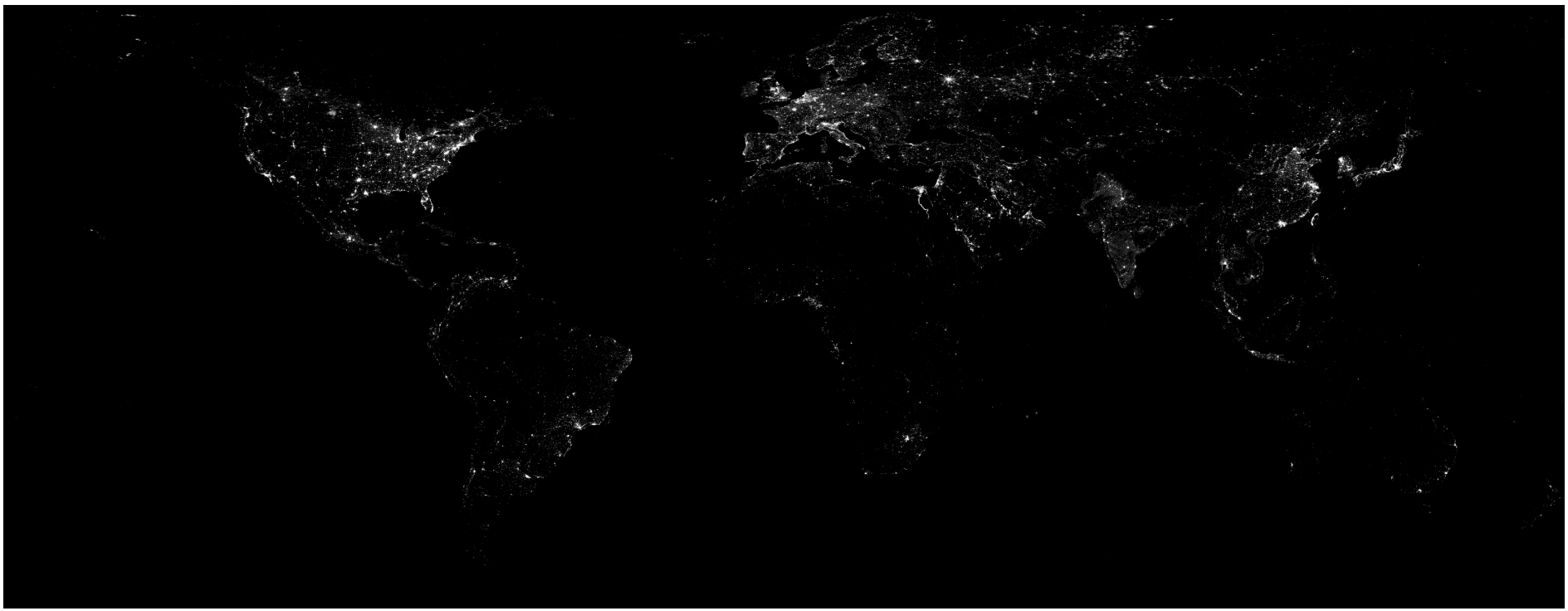
Studying the Effect of Natural Disasters on Economic Activity:
A first Approach using Night-Time Luminosity Data

Cameron, M. Rosales, V. Westermann, J.P.

July 30, 2017



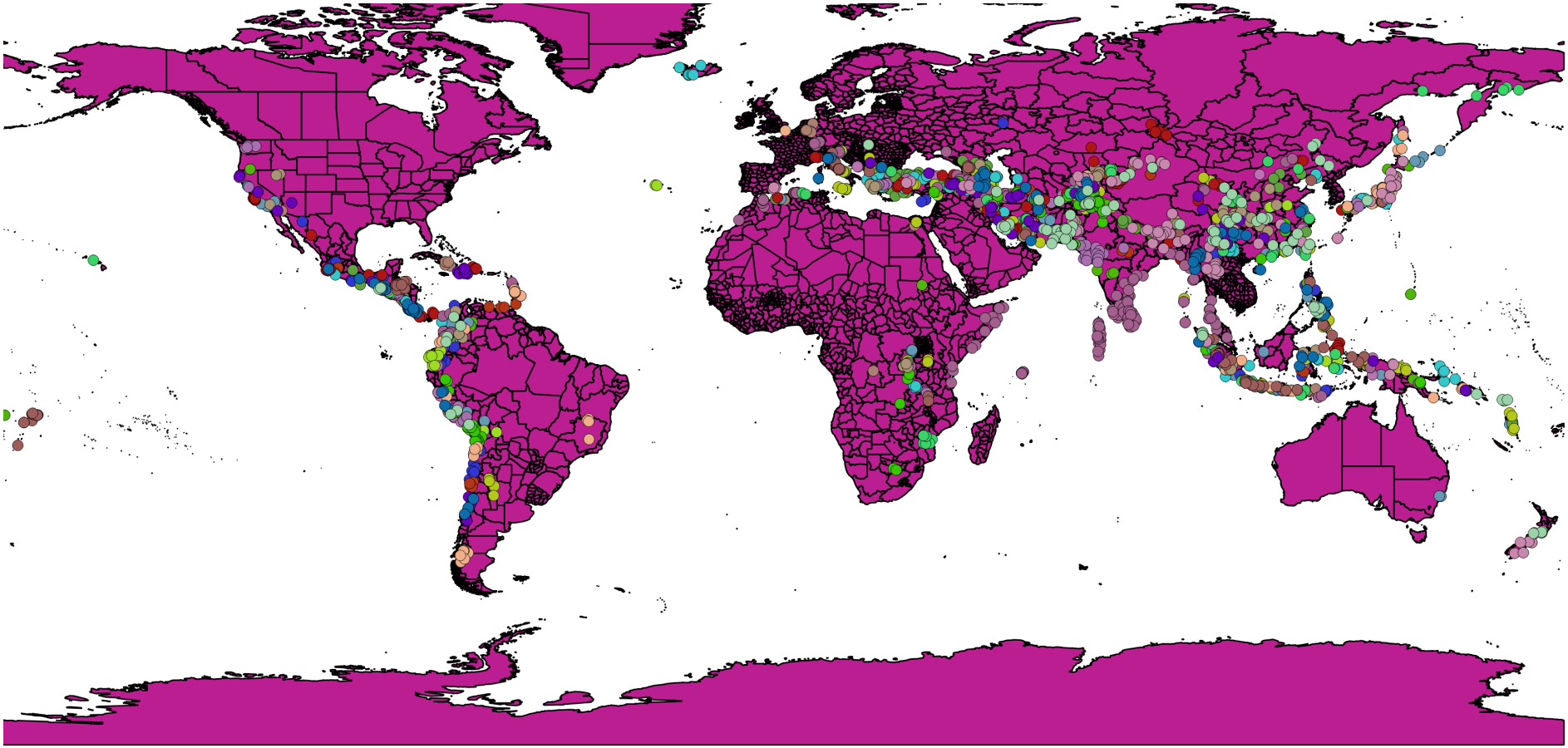


Figure: Administrative regions and earthquakes

Modelling Earthquake Impact

Linearly Decaying with Distance

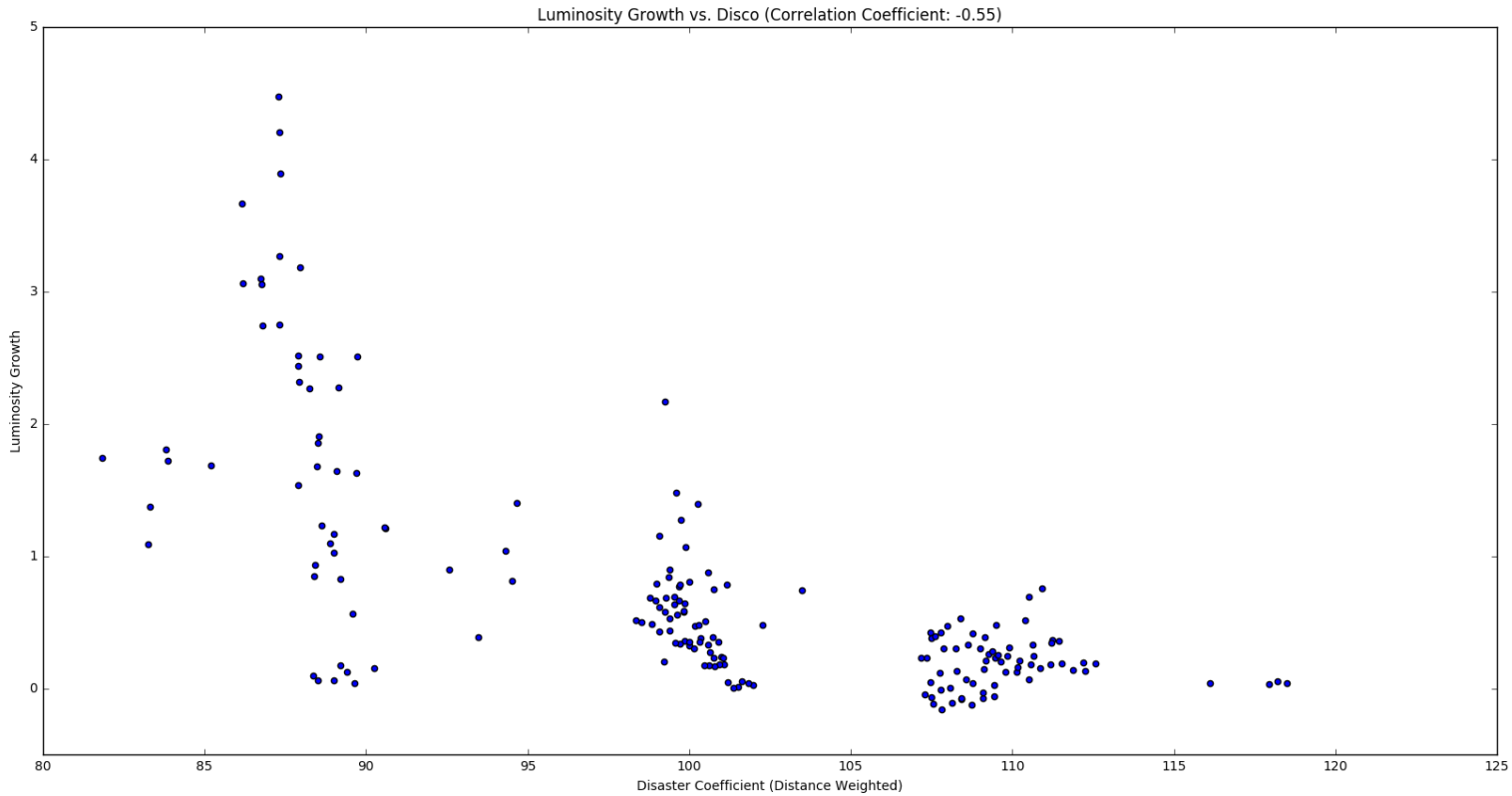


Figure: Luminosity Growth 1992-2013 plotted against a linearly decaying disaster coefficient for 150x150 image sections.

Earthquake Lag Coefficients

	Average Coefficient
el1	-0.60
el2	-0.37
el3	-0.14

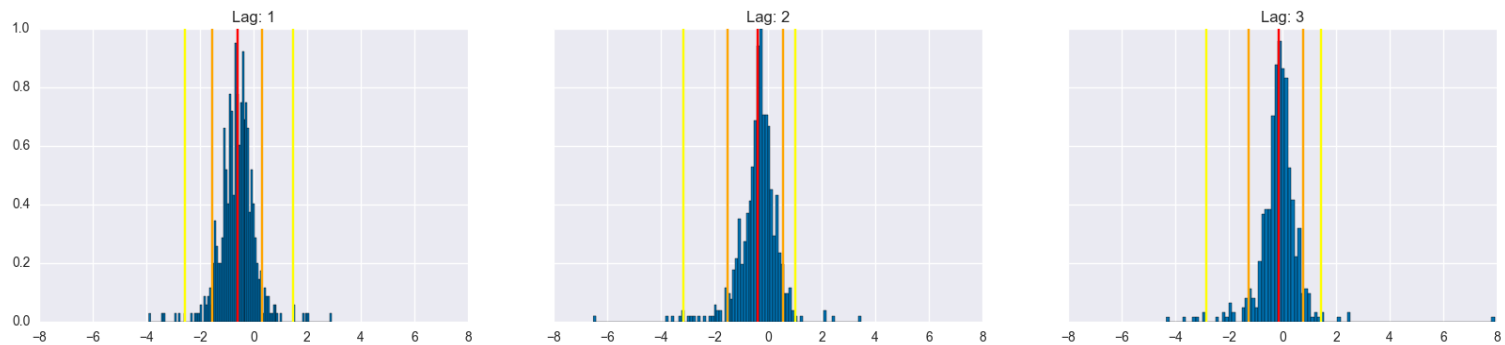


Figure: Distribution of Lag Coefficients for Earthquakes in Vector Autoregression Models per City with 95th and 99th Percentiles

Earthquake Lag Coefficients

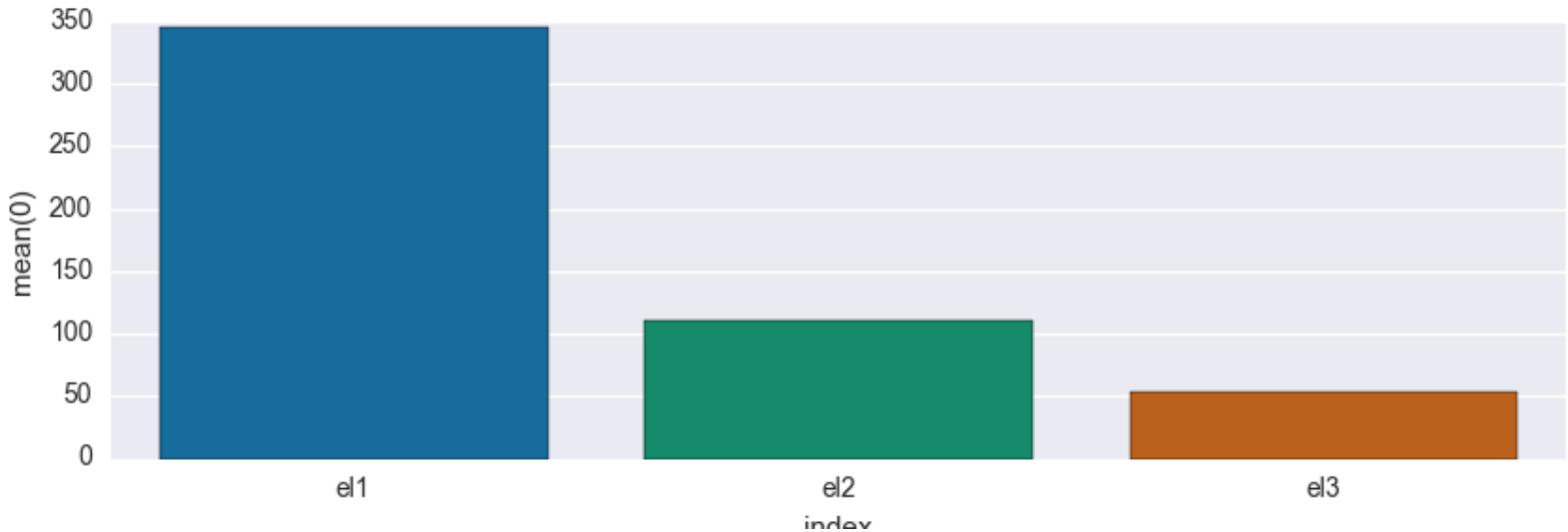


Figure: Count of the most impactful earthquake lag coefficient across all cities

Dynamic Panel Model with Fixed Effects

$$y_{i,t} - y_{i,t-1} = \alpha_i + \beta_t + \gamma(y_{i,t-1} - y_{i,t-2}) + \delta EQ_{i,t} + \eta EQ_{i,t-1} + \epsilon_{i,t}$$

Section-based Panel

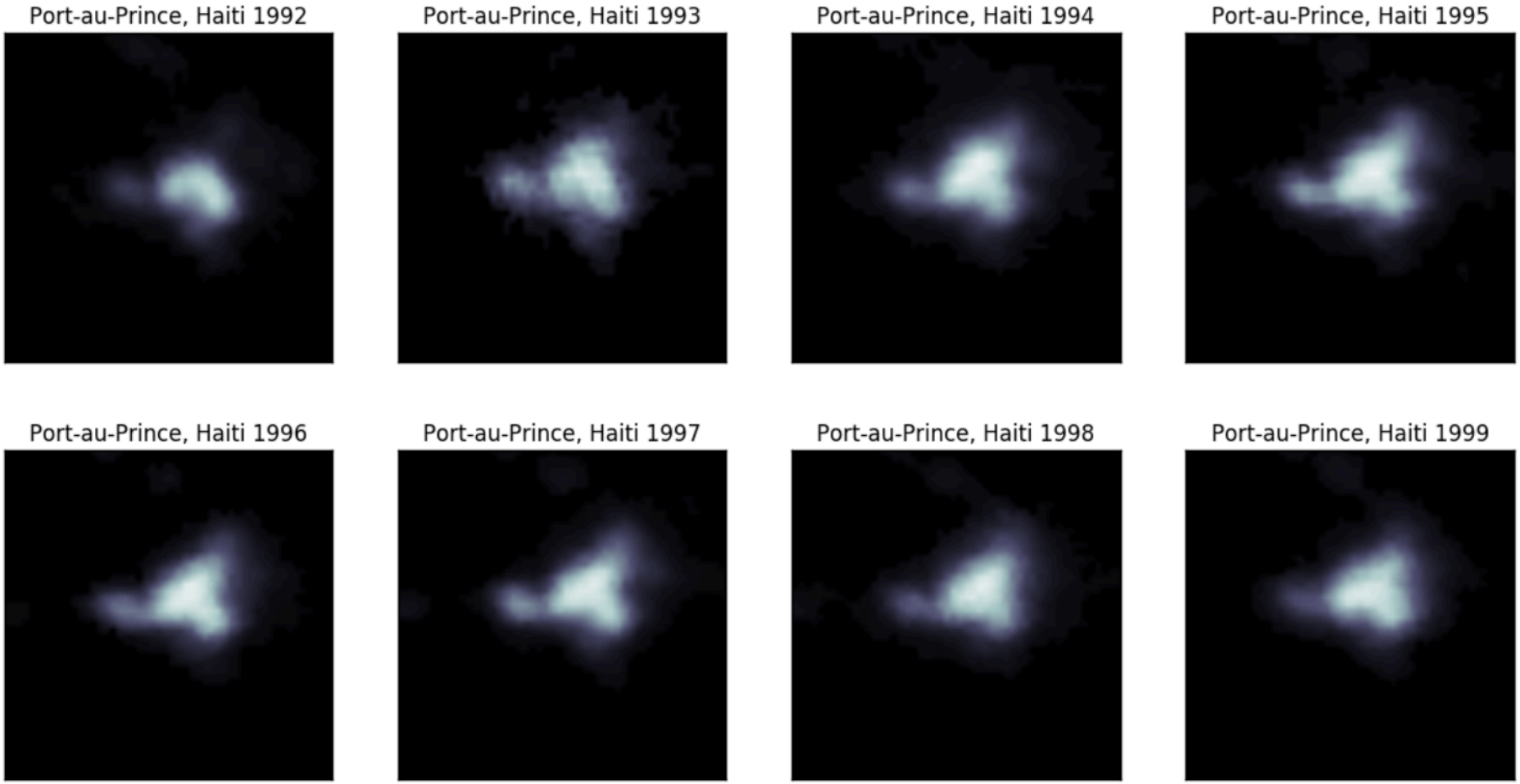


Figure: 50x50 pixel atellite image cutout of Port-au-Prince, Haiti

Figure: Absolute change in luminosity in Tocopilla

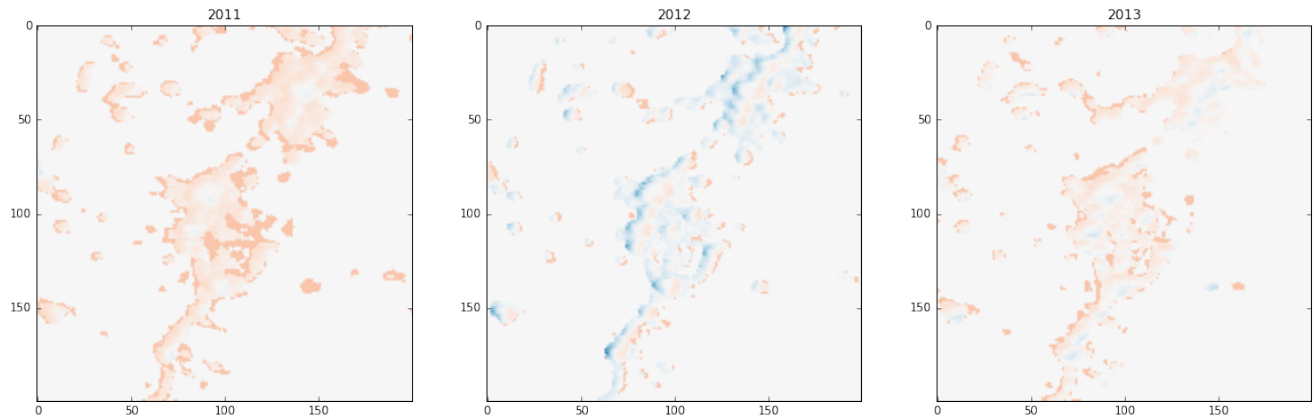
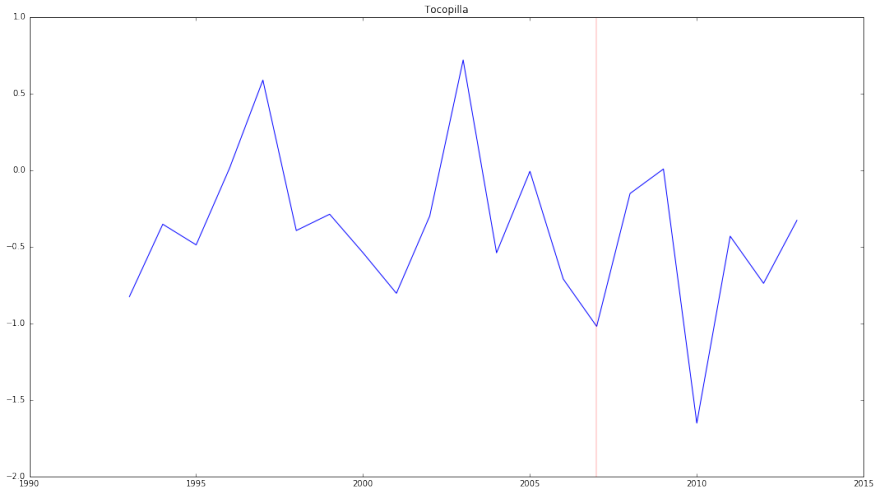


Figure: Absolute change in luminosity in Maule



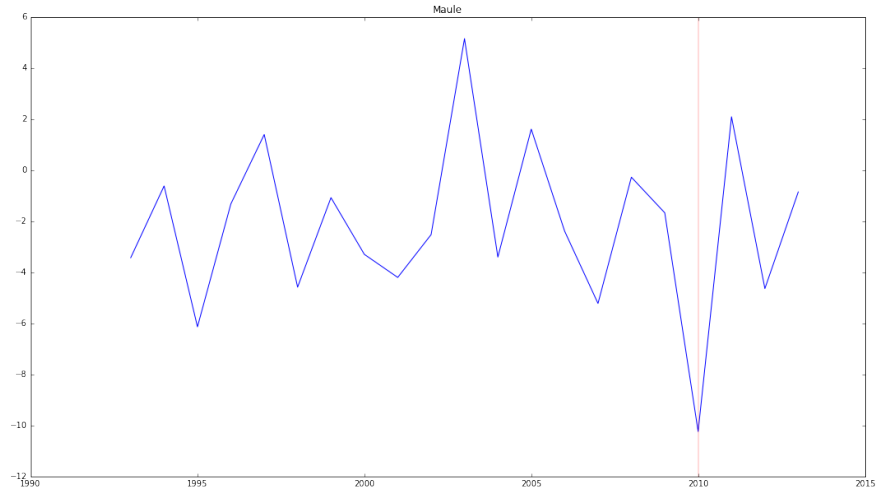


Figure: Tocopilla and Maule Luminosity Sum Time Series

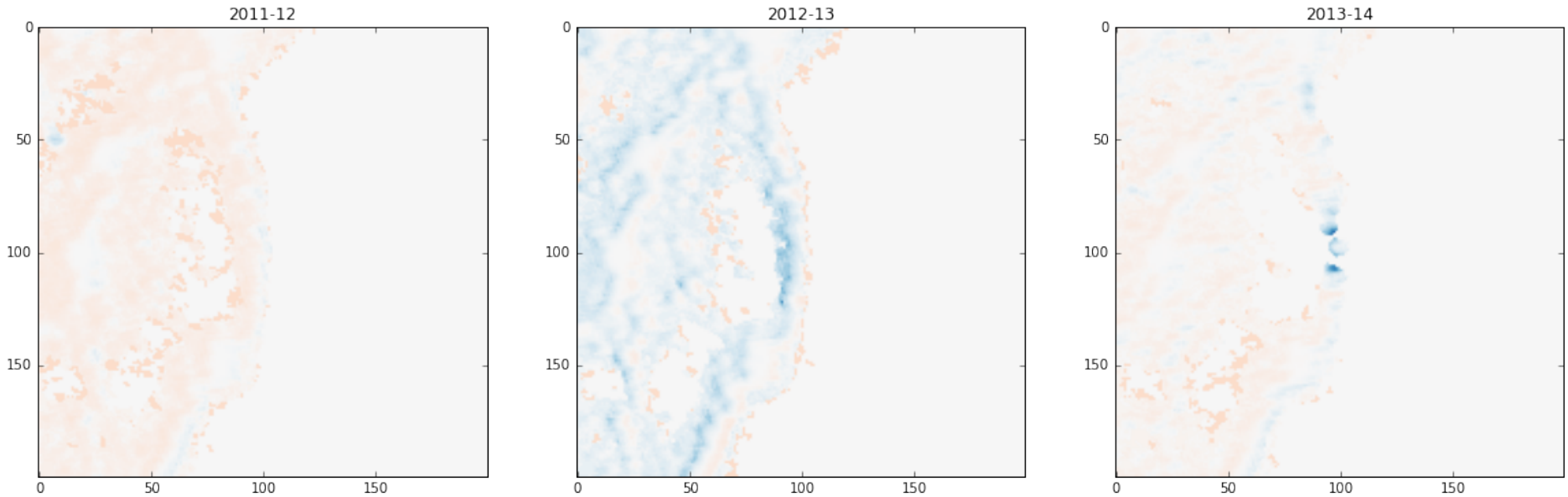


Figure: Fukushima Luminosity Delta around Tsunami Occurance

- Xi Chen and William D. Nordhausn. *Using luminosity data as a proxy for economic statistics*. Proceedings of the National Academy of Sciences, 2010.
- Maxim Pinkovskiy and Xavier Sala-i-Martin. *Lights, Camera,...Income! Estimating Poverty Using National Accounts, Survey Means, and Lights*. NBER WP 19831, 2014.
- VJ enderson, A Storeygard and Weil DN. *Measuring Economic Growth from Outer Space*. American Economic Review, 2011.
- Stelios Michalopoulos and Elias Papaioannou. *Pre-colonial Ethnic Institutions and Contemporary African Development*. Econometrica, 2013 Jan; 81(1): 113–152.
- Chilean Ministry of Planning. *Encuesta Post Terremoto: Principales resultados*. Ministerio de Planificación, 2011.
- George orwich. *Economic lessons of the Kobe earthquake*. Economic development and cultural change, 48(3), 521-542, 2000

- The Scientific Basis. *Intergovernmental Panel on Climate Change*. 2001
- Eduardo Cavallo and Ilan Noy. *The economics of natural disasters: a survey*. 2009.
- Claudio Raddatz. *The wrath of God: macroeconomic costs of natural disasters*. Washington DC: World Bank, 2009.
- Eduardo Cavallo, et al. *Catastrophic natural disasters and economic growth*. Review of Economics and Statistics, 95(5), 1549-1561, 2013