Harnessing satellite data to measure impacts of infrastructure investment

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Measuring impacts of transport infrastructure

- Investments in infrastructure e.g. roads aim to increase economic development and employment.
- Improve access to market, increase competition, reduce transport costs.
- Key to assess impacts for monitoring and future planning.
- Difficult to capture long-term effects, remote sensing offers an opportunity.

Source: ILO
Nighttime lights (NTL)

- Satellite imagery of light emissions at night from the NASA Visible Infrared Imagining Radiometer Suite (VIIRS)
- High spatial and temporal resolution
- Applied as a proxy for economic activity (GDP)
- Can be translated into employment

Source: NASA
Case study: Kenya transport corridor

- Rehabilitation of 500km of road, aimed to increase economic activity and employment opportunity for local population
- Administrative level analysis (areas within 2.5km of roads)
- Pixel level analysis up to 5km from road – spatial allocation of economic activity
- Control for population, conflicts, NDVI, precipitation, infrastructure projects
Case study: Kenya transport corridor

- Comparing areas/pixels before and after the road project was completed and treated vs untreated
- Change in NTL converted to GDP based on national level elasticity
- Change in GDP translated to employment
- More lights = increased GDP and employment
Case study: Kenya transport corridor

- NTL brightness increased between 11 – 22.8% between one and four years after completion
- Increase in GDP between 4.6 per cent, one year after completion and 9.6 per cent four years after
- Relationship between lights/GDP and GDP/employment, equates to an increase of between 1.4 and 3 per cent in employment
- Largest impacts within 1km of road, and negligible after 2km
Conclusions

- Insights for policy surrounding road planning and placement
- Impacts continue to increase over time
- Removes the need for resource intensive data collection
- But supplementing with georeferenced survey data will give additional dimensions relating to incomes, sectors, working hours and gender disaggregation
- Further applications to measure the impacts of projects in other sectors e.g. agriculture, energy