



USC Viterbi
School of Engineering

Megacities

J. P. Bardet, Chair

Workshop on Megacities
November 10 and 11, 2008
John A. Martin & Associates, Los Angeles

Sonny Astani

Department of Civil and Environmental Engineering



1. Megacities and Challenges
2. Past Work on Megacities
3. Workshop
4. Future

Sonny Astani

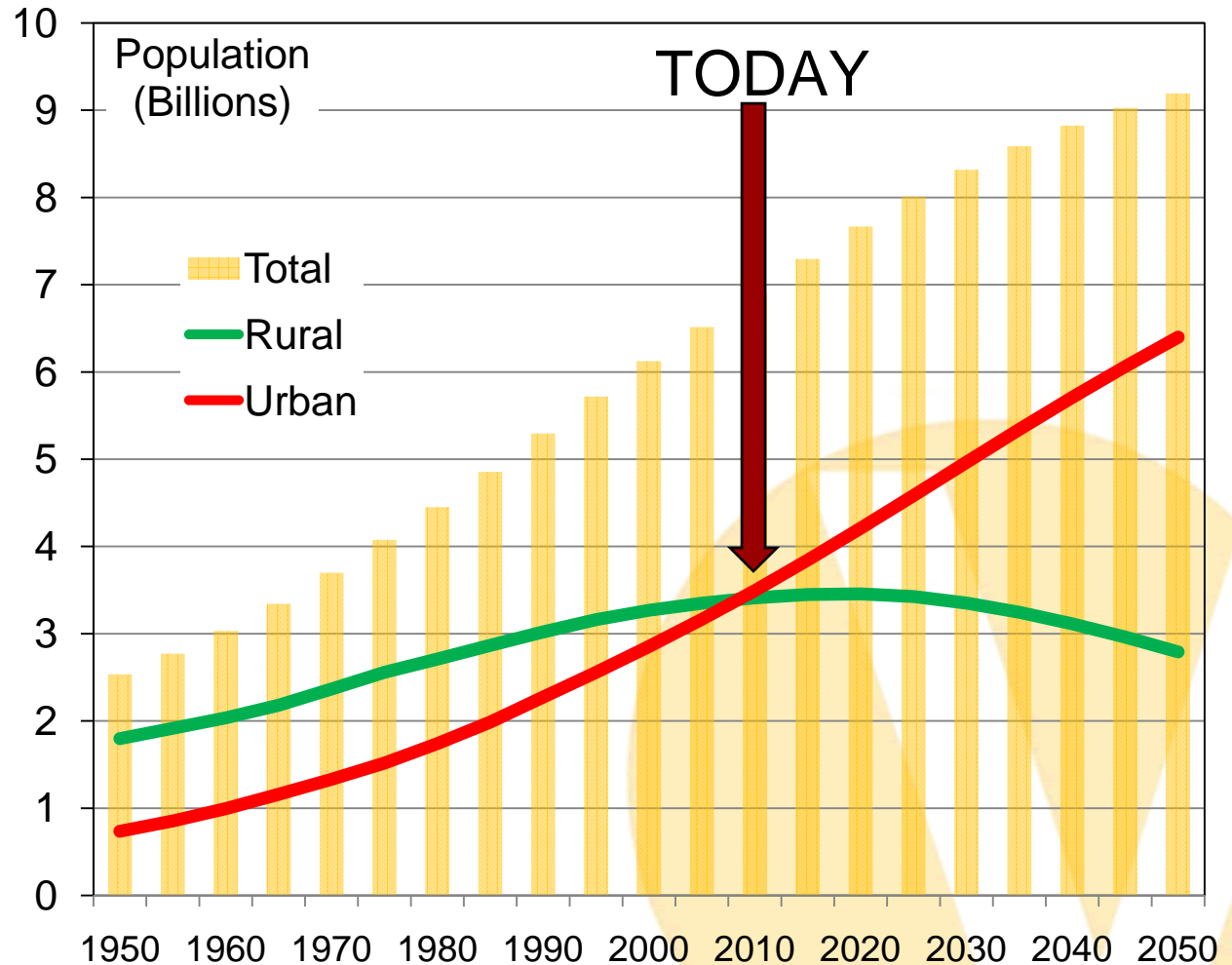
Department of Civil and
Environmental Engineering



World Urbanization

By 2008, for the first time in history, half of the world's population will live in urban areas.

Source: United Nations, 2005



Sonny Astani

Department of Civil and
Environmental Engineering



Megacities From Space

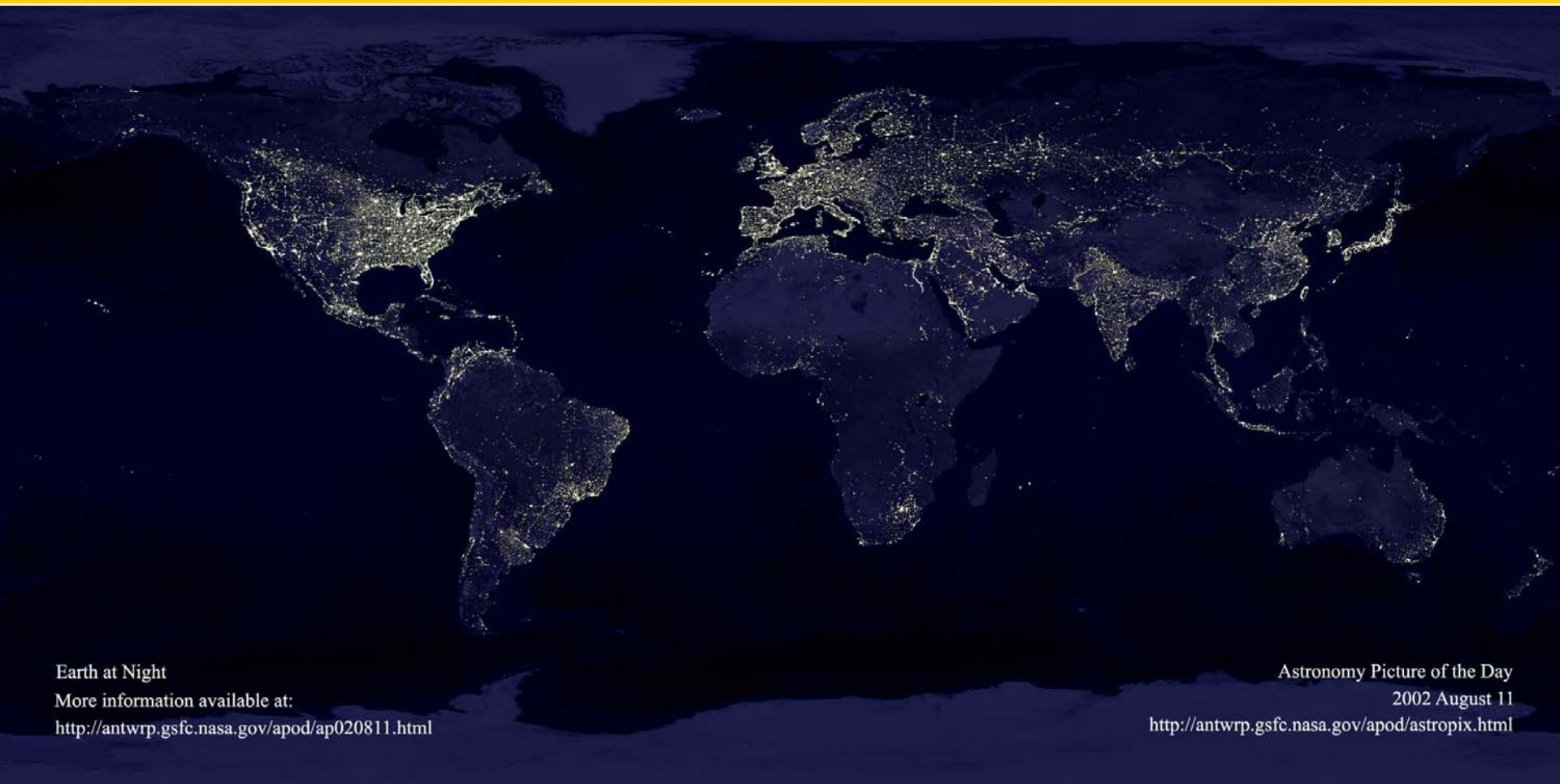


Sonny Astani

Department of Civil and
Environmental Engineering



Megacities From Space



Earth at Night

More information available at:

<http://antwrp.gsfc.nasa.gov/apod/ap020811.html>

Astronomy Picture of the Day

2002 August 11

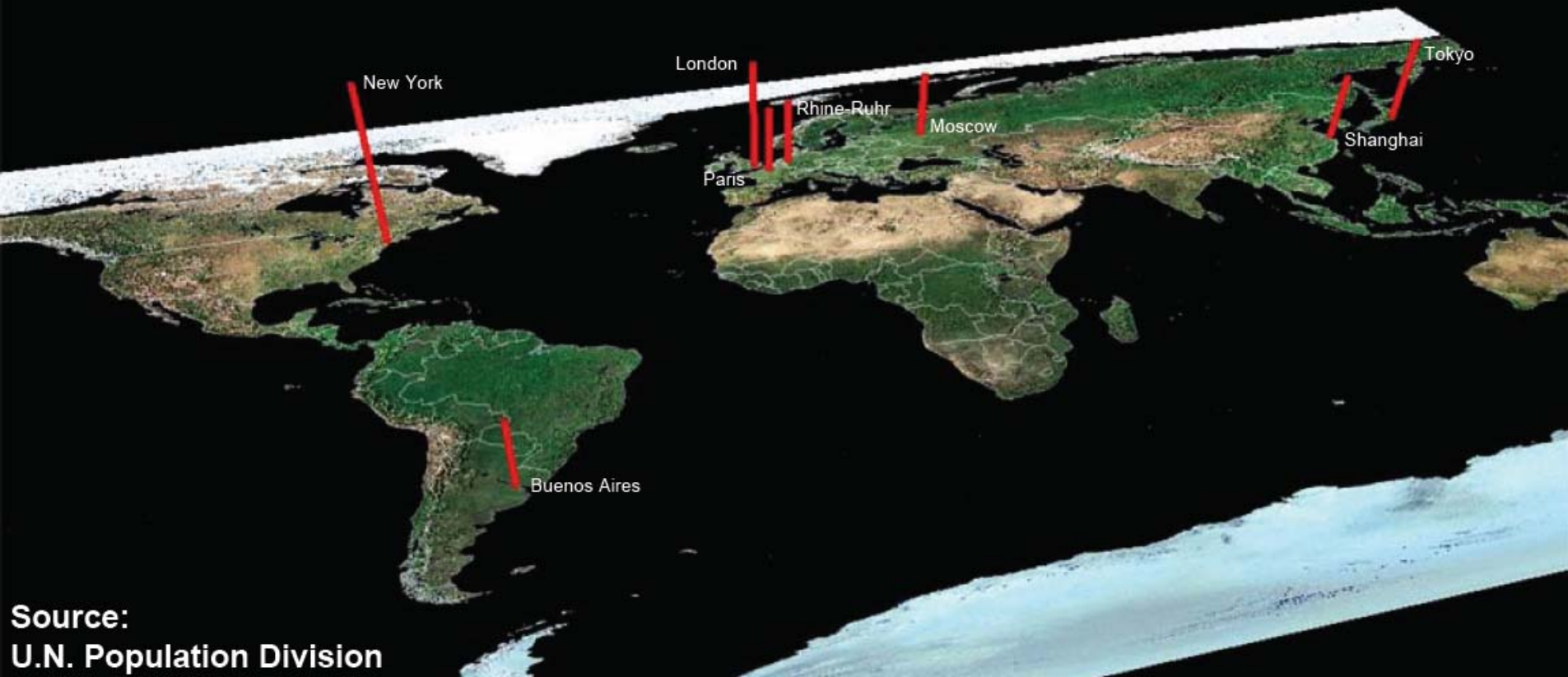
<http://antwrp.gsfc.nasa.gov/apod/astropix.html>

Sonny Astani

Department of Civil and
Environmental Engineering



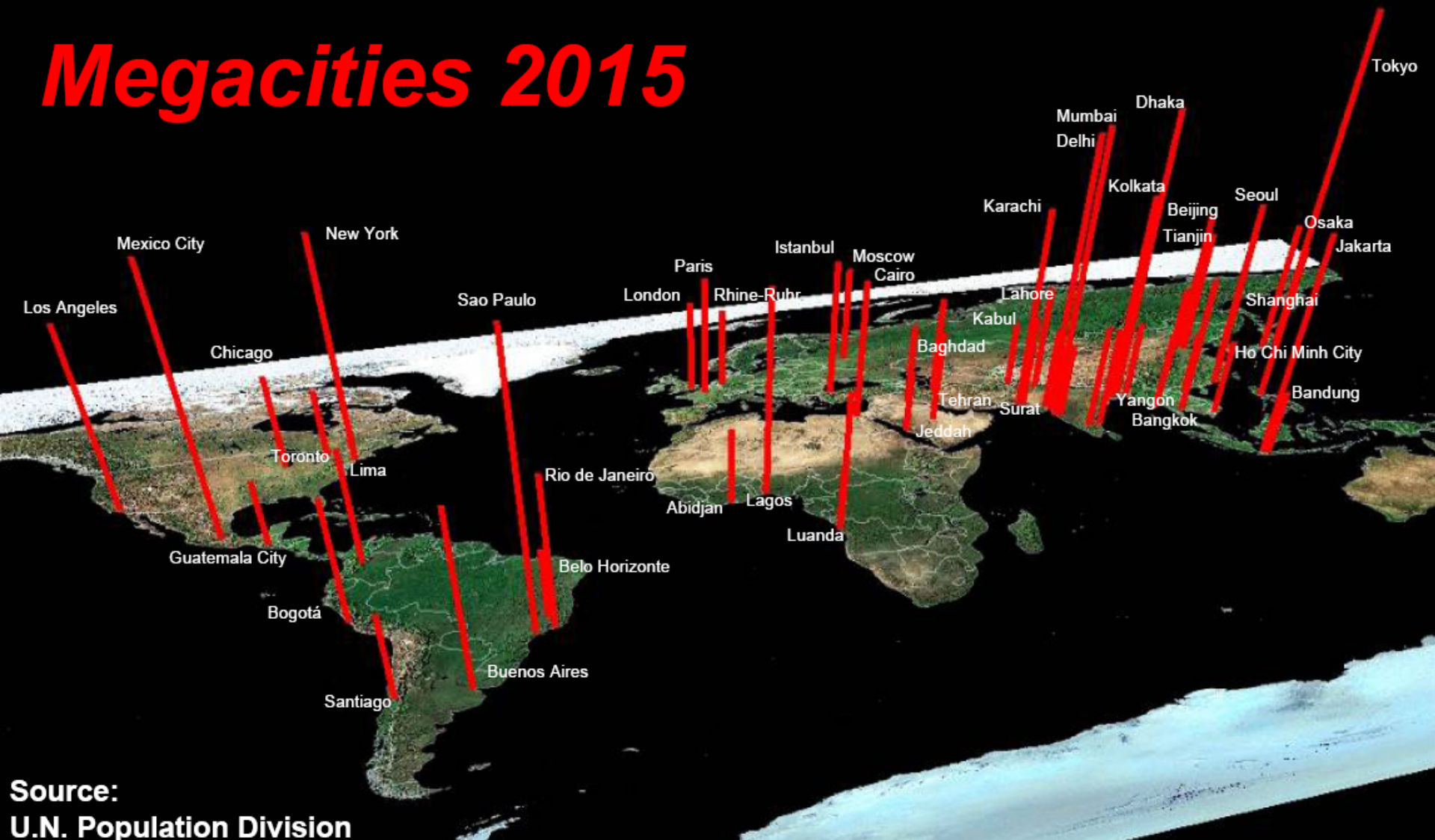
Megacities 1950



Source:
U.N. Population Division



Megacities 2015



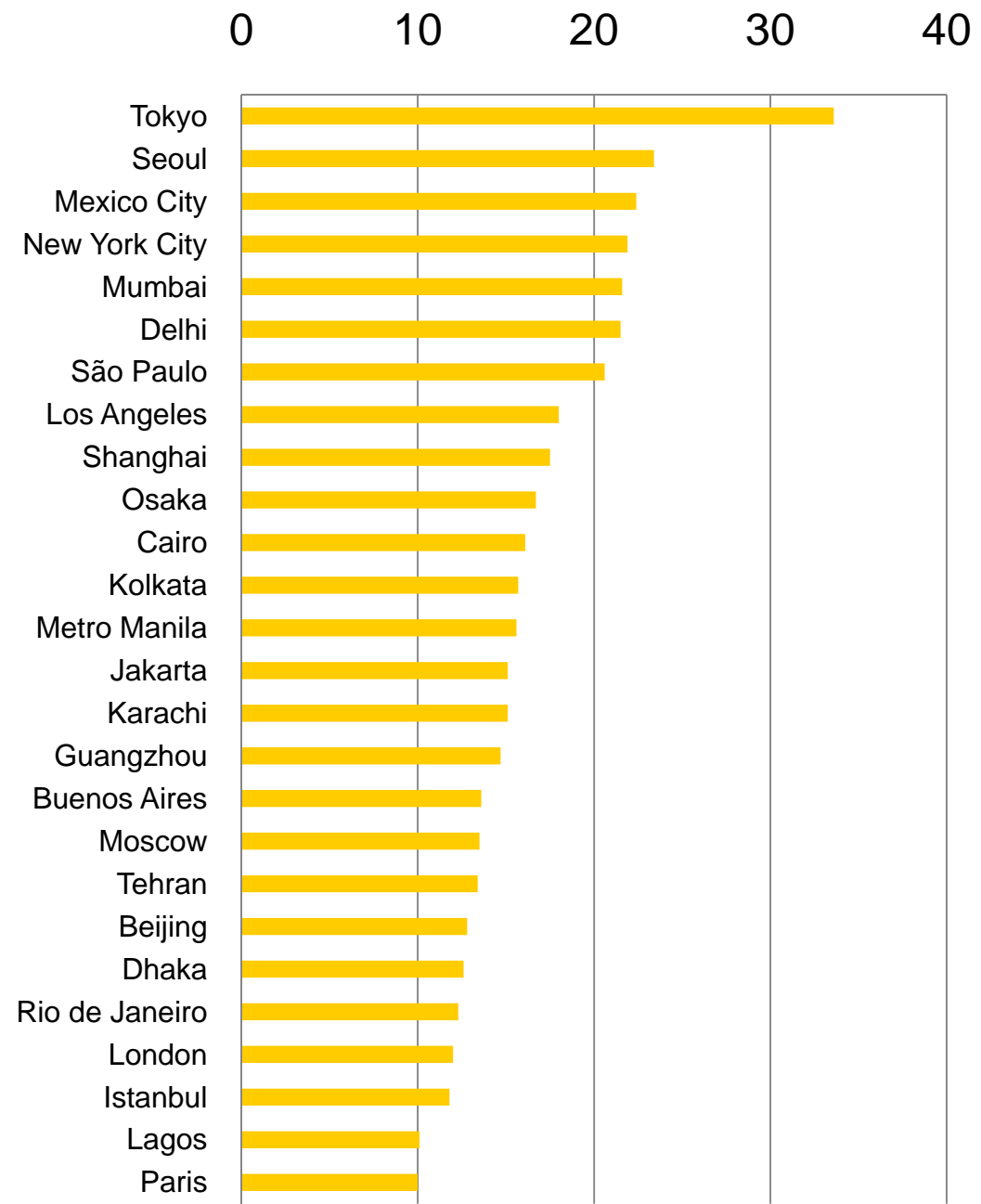


Megacities 2008

Sonny Astani

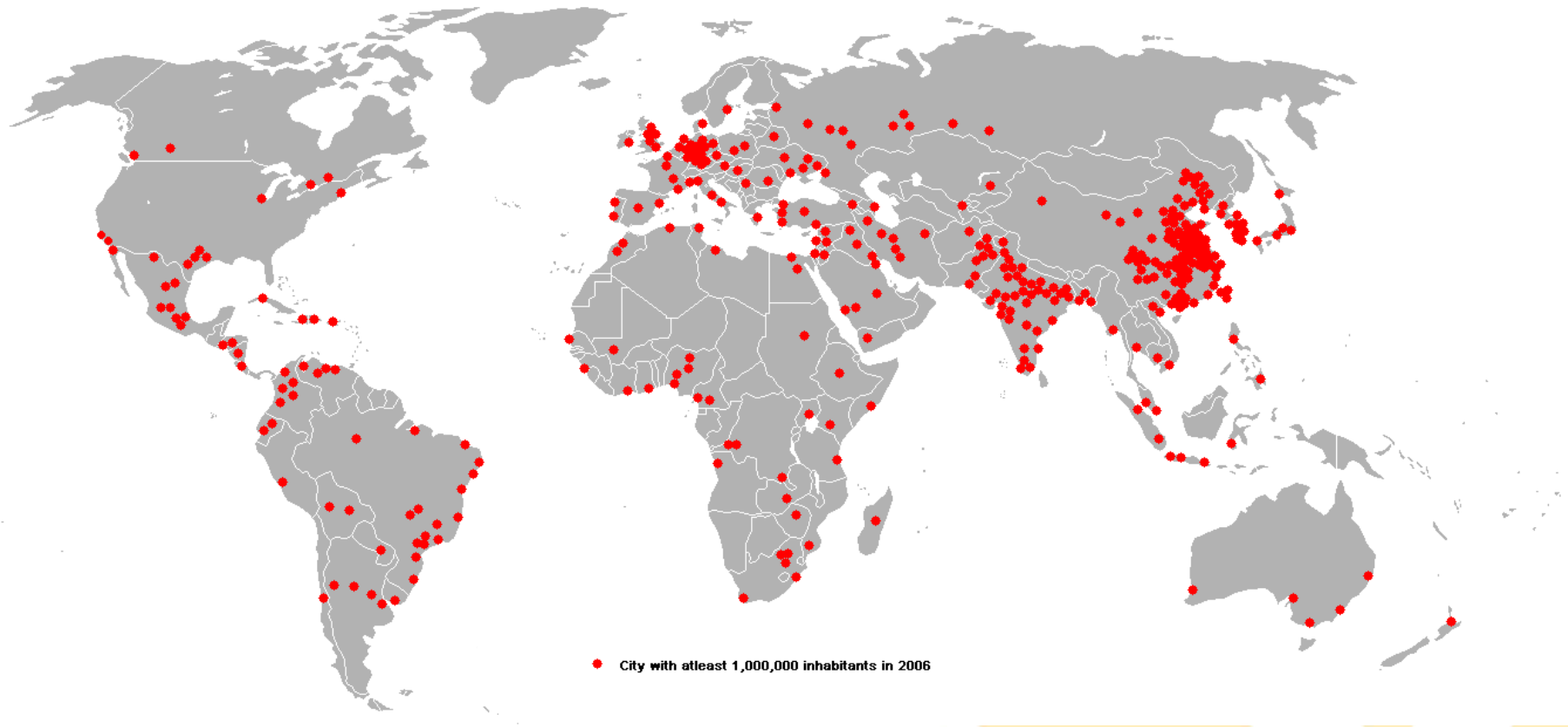
Department of Civil and
Environmental Engineering

Population (Millions)





Cities (> 1 Million)



Sonny Astani

Department of Civil and
Environmental Engineering





Definition: Megacity

- *Megacity* can be defined using the threshold of 10-million inhabitants (UN, 2004).
Megacities account for 10% of the world urban population
- Megacities has evolved and depend on mega-infrastructure systems so complicated and interdependent that they are not well understood and controlled by any organizations and governances.

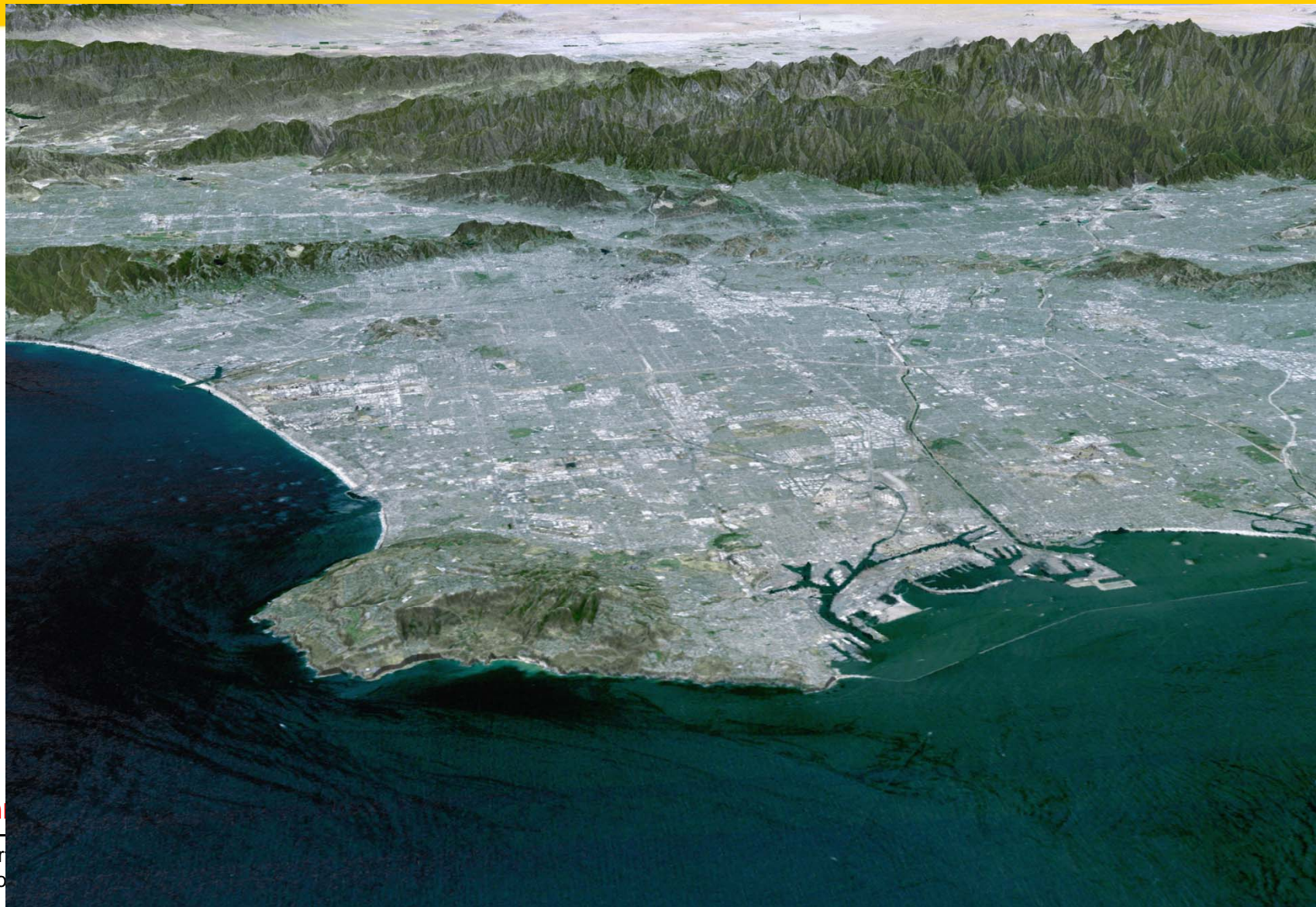


Characteristics of Megacities

- High concentration of
 - People
 - Values
 - Infrastructure
- High interconnectivity within region/country/
continent / world
 - close interdependence between flow of goods, finance and information
 - global cities are gateways (interaction between regional markets and global flow of information / goods)

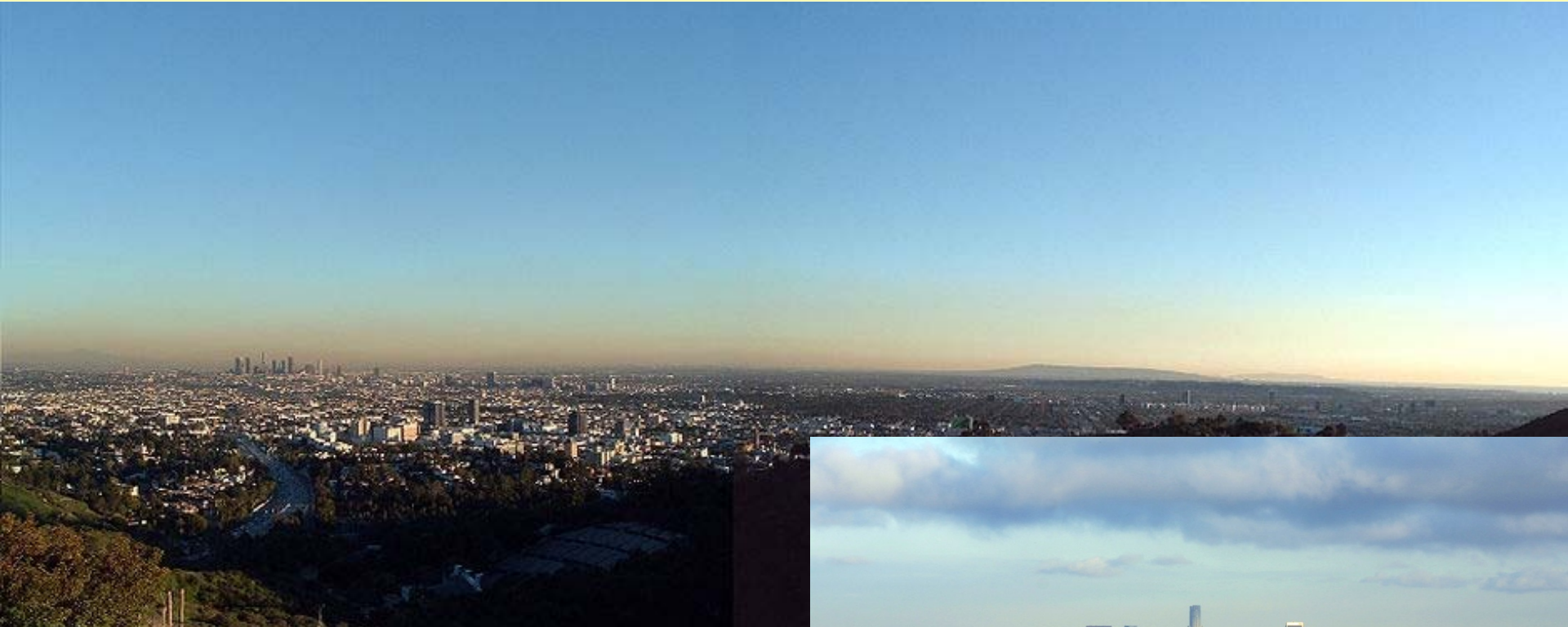


Los Angeles





Los Angeles

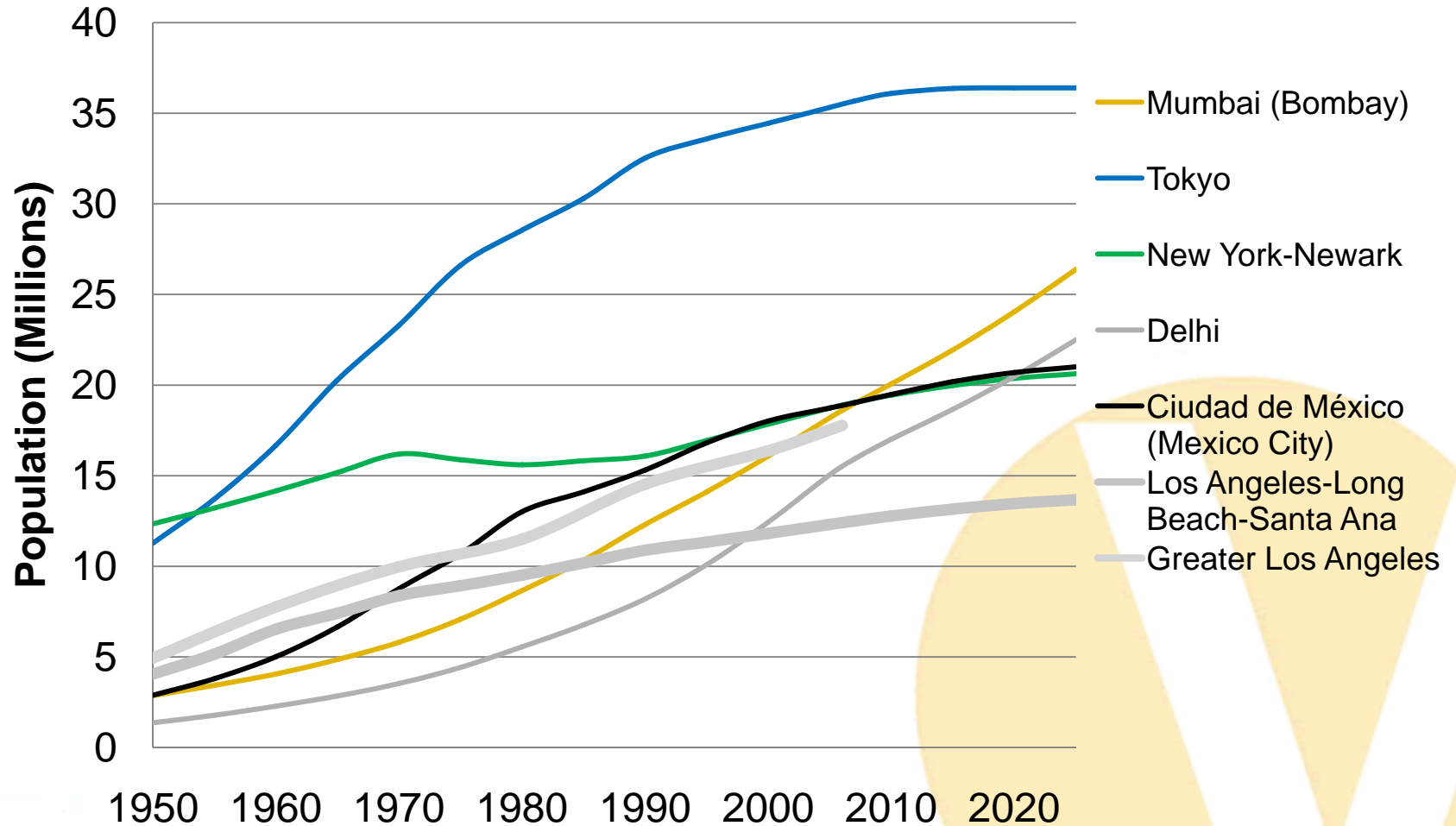


Sonny Astani

Department of Civil and
Environmental Engineering



Megacities



Sonny Astani

Department of Civil and
Environmental Engineering



1. Megacities and Challenges
- 2. Past Work on Megacities**
3. Workshop
4. Future

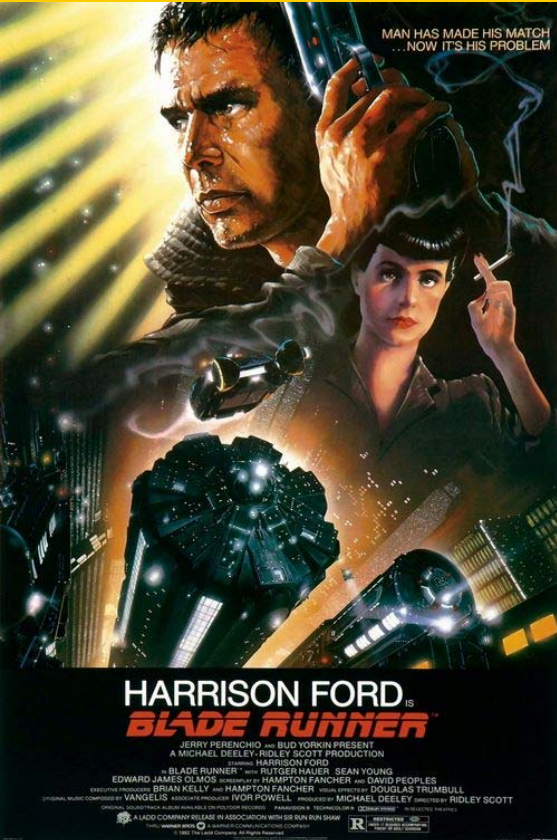
Sonny Astani

Department of Civil and
Environmental Engineering

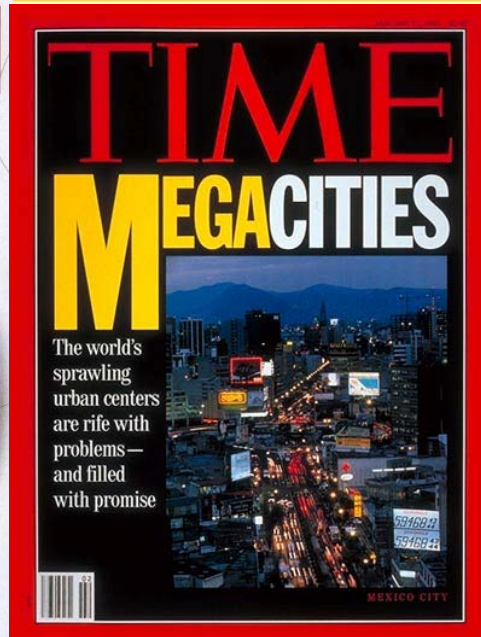




Megacities at the Movies



Megacities in the Press



Los Angeles Times

California | Local | Business

[Return to your last page](#)

Archive for Wednesday

Mega-cities,

By Nicolas P. Retsinas
February 28, 2007 in print

THE WORLD HAS reached more than half the global "mega-city" — metropolises threshold. Today there are Lagos, Jakarta and Chong

This type of drastic population concentrations of people



Los Angeles Times | News

Sports | Business | Entertainment | California | Local | Health | Opinion | National

You are here: [LAT Home](#) > [Articles](#) > [1997](#) > [October](#) > [19](#) > [News](#)

Archive for Sunday, October 19, 1997

Megacity Madness Grows in China, Asia

Sonny Astani

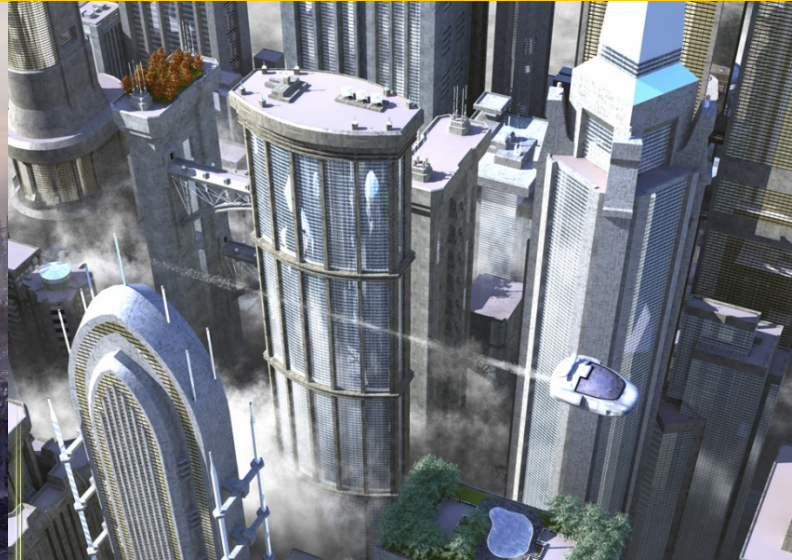
Department of Civil and Environmental Engineering





Future of Megacities

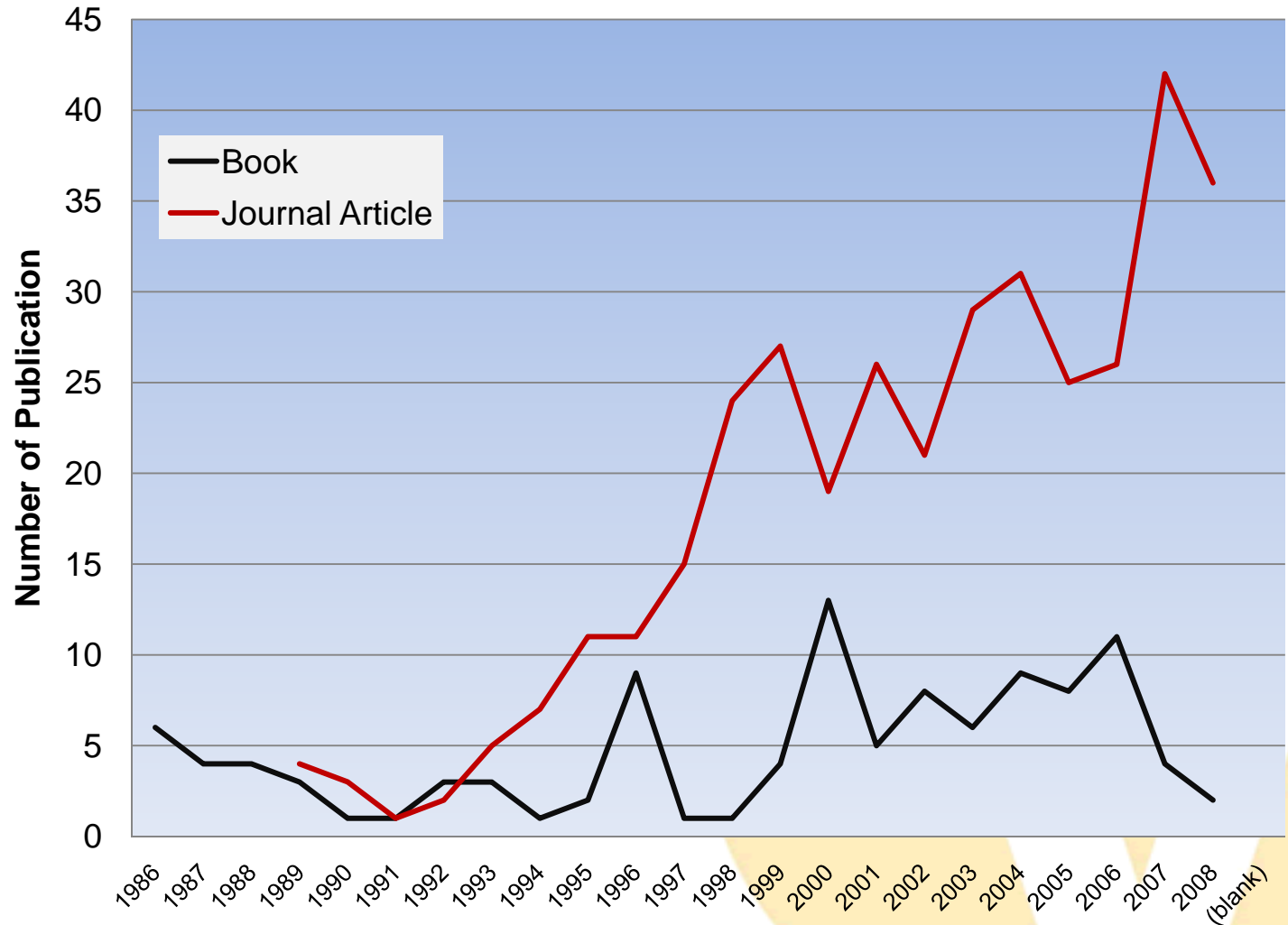
What will
they
become?



Journal Articles and Books on Megacities

Bibliographic Search on Megacities

- 600 references from various search engines
- Publications after 1990

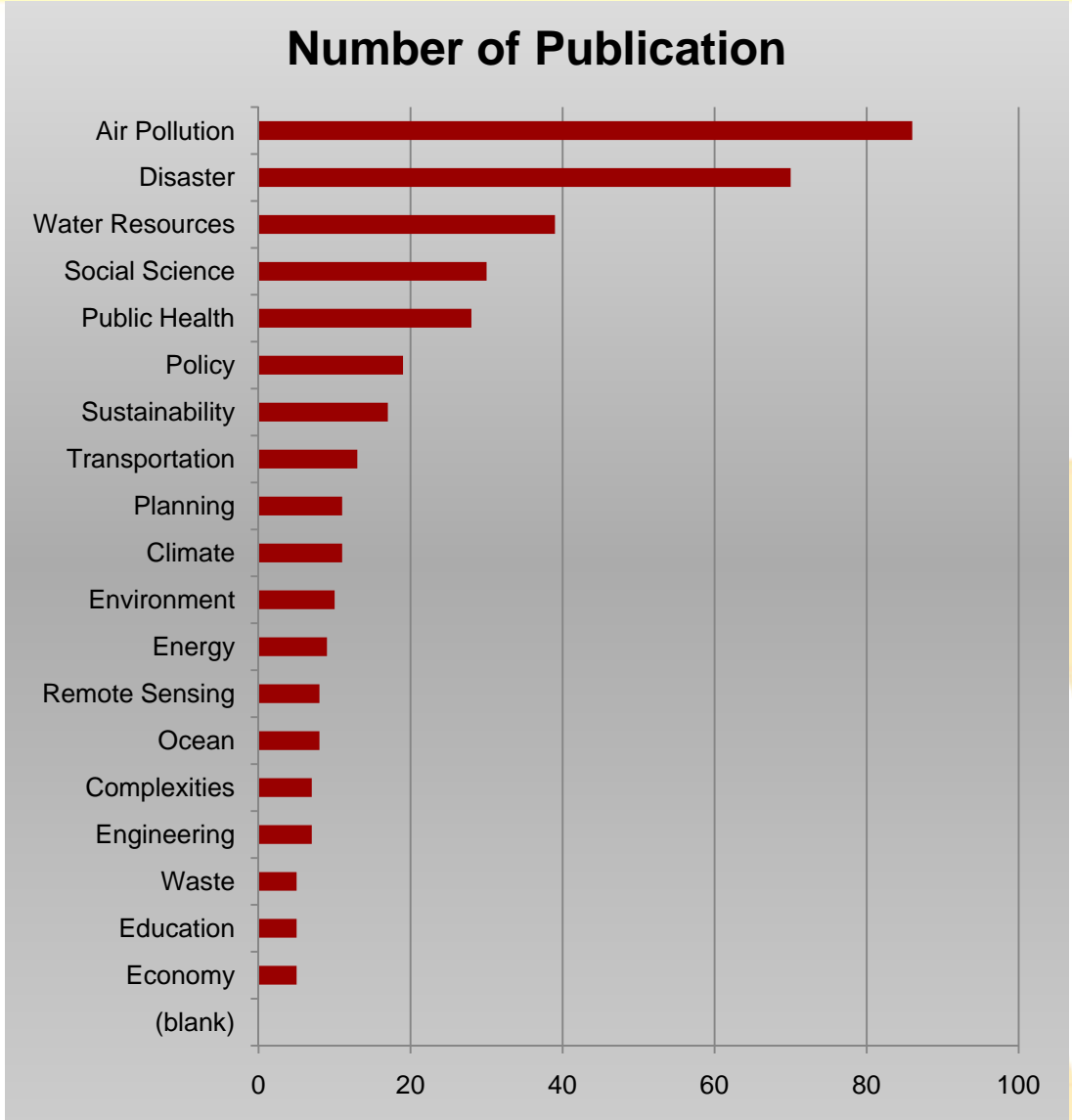


Sonny Astani

Department of Civil and Environmental Engineering



Number of Publications on Various Aspects in Megacities



Sonny Astani

Department of Civil and Environmental Engineering



Megacities Challenges

- **Main Challenges**
 - Pollution
 - Disasters
 - Energy/Water
 - Transportation
 - Crime

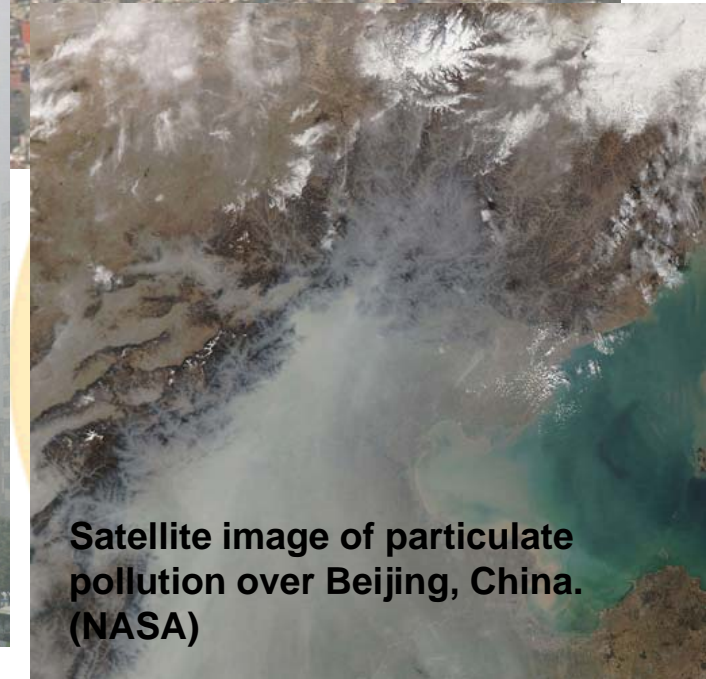
Sonny Astani

Department of Civil and
Environmental Engineering





Air Pollution in Megacities



Satellite image of particulate pollution over Beijing, China. (NASA)



Potential Risks Megacities

- **Natural Disasters**
 - Earthquake in San Francisco (1906)
 - Global warming
Hurricane Katrina
- **Technological and infrastructural catastrophes**
 - explosion of ammonium nitrate store in Toulouse in 2001
- **Social / political risks and terrorism**
 - New York (2001), Madrid (2004) and London (2005)
- **Epidemics and infectious diseases**
 - SARS in 2003 in Asian cities
 - Bird flu

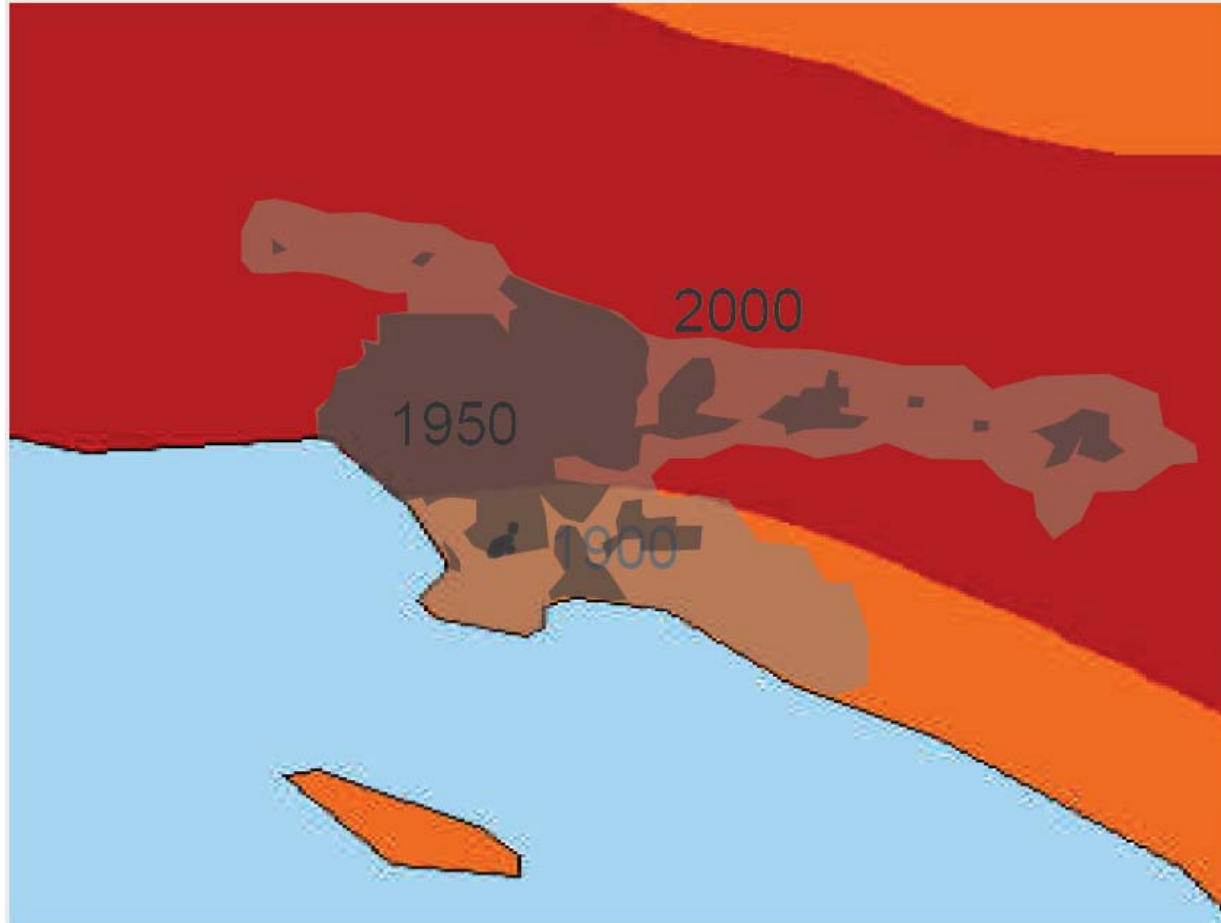
Sonny Astani

Department of Civil and
Environmental Engineering



Disaster and Megacities

Development of the City of Los Angeles from 1900 to 2000



Earthquake risk

high

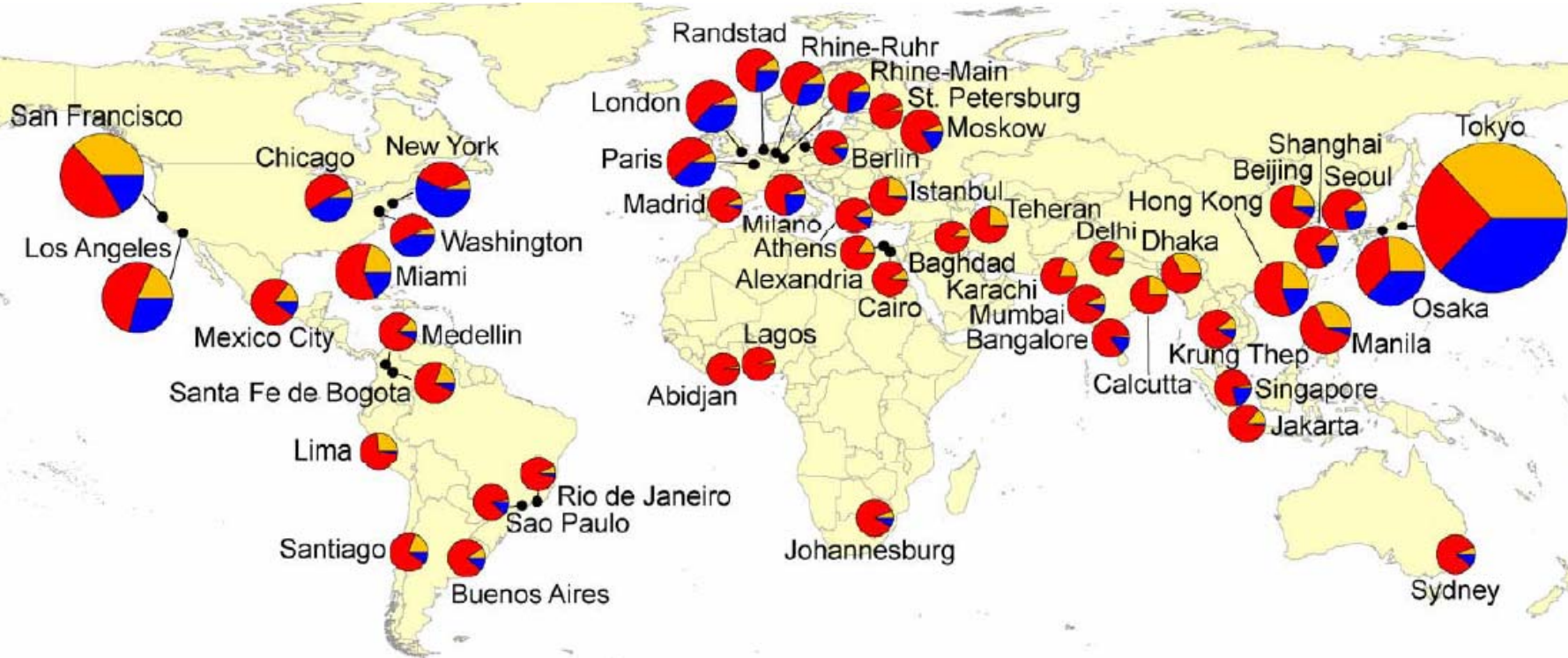
very high

Sonny Astani

Department of Civil and
Environmental Engineering

A Risk Index for Megacities, S. Voss (05 September 2006, at IAJ)

Risks and Megacities



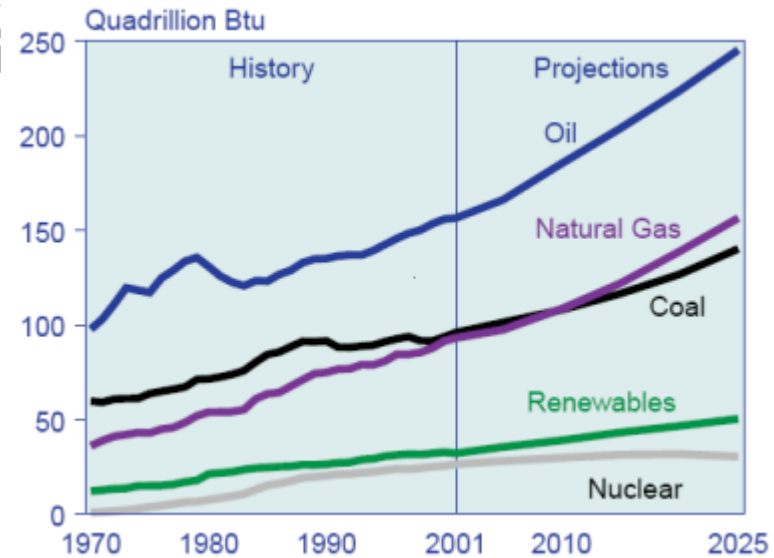
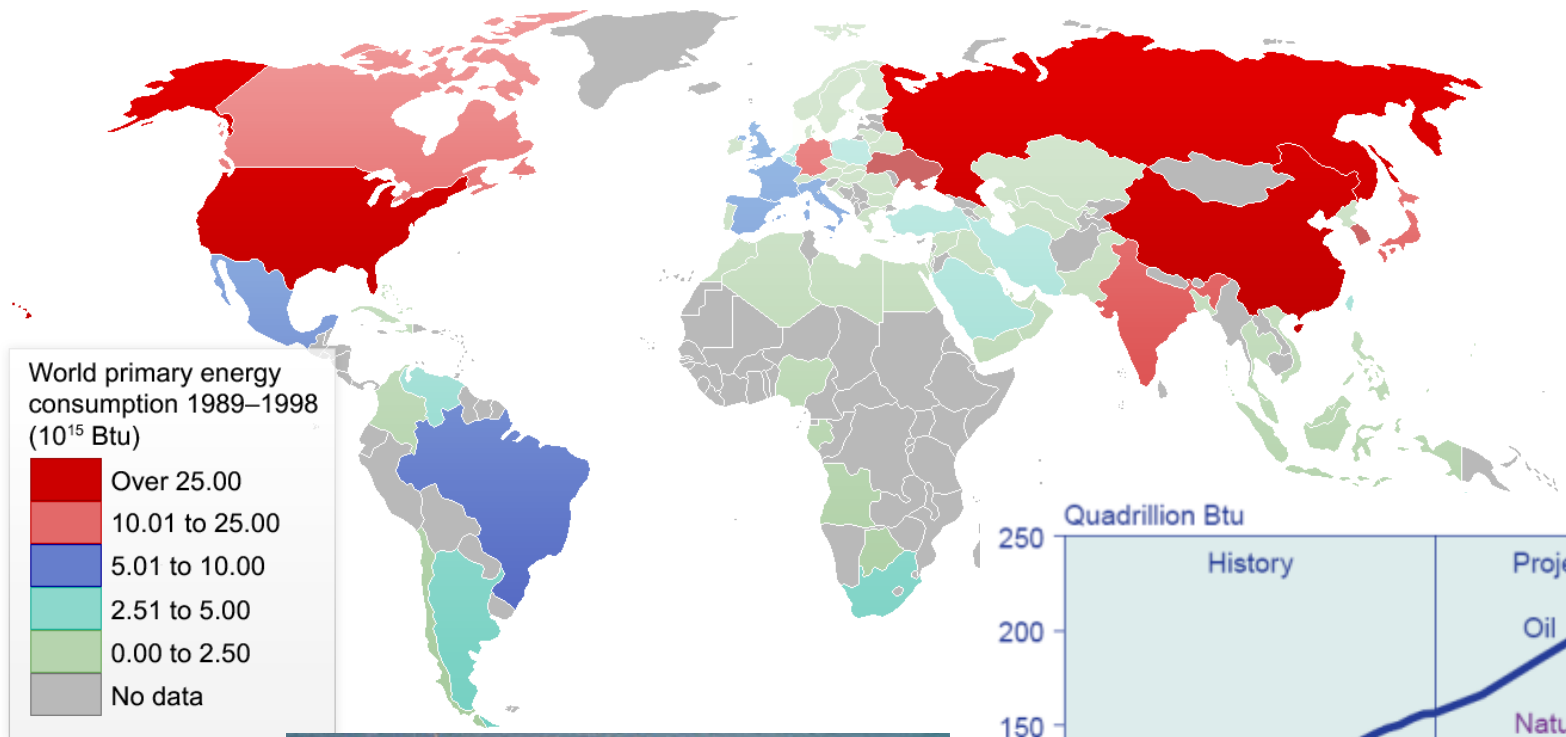
 Risk Index
(Circle size corresponding to Risk Index Value)

Risk Index Components:

-  Hazard
-  Vulnerability
-  Exposure

$$\text{Risk} = \text{Hazard} \times \text{Loss susceptibility} \times \text{Values}$$

Energy and Megacities

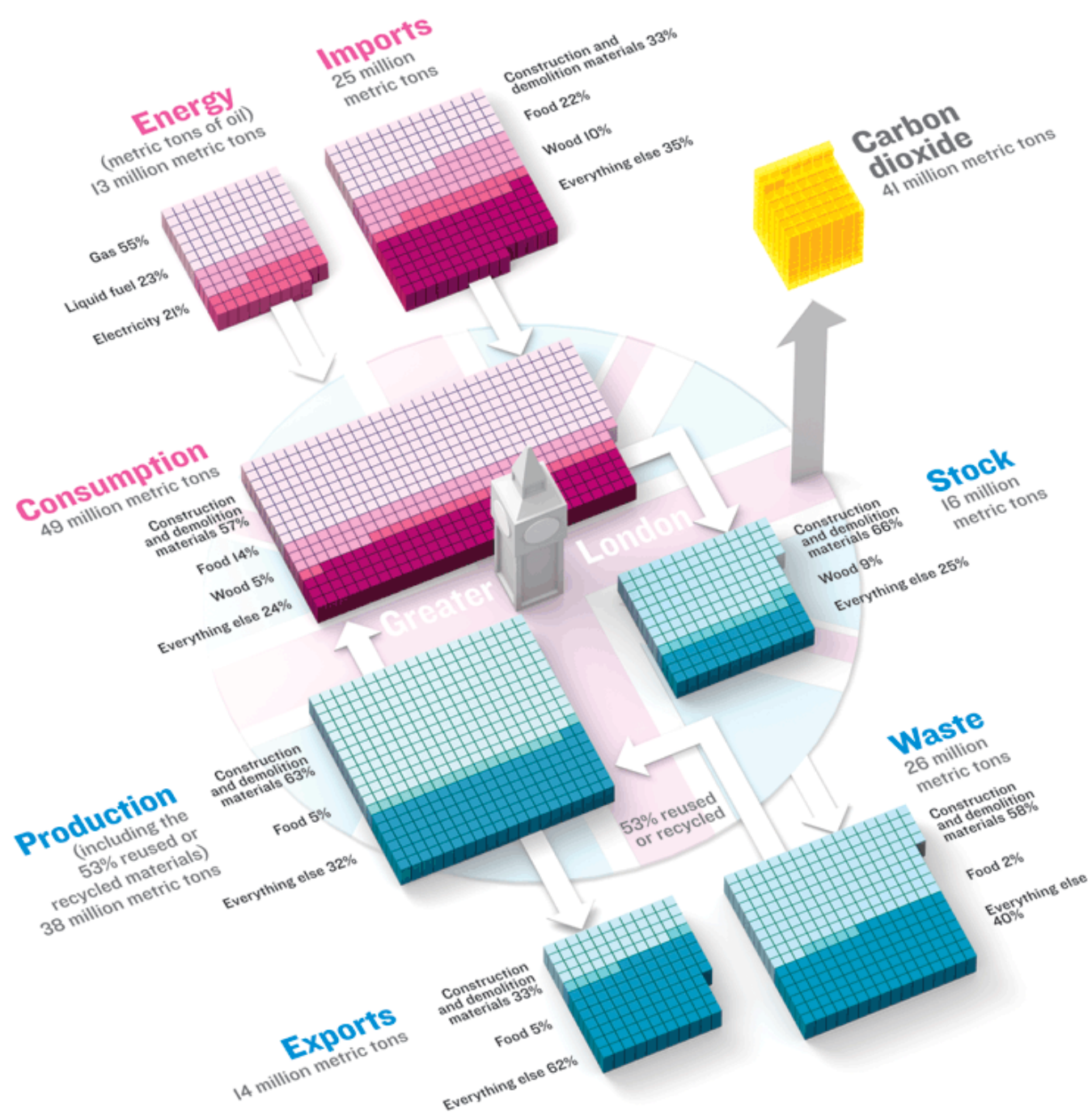


Sonny Astani

Department of Civil and
Environmental Engineering



How to Measure a City's Metabolism e.g., London (IEEE, 2007)



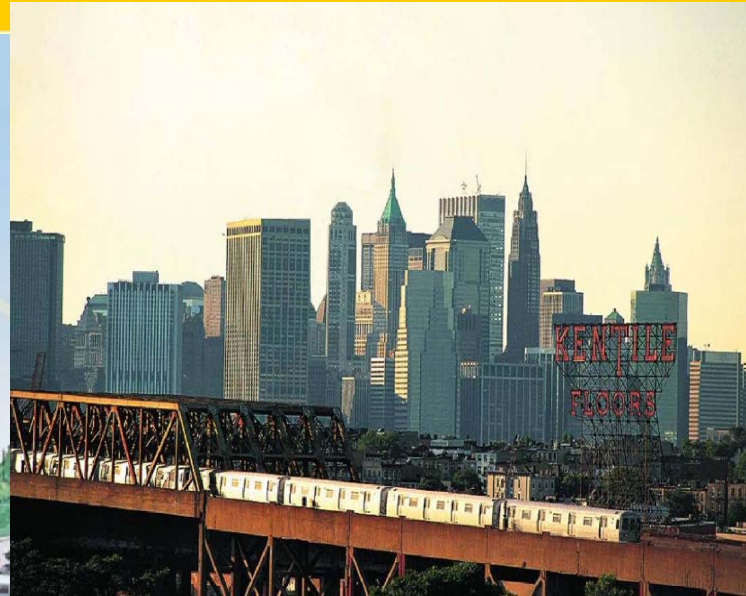
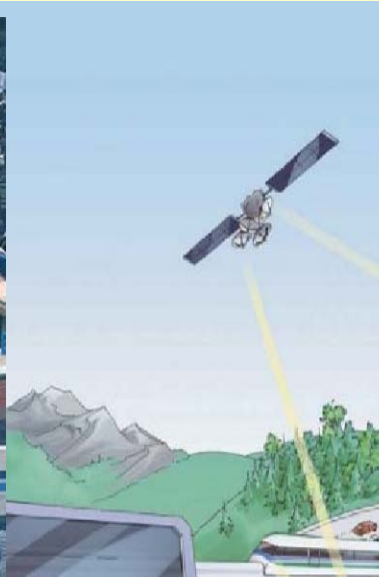
Each cube represents 100 thousand metric tons.

Sonny Astani

Department of Civil and Environmental Engineering



Transportation in Megacities





- **Main question**
 - By 2008, more than half of the world's population will live in urban areas
 - How can we make it work?
- **Main Challenges**
 - Pollution
 - Disasters
 - Energy/Water
 - Transportation
 - Crime





1. Megacities and Challenges
2. Past Work on Megacities
- 3. Workshop**
4. Future

Sonny Astani

Department of Civil and
Environmental Engineering





Workshop Objectives

- **The workshop**
 - intends to bring together experts of academia, and private and public sectors, and to have various disciplines exchange their perspectives on megacities.
 - is focused on US megacities, with a special emphasis on Los Angeles.
 - is the first one of a series of forthcoming workshops
- **Additional workshops will focus on**
 - the broader challenges of megacities in the world.
 - interactive discussions leading to a multidisciplinary research agenda on megacities.

Sonny Astani

Department of Civil and
Environmental Engineering



Workshop Organization

Day 1: CHALLENGES

1. Megacities: A Research and Practice Overview
2. Energy and Water Resources for Megacities
3. Environment and Public Health in Megacities
4. Transportation, Freight Mobility and Ports in Megacities
5. Disasters, Risks and Security in Megacities

BREAKOUT SESSIONS & DISCUSSIONS

Day 2: OPPORTUNITIES

6. Livability/Land use/Architecture
7. Social and Economic Issues in Megacities
8. Complex Systems Science for Urban Mega-Systems
9. Finance/Entrepreneurship

BREAKOUT SESSIONS, DISCUSSIONS & CLOSURE

Sonny Astani

Department of Civil and
Environmental Engineering





Workshop Speakers and Moderators

1. Jean-Pierre Bardet, Professor and Chair, Sonny Astani Department of Civil and Environmental Engineering, USC
2. James Baker, Director, Integrated Multimedia Systems Center
3. Mark Pisano, Senior Fellow, School of Policy, Planning and Development, USC
4. Eric Heikkila, Professor, School of Policy, Planning, and Development, USC
5. Mark Bernstein, Managing Director, USC Energy Institute
6. Dongxiao Zhang, Marshall Professor, USC Sonny Astani Department of Civil and Environmental Engineering, USC
7. Nancy Sutley, Deputy Mayor, Energy and Environment, Office of the Mayor, City of Los Angeles
8. Charles J. Cicchetti, President, Pacific Economics Group
9. Robert Lempert, Director, Frederick S. Pardee Center for Longer Range Global Policy and the Future Human Condition, RAND
10. Scott Fruin, Assistant Research Professor, Keck School of Medicine, USC
11. Constantinos Sioutas, Champion Professor, Sonny Astani Department of Civil and Environmental Engineering, USC
12. Edward Evol, Professor, Preventive Medicine, Keck School of Medicine, USC
13. David Kim, Centers for Disease Control, Atlanta, Georgia
14. James Moore, Professor and Chair, Epstein Department of Industrial System Engineering, USC
15. Rita Robinson, General Manager/Director, Los Angeles Department of Transportation
16. Martin Wachs, Director, Transportation, Space and Technologies Program, RAND
17. Tschangho John Kim, Endowed Professor of Urban and Regional Systems, University of Illinois at Urbana-Champaign
18. Craig Taylor, Research Director, Baseline Management Co.
19. Thomas Jordan, Professor of Earth Sciences, and Director, Southern California Earthquake Center, USC
20. Michael Christensen, Director of Port development, Port of LA
21. Henry Willis, Associate Policy Researcher, Infrastructure, Safety, and Environment, RAND
22. Adam Rose, Research Professor, School of Policy, Planning, and Development, USC
23. Qingyun Ma, Dean, School of Architecture, USC
24. Burcin Becerik-Gerber, Assistant Professor, Sonny Astani Department of Civil and Environmental Engineering, USC
25. Karen Kensek, Assistant Professor, School of Architecture, USC
26. Paul M. Torrens, Associate Professor, School of Geographical Sciences, Arizona State University
27. William Petak, Professor Emeritus, School of Policy, Planning and Development, USC
28. Mathew Kahn, Professor, Institute of the Environment, University of California, Los Angeles
29. Thomas Zearley, Consultant to the World Bank
30. David Newman, Professor, Physics Department, University of Alaska
31. Robert Glass, Distinguished Member, Technical Staff, Sandia National Laboratories
32. Charles Macal, Argonne National Laboratory
33. Richard Little, Director, Keston Institute for Public Finance and Infrastructure Policy, School of Policy, Planning, and Development, USC
34. Anthony Michaels, Managing Director, Proteus Environmental Technologies, LLC

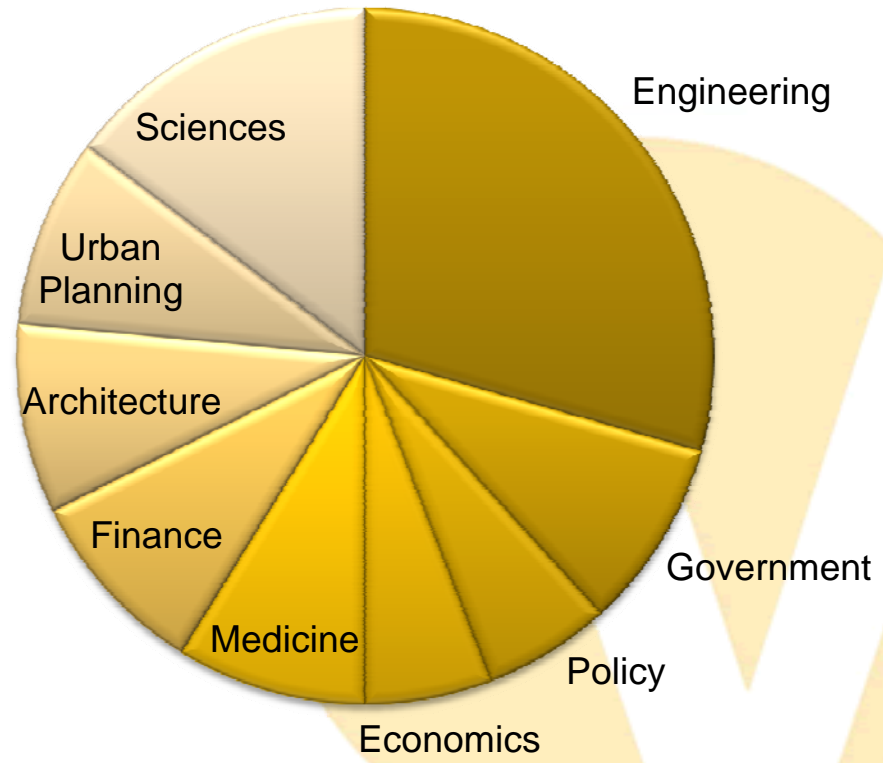
Sonny Astani

Department of Civil and
Environmental Engineering

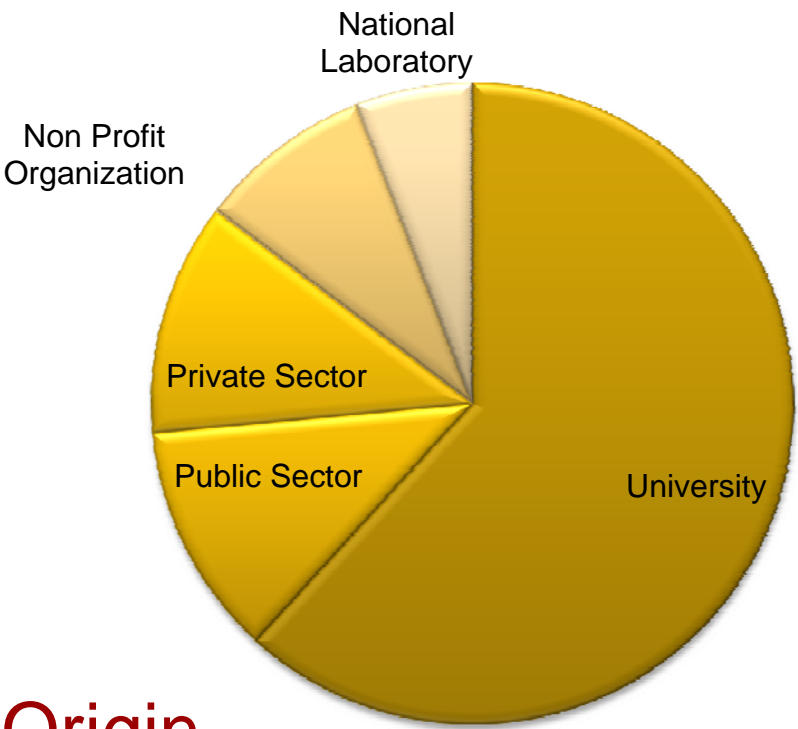


Origin and Expertise of Speakers and Moderators

Expertise



Origin

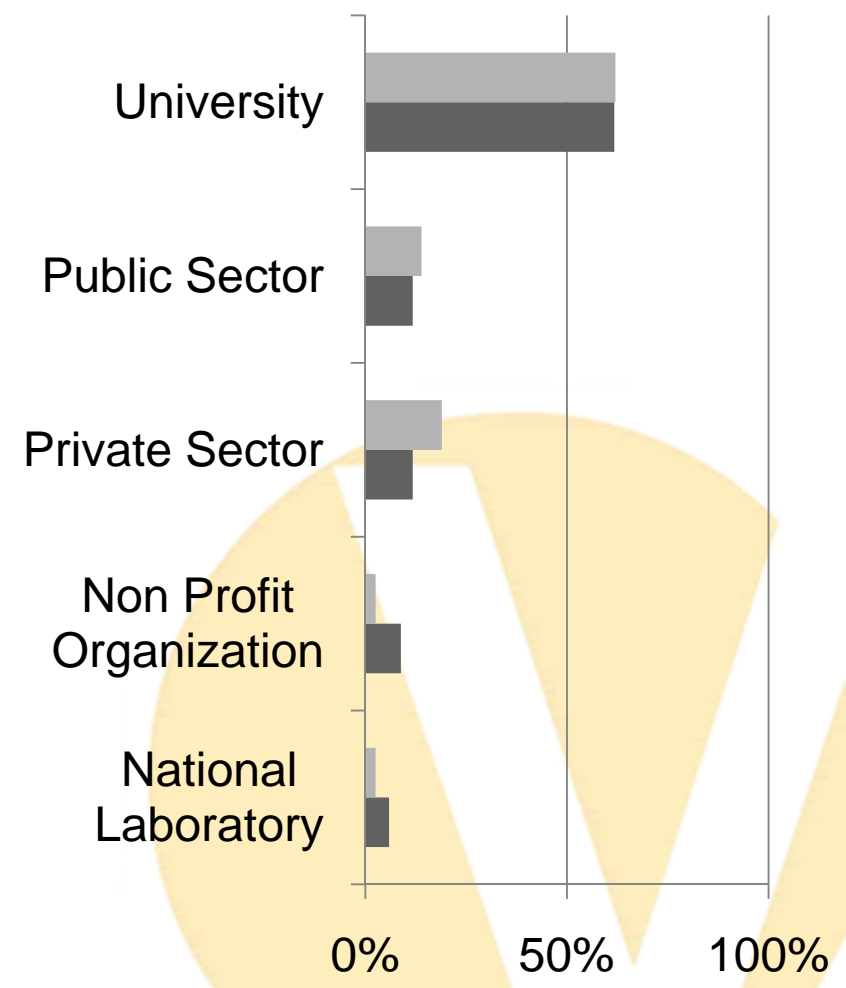
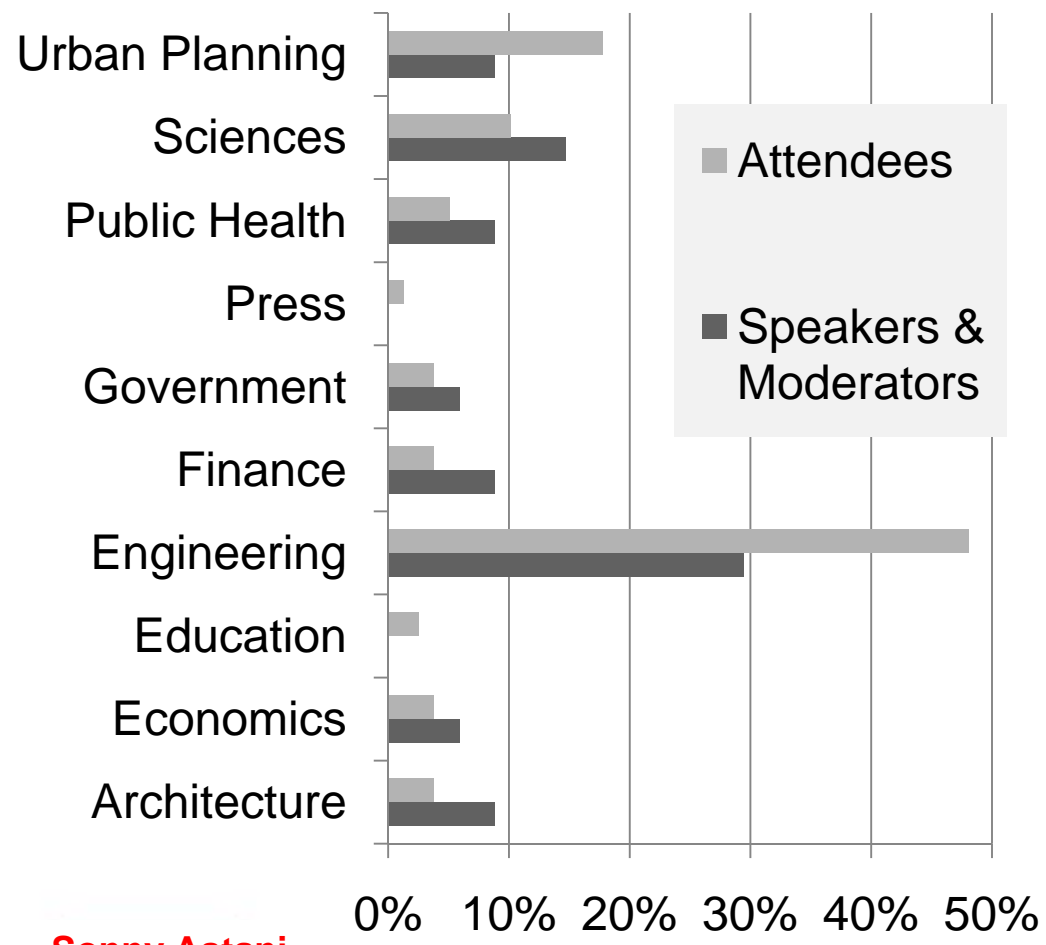


Sonny Astani

Department of Civil and Environmental Engineering



Origin and Expertise of Attendees, Speakers and Moderators



Sonny Astani

Department of Civil and Environmental Engineering



1. Megacities and Challenges
2. Past Work on Megacities
3. Workshop
- 4. Future**

Sonny Astani

Department of Civil and
Environmental Engineering





Center Mission:
Innovate to Evolve Urban Living



**Workshop
on Megacities**

Innovation for the Evolution of Urban Living

Sonny Astani

Department of Civil and
Environmental Engineering



- Large urban areas must evolve to ensure an adequate quality of life for their populations.
- To sustain their environment, they must pursue cleaner air, purer water, efficient and renewable energy, improved transportation, and reduced vulnerability to disasters.
- The Center for Megacities promotes the renaissance of large urban areas by rallying innovations in research, technology, planning, private sector initiatives and public management.
- Its core theme is to develop the new concept of cyber-information to integrate effectively all the critical components of megacity systems.

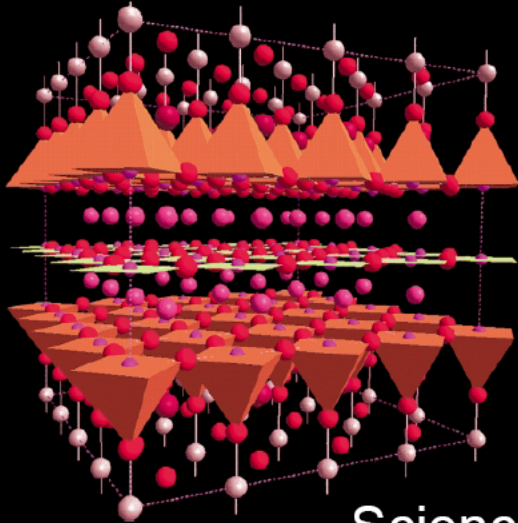
Sonny Astani

Department of Civil and
Environmental Engineering



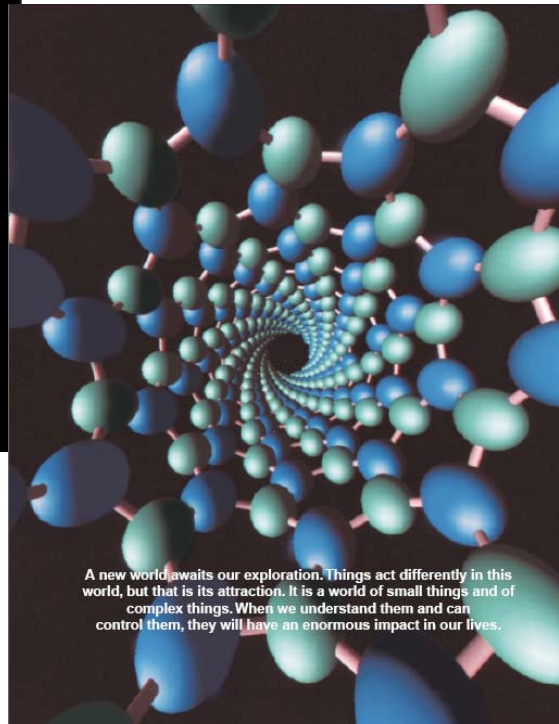
Complex System Sciences

Complex Systems



Science
for the
21st Century

Complex systems is a scientific field which studies the common properties of systems considered complex in nature, society and science



A new world awaits our exploration. Things act differently in this world, but that is its attraction. It is a world of small things and of complex things. When we understand them and can control them, they will have an enormous impact in our lives.

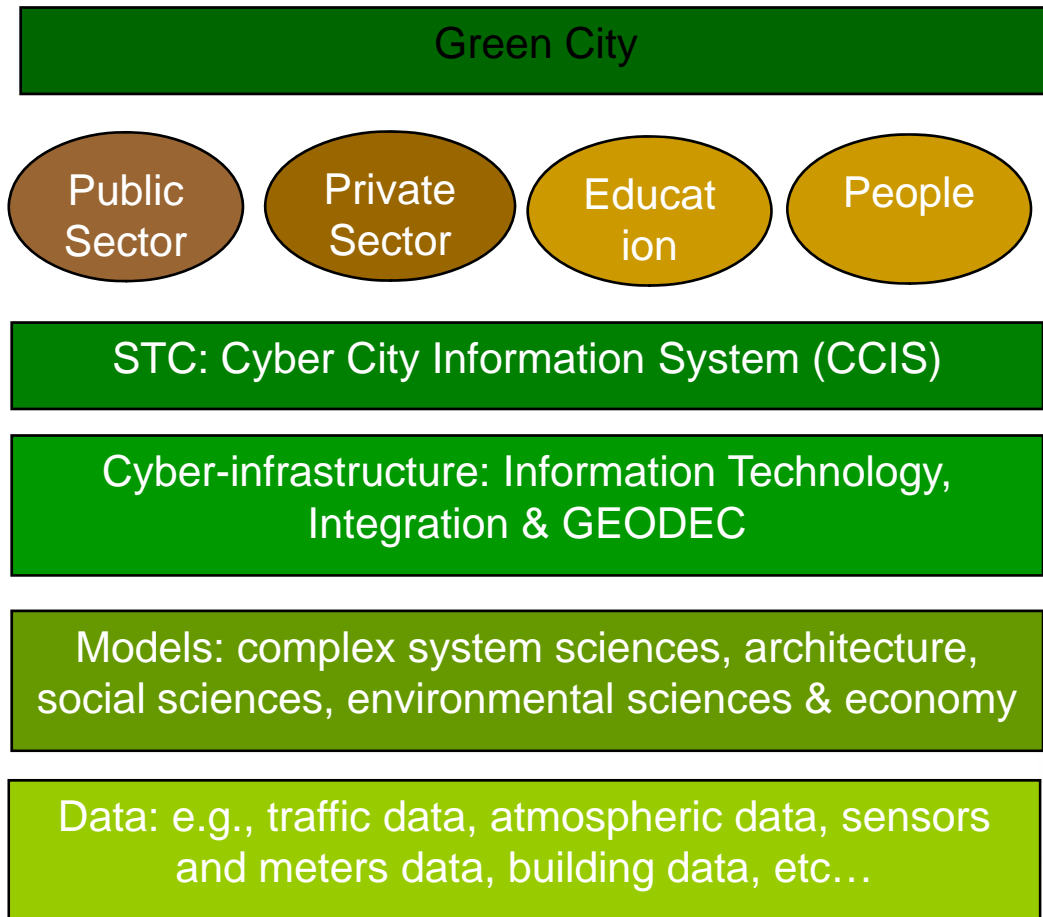
It is also called complex systems theory, complexity science, study of complex systems, sciences of complexity

Sonny Astani

Department of Civil and
Environmental Engineering



Cyber-City Information System



Outcome

Users & Beneficiaries

Tools & Outreach

Cyber-Convergence

Science/Engineering Modeling

Data Collection

Sonny Astani

Department of Civil and Environmental Engineering



Website of Center on Megacities

megacities.usc.edu

Sonny Astani

Department of Civil and
Environmental Engineering

University of Southern California



[ABOUT](#)

[PEOPLE](#)

[RESEARCH](#)

[NEWS](#)

[Sitemap](#)

Welcome

The Center on Megacities is a multidisciplinary research center headquartered at the University of Southern California. It is focused on developing innovative solutions for megacities through interdisciplinary teamwork of experts in sciences and engineering including civil and environmental engineering, information technology, architecture, economics and other social sciences, policy and planning, complex systems science, biological science, and atmospheric science.

The center's mission is to integrate engineering with other disciplines to develop major innovations that will promote a better future for megacities through a strategic partnership with science, technology, government, and industry. Progress made in solving megacity issues can also benefit cities of lesser size thereby contributing to the broader world's welfare.



News



Dr. Naj Meshkati - Heightened attention to RR safety could be a silver lining of recent Metrolink crash (Op-ed) Daily News, Los Angeles
October 03, 2008
[Learn More >>](#)

Announcements

Workshop on Megacities, November 10-11, 2008 in Los Angeles
November 05, 2008
[Learn More >>](#)

Toward a Research Center on Megacities
July 19, 2008
[Learn More >>](#)

Conference on Earthquakes and Megacities in Los Angeles, November 12-14, 2008
July 16, 2008
[Learn More >>](#)



Welcome to the

Workshop on Megacities

Innovation for the Evolution of Urban Living

