**GEE CODE FOR INDICES**

**Import the district shapefile**

// var roi = ee.FeatureCollection("projects/ee-040901/assets/Selected\_Districts");

// var dataTable = [['District', 'Year', 'Mean NDVI']];

// // Define agricultural land cover

// var LU = ee.ImageCollection("ESA/WorldCover/v200").first();

// var landuse = LU.clip(roi).eq(40).selfMask();

**Define a function to mask images with agricultural land cover**

// function AgriMask(image) {

// var mask = image.mask(landuse).clip(roi);

// return mask;

// }

**NDVI**

/ var modisNDVI = ee.ImageCollection('MODIS/006/MOD13Q1')

// .filterDate('2022-06-01', '2022-10-15')

// .select('NDVI')

// .filterBounds(roi);

// var maskedNDVI = modisNDVI.map(function(image) {

// return AgriMask(image);

// });

// // Visualize the masked NDVI image

// Map.centerObject(roi, 8);

// Map.addLayer(maskedNDVI.mean().multiply(0.0001).clip(roi), {min: 0.0440, max: 0.680, palette: ['green']}, 'NDVI Map');

// // Export the masked NDVI image to Google Drive

// Export.image.toDrive({

// image: maskedNDVI.mean().multiply(0.0001),

// description: 'masked\_ndvi\_export', // Set your desired description here

// folder: 'GEE\_exports', // Set the folder name in your Google Drive

// region: roi.geometry()

// });

// var featureCollection = ee.FeatureCollection(dataTable.slice(1).map(function(row) {

// return ee.Feature(null, {

// 'District': row[0],

// 'Year': row[1],

// 'Mean NDVI': row[2]

// });

// }));

// Export.table.toDrive({

// collection: featureCollection,

// description: 'GujaratDistrictsMeanNDVI',

// folder: 'IIRS\_M\_4\_DATA', // Set the folder name here

// fileFormat: 'CSV'

// });

**EVI**

// var modisEVI = ee.ImageCollection('MODIS/006/MOD13Q1')

// .filterDate('2022-06-01', '2022-10-15')

// .select('EVI')

// .filterBounds(roi);

// var maskedEVI = modisEVI.map(function(image) {

// return AgriMask(image);

// });

// // Visualize the masked NDVI image

// Map.centerObject(roi, 8);

// Map.addLayer(maskedEVI.mean().multiply(0.0001).clip(roi), {palette: ['green']}, 'EVI Map');

// // Export the masked NDVI image to Google Drive

// Export.image.toDrive({

// image: maskedEVI.mean().multiply(0.0001),

// description: 'masked\_evi\_export', // Set your desired description here

// folder: 'GEE\_exports', // Set the folder name in your Google Drive

// region: roi.geometry()

// });

// // Create a FeatureCollection from the data table

// var featureCollection = ee.FeatureCollection(dataTable.slice(1).map(function(row) {

// return ee.Feature(null, {

// 'District': row[0],

// 'Year': row[1],

// 'Mean EVI': row[2]

// });

// }));

// // Export the data table to Google Drive

// Export.table.toDrive({

// collection: featureCollection,

// description: 'GujaratDistrictsMeanEVI',

// folder: 'IIRS\_M\_4\_DATA', // Set the folder name here

// fileFormat: 'CSV'

// });

**FAPAR**

/ var modisFPAR = ee.ImageCollection('MODIS/006/MCD15A3H')

// .filterDate('2022-06-01', '2022-10-15')

// .select('Fpar')

// .filterBounds(roi);

// var maskedFPAR = modisFPAR.map(function(image) {

// return AgriMask(image);

// });

// // Visualize the masked FPAR image

// Map.centerObject(roi, 8);

// Map.addLayer(maskedFPAR.mean().multiply(0.1).clip(roi), {palette: ['RED']}, 'FPAR Map');

// // Export the masked NDVI image to Google Drive

// Export.image.toDrive({

// image: maskedFPAR.mean().multiply(0.1),

// description: 'masked\_FPAR\_export', // Set your desired description here

// folder: 'GEE\_exports', // Set the folder name in your Google Drive

// region: roi.geometry()

// });

// // Create a FeatureCollection from the data table

// var featureCollection = ee.FeatureCollection(dataTable.slice(1).map(function(row) {

// return ee.Feature(null, {

// 'District': row[0],

// 'Year': row[1],

// 'Mean FPAR': row[2]

// });

// }));

// // Export the data table to Google Drive

// Export.table.toDrive({

// collection: featureCollection,

// description: 'GujaratDistrictsMeanFPAR',

// folder: 'IIRS\_M\_4\_DATA', // Set the folder name here

// fileFormat: 'CSV'

// });

**GPP**

// var modisGPP = ee.ImageCollection('MODIS/006/MOD17A2H')

// .filterDate('2022-06-01', '2022-10-15')

// .select('Gpp')

// .filterBounds(roi);

// var maskedGPP = modisGPP.map(function(image) {

// return AgriMask(image);

// });

// // Visualize the masked FPAR image

// Map.centerObject(roi, 8);

// Map.addLayer(maskedGPP.mean().multiply(0.0001).clip(roi), {palette: ['BLUE']}, 'GPP Map');

// // Export the masked NDVI image to Google Drive

// Export.image.toDrive({

// image: maskedGPP.mean().multiply(0.0001),

// description: 'masked\_GPP\_export', // Set your desired description here

// folder: 'GEE\_exports', // Set the folder name in your Google Drive

// region: roi.geometry()

// });

// // Create a FeatureCollection from the data table

// var featureCollection = ee.FeatureCollection(dataTable.slice(1).map(function(row) {

// return ee.Feature(null, {

// 'District': row[0],

// 'Year': row[1],

// 'Mean GPP': row[2]

// });

// }));

// // Export the data table to Google Drive

// Export.table.toDrive({

// collection: featureCollection,

// description: 'GujaratDistrictsMeanGPP',

// folder: 'IIRS\_M\_4\_DATA', // Set the folder name here

// fileFormat: 'CSV'

// });

**LAI**

// var modisLAI = ee.ImageCollection('MODIS/006/MCD15A3H')

// .filterDate('2022-06-01', '2022-10-15')

// .select('Lai')

// .filterBounds(roi);

// var maskedLAI = modisLAI.map(function(image) {

// return AgriMask(image);

// });

// // Visualize the masked LAI image

// Map.centerObject(roi, 8);

// Map.addLayer(maskedLAI.mean().multiply(0.0001).clip(roi), {palette: ['VIOLET']}, 'LAI Map');

// // Export the masked LAI image to Google Drive

// Export.image.toDrive({

// image: maskedLAI.mean().multiply(0.0001),

// description: 'masked\_LAI\_export', // Set your desired description here

// folder: 'GEE\_exports', // Set the folder name in your Google Drive

// region: roi.geometry()

// });

// // Create a FeatureCollection from the data table

// var featureCollection = ee.FeatureCollection(dataTable.slice(1).map(function(row) {

// return ee.Feature(null, {

// 'District': row[0],

// 'Year': row[1],

// 'Mean LAI': row[2]

// });

// }));

// // Export the data table to Google Drive

// Export.table.toDrive({

// collection: featureCollection,

// description: 'GujaratDistrictsMeanLAI',

// folder: 'IIRS\_M\_4\_DATA', // Set the folder name here

// fileFormat: 'CSV'

// });

**RAINFALL**

// var CHIRPSRAINFALL = ee.ImageCollection('UCSB-CHG/CHIRPS/DAILY')

// .filterDate('2022-06-01', '2022-10-15')

// .select('precipitation')

// .filterBounds(roi);

// var maskedRAINFALL = CHIRPSRAINFALL.map(function(image) {

// return AgriMask(image);

// });

// // Visualize the masked FPAR image

// Map.centerObject(roi, 8);

// Map.addLayer(maskedRAINFALL.mean().multiply(30).clip(roi), {palette: ['VIOLET']}, 'RAINFALL Map');

// // Export the masked NDVI image to Google Drive

// Export.image.toDrive({

// image: maskedRAINFALL.mean().multiply(30),

// description: 'masked\_RAINFALL\_export', // Set your desired description here

// folder: 'GEE\_exports', // Set the folder name in your Google Drive

// region: roi.geometry()

// });

// // Create a FeatureCollection from the data table

// var featureCollection = ee.FeatureCollection(dataTable.slice(1).map(function(row) {

// return ee.Feature(null, {

// 'District': row[0],

// 'Year': row[1],

// 'Mean Rainfall (mm)': row[2]

// });

// }));

// // Export the data table to Google Drive

// Export.table.toDrive({

// collection: featureCollection,

// description: 'GujaratDistrictsMeanRainfall\_CHIRPS',

// folder: 'IIRS\_M\_4\_DATA', // Set the folder name here

// fileFormat: 'CSV'

// });

**LST**

// var modisLST = ee.ImageCollection('MODIS/006/MOD11A2')

// .filterDate('2022-06-01', '2022-10-15')

// .select('LST\_Day\_1km')

// .filterBounds(roi);

// var maskedLST = modisLST.map(function(image) {

// return AgriMask(image);

// });

// // Visualize the masked FPAR image

// Map.centerObject(roi, 8);

// Map.addLayer(maskedLST.mean().multiply(0.02).clip(roi), {palette: ['VIOLET']}, 'LST Map');

// // Export the masked NDVI image to Google Drive

// Export.image.toDrive({

// image: maskedLST.mean().multiply(0.02),

// description: 'masked\_LST\_export', // Set your desired description here

// folder: 'GEE\_exports', // Set the folder name in your Google Drive

// region: roi.geometry()

// });

// // Create a FeatureCollection from the data table

// var featureCollection = ee.FeatureCollection(dataTable.slice(1).map(function(row) {

// return ee.Feature(null, {

// 'District': row[0],

// 'Year': row[1],

// 'Mean Temperature (C)': row[2]

// });

// }));

// // Export the data table to Google Drive

// Export.table.toDrive({

// collection: featureCollection,

// description: 'GujaratDistrictsMeanTemperature',

// folder: 'IIRS\_M\_4\_DATA', // Set the folder name here

// fileFormat: 'CSV'

// });

**SMI**

// var districts = ['Jamnagar', 'Junagadh', 'Rajkot', 'Amreli', 'Bhavnagar'];

// var startDate = '2000-01-01';

// var endDate = '2022-10-15';

// // Initialize the data table with headers

// var dataTable = [['District', 'Year', 'Soil Moisture Index']];

// // Loop over each year, district, and calculate mean soil moisture

// for (var year = 2000; year <= 2022; year++) {

// for (var i = 0; i < districts.length; i++) {

// var district = districts[i];

// // Filter SMAP soil moisture by date, district, and region of interest

// var smapSoilMoisture = ee.ImageCollection('NASA\_USDA/HSL/SMAP\_soil\_moisture')

// .filterDate(startDate, endDate)

// .filterBounds(roi)

// .map(AgriMask);

// // Calculate the mean soil moisture for the district

// var meanSoilMoisture\_district = smapSoilMoisture.mean();

// // Reduce region to get the mean soil moisture value

// var districtMeanSoilMoisture = meanSoilMoisture\_district.reduceRegion({

// reducer: ee.Reducer.mean(),

// geometry: roi.filter(ee.Filter.eq('district', district)).geometry(),

// scale: 1000 // Adjusted to 1 km resolution (SMAP resolution)

// });

// // Calculate the Soil Moisture Index (SMI) using a formula

// var smi = ee.Number(districtMeanSoilMoisture.get('ssm')).subtract(0.1); // Assuming 'ssm' is the soil moisture band

// // Add data to the data table

// dataTable.push([district, year, smi]);

// }

// }

// // Create a FeatureCollection from the data table

// var featureCollection = ee.FeatureCollection(dataTable.slice(1).map(function(row) {

// return ee.Feature(null, {

// 'District': row[0],

// 'Year': row[1],

// 'Soil Moisture Index': row[2]

// });

// }));

// // Export the data table to Google Drive

// Export.table.toDrive({

// collection: featureCollection,

// description: 'GujaratDistrictsSMI',

// folder: 'IIRS\_M\_4\_DATA', // Set the folder name here

// fileFormat: 'CSV'

//  });

// // Apply the AgriMask function to the MODIS TEMPERATURE dataset

// var maskedSoilMoisture = smapSoilMoisture.map(AgriMask);

// // Get the maximum value of the masked images

// var maxAgriMask = maskedSoilMoisture.max();

// // Visualize the agricultural mask layer by selecting a single band

// Map.addLayer(maxAgriMask.select('ssm'), {palette: ['RED']}, 'Agricultural Mask');

// // Center the map on the ROI

// Map.centerObject(roi, 8);

// // Export the image to Google Drive

// Export.image.toDrive({

// image: maxAgriMask.toFloat(), // Convert to float to avoid export issues

// description: 'masked\_SMI\_export', // Description for the exported image

// folder: 'GEE\_exports', // Specify the folder in your Google Drive where you want to save the image

// region: roi.geometry(), // Region of interest

// crs: 'EPSG:4326', // Coordinate Reference System

// maxPixels: 1e12 // Maximum number of pixels allowed

// });