Using satellite radiometry to Develop Data for Models

H.G. LOPEZ-RUIZ, A. MUHSEN, M. YUAN, M. MORALES, N. CHASE

1. Overview of approach

2. Examples
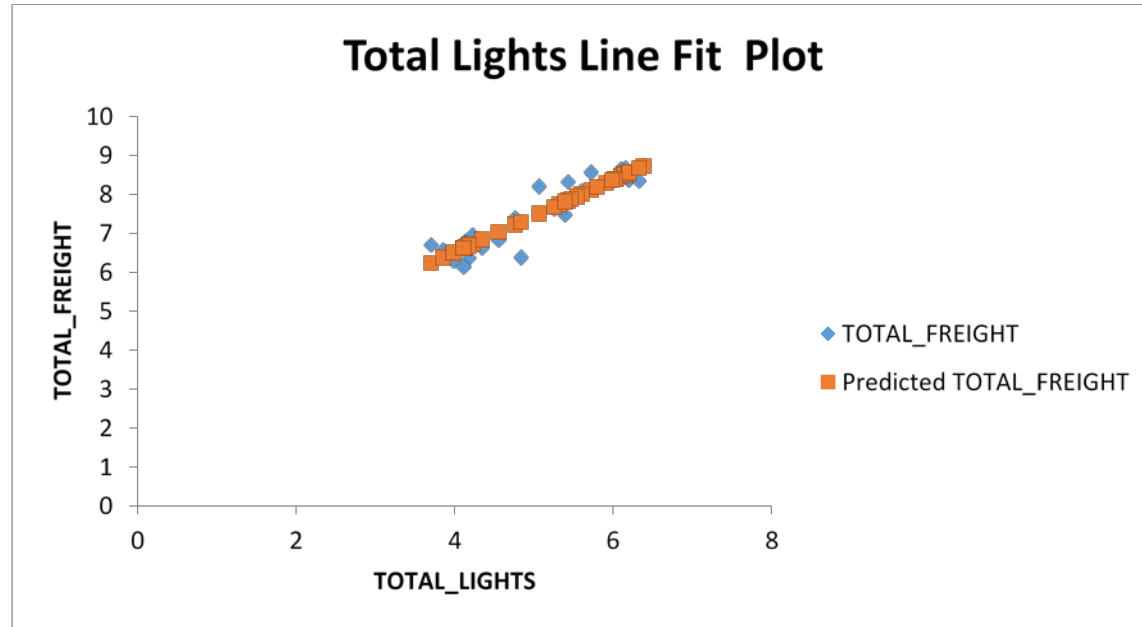   a) Estimating freight movement in China and India
   b) Going Urban: use of complimentary data
   c) Freight shipping: a World Model

3. Future work

Overview of approach

- What we needed for SOFIA-T (Simple Open Framework for Informed Assessments in Transportation):
  - Global data source
  - Open data
  - Easy to process

- How we did it:
  - Derive indicators of human and economic activity from night lights and urban form from color composites (other uses are possible)
  - Use indicators as a seed for flow estimation
  - Compliment with other open sources (Google, OSM, AIS, COMTRADE)

- How we can make it better:
  - Open Street map (amenities, roads, routing)
  - Google API (distances, speed, amenities, routing)
  - UN COMTRADE API
  - Scraping (source for massive amounts of data from public websites)
  - Social media (particularly for passenger transport)

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Results India State Level (33 Obs)

Total Lights Line Fit Plot

Regression Statistics	
Multiple R	0.93443
R Square	0.87317
Adjusted R Square	0.86908
Standard Error	0.307009

	Coefficients	Standard Error	t Stat	P-value
Intercept	2.800635	0.337298	8.303142	2.23E-09
TOTAL_LIGHTS	0.928703	0.06357	14.60921	1.91E-15

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1. Overview of approach
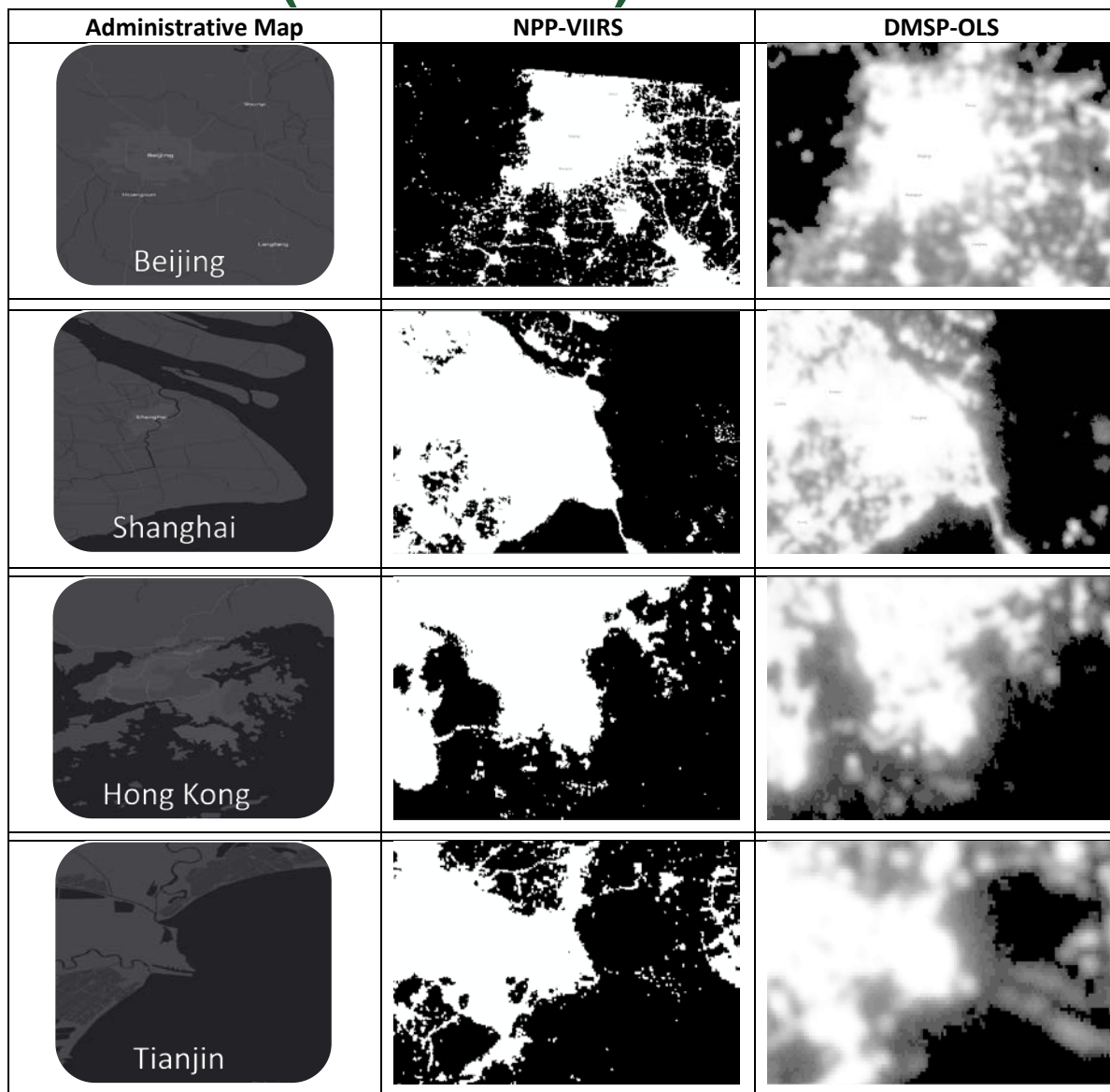2. **Examples**
   a) **Estimating freight movement in China and India**
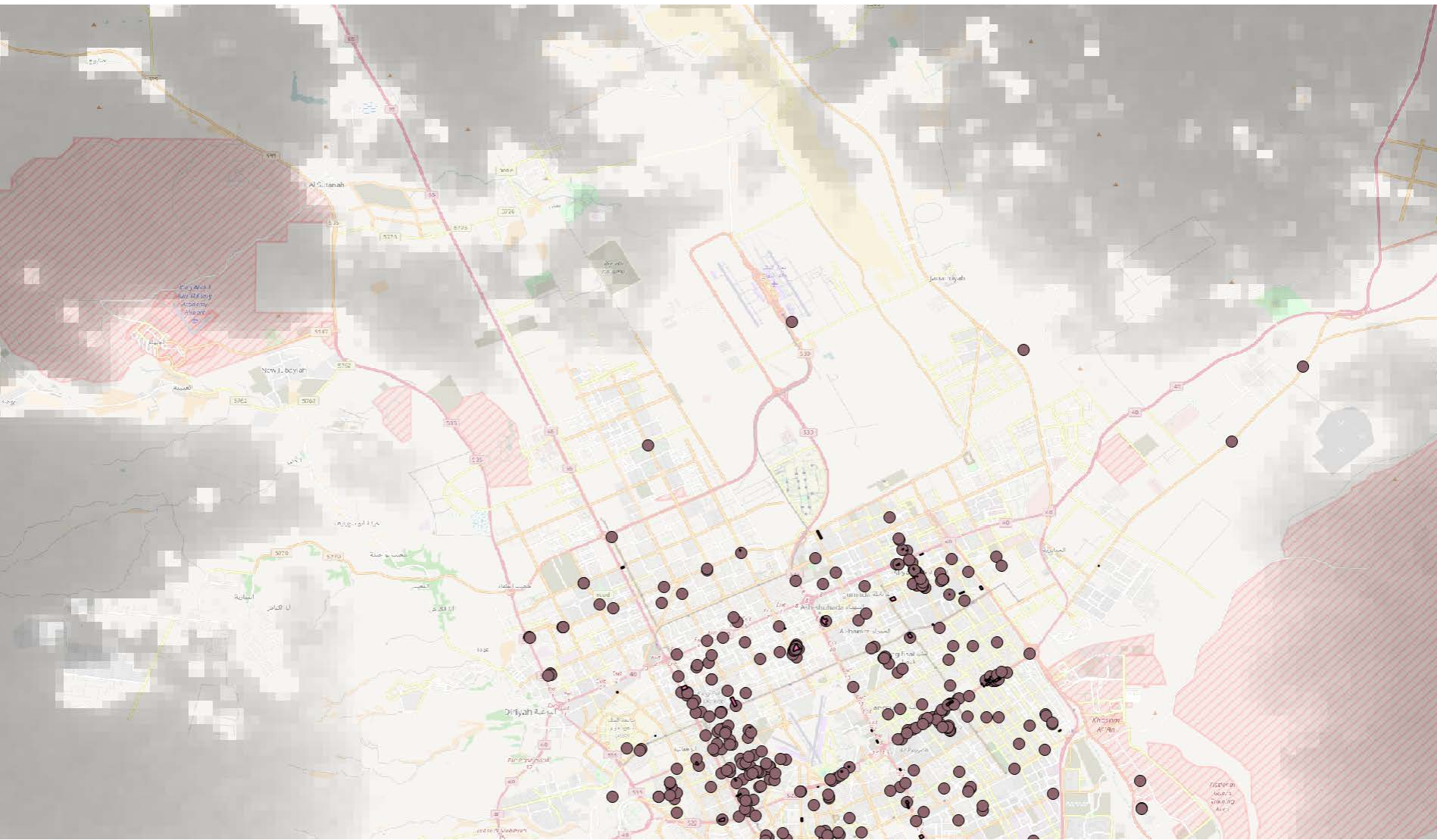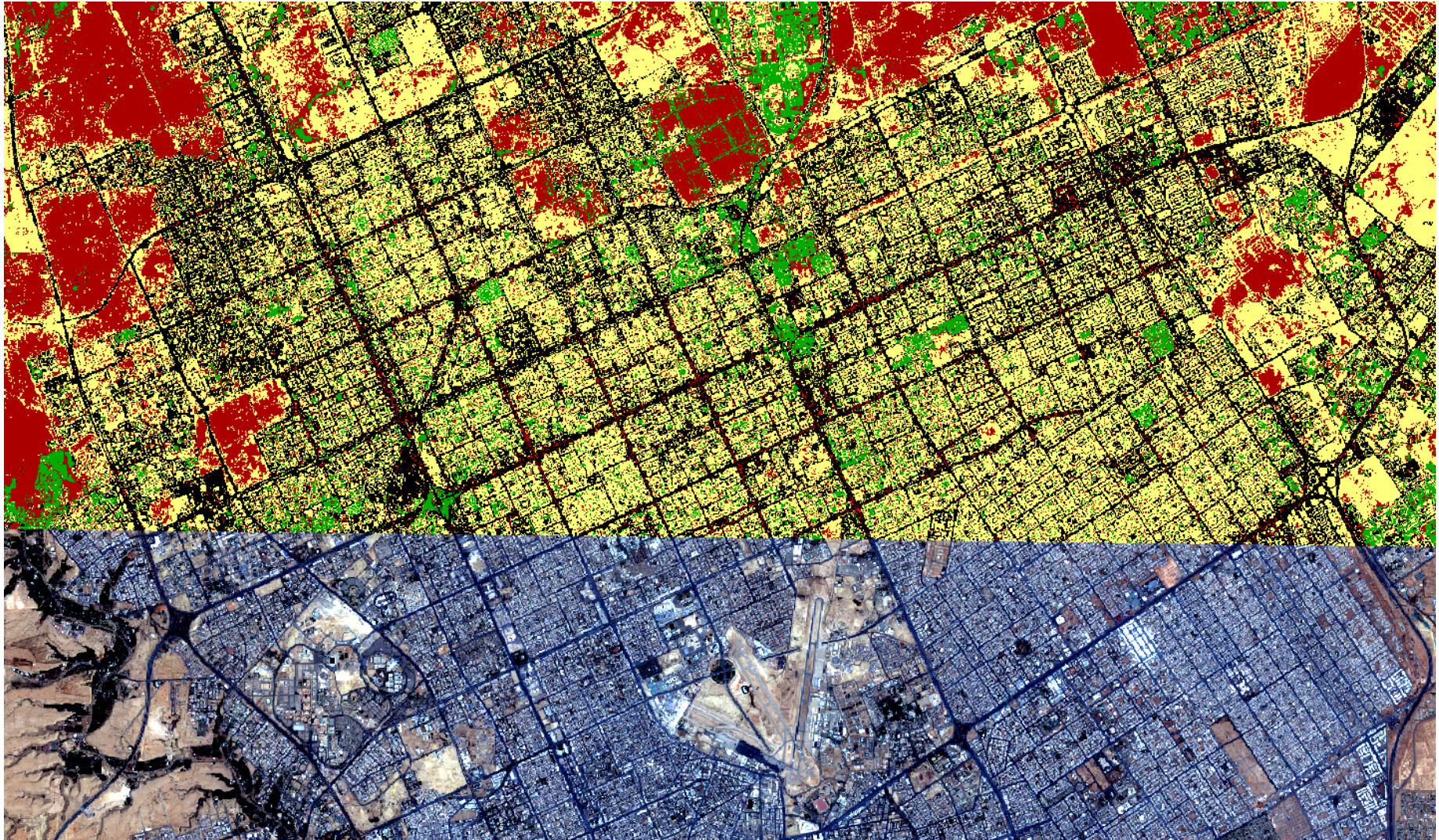   b) **Going Urban: use of complimentary data**
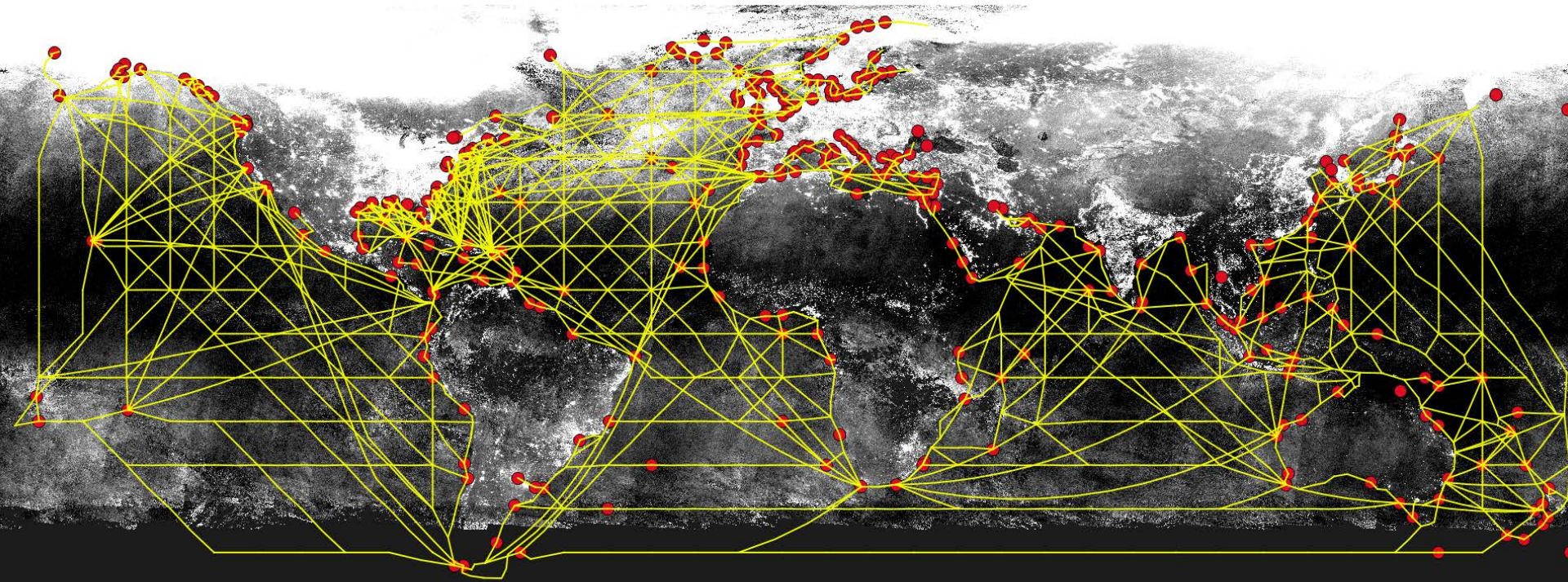   c) **Freight shipping: a World Model**
3. Future work

Night Lights China (Main Cities)

Administrative Map	NPP-VIIRS	DMSP-OLS
Beijing		
Shanghai		
Hong Kong		
Tianjin		

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1. Overview of approach
2. Examples
   a) Estimating freight movement in China and India
   b) Going Urban: use of complimentary data
   c) Freight shipping: a World Model
3. **Future work**

- Time Series – Deblurring

- Passenger and Freight Transportation ->LUTI

    Deep understanding of the interaction between residential and commercial land-use with transportation activities
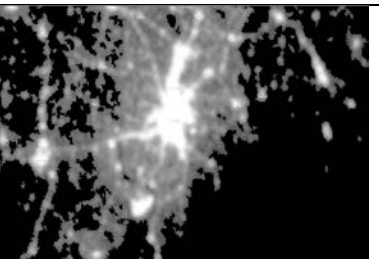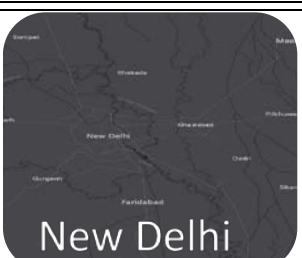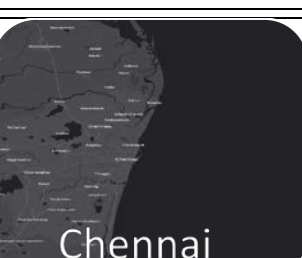
- Strategic plan for increased urban energy efficiency for major cities in Saudi Arabia.

    Sustainable Urban Mobility Plans (SUMPS) dataset (quantified effects of urban policy measures in transportation)

    +

    Analysis on the possible efficiency gains in buildings.
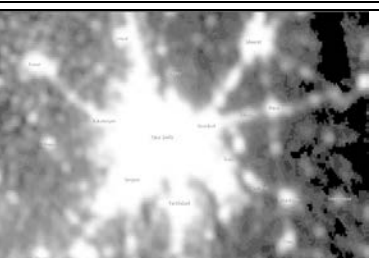
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Night Lights India (Main Cities)

Administrative Map	NPP-VIIRS	DMSP-OLS
Mumbai		
Kolkata		
New Delhi		
Chennai		

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ANNEX

Results China Province Level (31 Obs)

Total Lights Line Fit Plot
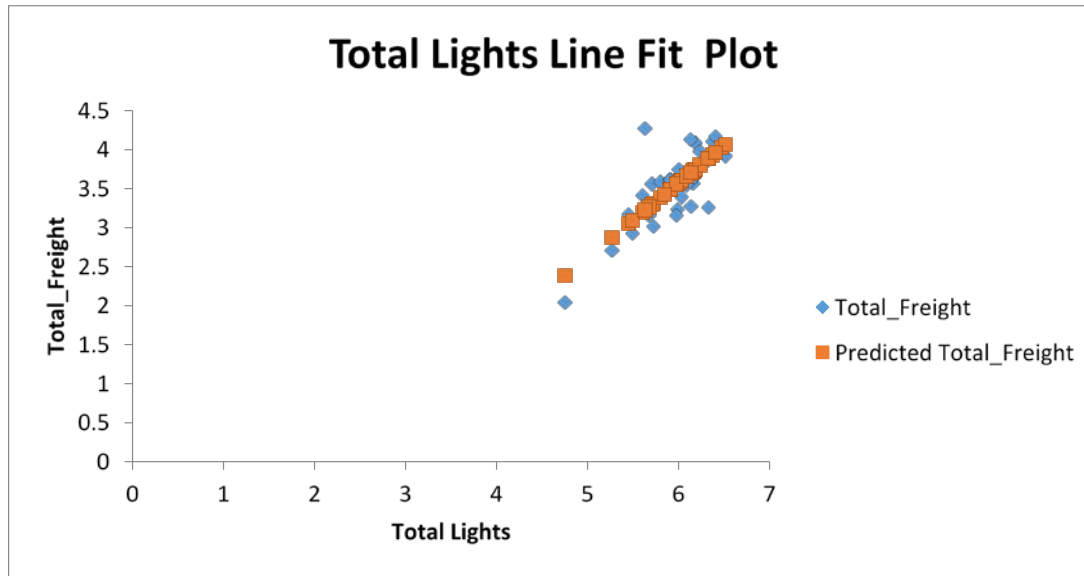
With Shanghai

Regression Statistics	
Multiple R	0.756862
R Square	0.572839
Adjusted R Square	0.55811
Standard Error	0.320369

	Coefficients	Standard Error	t Stat	P-value
Intercept	-2.14233	0.910459	-2.35302	0.025616
Total Lights	0.952868	0.152796	6.236198	8.35E-07

Without Shanghai

Regression Statistics	
Multiple R	0.845994
R Square	0.715706
Adjusted R Square	0.705553
Standard Error	0.254769

	Coefficients	Standard Error	t Stat	P-value
Intercept	-2.65042	0.733944	-3.6112	0.001179
Total Lights	1.032302	0.122954	8.395818	3.93E-09

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H.G. LOPEZ-RUIZ
hector.lopez@kapsarc.org

Dr. Hector G. LOPEZ RUIZ
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