



## Phone traffic as a measurement of agricultural events

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Inspired by empirical studies of networked systems such as the Internet, social networks, and biological networks, researchers have in recent years developed a variety of techniques and models to help us understand or predict the behaviour of these systems (1). However, it has been recently when global food system has been seen as a complex web of production, processing, storage and transportation opening new challenges in their analysis.

Agricultural activities in developing countries remain as important today as in the 1950s implying seasonal workers mobilization. The proliferation of mobile phones (MPs) offers an unprecedented tool to analyze human activity mapping. We would like to mention that in developed countries, the number of MP subscribers has surpassed the total population, with a penetration rate now reaching 121%, whereas in developing countries, it is as high as 90% and continuing to rise (2).

As an example, we have analyzed the impact that agricultural activities, such as the growing of groundnut, have on Senegal. To this end we have analyzed the Normalized Difference Vegetation Index (NDVI) time series of the whole of Senegal and spotted the regions where groundnut is grown to identify the time period when this crop growth. By analyzing phone calls at each region of the country we found that a significant fraction of antennas exhibit two well defined peaks of activity corresponding with the beginning and end of the growing season. Antennas located on regions identified as growing regions present this pattern. However, other antennas, located in non growing regions, such as Dakar, also present the two peaks pattern pointing out the synchronization between growing regions and key points in cities that emerges from the agricultural activity.

### References

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2. International Telecommunication Union (2014) World Telecommunication Development Conference (WTDC-2014): Final Report. (ITU, Dubai, United Arab Emirates).