

Corn OSAVI Soil-Adjusted Vegetation Analysis Report

September 18, 2026 · GeoCommsX

Executive Summary

This report analyzes the `maize_OSAVI` new raster as the sole dataset, characterizing the soil-adjusted vegetation response of the corn field. OSAVI (Optimized Soil-Adjusted Vegetation Index) values across the field range from -1.16 to 1.16, with a mean of 0.114 and a median of 0.034. The distribution is heavily concentrated in a moderate band: 79.1% of pixels fall between 0.0 and 0.35, 8.7% fall below 0.0, and 12.2% exceed 0.35. Spatial analysis shows a pronounced east-west and north-south gradient, with the central portion of the field and the middle row band showing distinctly higher OSAVI values than the flanking zones. All observations below are measured directly from the raster; no polygons, additional GIS layers, external datasets, or other vegetation indices were used, and no biological or environmental cause is assigned to any observed pattern.

OSAVI Statistical Summary

The raster covers $9,872 \times 16,511$ pixels; 162,996,592 pixels (100% of the raster extent) carry valid OSAVI values.

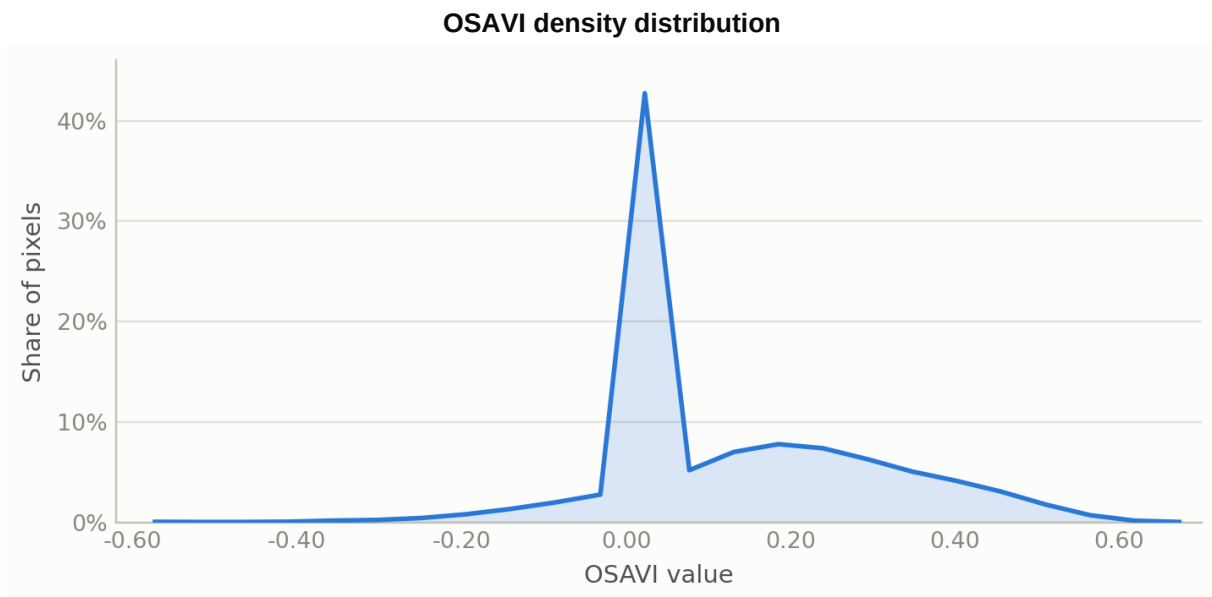
Statistic	Value	Percentile	OSAVI
Minimum	-1.160	1st	-0.286
Maximum	1.160	5th	-0.075
Mean	0.114	10th	0.000
Median	0.034	25th	0.000
Standard deviation	0.186	50th (median)	0.034
Coefficient of variation	162.3%	75th	0.239
Skewness	-0.484	90th	0.375
Excess kurtosis	6.052	95th	0.442
		99th	0.537

The median (0.034) sits well below the mean (0.114), and the 10th and 25th percentiles both equal exactly 0.000, indicating that a large share of pixels cluster at or near zero rather than spreading evenly through the range. The negative skewness (-0.484) reflects a longer tail toward low and negative values, while the high excess kurtosis (6.052) indicates a sharply peaked distribution with a concentration of values near a central cluster rather than a flat spread. The coefficient of variation (162.3%) is very large in relative terms; because the mean is close to zero, this ratio is dominated by the small denominator and is reported here for

completeness rather than as a primary measure of variability. The standard deviation (0.186) is a more directly interpretable measure of overall spread for this raster.

OSAVI Distribution

The chart below shows the share of valid pixels at each OSAVI value across the field, using a 24-bin histogram spanning the -0.6 to 0.7 range where nearly all pixels fall.



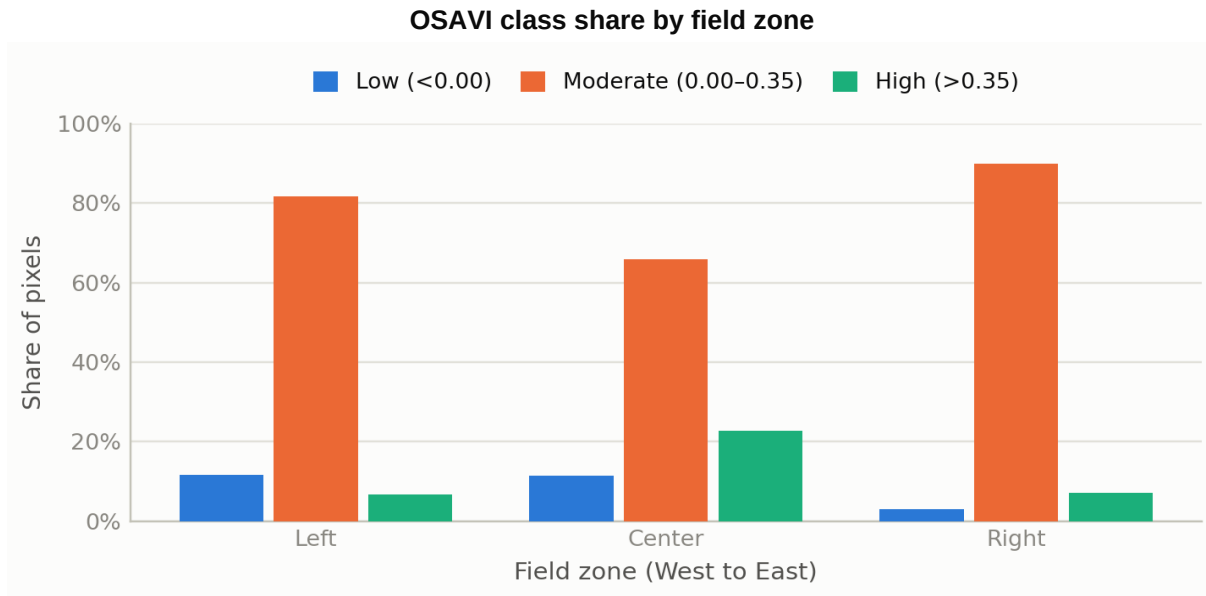
QGIS raster statistics · maize_OSAVI new, 24-bin histogram over -0.6 to 0.7

The distribution has a single dominant peak immediately around 0.0, where 42.7% of all pixels are concentrated in one narrow bin. Beyond that peak, pixel counts decline steadily but remain elevated through roughly 0.05 to 0.35, forming a broad secondary shoulder before tapering toward the upper tail near 0.5-0.7. A thin, near-continuous tail also extends into negative values down to about -0.6. This shape indicates a field with a very large contiguous population of near-zero response pixels alongside a substantial secondary population of moderately higher values, rather than two cleanly separated classes.

Dominant Range and Classification

Using fixed descriptive cut points (below 0.00, 0.00 to 0.35, above 0.35) chosen from the histogram's natural break points, the field-wide OSAVI distribution splits as: 8.7% low, 79.1% moderate, and 12.2% high. The moderate band is the clearly dominant condition across the field as a whole.

This three-class split is not uniform across the field, however. The chart below reports the same low/moderate/high shares computed separately within each of three equal West-East field thirds (Left, Center, Right).



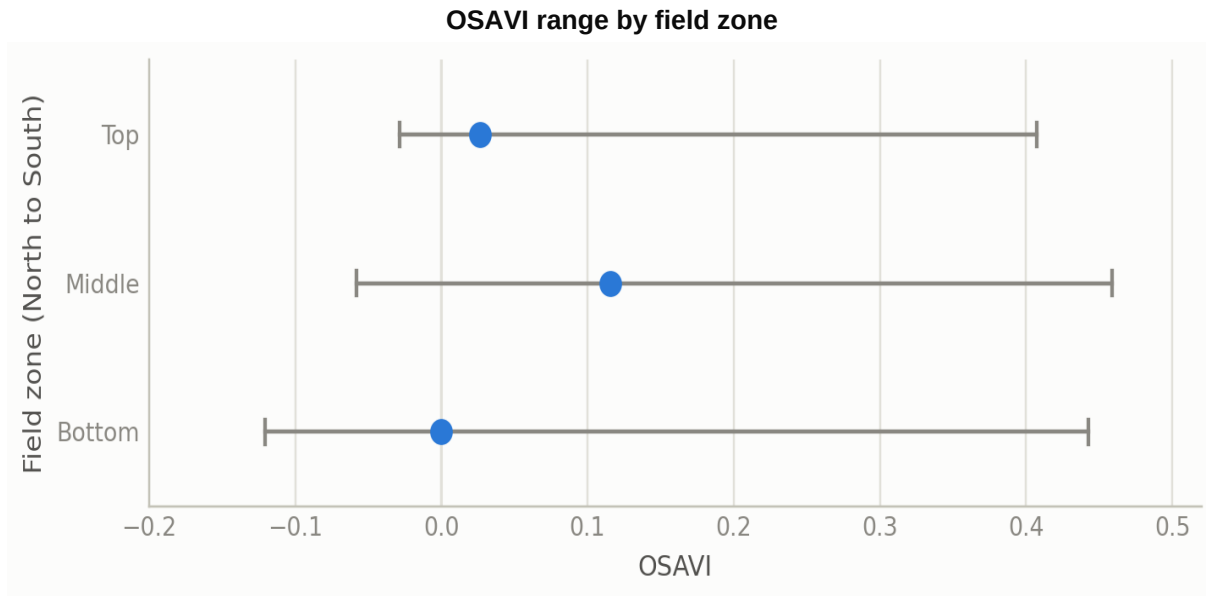
QGIS raster statistics · maize_OSAVI new, field split into equal West-East thirds

The Center zone carries a markedly larger high-OSAVI share (22.7%) than either the Left (6.8%) or Right (7.1%) zones, while the Right zone has the smallest low-OSAVI share (3.1%) and the largest moderate share (89.8%). The Left and Right zones are broadly similar to each other in their low- and high-class shares, while the Center zone stands apart with a distinctly larger high-value population. These are descriptive class shares only; the 0.00 and 0.35 cut points are narrative reference lines drawn from the histogram, not classification polygons or zonal GIS layers.

Spatial Pattern Analysis

Block-averaged local standard deviation (5×5 windows over an 8× downsampled grid) has a field-wide mean of 0.043 and a 90th-percentile value of 0.086, with roughly a quarter of the field's area exceeding a local standard deviation of 0.066 — indicating that sharp local transitions in OSAVI are present but are not the dominant spatial characteristic. An approximate global Moran's I of 0.910 indicates strong positive spatial autocorrelation: neighboring areas of the field tend to have similar OSAVI values, consistent with broad, gradually varying zones rather than a randomly speckled pattern.

Splitting the field into three equal North-South bands (Top, Middle, Bottom) and computing the median and 5th-95th percentile range within each band shows the following.



Dot = median, whisker = 5th–95th percentile · QGIS raster statistics, field split into equal North-South thirds

The Middle band has the highest median OSAVI (0.116), well above the Top band (0.026) and the Bottom band (0.000). The Bottom band also has the lowest 5th percentile (-0.121), indicating it carries the field's most negative-value tail. All three bands share a broadly similar upper bound (95th percentile between 0.41 and 0.46), meaning the zones differ mainly in their typical (median) and low-end values rather than in their peak values. Combined with the earlier West-East breakdown, the overall spatial pattern is one of a higher-response core area near the field's center that grades outward toward lower and more negative values at the field's margins, rather than a sharp boundary or a single abrupt transition line.

OSAVI as a Soil-Adjusted Vegetation Index

OSAVI (Optimized Soil-Adjusted Vegetation Index) is calculated from near-infrared and red reflectance with a fixed soil-adjustment factor (commonly $L = 0.16$) added to the denominator. This adjustment is designed to dampen the influence that exposed or partially exposed soil background has on the index, which matters most where canopy cover is incomplete: early-season growth stages, row middles, field margins, and any area where the sensor's field of view mixes vegetation and bare-soil reflectance in the same pixel. In fully closed canopy, OSAVI and simpler indices tend to converge, but where soil is visible between or beneath plants, an index without a soil-adjustment term can be pulled toward the soil's own reflectance signature and misrepresent the vegetation actually present.

In this dataset, OSAVI values near or below zero are consistent with pixels where soil background dominates the reflectance signal (bare ground, very sparse cover, or non-vegetated surfaces), while progressively higher positive values are consistent with progressively greater vegetation reflectance contribution. This is a description of what the index is designed to represent, not a claim about the specific vegetation condition, crop stage, or field practice underlying any individual pixel in this field.

Interpretation and Field Uniformity

Measured observations: the field-wide OSAVI mean (0.114), median (0.034), and standard deviation (0.186) are computed directly from all 162,996,592 valid pixels. The zone-level medians, percentile ranges, and class shares reported above are computed directly from the same raster, split into equal geometric thirds with no smoothing, interpolation, or external boundary data.

Interpretation: the combination of a strong positive Moran's I (0.910), a dominant central peak in the distribution, and a Center/Middle zone with consistently higher OSAVI values than the field's margins points toward a field that is spatially heterogeneous at the broad scale (clear zone-to-zone differences) but spatially structured rather than noisy (neighboring pixels are similar to each other, and transitions are gradual rather than abrupt). This pattern is more consistent with a field that has a stronger-responding core area and weaker-responding margins than with a field where high and low values are randomly interspersed.

Whether this pattern reflects differences in canopy development, planting geometry, field boundary effects, soil exposure, or another cause cannot be determined from the OSAVI raster alone, and no such attribution is made here. The finding that can be stated directly from the data is limited to the spatial arrangement and magnitude of the OSAVI values themselves.

Uncertainty and Limitations

This analysis is subject to several limitations. First, the raster's minimum and maximum values (-1.16 and 1.16) sit at symmetric extremes beyond the range where OSAVI is typically informative for vegetation, and a small but nonzero share of pixels (0.30% below -1.04, 0.02% above 0.93) cluster at or very near these extreme values; these may reflect image border effects, sensor artifacts, or edge-of-footprint pixels rather than typical field conditions, and they were not excluded or reclassified for this report. Second, a very large share of pixels (over 40%) fall within a narrow band immediately around 0.0, which may include genuine bare-soil or non-vegetated background alongside any residual sensor or processing effects at that value; this report describes the statistical concentration but does not separate these possible sources. Third, the descriptive cut points used to define low, moderate, and high OSAVI (0.00 and 0.35) are narrative reference lines drawn from the histogram's shape, not an externally validated agronomic threshold, and a different set of cut points would shift the reported class shares. Fourth, the spatial statistics (local standard deviation, Moran's I, zone percentiles) are computed on an 8× downsampled grid for computational tractability; fine-scale, sub-block variation smaller than the downsampling window is not captured. Finally, this report analyzes OSAVI in isolation: it does not incorporate any other vegetation index, band, elevation data, or external spatial dataset, and no field visit, ground-truth sample, or crop stage information was used to validate any observation made here.

Concluding Assessment

The corn field's OSAVI raster shows a moderate-condition field overall, with 79.1% of pixels in the moderate band (0.00-0.35), a low-value share of 8.7%, and a high-value share of 12.2%. The distribution is dominated by a single sharp peak near zero rather than a broad, even spread, indicating that soil-influenced or minimal-vegetation-response pixels make up a substantial and spatially concentrated portion of the field rather than being scattered evenly throughout.

Spatially, the field is structured rather than random: strong positive spatial autocorrelation (Moran's I of 0.910) combined with clear zone-to-zone differences (a higher-median, higher-high-share Center/Middle core versus lower-median, more negative-tailed margins) point to a field with a coherent central area of stronger soil-adjusted vegetation response bounded by weaker-responding margins. This pattern is broad and gradual rather than sharply bounded, based on the local-standard-deviation and percentile-range results.

The main observation warranting further field attention is the contrast between the Center zone (22.7% high-OSAVI share, median 0.116) and the Left and Right zones (6.8% and 7.1% high-OSAVI share respectively), together with the Bottom zone's larger negative tail (5th percentile of -0.121). This report does not attribute these differences to a specific cause; it identifies where, within the raster, OSAVI response is measurably higher or lower so that any follow-up assessment can be targeted accordingly.