



# Land Use Land Cover Data

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Data Analytics and Research Team  
Houston Galveston Area Council

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# Agenda

01 Introduction

02 Methodology

03 Application Development

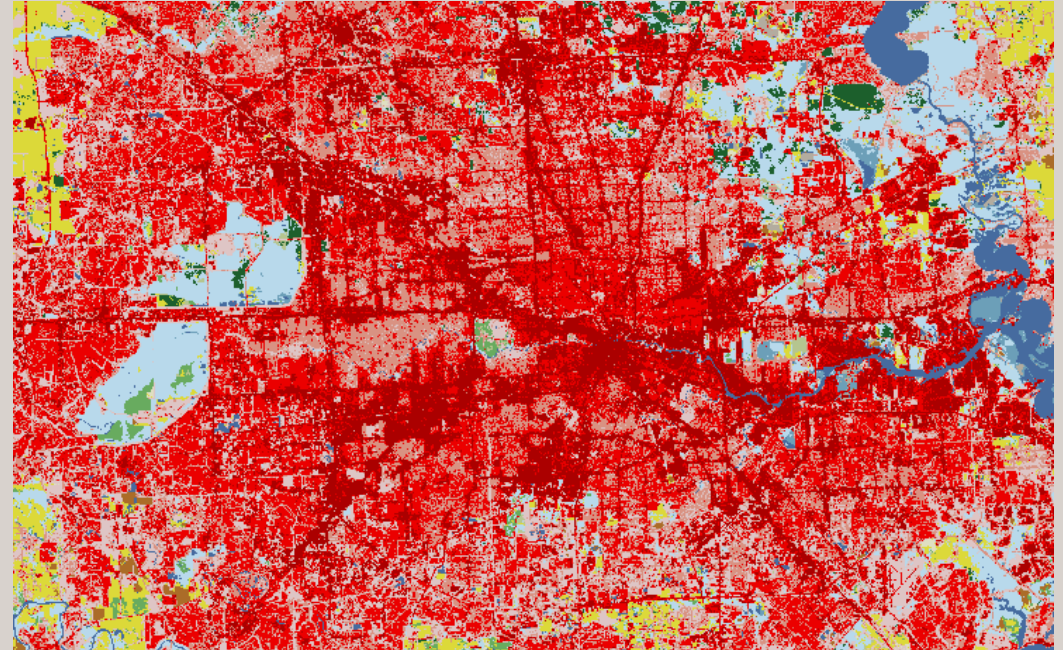
# 01 Introduction

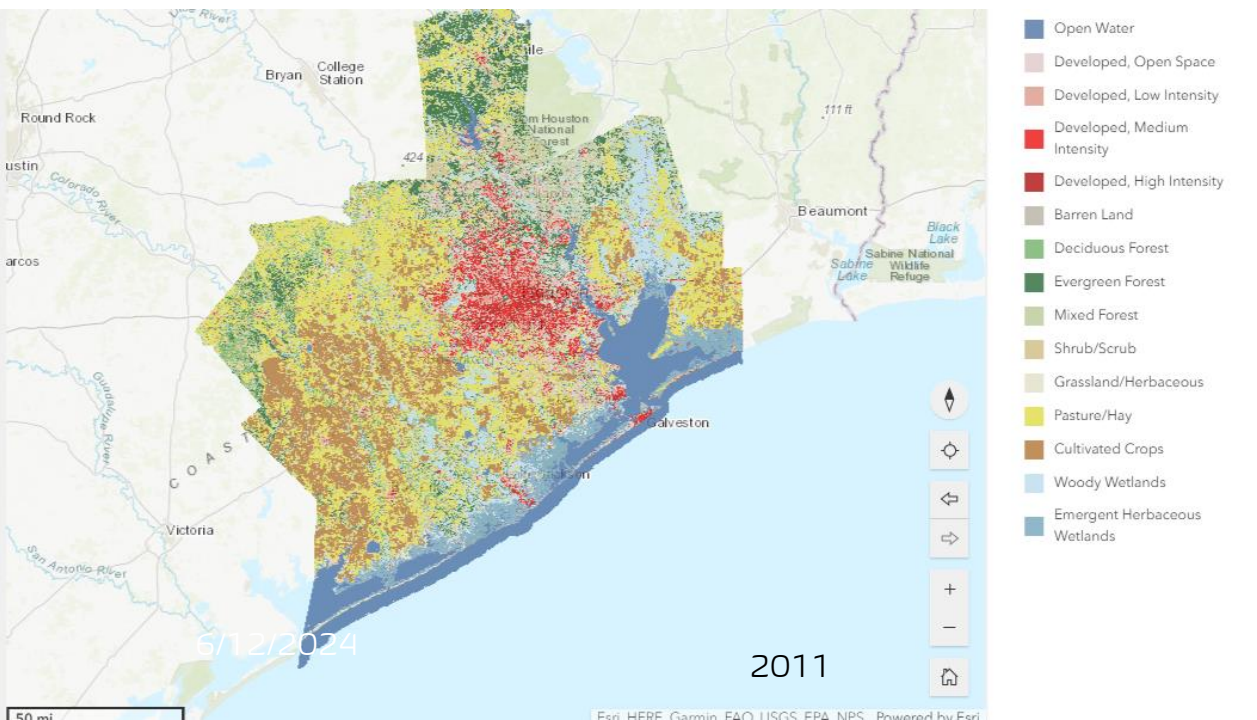
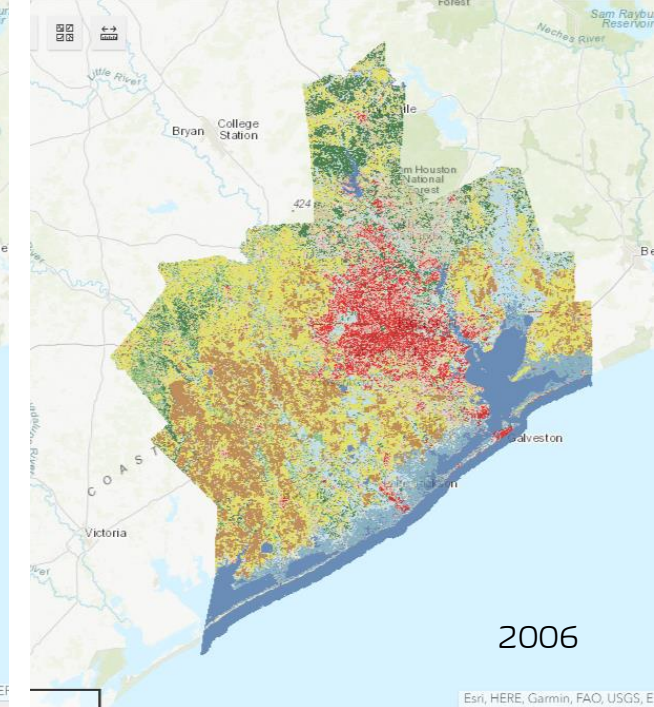
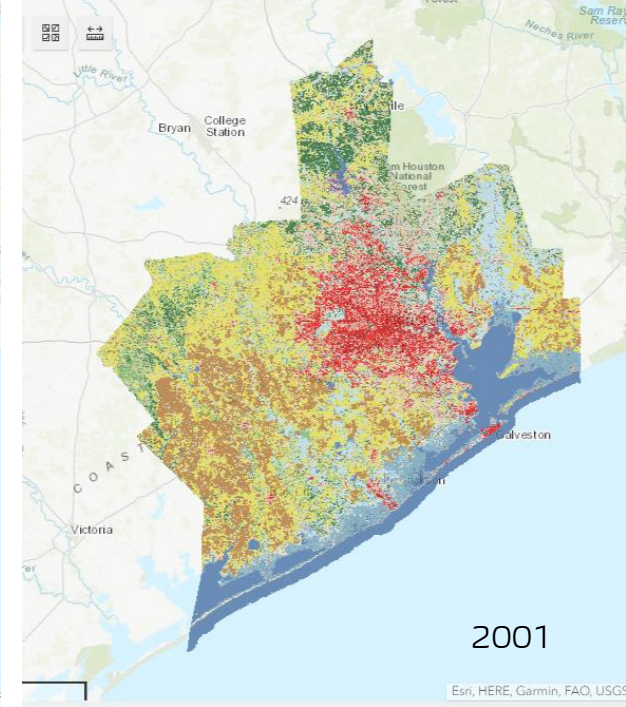
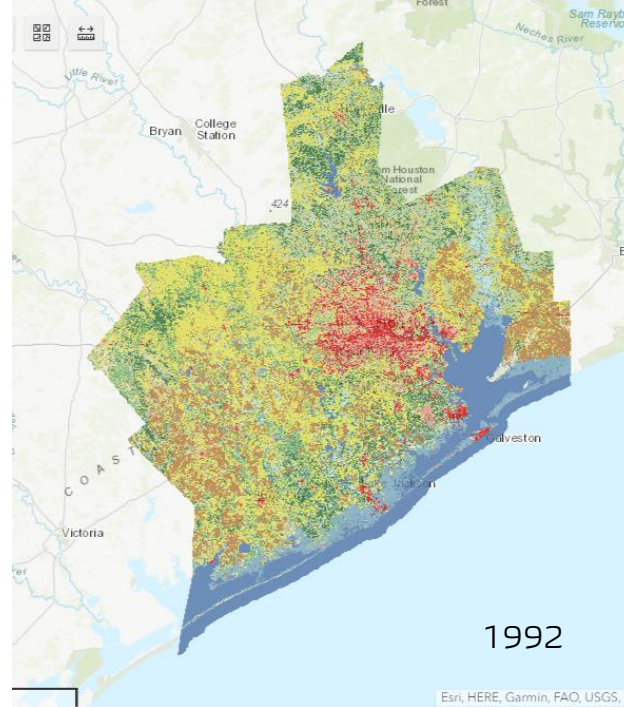
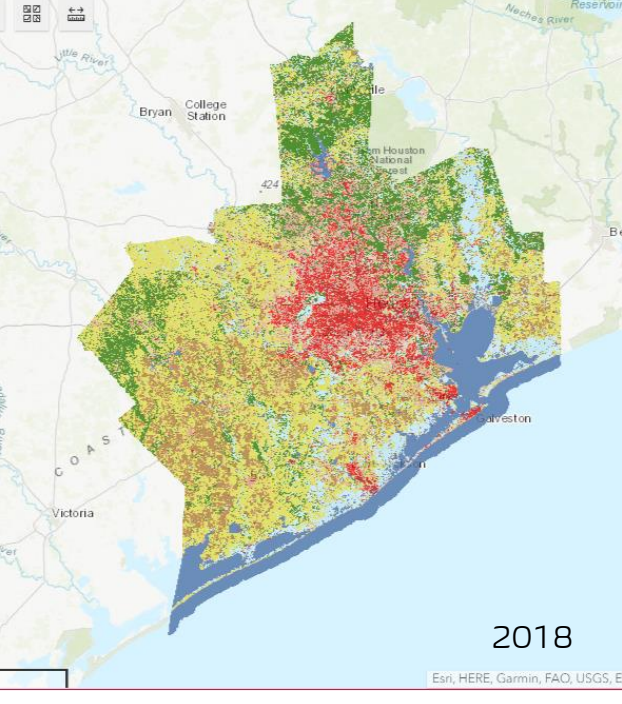
H-GAC region consists of **13 counties**

**Land cover data** is an important element in understanding the **dynamics** of the H-GAC region

Data used **are**

- **National Oceanic and Atmospheric Administration Coastal Change Analysis Program (NOAA C-CAP),**
- **National Land Cover Database (NLCD) from United States Geological Services (USGS) and,**
- **Land cover classification** data created by DAR, H-GAC

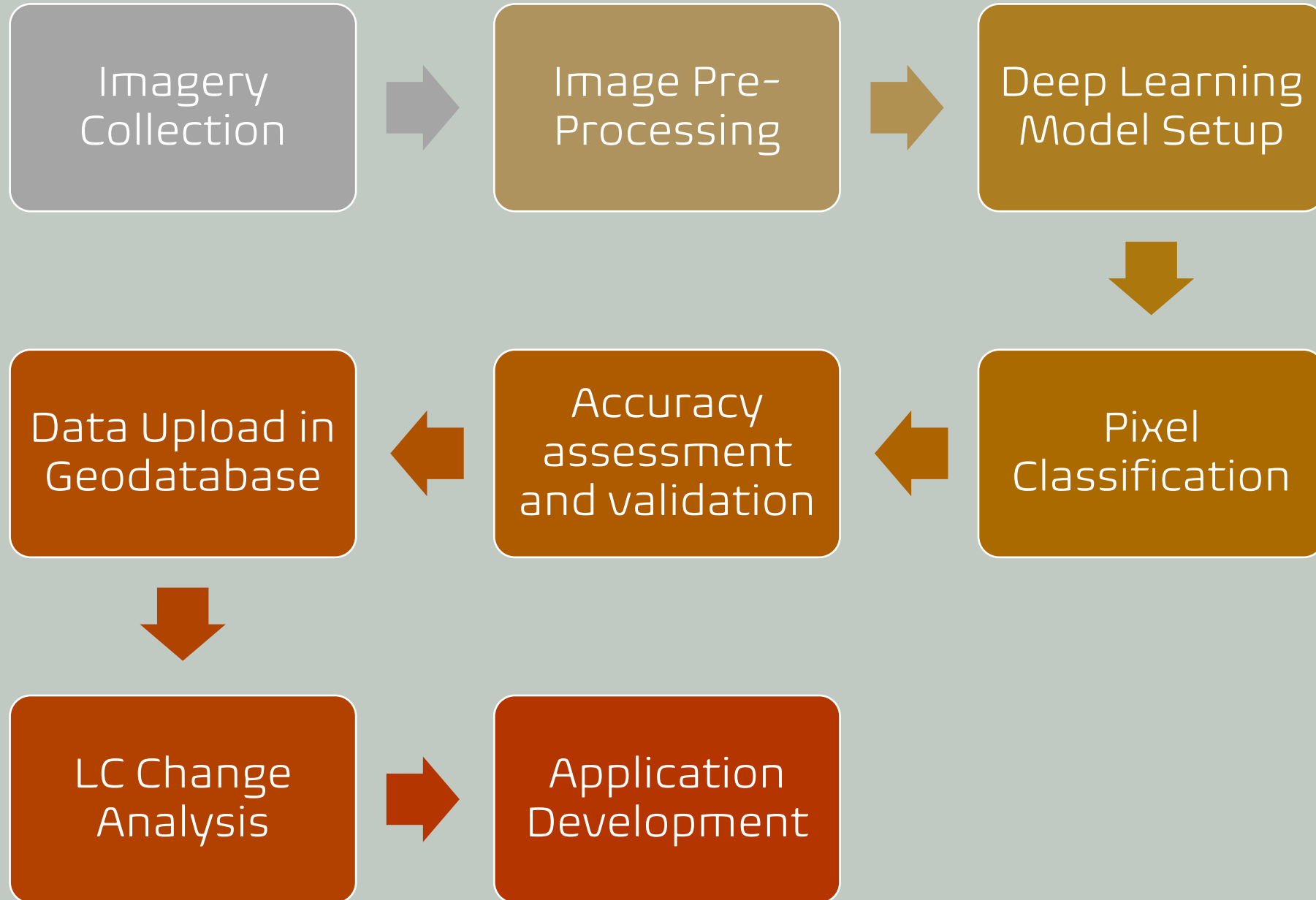




## Methodology (1992-2018)

- Data downloaded from NLCD and NOAA website
- Resampled to match the latest land use land cover classification based on NLCD requirements

# 02 Methodology (2020-2022)





**Landsat 1** July 1972 – January 1978

**Landsat 2** January 1975 – July 1983

**Landsat 3** March 1978 – September 1983

**Landsat 4** July 1982 – December 1993

**Landsat 5** March 1984 – January 2013

**Landsat 6** October 1993

**Landsat 7** April 1999 –

**Landsat 8** February 2013 –

**Landsat 9** 2021

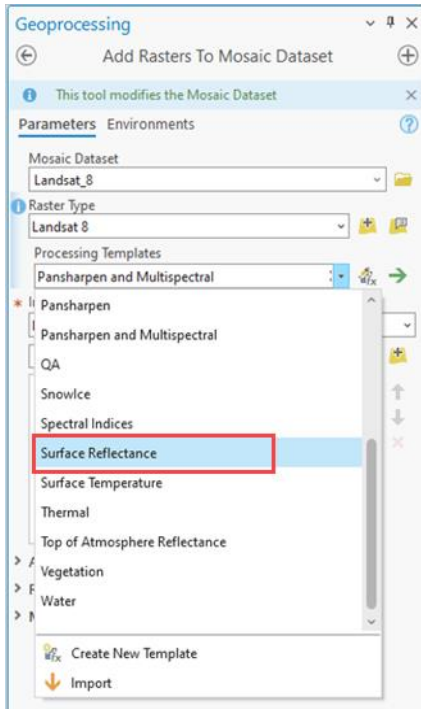
**Landsat Next** 2030

Resolution: 15-meter panchromatic and 30-meter multi-spectral spatial resolutions

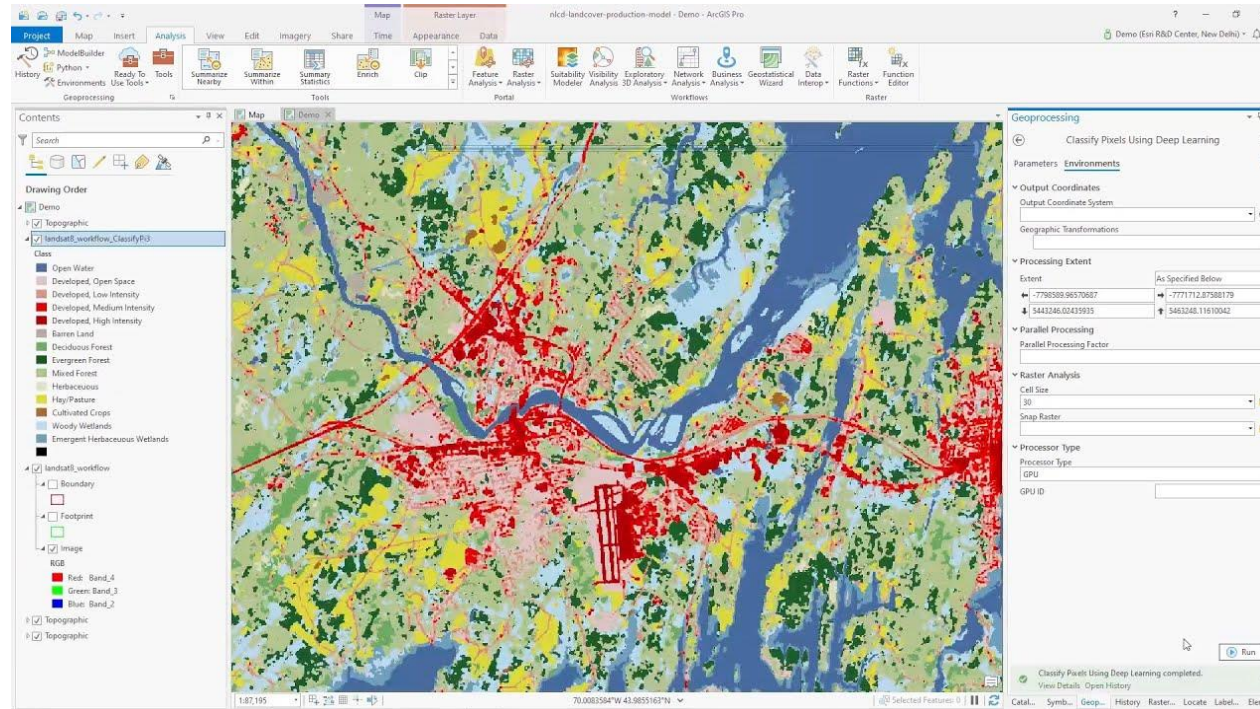
Temporal Resolution: 16 days

# ArcGIS deep learning model

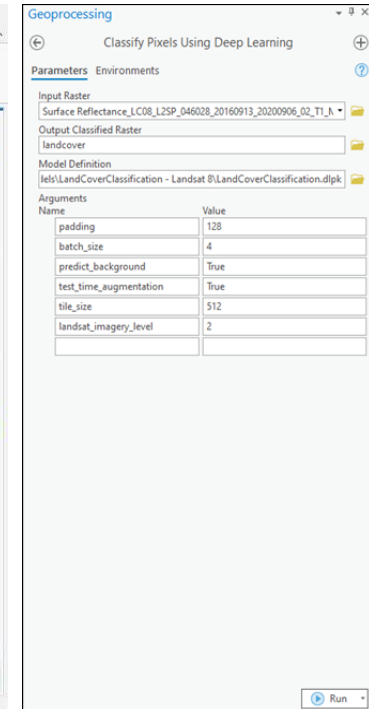
## Image Pre-processing



## Pixel Classification



## Deep Learning Model Setup

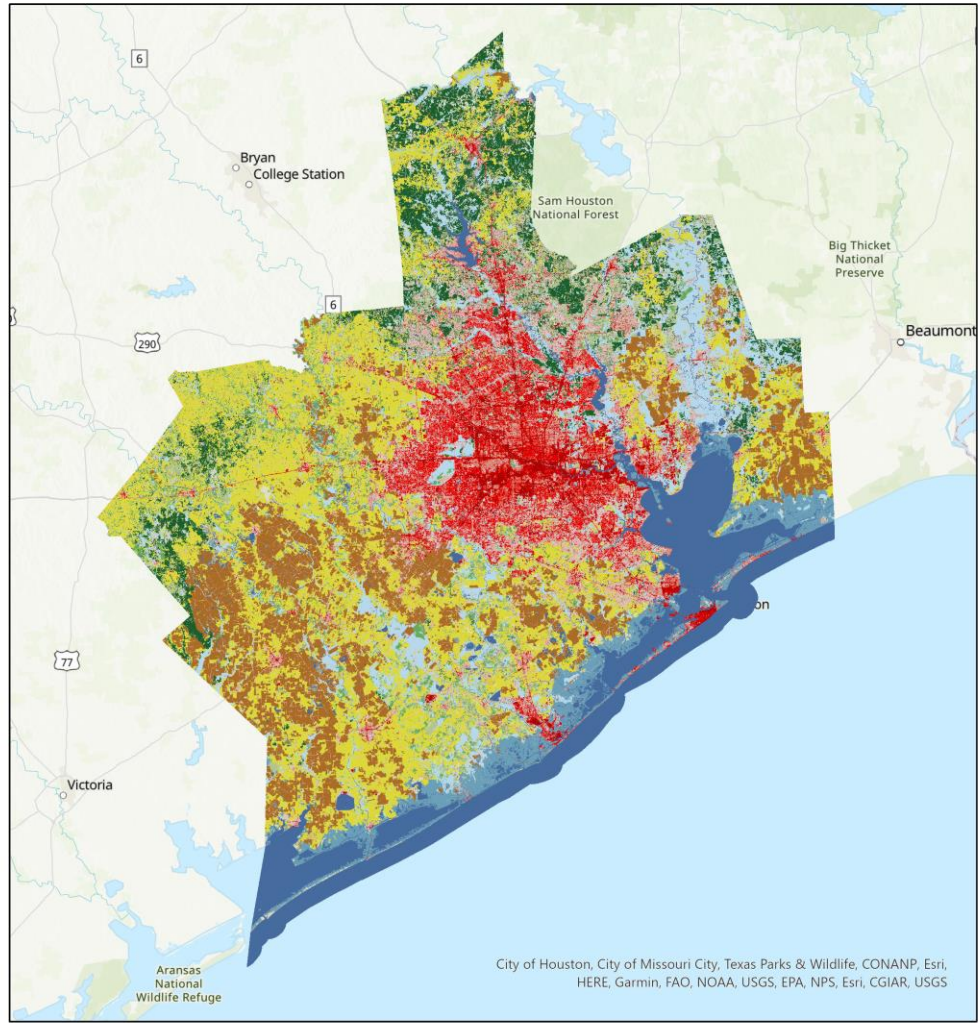


# Accuracy Assessment and Corrections

- Performed using kappa statistics
- Used ancillary data for improving the accuracy of the land cover classification
- Used pixel editor to edit misclassified pixels



# Land Use Land Cover Map of 2022



City of Houston, City of Missouri City, Texas Parks & Wildlife, CONANP, Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS, Esri, CGIAR, USGS

Data Source:  
Landsat 8 mission

Software:  
ArcGIS Pro  
Deep Learning Model

Created by:  
DAR, HGAC



### Legend

LULCC 2022	
Value	
Blue	Open Water
Light Pink	Developed, Open Space
Light Red	Developed, Low Intensity
Red	Developed, Medium Intensity
Dark Red	Developed High Intensity
Grey	Barren Land
Green	Deciduous Forest
Dark Green	Evergreen Forest
Light Green	Mixed Forest
Yellow-Green	Shrub/Scrub
Yellow	Grassland/Herbaceous
Light Yellow	Pasture/Hay
Orange	Cultivated Crops
Light Blue	Woody Wetlands
Dark Blue	Emergent Herbaceous Wetlands

# Data created for the application

1992_2001_2006	11/8/2023 10:57 AM
1992_2011_2022	11/14/2023 4:16 PM
featureClassesforSheet	11/8/2023 9:31 AM
1992_2001	11/8/2023 10:00 AM
1992_2022	11/8/2023 10:43 AM
2001_2011	11/8/2023 11:02 AM
2001_2022	11/8/2023 10:54 AM
Copy of Master_landcoverTransition	11/15/2023 12:06 PM
Master_Change_Spreadsheet	11/14/2023 10:54 AM
Master_LandCoverInformation	11/14/2023 11:04 AM
Master_landcoverTransition	11/14/2023 11:13 AM
namingConvention	11/8/2023 8:53 AM

gridcode	NAME	Class_From	Class_To	Class_name	AreaSqM
0	Austin County	Open Water	Open Water	Open Water->Open Water	3.198756917
0	Brazoria County	Open Water	Open Water	Open Water->Open Water	197.6016987
0	Chambers County	Open Water	Open Water	Open Water->Open Water	263.3005529
0	Colorado County	Open Water	Open Water	Open Water->Open Water	6.455816633
0	Fort Bend County	Open Water	Open Water	Open Water->Open Water	9.774847318
0	Galveston County	Open Water	Open Water	Open Water->Open Water	470.1543649
0	Harris County	Open Water	Open Water	Open Water->Open Water	46.24963785
0	Liberty County	Open Water	Open Water	Open Water->Open Water	7.253759657
0	Matagorda County	Open Water	Open Water	Open Water->Open Water	490.8384361
0	Montgomery County	Open Water	Open Water	Open Water->Open Water	31.4211807
0	Walker County	Open Water	Open Water	Open Water->Open Water	8.932602936
0	Waller County	Open Water	Open Water	Open Water->Open Water	3.146381581
0	Wharton County	Open Water	Open Water	Open Water->Open Water	3.142282308
1	Austin County	Open Water	Developed, Open Space	Open Water->Developed, Open Space	0.086639899
1	Brazoria County	Open Water	Developed, Open Space	Open Water->Developed, Open Space	0.419829213
1	Chambers County	Open Water	Developed, Open Space	Open Water->Developed, Open Space	0.103646535
1	Colorado County	Open Water	Developed, Open Space	Open Water->Developed, Open Space	0.097693668
1	Fort Bend County	Open Water	Developed, Open Space	Open Water->Developed, Open Space	0.34324127
1	Galveston County	Open Water	Developed, Open Space	Open Water->Developed, Open Space	0.689510325
1	Harris County	Open Water	Developed, Open Space	Open Water->Developed, Open Space	0.505251165
1	Liberty County	Open Water	Developed, Open Space	Open Water->Developed, Open Space	0.027844526
1	Matagorda County	Open Water	Developed, Open Space	Open Water->Developed, Open Space	0.401160409
1	Montgomery County	Open Water	Developed, Open Space	Open Water->Developed, Open Space	0.174013531
1	Walker County	Open Water	Developed, Open Space	Open Water->Developed, Open Space	0.020959422
1	Waller County	Open Water	Developed, Open Space	Open Water->Developed, Open Space	0.002046175
1	Wharton County	Open Water	Developed, Open Space	Open Water->Developed, Open Space	0.163236635
2	Austin County	Open Water	Developed, Low Intensity	Open Water->Developed, Low Intensity	0.060558231
2	Brazoria County	Open Water	Developed, Low Intensity	Open Water->Developed, Low Intensity	0.239957124
2	Chambers County	Open Water	Developed, Low Intensity	Open Water->Developed, Low Intensity	0.080213593
2	Colorado County	Open Water	Developed, Low Intensity	Open Water->Developed, Low Intensity	0.002757832
2	Fort Bend County	Open Water	Developed, Low Intensity	Open Water->Developed, Low Intensity	0.161139822
2	Galveston County	Open Water	Developed, Low Intensity	Open Water->Developed, Low Intensity	0.519555498
2	Harris County	Open Water	Developed, Low Intensity	Open Water->Developed, Low Intensity	0.349566318
2	Liberty County	Open Water	Developed, Low Intensity	Open Water->Developed, Low Intensity	0.153599026
2	Matagorda County	Open Water	Developed, Low Intensity	Open Water->Developed, Low Intensity	0.244149598
2	Montgomery County	Open Water	Developed, Low Intensity	Open Water->Developed, Low Intensity	0.302680795
2	Walker County	Open Water	Developed, Low Intensity	Open Water->Developed, Low Intensity	0.052978849

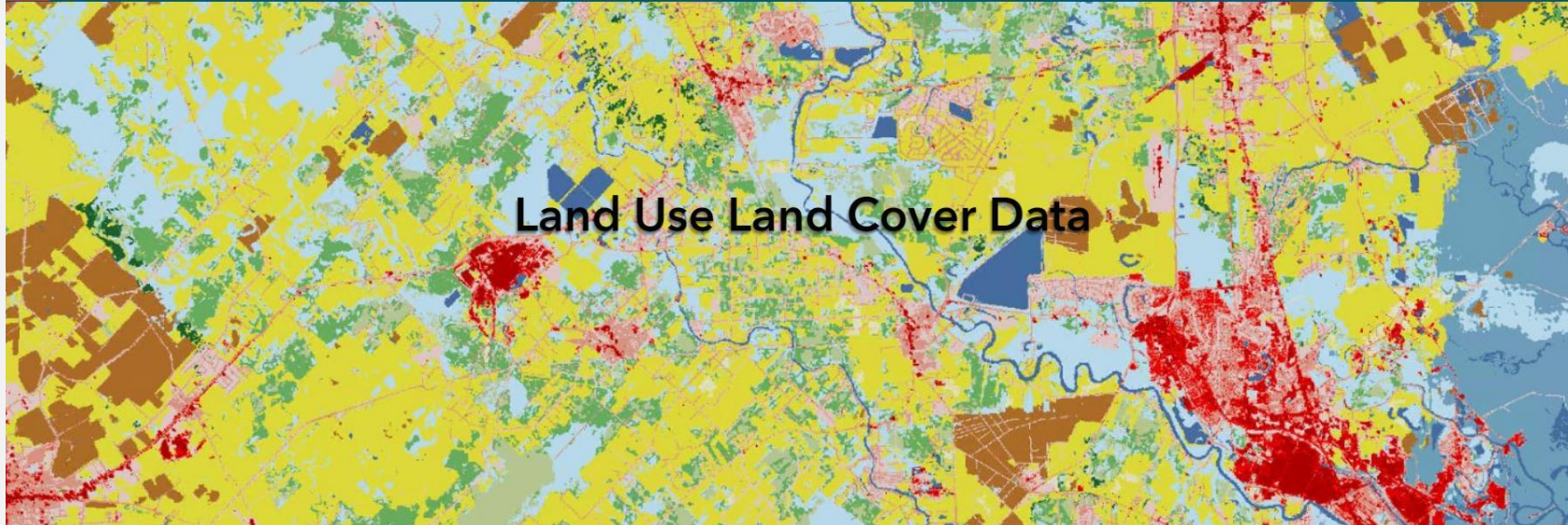


Land Cover Images

Land Cover Change

Technical Document

[Application Home Page](#)



Welcome to the application, offering access to the Houston-Galveston Area Council's (H-GAC) Land Use Land Cover (LULC) data. Leveraging advanced satellite imagery processing and data analysis techniques, it delivers detailed analysis, including change detection. The application's use of cutting-edge methods ensures accurate interpretation, providing profound insights into the region's diverse land cover through interactive maps and charts. Indispensable for urban planners, environmentalists, researchers, and anyone interested in understanding the dynamics of the area's land cover, this tool is essential for gaining actionable insights.

# 03 Application Development