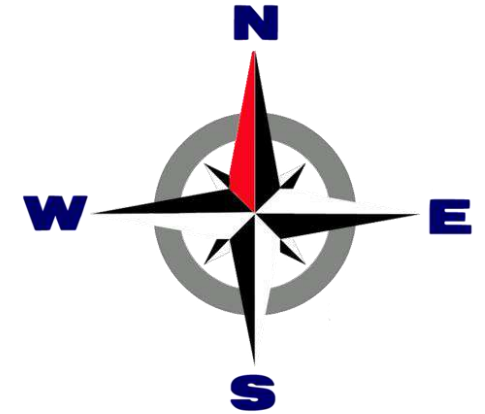


On-line emission monitoring at Shongweni landfill

March 2017

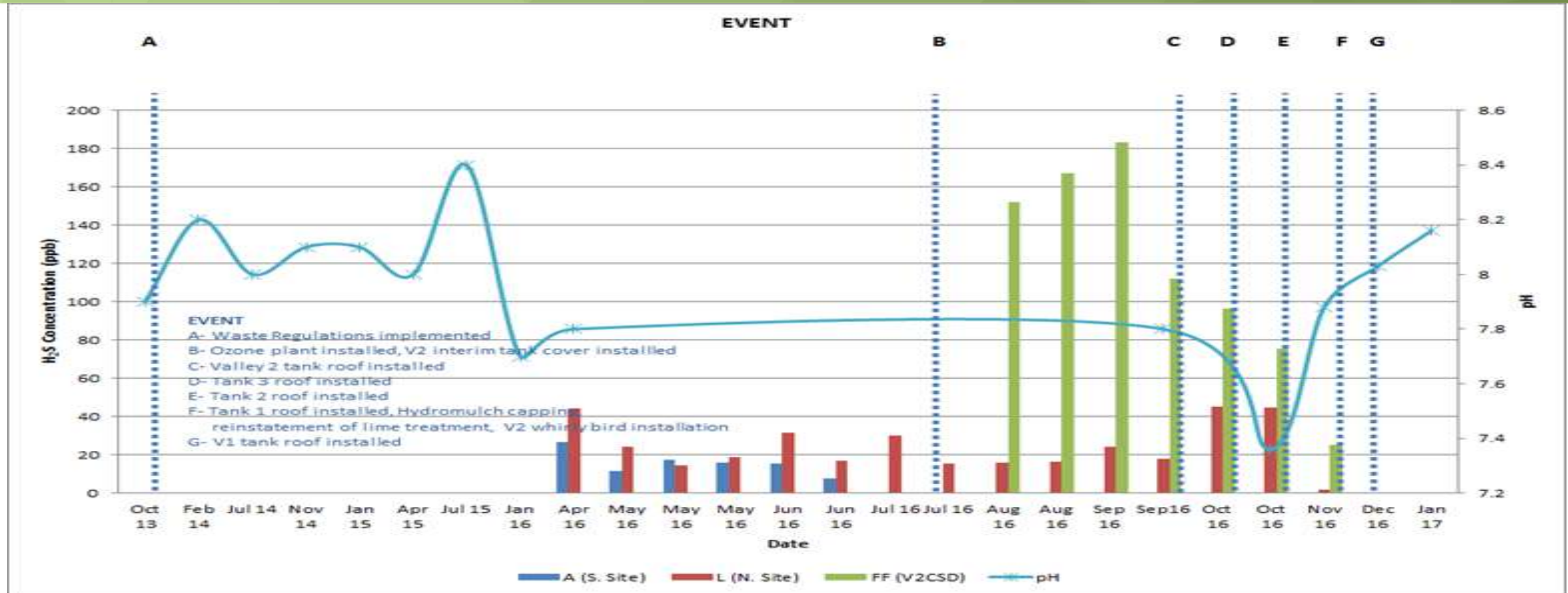


Site overview



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Passive boundary air quality monitoring vs pH



Scential Real Time Monitors

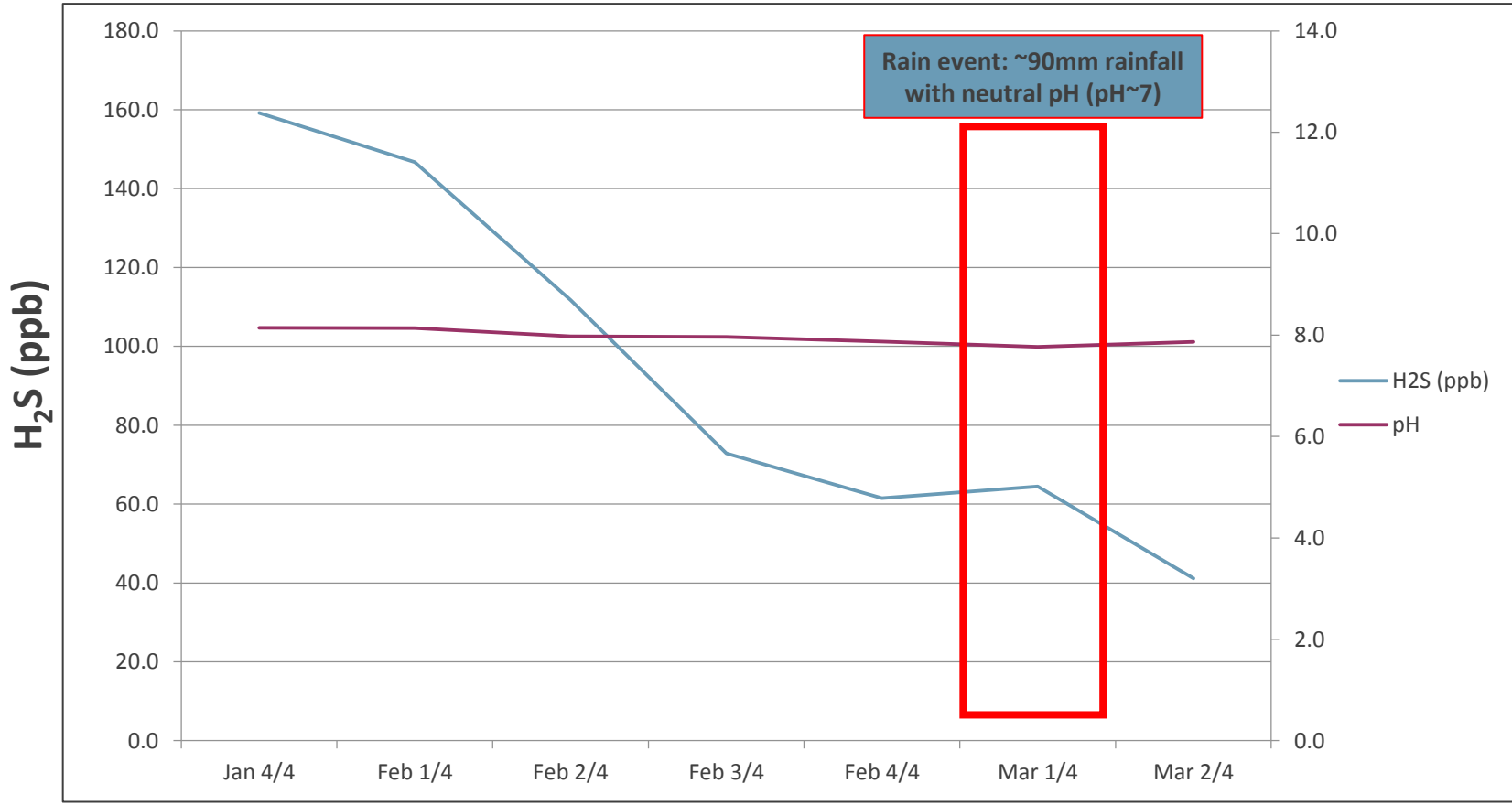


Scentroid SL 121604 – Shongweni gate monitor



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Active/on-line boundary air quality monitoring vs pH



Scentroid monitor SL 121604
Commissioned 24th Jan. 2017



In-coming emission event: Shongweni gate monitor



- Wind direction: SW to W
- Incoming to gate monitor
- NH₃ peak = 655ppb
- H₂S peak = 1 195ppb
- VOC peak = 35 222ppb

Identification of significant gaseous pollutant not related to Shongweni landfill

March 2017

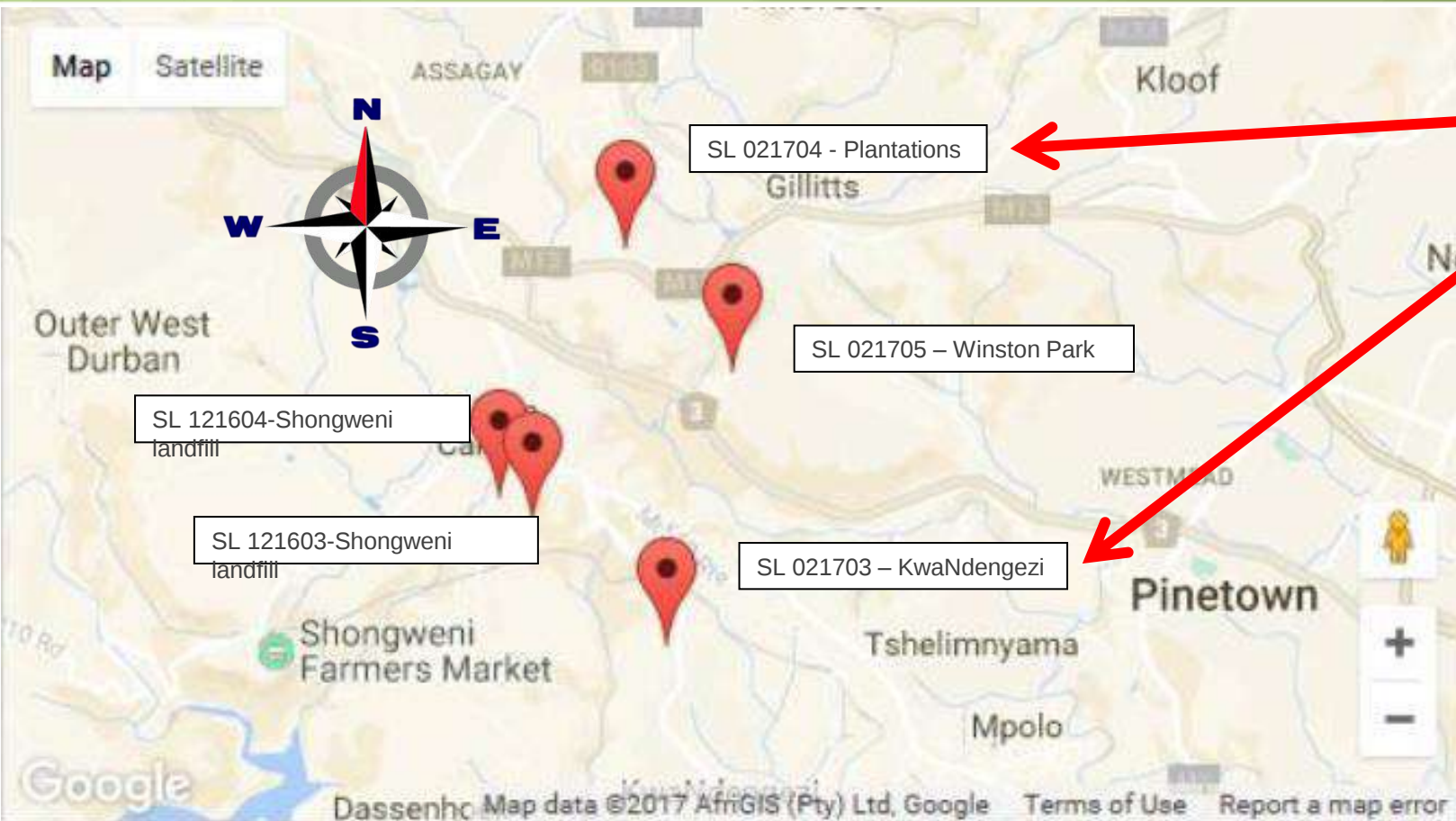


Installation of Scentroid on-line air emission monitors

- Initially installed 2 on site to monitor:
 - Wind direction and speed
 - H_2S
 - NH_3
 - VOCs
- Additional 2 units purchased with additional capacity to monitor SO_2
 - Need to establish SO_2 levels in community before installing gas flaring system
 - Commissioned late 2nd week March 2017



Location of on-site and community monitors



- **SO₂ capable monitors:**

- SL 021704
- SL 021703

- **All monitors able to measure:**

- Wind speed
- Wind direction
- H₂S
- NH₃
- VOCs

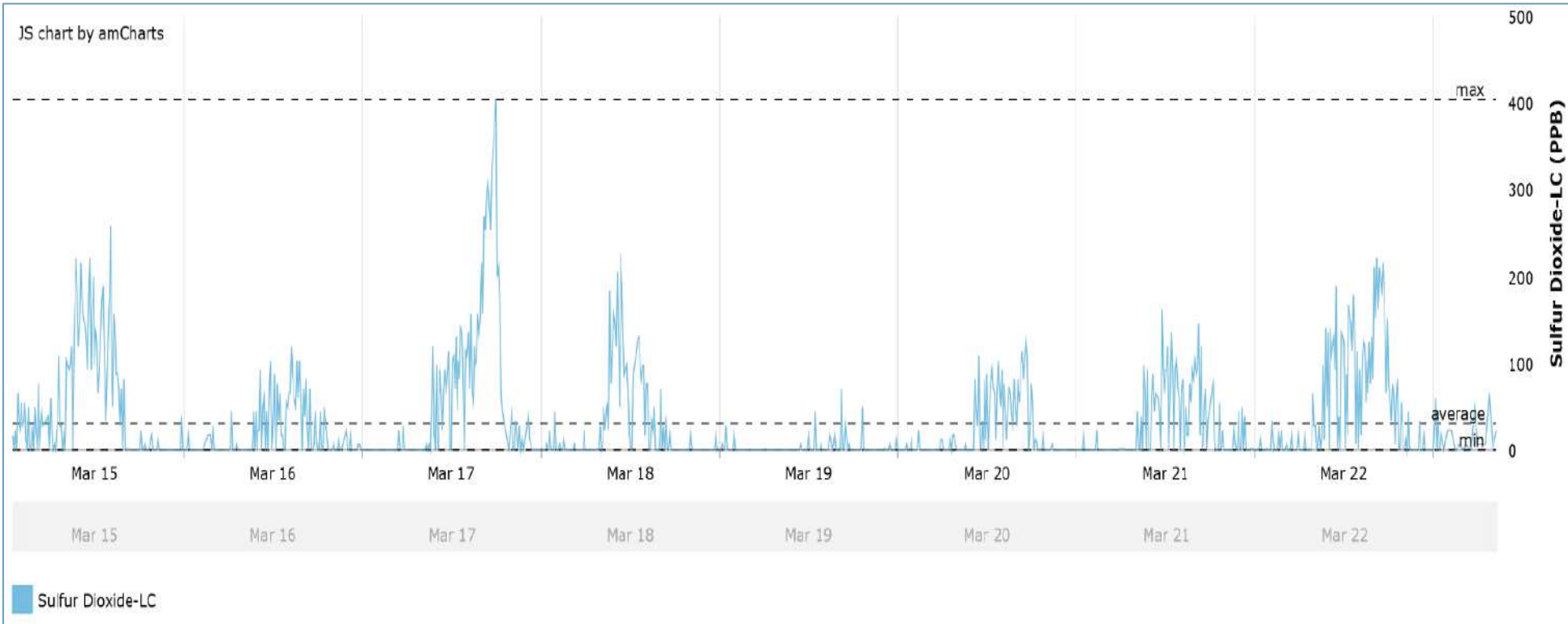


Shongweni and potential for SO₂ generation

- SO₂ acknowledged by Scottish Environmental Protection Agency (SEPA), the US EPA and the Massachusetts Environmental Agency to be a pollutant generated by combustion of sulfur containing materials
- No waste combustion occurring at Shongweni
- SO₂ not generated at Shongweni as verified by Dräger tube analysis (<100ppb)
- No potential for chemical generation (highly acidic pH required)



SO₂ at Plantations (SL 021704) - 15th to 23rd March

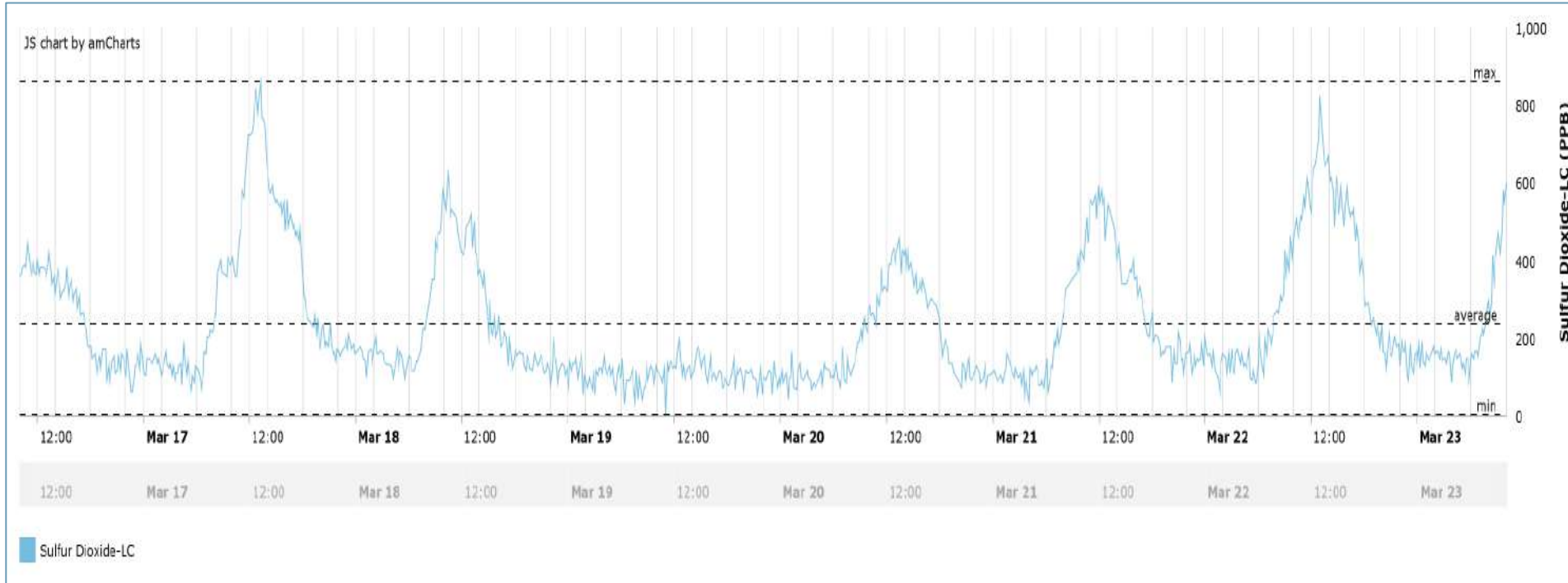


- **Average = 30.2ppb**
- **Peak = 404ppb**
- **Wind direction:**
 - 15th March – ESE
 - 16th March – ENE
 - 18th March – ESE
 - 20th March – SSE
 - 22nd March – SE



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SO₂ at KwaNdengezi (SL 021703) - 16th to 23rd March

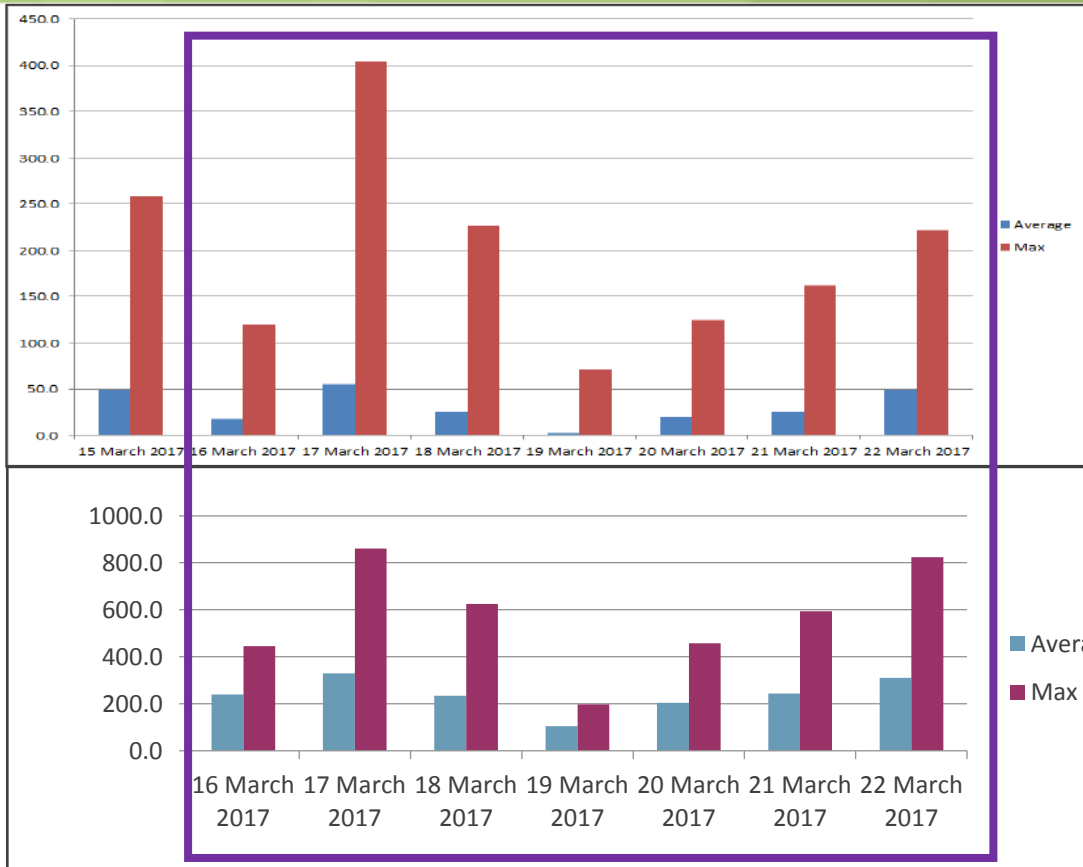


- **Average = 239ppb**
- **Peak = 861ppb**
- **Wind direction:**
 - 17th March – E
 - 18th March – SE
 - 19th March – SE
 - 20th March – ENE
 - 21st March – E
 - 22nd March – E



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Comparison of SO₂ events – 16th to 23rd March



- **Plantations – 15th to 23rd March**

- Average = 30.2ppb
- Peak = 404ppb

- **KwaNdengezi – 16th to 23rd March**

- Average = 239ppb
- Peak = 861ppb



Symptoms related to pollutant exposure

- **H₂S** - nausea, tearing of the eyes, headaches or loss of sleep, bronchial constriction in some asthma patients, coughing, eye irritation
- **SO₂** - severe irritation of the nose and throat, shortness of breath, tightness in the chest and wheezing, irritates or burns the skin, irritates or burns the eyes



Health impact of SO₂ exposure as pollutant

- **INFOTOX statement:**

“evaluation of the health evidence by the US Environmental Protection Agency (USEPA) has confirmed that there is a causal relationship between respiratory morbidity and short-term exposure to sulfur dioxide. Epidemiological studies provide consistent evidence of an association between ambient sulfur dioxide and respiratory symptoms in exposed communities, especially children and sensitive individuals, particularly those with asthma or chronic respiratory symptoms”.



Yesterday: 27th March – SO₂



Plantations:

- SO₂ peak = 119ppb

KwaNdengezi:

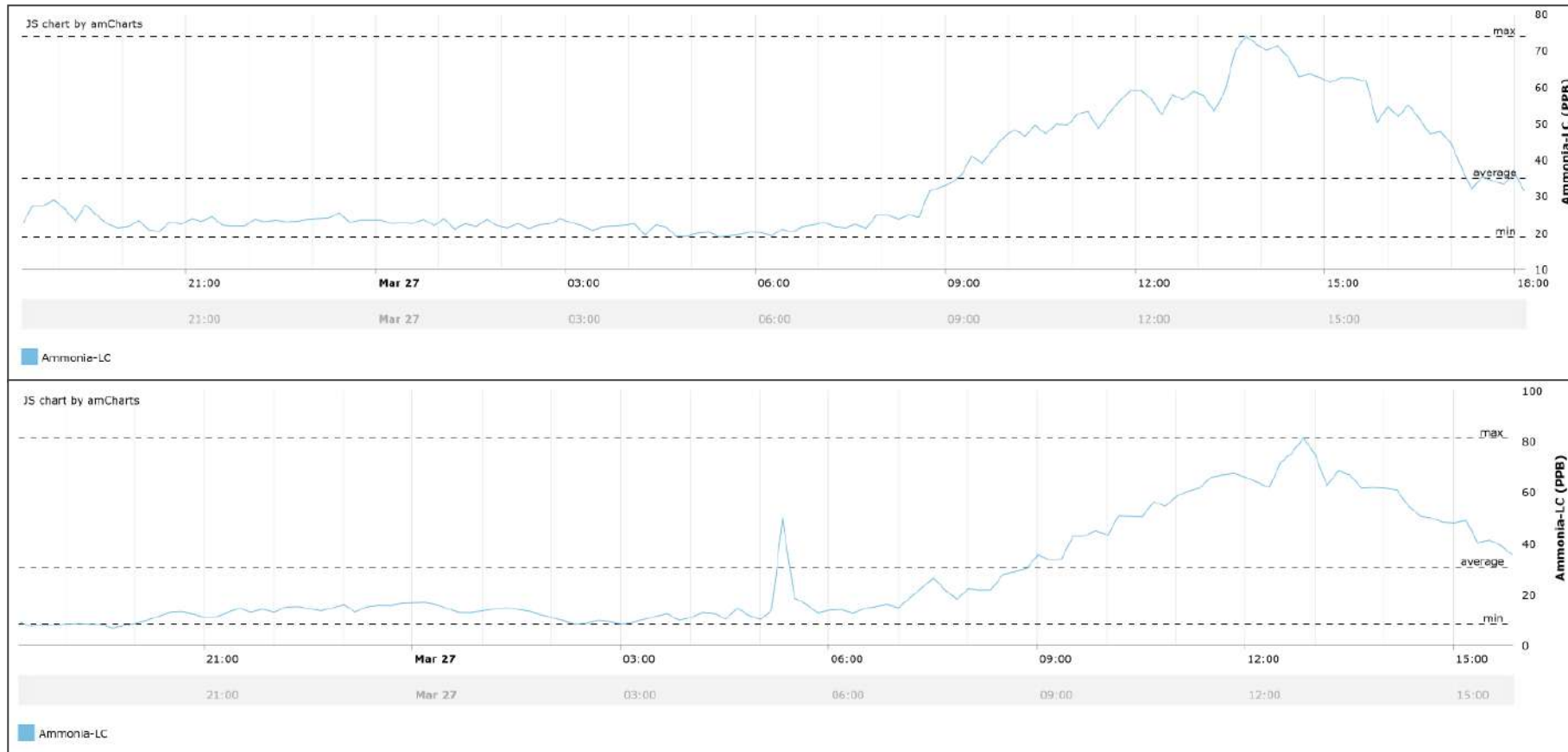
- SO₂ peak = 724ppb



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Yesterday: 27th March – NH₃



Plantations:

- NH₃ peak = 74ppb

KwaNdengezi:

- NH₃ peak = 81ppb



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Yesterday: 27th March – H₂S



Plantations:

- H₂S peak = 259ppb

KwaNdengezi:

- H₂S peak = 229ppb



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Wind direction 27th March: Plantations – H₂S



Plantations:

- H₂S peak = 259ppb

Wind direction:

- Swings to E/SE from ~12:30



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Wind direction 27th March : KwaNdengezi – H₂S



KwaNdengezi:

- H₂S peak = 229ppb

Wind direction:

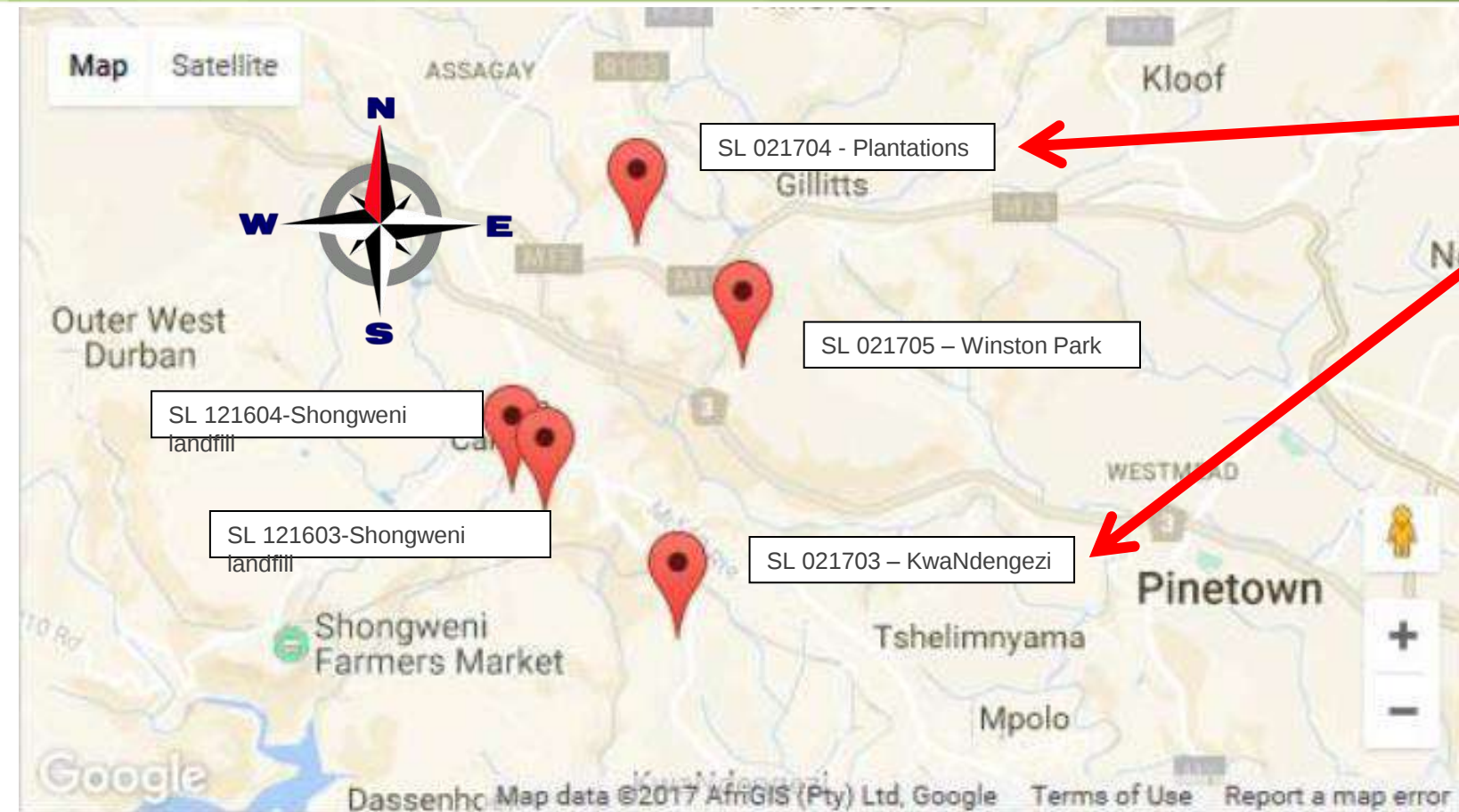
- Steady E/SE from ~11:10



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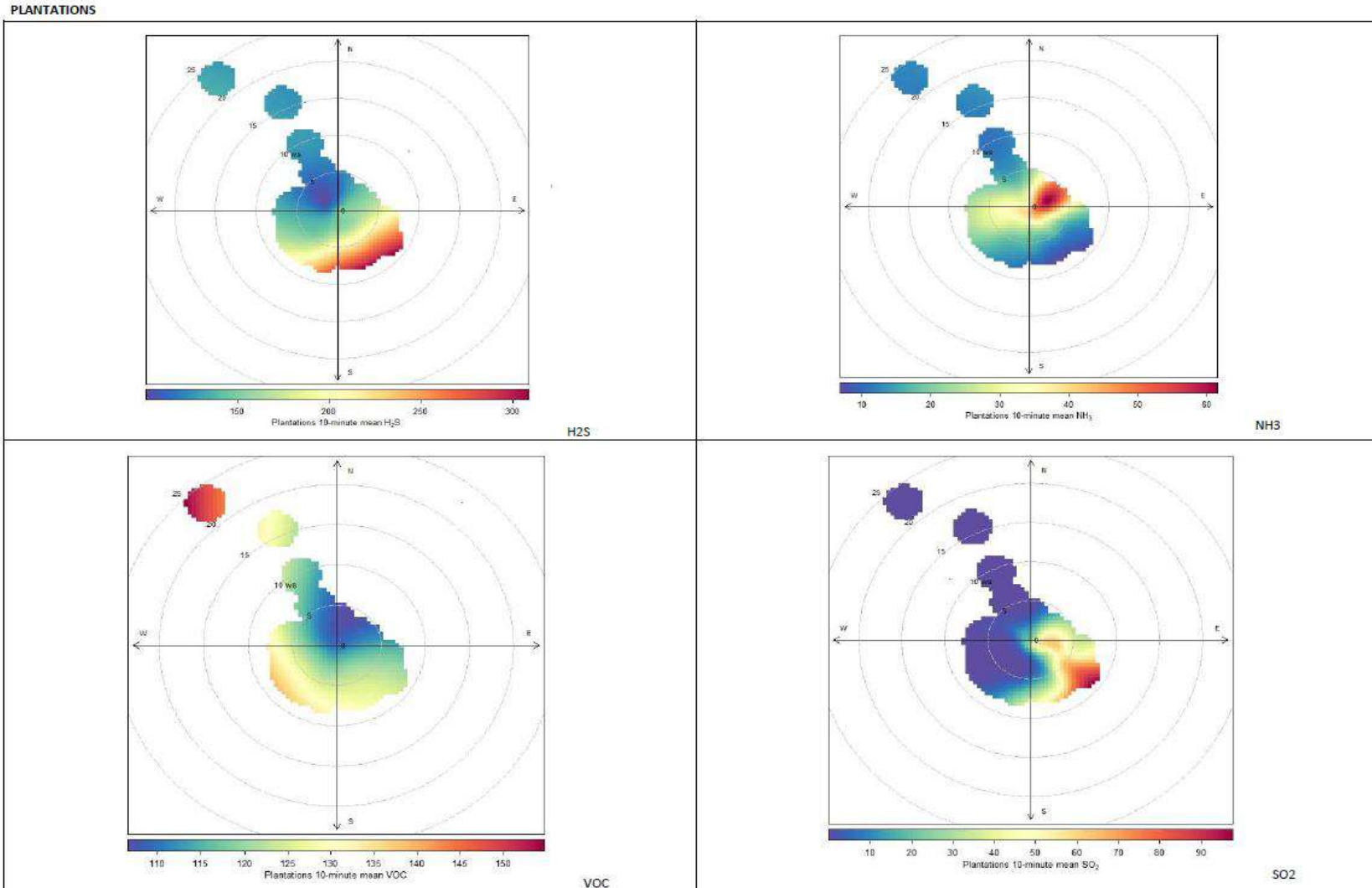
Shongweni i.r.o. Easterly and SE wind direction



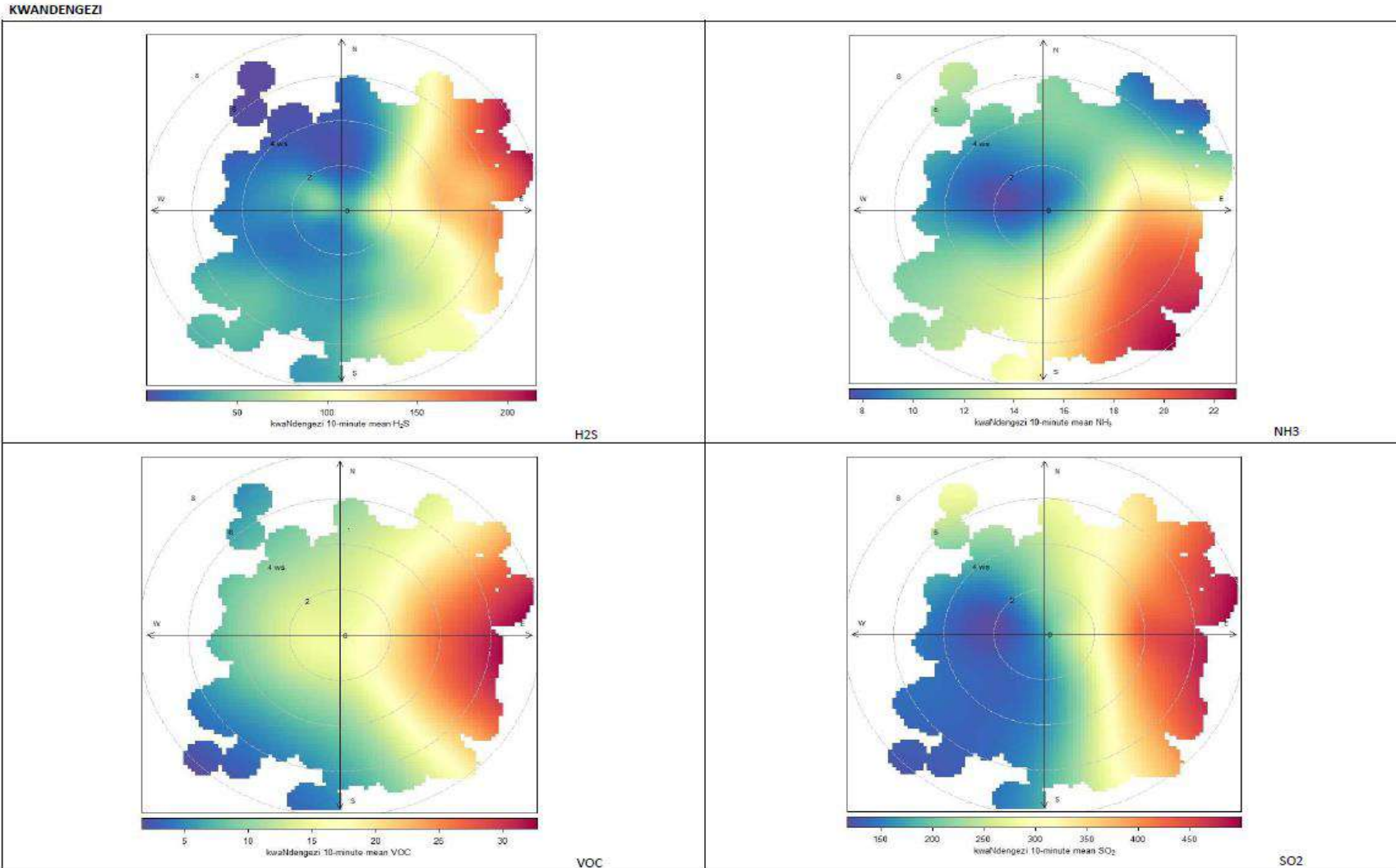
- SO₂ capable monitors:
 - SL 021704
 - SL 021703
- All monitors able to measure:
 - Wind speed
 - Wind direction
 - H₂S
 - NH₃
 - VOCs



Airshed – Polar plots - Plantations

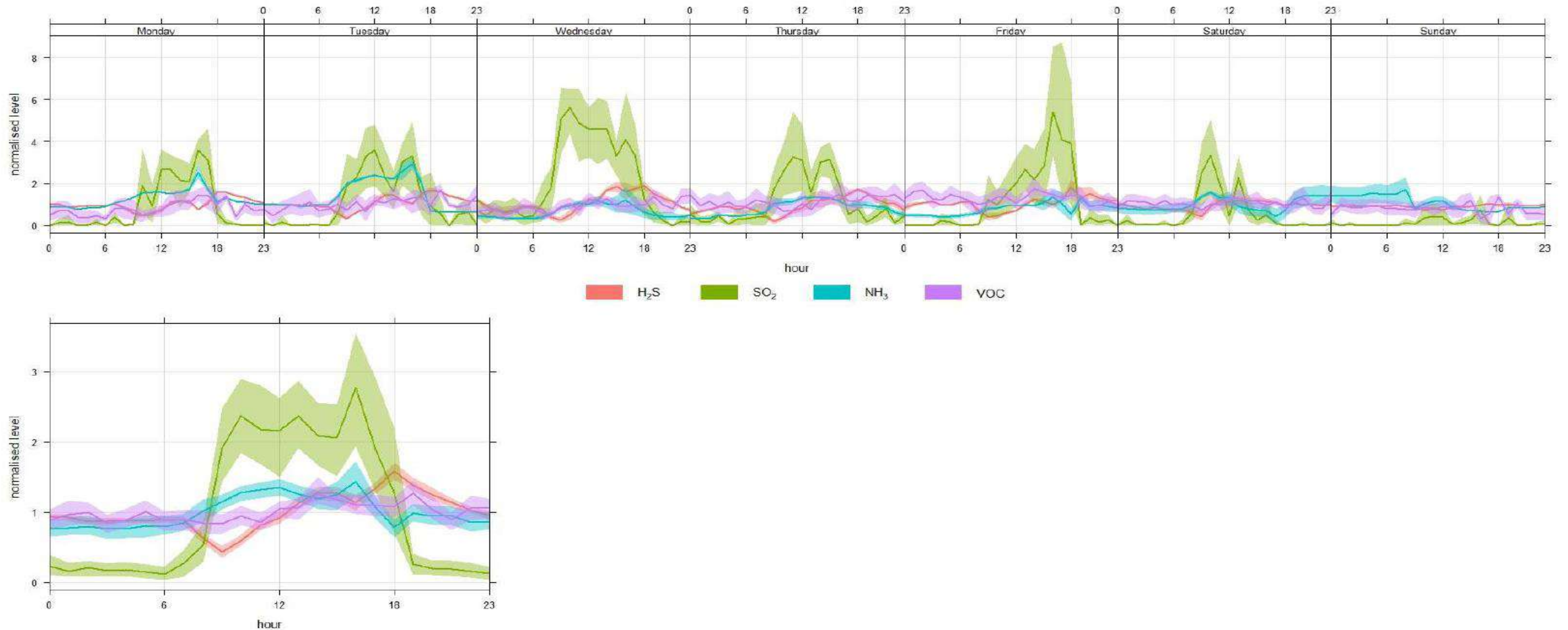


Airshed – Polar plots - KwaNdengezi



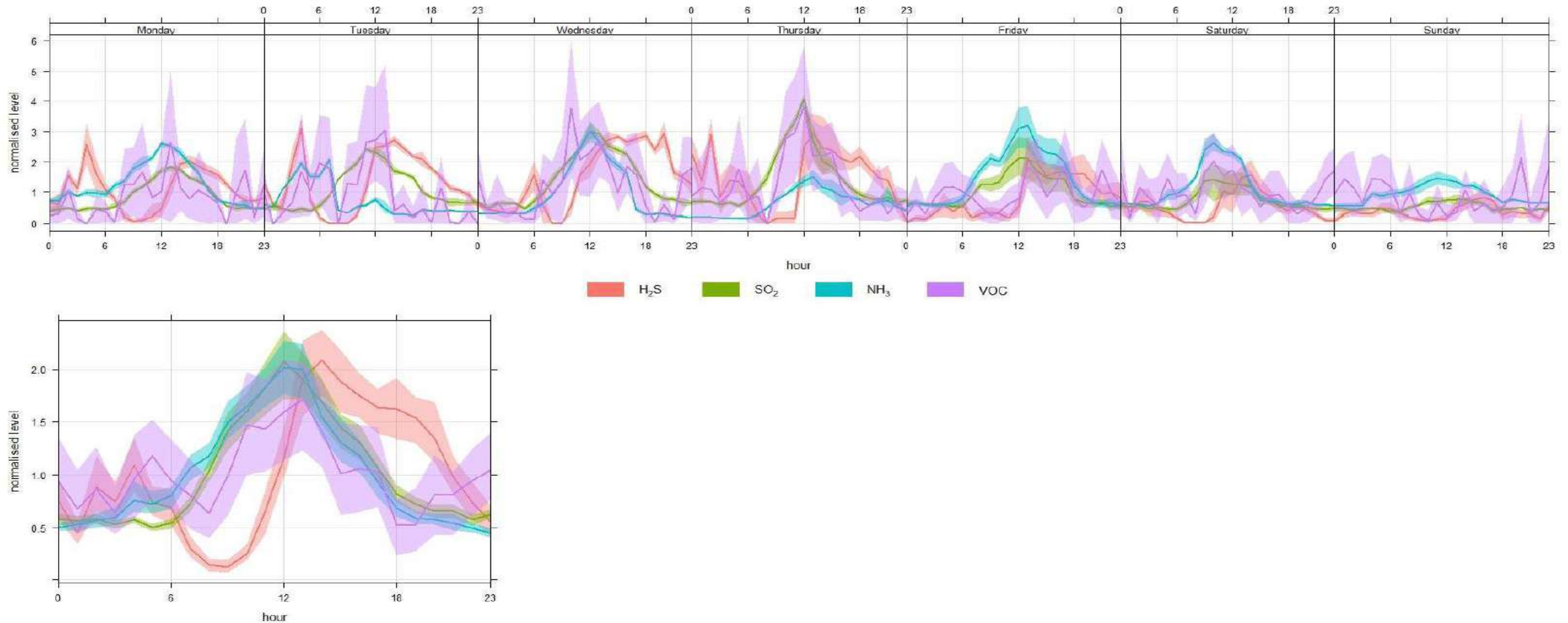
Airshed – Time plots vs events - Plantations

PLANTATIONS



Airshed – Time plots vs events - KwaNdengezi

KWANDENGZI



Conclusion

- EnviroServ have identified SO₂ as a significant pollutant entering the area
- Health impacts of SO₂ match those reported by the community
- SO₂ is a combustion emission and not generated at Shongweni landfill
- There is another source or sources of pollutants impacting the area
- There may be other as yet unidentified pollutants from unknown source(s)



Questions?

