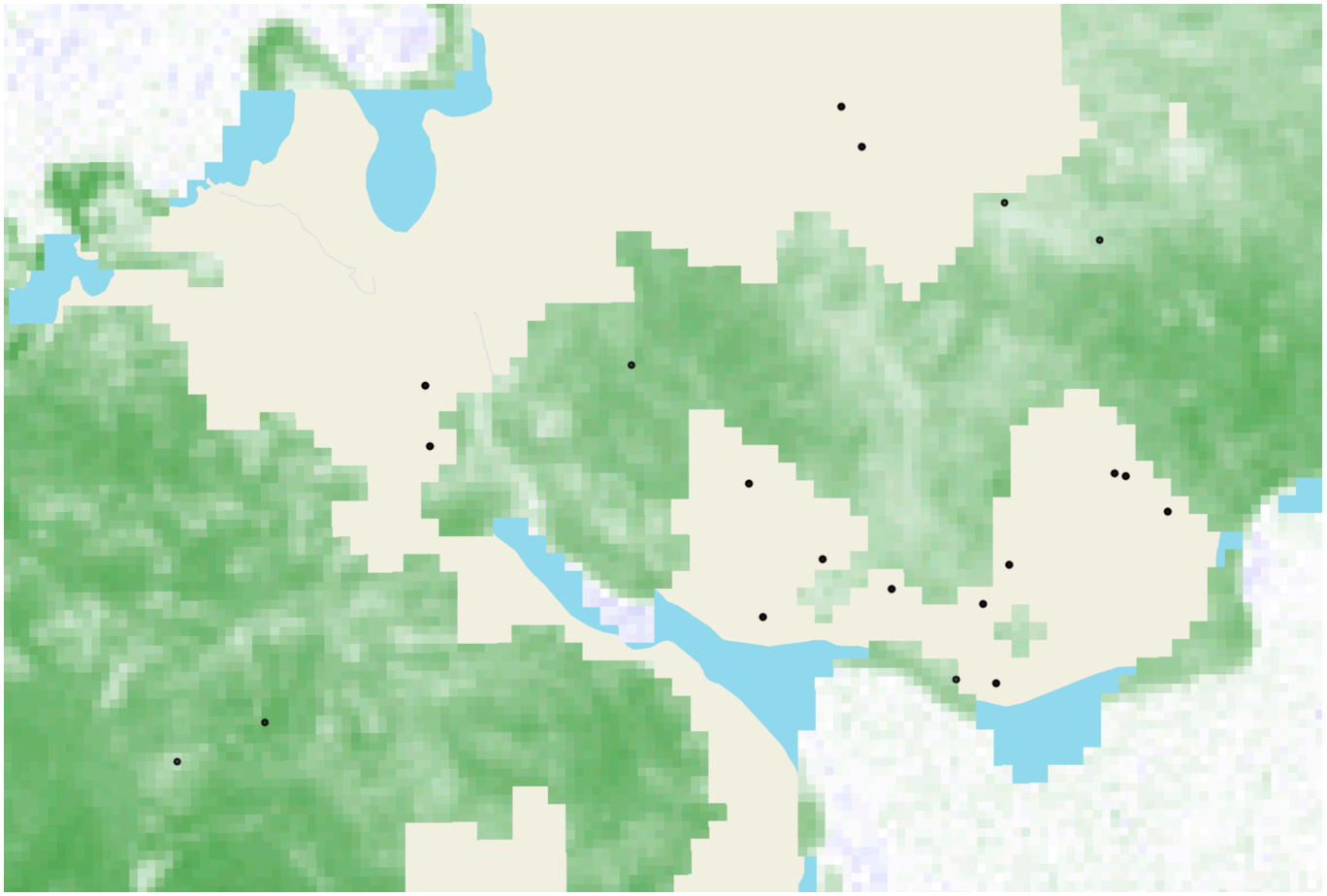

Figure 4: Examples of errors or artefacts in Sentinel images. Black dots indicate the phenology plots from where to sample. Sandy color is the back ground map with no Sentinel NDVI values.

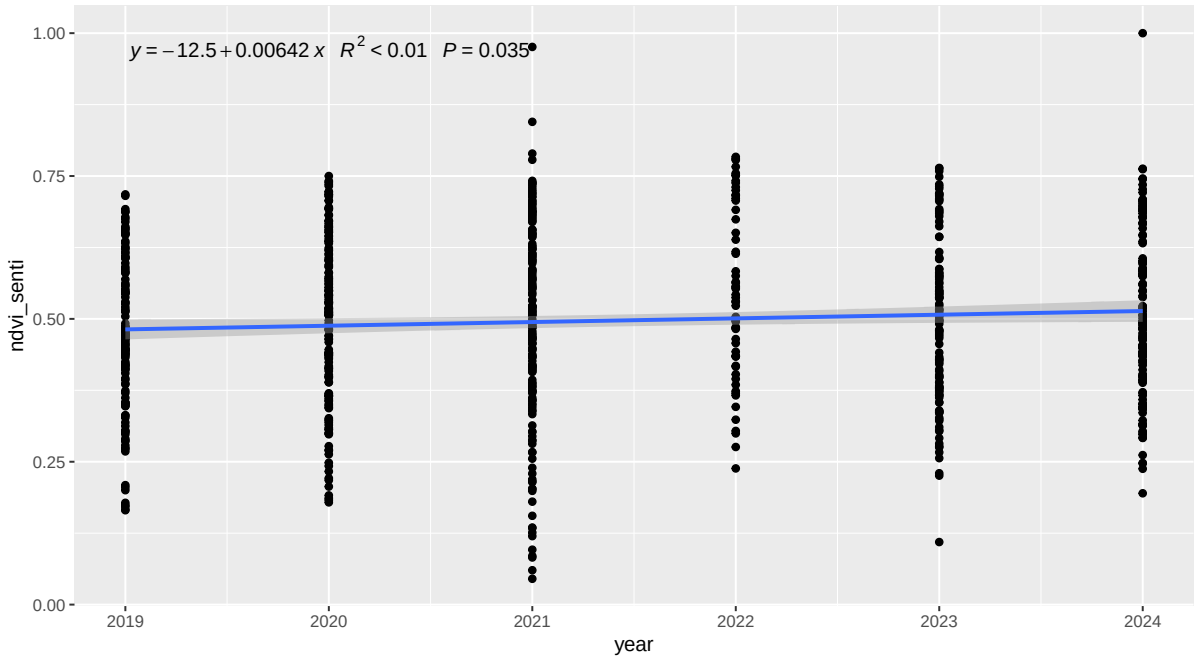

Figure 5: Ground measured NDVI compared to Sentinel2 remotely sensed NDVI. Regression made pr month.

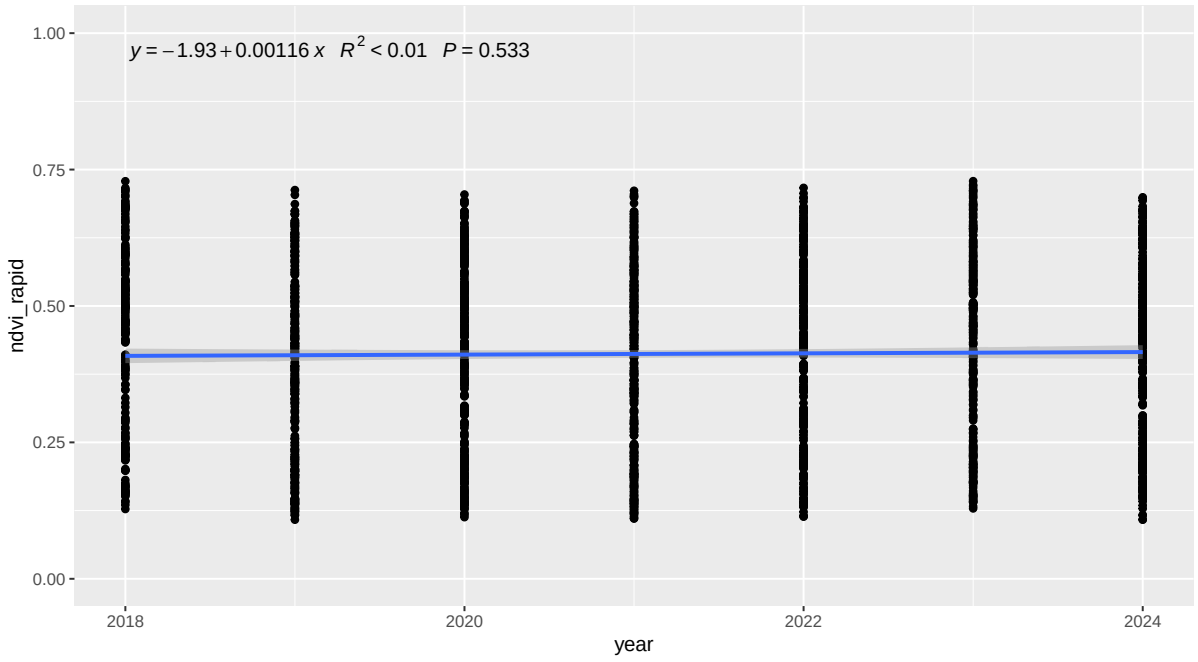

Figure 6: Ground measured NDVI compared to Sentinel2 remotely sensed NDVI. Regression made pr month.

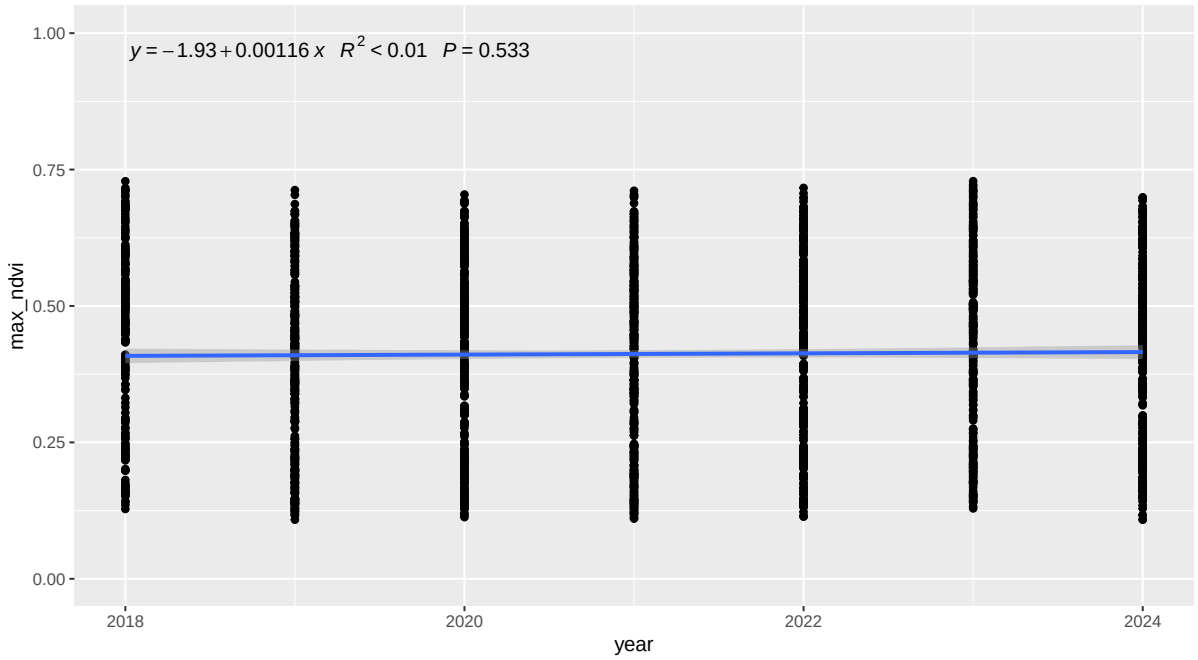

Figure 7: Ground measured NDVI compared to Sentinel2 remotely sensed NDVI. Regression made pr month.

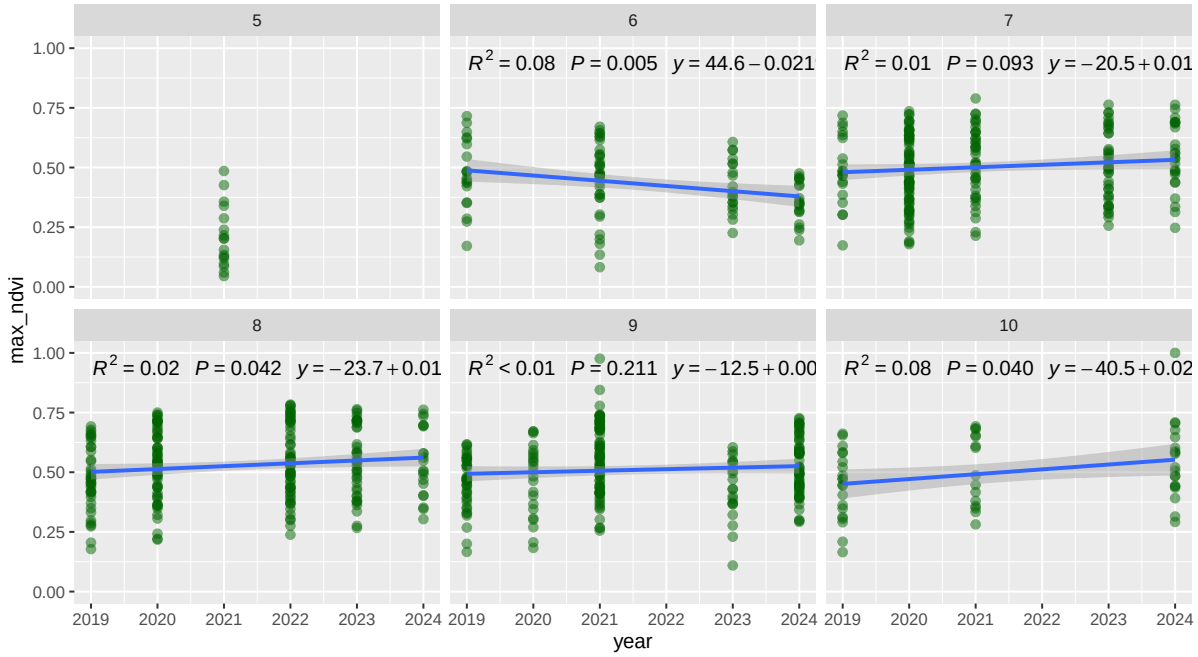

Figure 8: Trends in max Sentinel NDVI pr plot pr month.

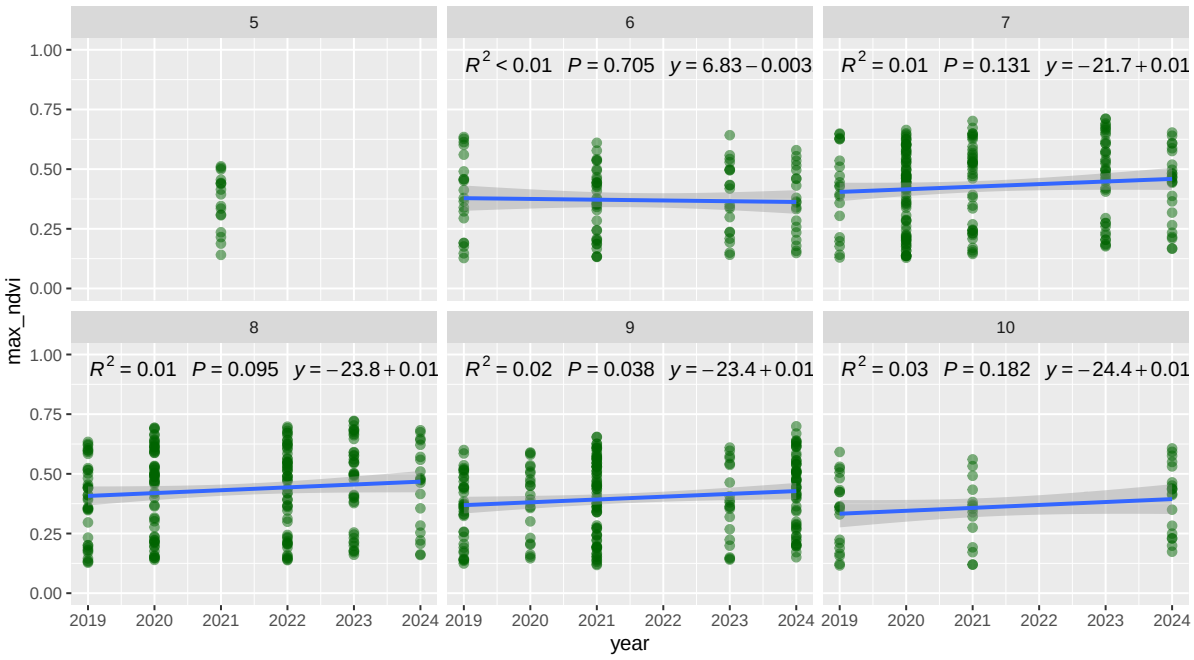

Figure 9: Trends in max Sentinel NDVI pr plot pr month.

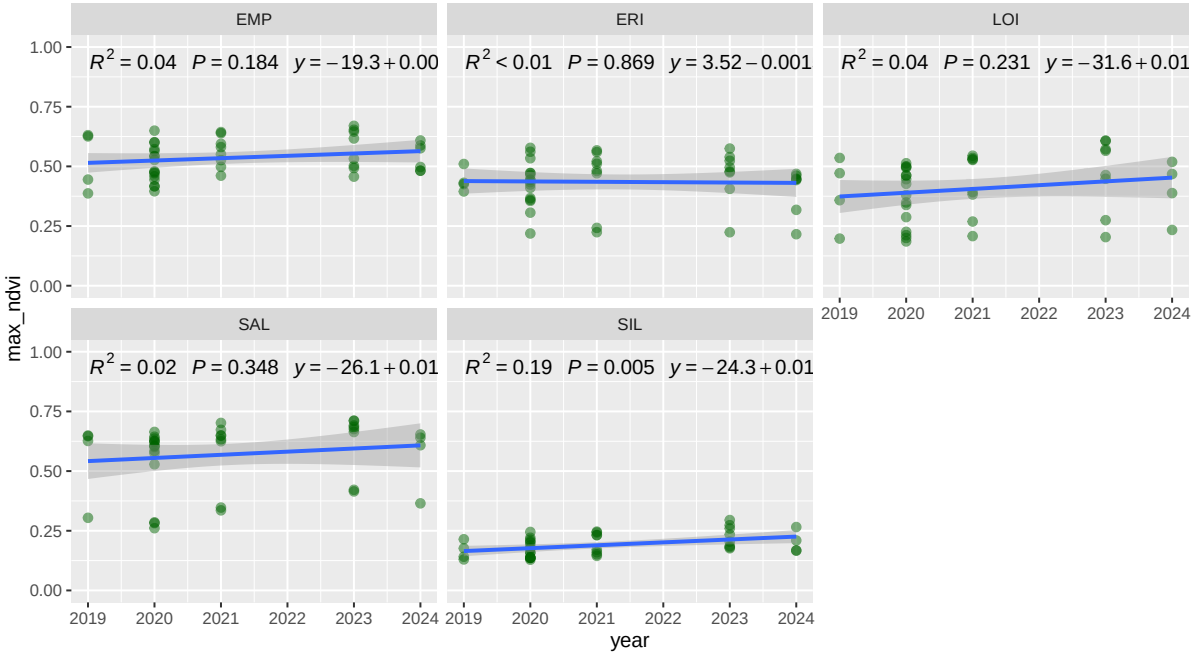

Figure 10: Trends in max Sentinel NDVI pr plot pr month.