



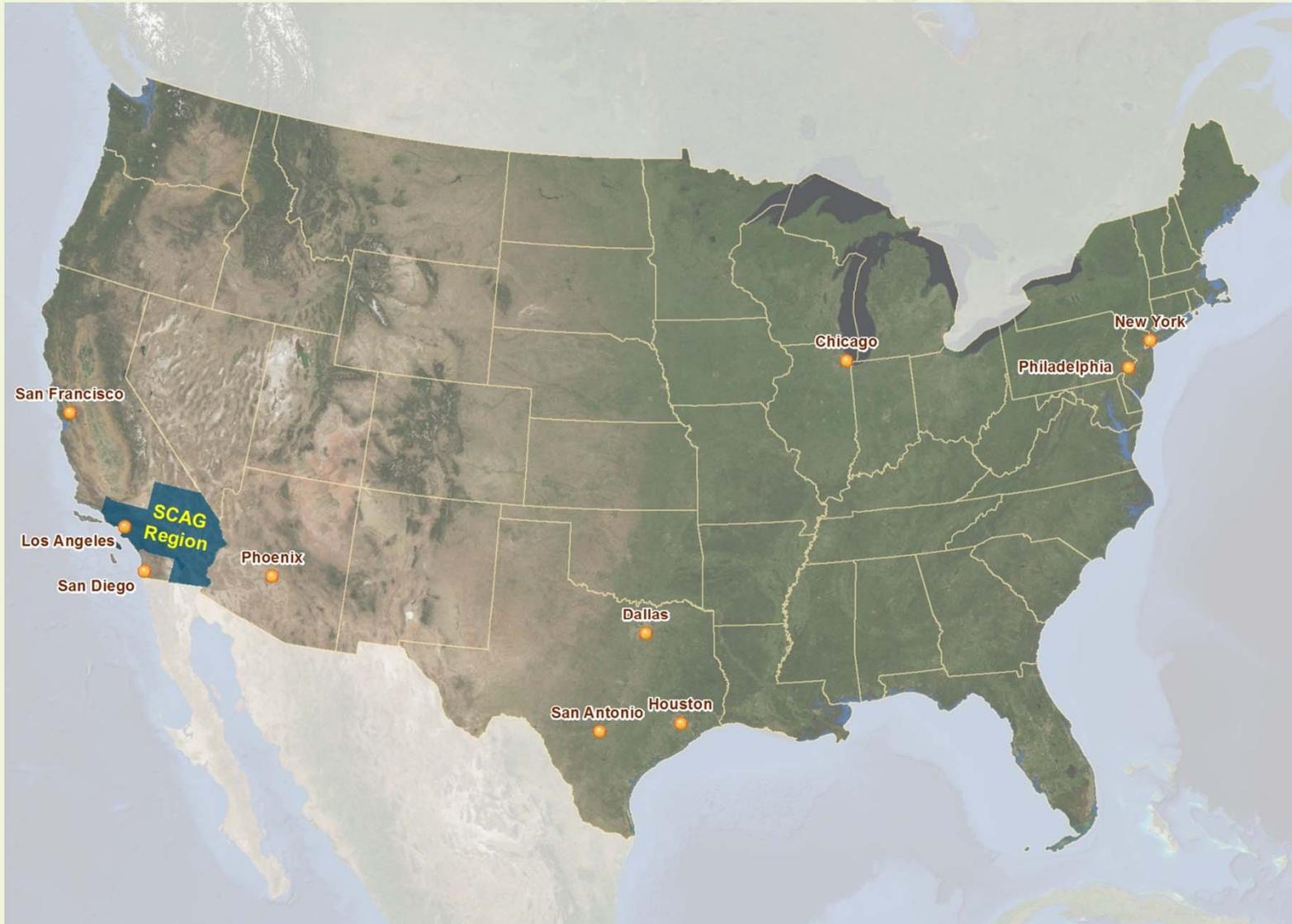
Visualization of LODES/OnTheMap Work Destination Data Using GIS and Statistical applications

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Research & Analysis
Southern California Association of Governments

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Southern California Association of Governments (SCAG)



SCAG Quick Facts

Nation's largest Metropolitan Planning Organization (MPO)

6 counties and 191 cities

18 million people within 38,000+ square miles

GDP in 2012: \$890 Billion
(16th largest economy in the world)

Overview

- Background
- Objectives
- Methodology
- Results
- Conclusions

SCAG's Local Profiles

- Planning data reports prepared for each city and county within the SCAG Region.
- Provides local jurisdictions with a resource for local data and analysis.

Profile of the City of Long Beach

Southern California Association of Governments' (SCAG) Regional Council includes 67 districts which represent 191 cities in the SCAG region. SCAG Regional Council Districts 29 and 30 include Avalon and Long Beach. Represented by: Hon. Steven Neal and Hon. James Johnson



This profile report was prepared by the Southern California Association of Governments and shared with the City of Long Beach. SCAG provides local governments with services including planning data and information, technical and planning assistance (i.e. GIS training and growth visioning), and analyzing the impacts of infill development.

May 2013
Southern California Association of Gov

2012 STATISTICAL SUMMARY

Category	Long Beach	Los Angeles County	Long Beach relative to Los Angeles County*	SCAG Region
2012 Population	464,662	9,864,632	[4.7%]	18,242,331
2012 Median Age (Years)	34.3	35.6	-1.3	35.2
2012 Hispanic	42.0%	48.5%	-6.5%	46.4%
2012 Non-Hispanic White	28.6%	27.1%	1.5%	32.1%
2012 Non-Hispanic Asian	12.7%	13.9%	-1.2%	12.4%
2012 Non-Hispanic Black	12.6%	8.0%	4.6%	6.3%
2012 Non-Hispanic American Indian	-.3%	-.2%	-.1%	-.2%
2012 Non-Hispanic All Other	3.9%	2.4%	1.5%	2.5%
2012 Number of Households	163,623	3,240,575	[5%]	5,870,003
2012 Average Household Size	2.8	3.0	-0.2	3.1
2012 Median Household Income (\$)	49,808	53,880	-4,072	57,465
2012 Number of Housing Units	176,131	3,454,092	[5.1%]	6,356,479
2012 Homeownership Rate	41.5%	54.3%	-12.8%	54.3%
2012 Median Existing Home Sales Price (\$)	299,000	330,000	-31,000	323,000
2011 - 2012 Median Home Sales Price Change	3.1%	4.8%	-1.7%	6.4%
2012 Drive Alone to Work	75.9%	75.3%	-.6%	77.8%
2012 Mean Travel Time to Work (minutes)	31	32	-1	31.4
2012 Number of Jobs	165,186	4,209,116	[3.9%]	7,462,957
2011 - 2012 Total Job Change	2,009	54,513	[3.7%]	109,491
2011 Average Salary per Job (\$)	44,520	50,666	-6,146	49,468
2012 K-12 Public School Student Enrollment	73,500	1,569,933	4.7%	3,096,034

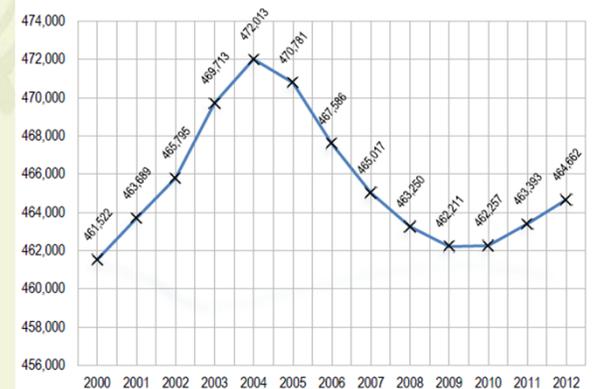
Sources: U.S. Census Bureau; Nielsen Co.; California Department of Finance; MDA Data Quick; and SCAG
* Numbers with [] represent Long Beach's share of Los Angeles County. The other numbers represent the difference between Long Beach and Los Angeles County.
Mapped jurisdictional boundaries are as of July 1, 2012 and are for visual purposes only. Report data, however, is updated according to their respective sources.

SCAG's Local Profiles (cont.)

- Current and historical demographic, socio-economic, housing, transportation and education data
- Information and communication resources for elected officials, business and residents.

II. Population (the City of Long Beach)* Population Growth

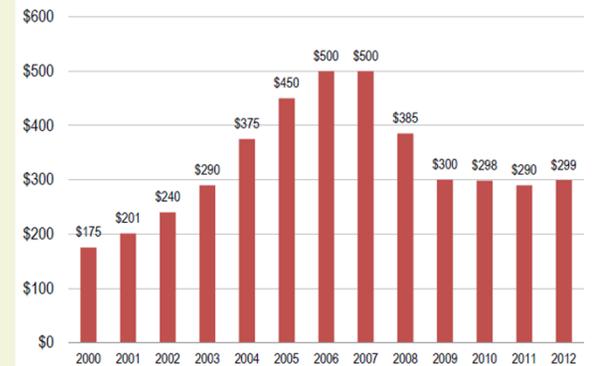
Population: 2000 - 2012



Sources: California Department of Finance, E-5, 2012

Home Sales Prices

Median Home Sales Price for Existing Homes: 2000 - 2012
(in \$ thousands)



Source: MDA Data Quick, 2012

Major Work Destinations

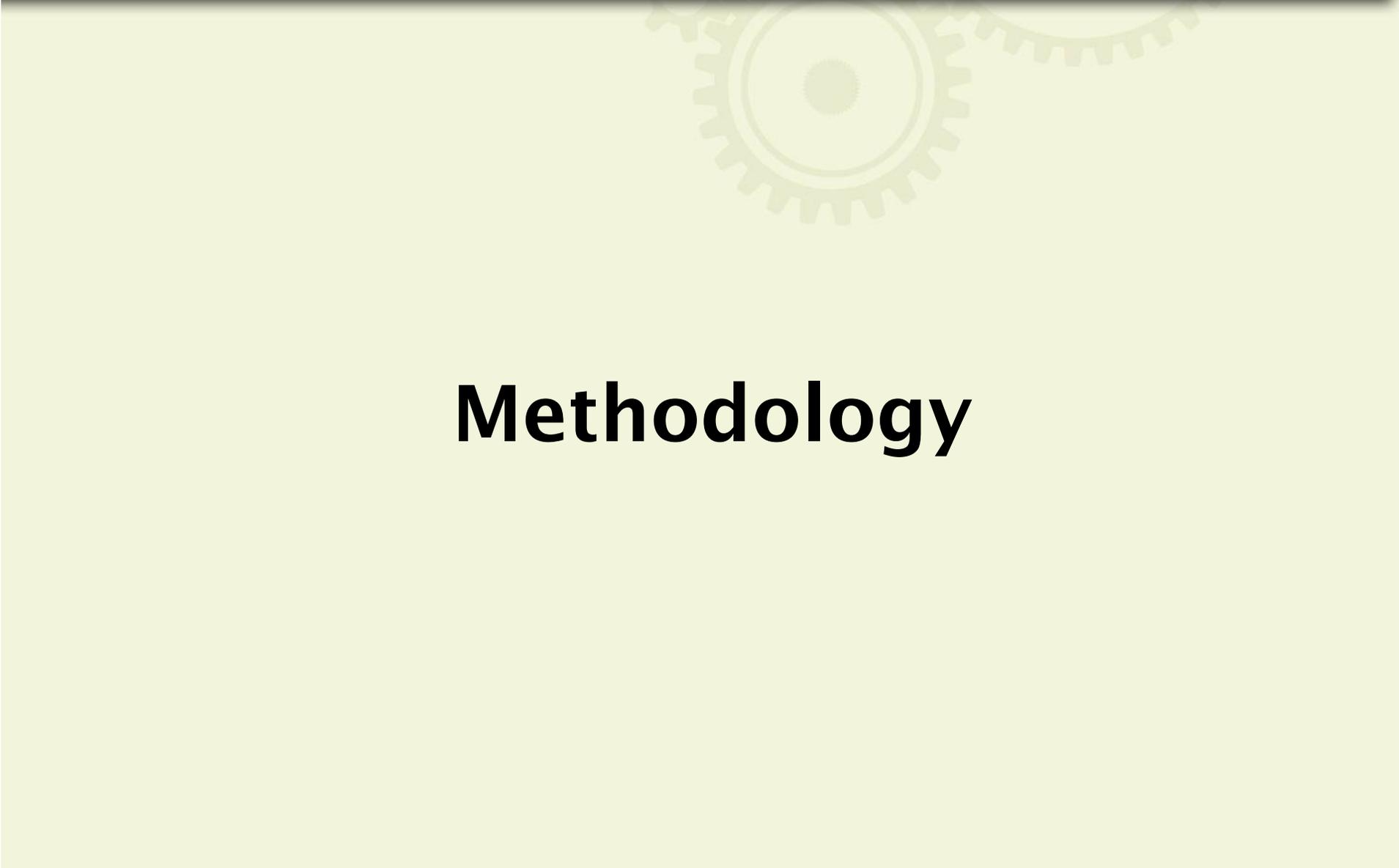
- New feature of the 2013 Local Profiles
- Top 10 locations where residents from a local jurisdiction commute to work
- Correlation with regional development patterns and the geographical location of the local jurisdictions, particularly in relation to the regional transportation system.

Objectives

- Identify the major work destinations for each jurisdiction in the SCAG region
 - 191 cities and 6 counties
- Visualize the spatial patterns of the major work destinations for each jurisdiction
 - To understand where residents of each jurisdiction are employed



Methodology

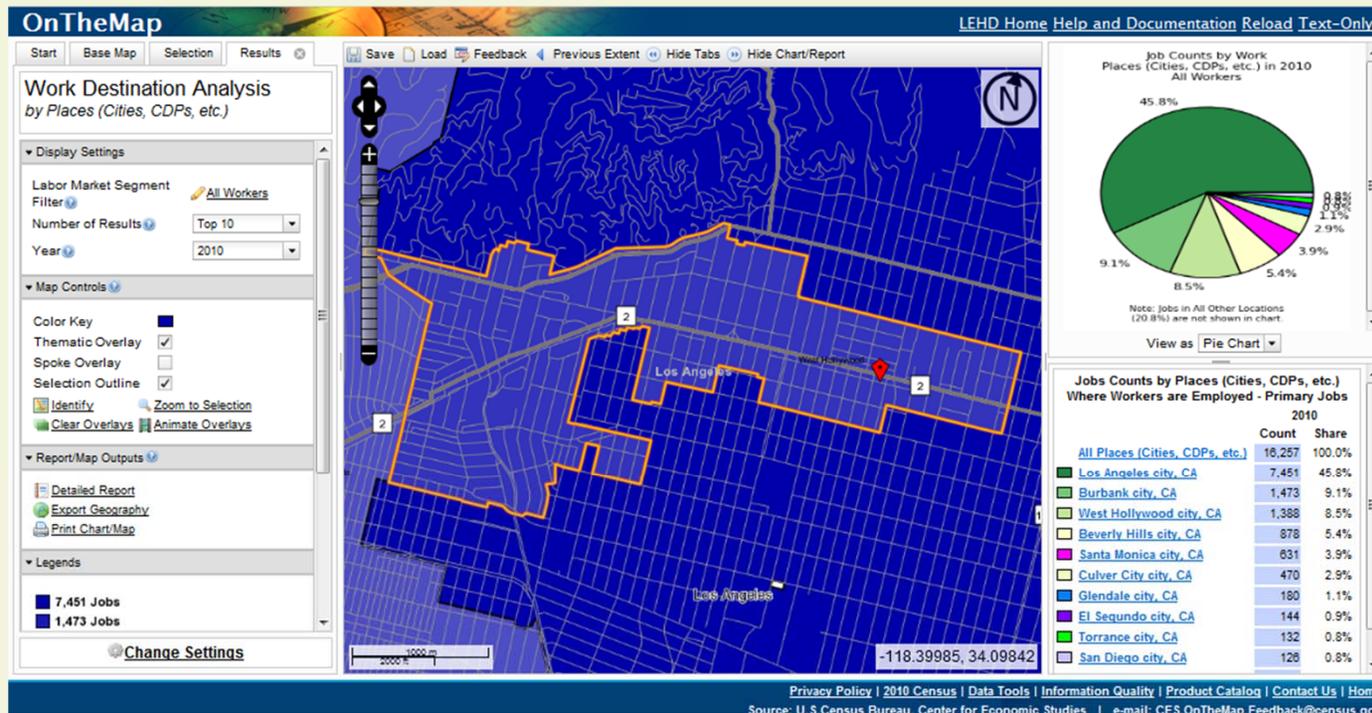


Identifying Major Work Destinations

- Using *OnTheMap* application
 - Work Destination Analysis
- Using LEHD Origin-Destination Employment Statistics (*LODES*) raw datasets
 - Available for download from LEHD website

OnTheMap Application

- Web-based mapping and reporting application



OnTheMap Application

- Web-based mapping and reporting application
- Based on 2002-2011 *LODES* data
- Easy-to-use interface
- Not able to search/download for multiple locations

LODES Raw Datasets

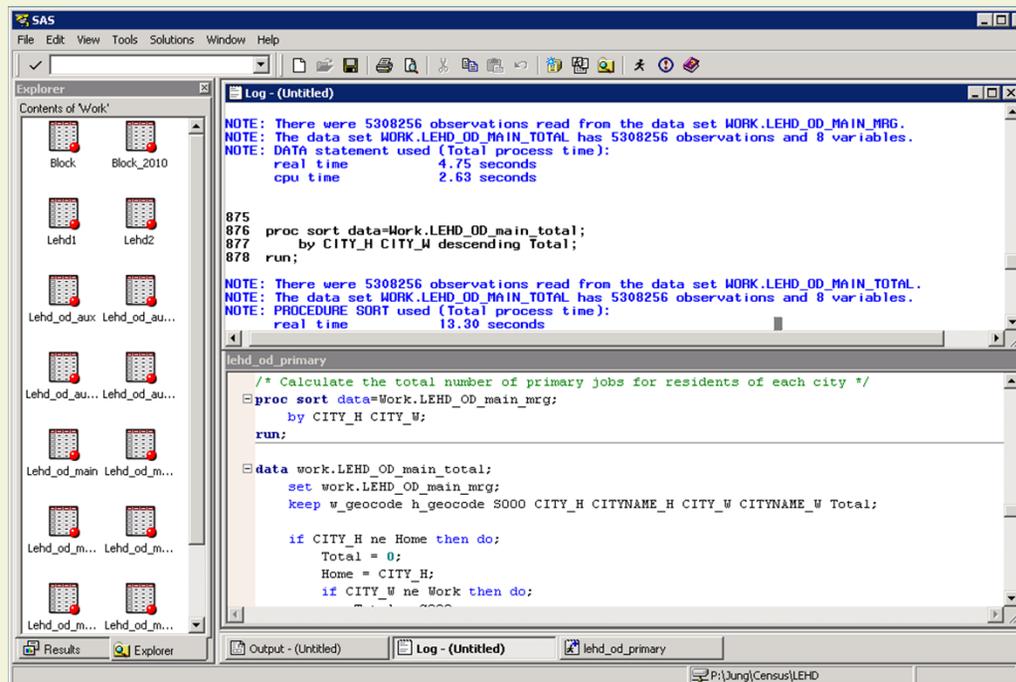
- Raw form as a set of comma separated variable (CSV) text files
 - Available for the years 2002-2010
 - State-based / 3 types (OD, RAC, WAC)
- Enumerated by census blocks
 - Version 6 by 2010 census blocks
- Data manipulation and processing

LODES Raw Datasets (cont.)

- *LODES* CA Version 6.1 (2010)
- Variables
 - Residence Census Block Code (*h_geocode*)
 - Workplace Census Block Code (*w_geocode*)
 - Total number of primary jobs (*S000*)
 - Correspondence between Census Blocks and Places

Identifying Major Work Destinations (O-D Analysis)

- Using SAS (Statistical Analysis System) to calculate the total number of jobs for each O-D at *place* level



The screenshot displays the SAS software interface. On the left, the Explorer window shows the contents of a workspace named 'Wok', including folders like 'Block', 'Lehd1', 'Lehd2', and 'Lehd_od_main'. The main window shows a log titled 'Log - (Untitled)' with the following content:

```
NOTE: There were 5308256 observations read from the data set WORK.LEHD_OD_MAIN_MRG.  
NOTE: The data set WORK.LEHD_OD_MAIN_TOTAL has 5308256 observations and 8 variables.  
NOTE: DATA statement used (Total process time):  
      real time          4.75 seconds  
      cpu time           2.63 seconds  
  
875  
876 proc sort data=Work.LEHD_OD_main_total;  
877     by CITY_H CITY_W descending Total;  
878 run;  
  
NOTE: There were 5308256 observations read from the data set WORK.LEHD_OD_MAIN_TOTAL.  
NOTE: The data set WORK.LEHD_OD_MAIN_TOTAL has 5308256 observations and 8 variables.  
NOTE: PROCEDURE SORT used (Total process time):  
      real time          13.30 seconds  
  
lehd_od_primary  
  
/* Calculate the total number of primary jobs for residents of each city */  
proc sort data=Work.LEHD_OD_main_mrg;  
  by CITY_H CITY_W;  
run;  
  
data work.LEHD_OD_main_total;  
  set work.LEHD_OD_main_mrg;  
  keep w_geocode h_geocode S000 CITY_H CITYNAME_H CITY_W CITYNAME_W Total;  
  
  if CITY_H ne Home then do;  
    Total = 0;  
    Home = CITY_H;  
    if CITY_W ne Work then do;  
      Total = 0;  
    end;  
  end;
```

Visualizing Major Work Destinations

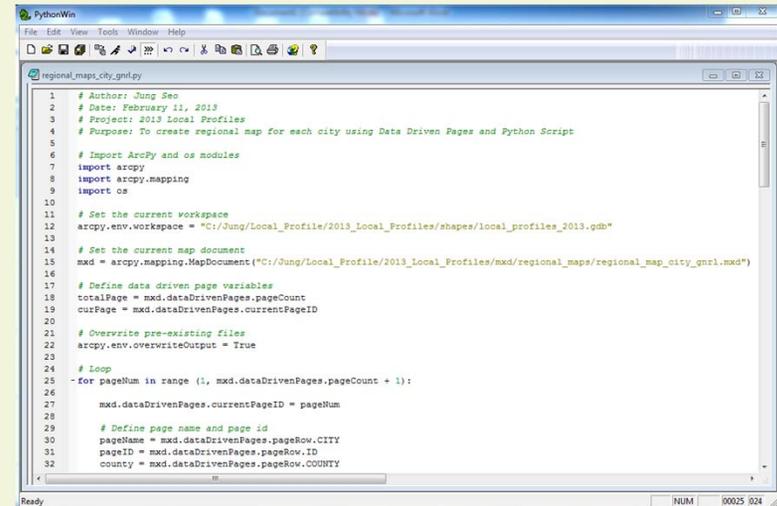
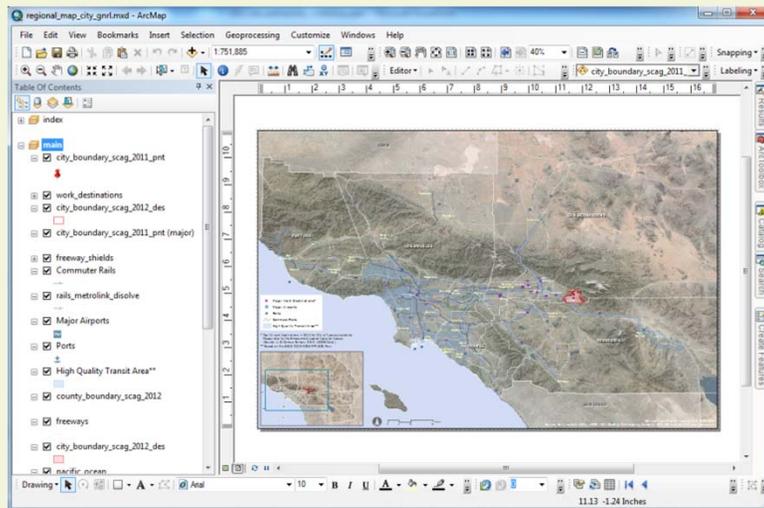
- Using *ESRI ArcGIS* application
 - *Data Driven Pages* – To create a multi-page map series from a single map document
- Using *Python* programming language
 - *Python* – Interpreted, object-oriented, high-level general-purpose programming language

ArcPy

- *Python* site package for performing GIS functions available in *ArcGIS*
 - Encompassing the *arcpy* scripting module
 - Ex) *arcpy.mapping* (mapping module)
- Useful and productive way to perform geographic data analysis, data conversion, data management, and map automation with Python

Visualizing Major Work Destinations (Automated Mapping Workflow)

- Using ArcGIS and Python to create a series of work destination maps for 191 cities and 6 counties



```
1 # Author: Jung Seo
2 # Date: February 11, 2013
3 # Project: 2013 Local Profiles
4 # Purpose: To create regional map for each city using Data Driven Pages and Python Script
5
6 # Import ArcPy and os modules
7 import arcpy
8 import arcpy.mapping
9 import os
10
11 # Set the current workspace
12 arcpy.env.workspace = "C:/Jung/Local_Profile/2013_Local_Profiles/shapes/local_profiles_2013.gdb"
13
14 # Set the current map document
15 mxd = arcpy.mapping.MapDocument("C:/Jung/Local_Profile/2013_Local_Profiles/mxd/regional_maps/regional_map_city_gnrl.mxd")
16
17 # Define data driven page variables
18 totalPage = mxd.dataDrivenPages.pageCount
19 curPage = mxd.dataDrivenPages.currentPageID
20
21 # Overwrite pre-existing files
22 arcpy.env.overwriteOutput = True
23
24 # Loop
25 -for pageNum in range (1, mxd.dataDrivenPages.pageCount + 1):
26
27     mxd.dataDrivenPages.currentPageID = pageNum
28
29     # Define page name and page id
30     pageName = mxd.dataDrivenPages.pageRow.CITY
31     pageID = mxd.dataDrivenPages.pageRow.ID
32     county = mxd.dataDrivenPages.pageRow.COUNTY
```



Results

Top 10 Work Destinations (LODES Raw Dataset)

- Identified top 10 work destinations where residents of local jurisdictions commute to work (191 cities and 6 counties), based on *LODES* raw datasets.

The screenshot shows a Microsoft Excel spreadsheet titled 'WorkDestinations_2010_Compiled_join.xlsx'. The spreadsheet contains a list of cities in column A and their corresponding destination codes in columns B through L. The data is organized into a grid with 191 rows and 11 columns of destination codes.

Top 10 Places Where Residents Commute to Work: 2010

Local Jurisdiction	Number of Commuters	Percent of Total Commuters
1. Long Beach	38,504	23.27 %
2. Los Angeles	23,371	14.13 %
3. Torrance	5,216	3.15 %
4. Carson	3,922	2.37 %
5. Anaheim	3,522	2.13 %
6. Irvine	3,428	2.07 %
7. Huntington Beach	3,113	1.88 %
8. Santa Ana	2,833	1.71 %
9. Signal Hill	2,559	1.55 %
10. Lakewood	2,463	1.49 %
Other Destinations	76,504	46.24 %

Source: U.S. Census Bureau, 2012; LODES Data; Longitudinal-Employer Household Dynamics Program

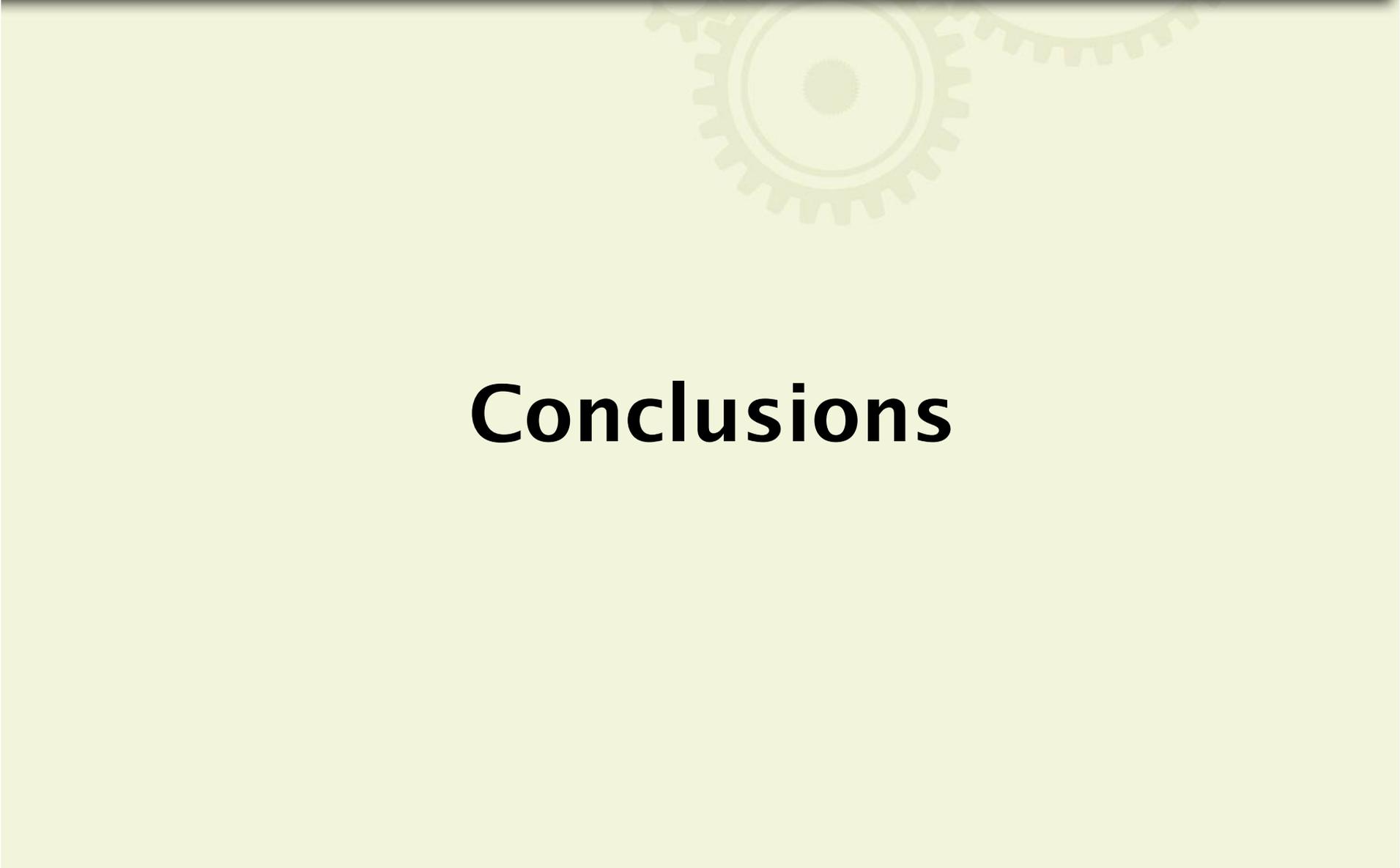
Visualization of Top 10 Work Destinations

- Created a series of maps that depict top 10 work destinations for 191 cities and 6 counties, based on automated workflow using ArcGIS and Python.





Conclusions



Conclusions

- Using LODES raw datasets with SAS, was significantly efficient in processing O-D data for numerous jurisdictions in the region.
- Automation process improved visualization workflow efficiency.
 - The workflow allows for repetitive tasks to be automated by executing programmed actions.
- Some inconsistencies were found in O-D job numbers between results from *LODES* raw datasets and results from *OnTheMap* results.

Thank you!

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