

# The Impact of Crime on the Quality of Rail Services in South Africa

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# Positive feedback from illegitimate behaviour:

1. “Crime levels are not controlled solely by public resources spent on deterrence, but by the characteristics of the criminal justice system.
2. As the perceived probability of being punished for an illegal undertaking diminishes, crime becomes more appealing to individuals, and people’s propensity to commit crime increases.
3. As more crimes are committed, the ability of the legal system to cope with them diminishes.
4. Thus, the probability of being punished falls, and crime becomes even more appealing to individuals.
5. Increasing police resources just overwhelms an already overloaded legal system.
6. Exogenous crime shocks can temporarily overwhelm the legal system, leading to even higher crime levels in the long run.”

# A Systems Model for Crime (Tested for Argentina, Brazil and Costa Rica)



## Decay of Crime Deterrence:

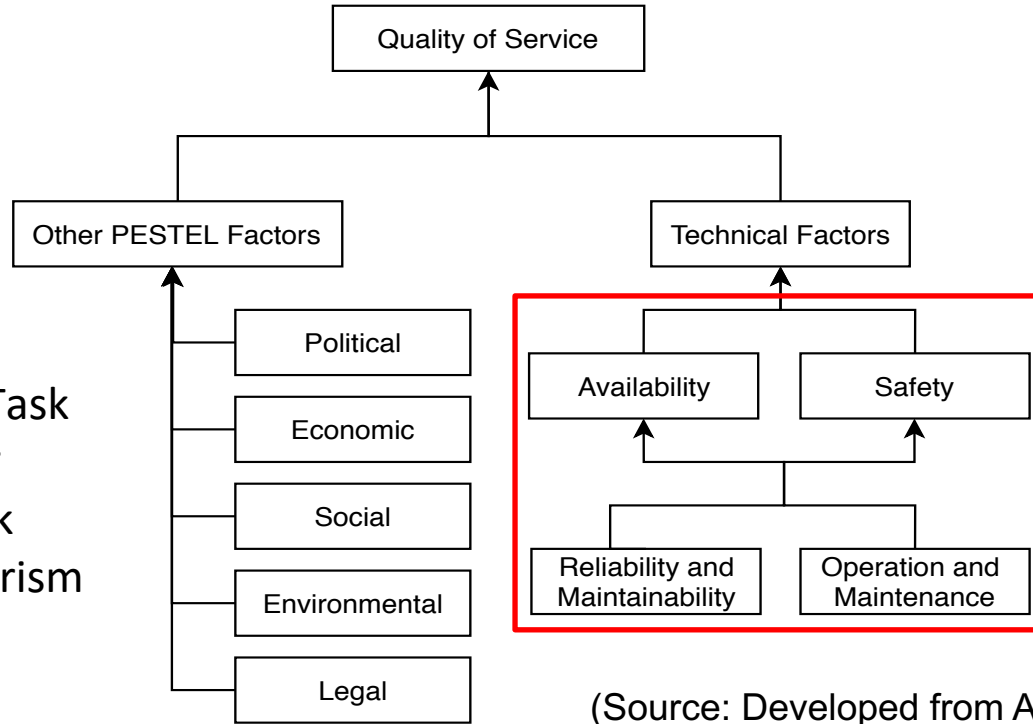
- ← I will get caught
- ← I can get away with it
- ← You can't catch me

(Source: López, L. and Zúñiga, R. 2001.

*A system dynamics model of crime.*

19th International Conference of the System Dynamics Society. Atlanta.)

# Quality of Service derives from PESTEL factors



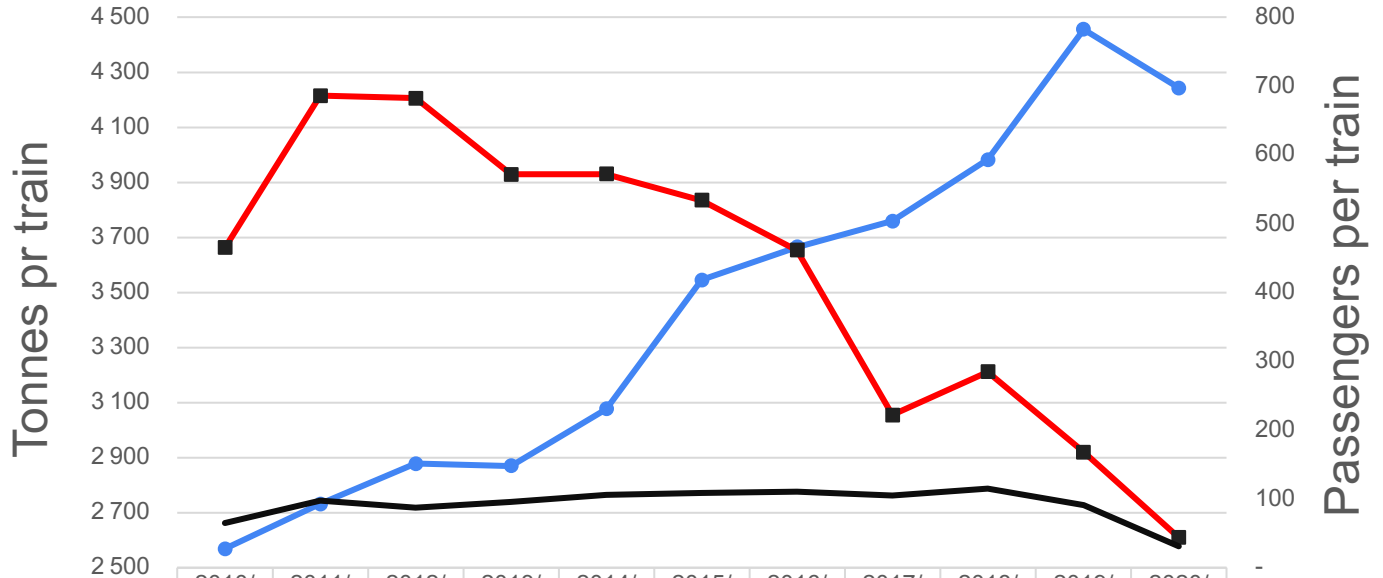
The Financial Action Task Force uses PESTEL for money laundering risk assessment and terrorism research. (Blanco and Cohen, 2014).

← Railway RAMS (from Conradie)

(Source: Developed from Aquilar, 1967; Conradie *et al.*, 2015; Milutinović and Lučanin, 2005)

# Train Productivity

(Source: Analysis of RSR data)

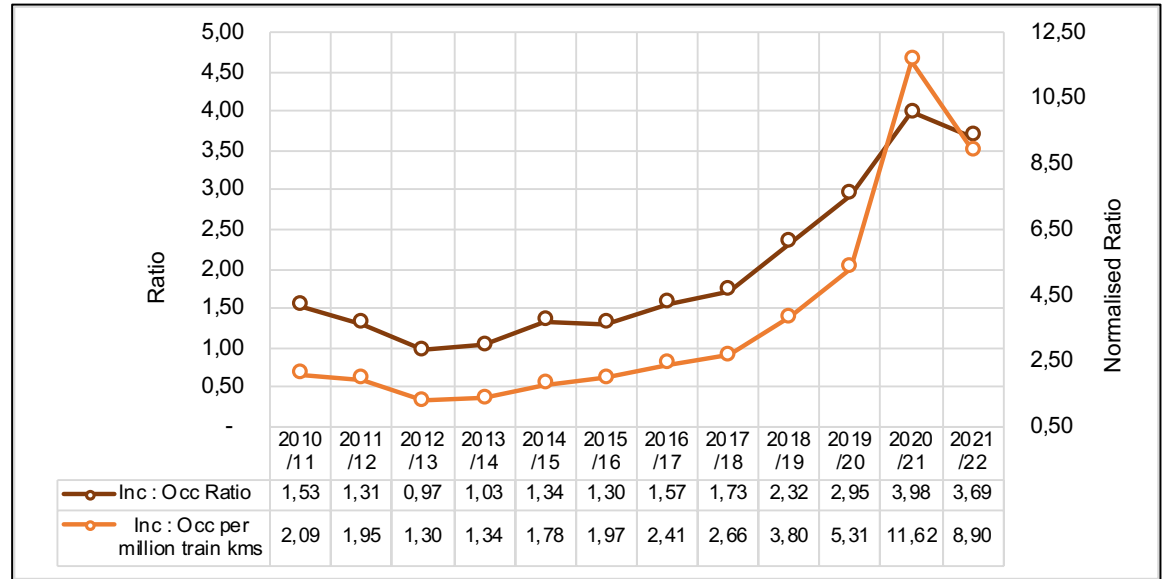


	2010/ 11	2011/ 12	2012/ 13	2013/ 14	2014/ 15	2015/ 16	2016/ 17	2017/ 18	2018/ 19	2019/ 20	2020/ 21
● Average tonnes per train	2 569	2 732	2 878	2 870	3 077	3 545	3 665	3 759	3 982	4 455	4 243
■ PRASA Average passengers per train	465	686	682	571	572	534	461	222	285	168	44
— Gautrain Average passengers per train	65	97	87	95	106	109	110	105	115	91,19	31,12

# The ratio of Security-Related Incidents to Safety-related Occurrences in South Africa

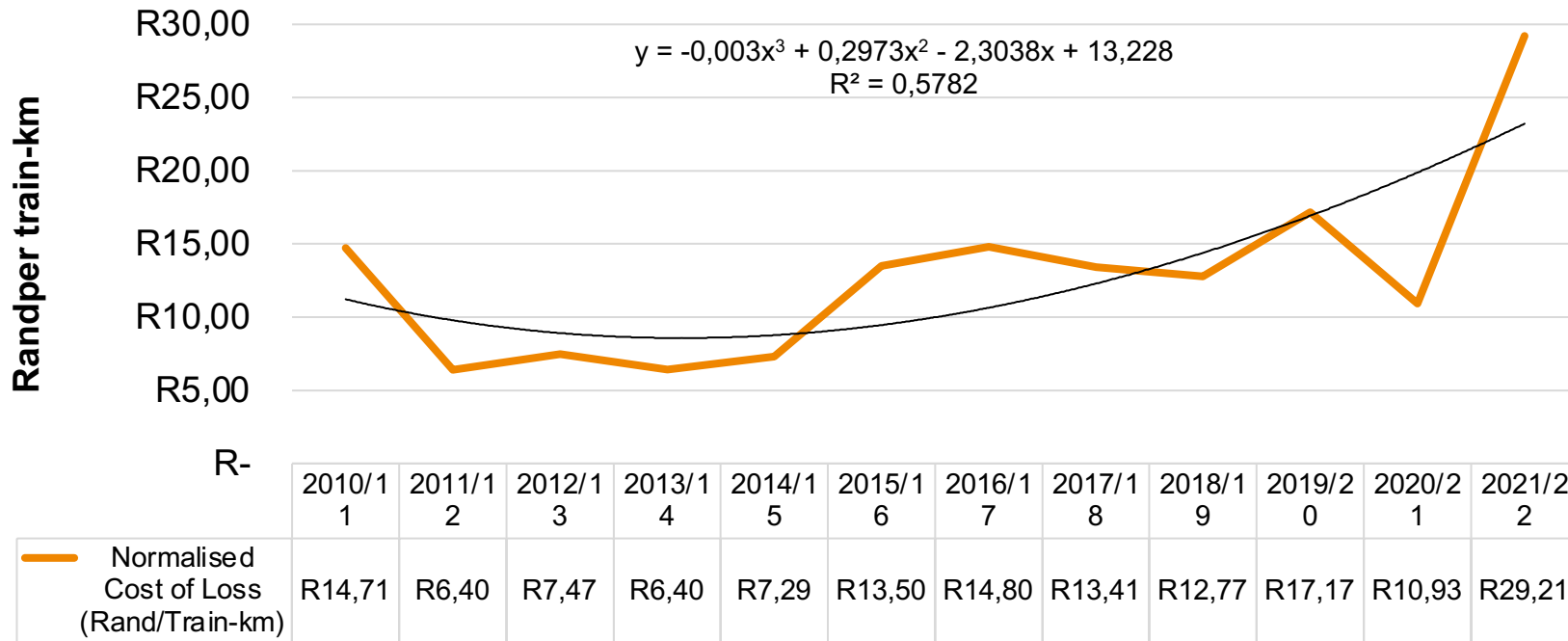
1 Apr 2010 to 31 Mar 2022:

- 127 935 Events
- Security-Related Incidents
  - 64% (46 265 events)
  - Avg. 6 806 /annum
- Safety-related Occurrences:
  - 36% (81 670 events)
  - Avg. 3 855 /annum



(Source: Analysis of RSR data)

# Inflationary Normalised Direct Cost of Loss Events, incl. Crime

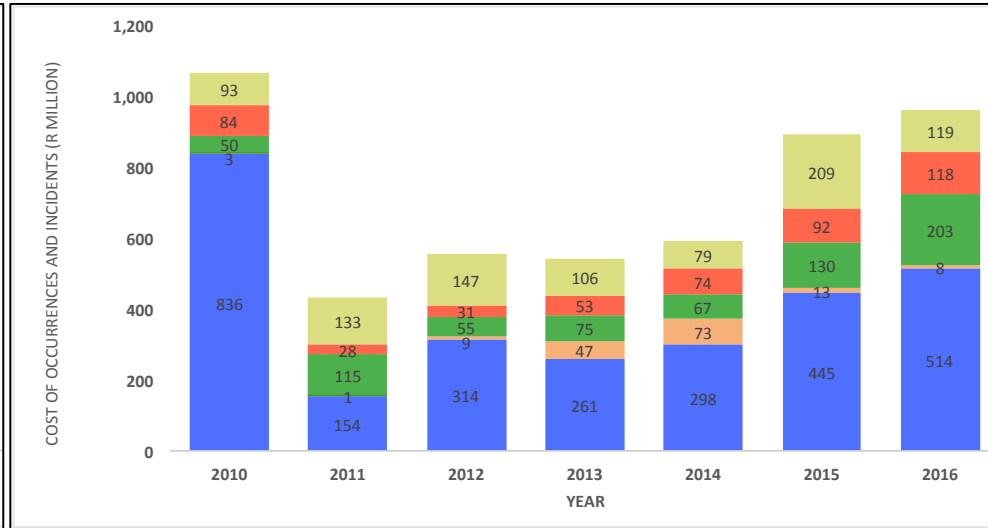
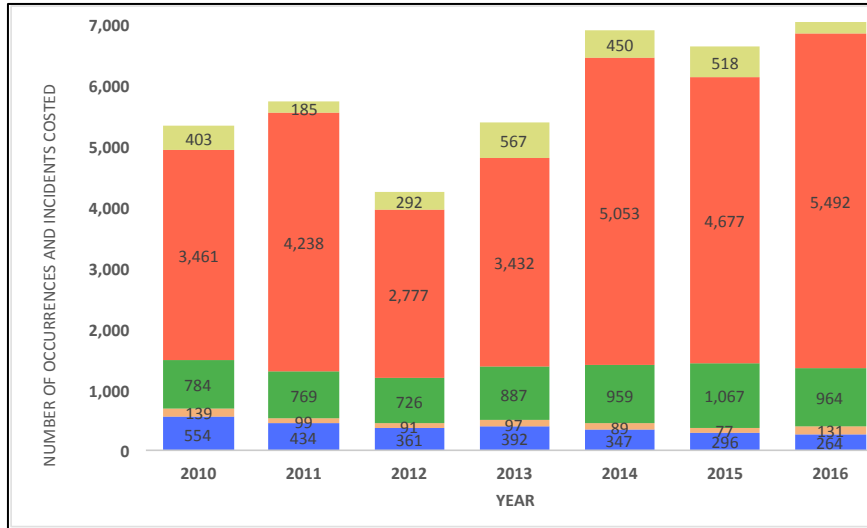


(Source: Analysis of RSR data)

# Direct count and cost of all freight & passenger Railway Occurrences in South Africa (2010-2016)

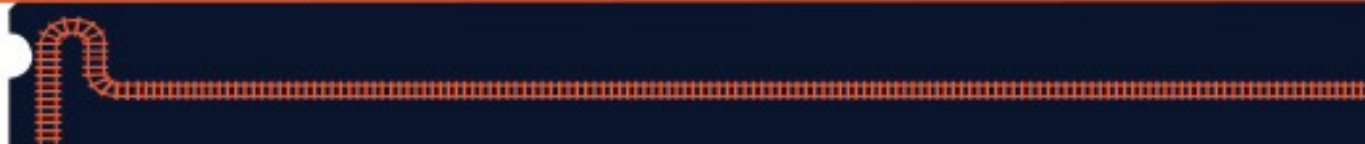
Intrinsic Occurrences & Extrinsic Incidents (#)

Cost of Intrinsic Occurrences & Incidents (Rm)



- Collisions
- Derailments
- Level Crossing Occurrences
- Train fires
- Theft & Vandalism

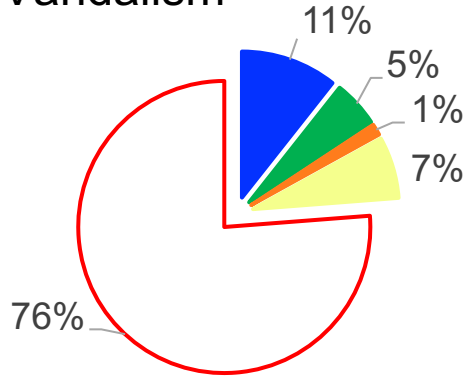
(Source: Analysis of RSR data)





# Geospatial Temporal Visualization of an average 8 573 selected events per annum

- Collisions
- Derailments
- Level Crossing Occurrences
- Train fires
- Theft & Vandalism



- Event frequency on the Ermelo-Richards Bay Coal Export Corridor is 18 times higher than the Sishen Saldanha Line.
- Event frequency on the Gauteng - Durban General Freight Corridor is 3 times higher than the Gauteng-Cape Town GF, Postmasburg-Kimberley Mn Corridor.

(Source: Analysis of RSR data)



# If you could hear these Events Occurring on each Corridor

x1 Sishen Saldanha Iron Ore Export



x12 Gauteng - Durban General Freight



x4 Gauteng-Cape Town GF, Postmasburg-Kimberley Mn.



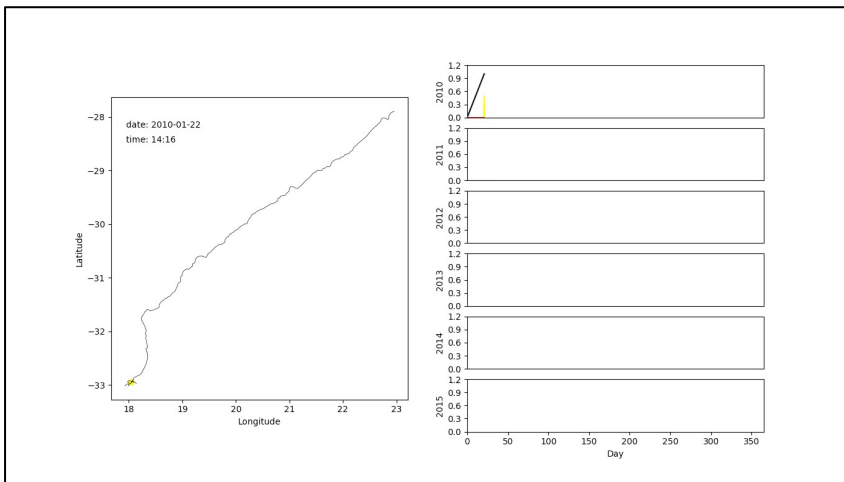
x18 Ermelo-Richards Bay Coal Export



(Source: Analysis of RSR data)

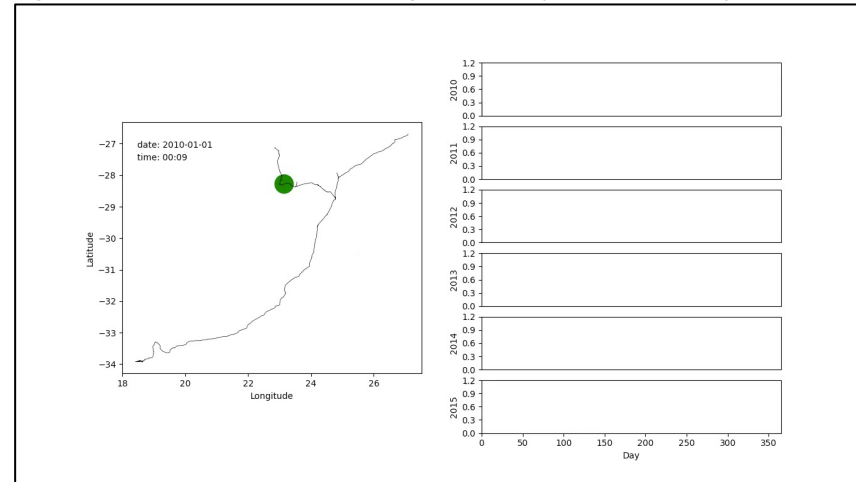


Sishen-Saldanha Iron Ore Export Corridor (2010-2015)

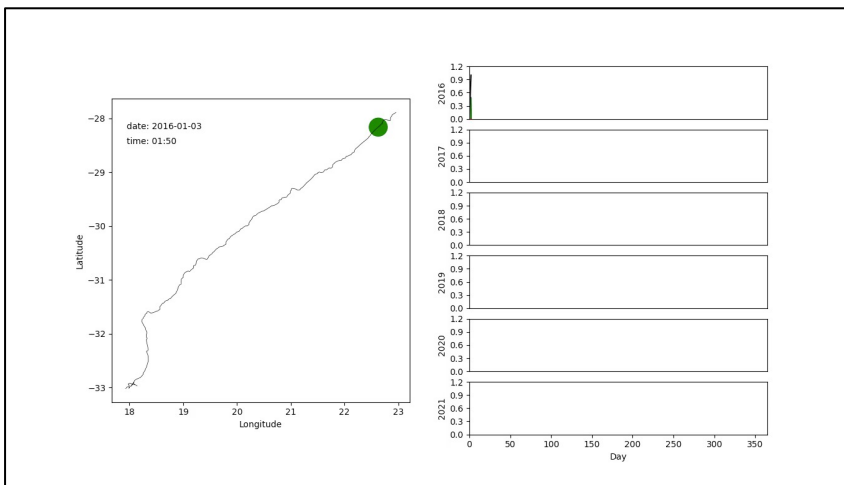


- C
- D
- Lx
- F
- T/V

Gauteng-Cape Town GF, Postmasburg-Kimberley Mn Corridor (2010-2015)

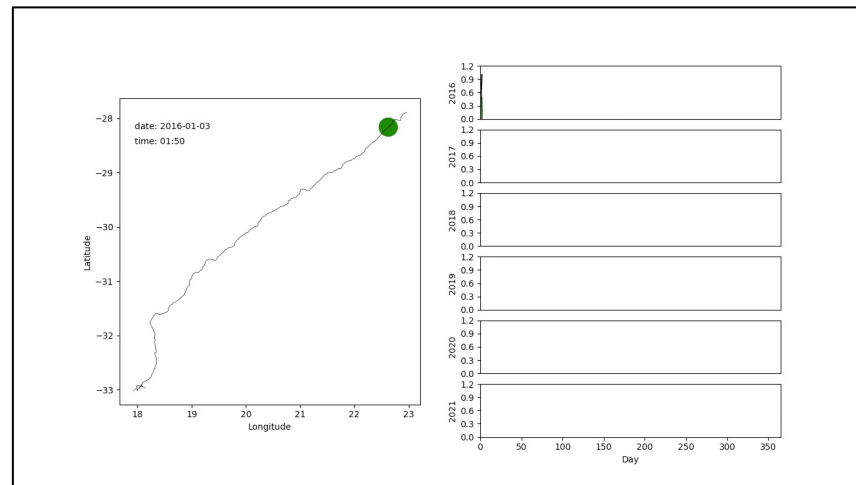


Sishen-Saldanha Iron Ore Export Corridor (2016-2021)

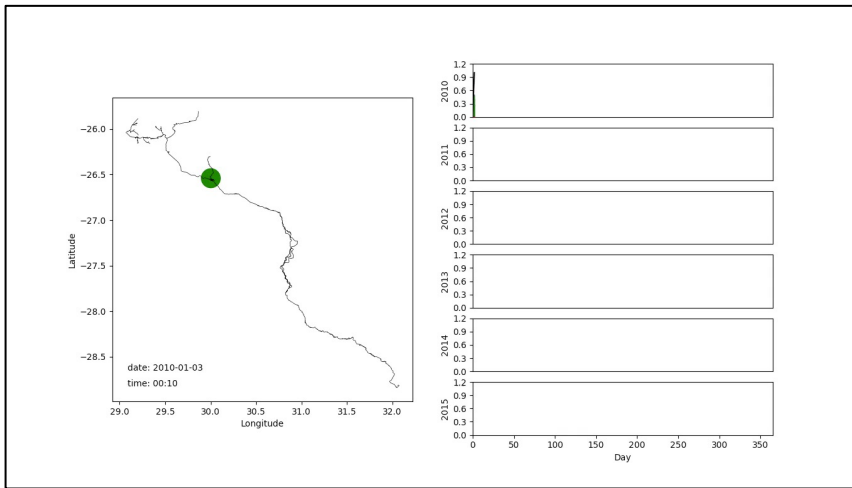


- C
- D
- Lx
- F
- T/V

Gauteng-Cape Town GF, Postmasburg-Kimberley Mn Corridor (2016-2022)

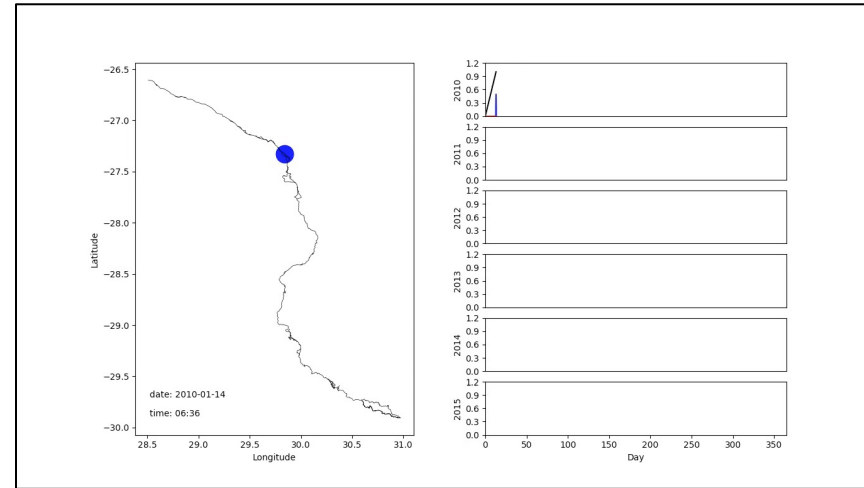


Ermelo-Richards Bay Coal Export Corridor (2010-2015)

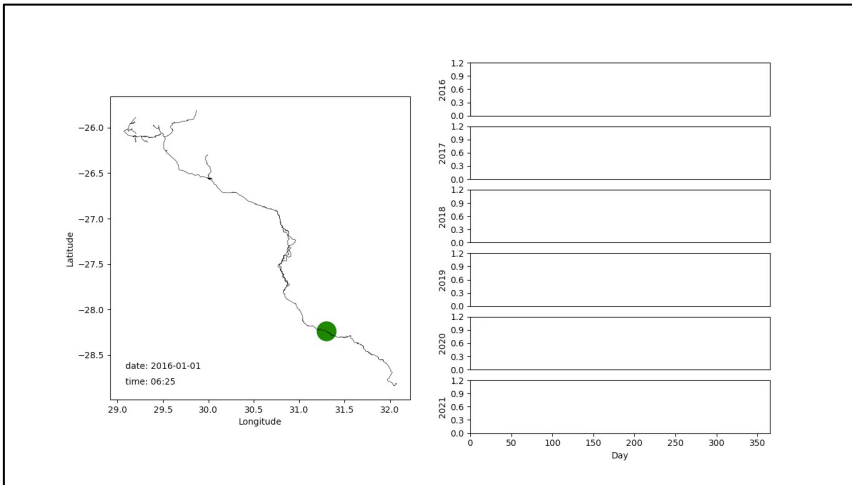


- C
- D
- Lx
- F
- T/V

Gauteng - Durban General Freight Corridor (2010-2015)

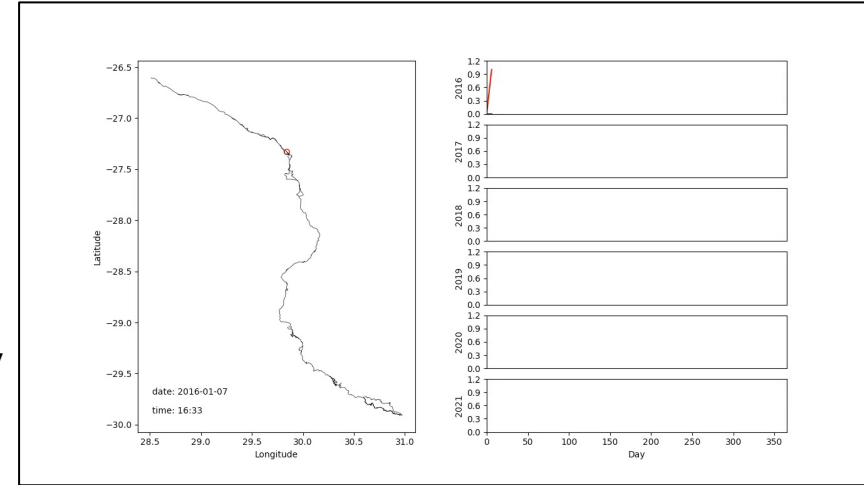


Ermelo-Richards Bay Coal Export Corridor (2016-2021)



- C
- D
- Lx
- F
- T/V

Gauteng - Durban General Freight Corridor (2016-2021)



**Thank You**

