

Dog's Nose @ Linz

FAIMS Mobile Measurement Analysis Report

September 3, 2026 Linz, Austria

Purpose of this report: This report overlays FAIMS measurement data, GPS, on-site video, and comments shared from the field to provide an initial organization of the times and locations with notable signals and the dog's behavior. The first half focuses mainly on measurement facts, while the second half also draws on the Chiyoko Walk measurements conducted in Tokyo to describe, as a discussion, impressions gained from this round of measurements.

1. Background and Purpose

A FAIMS inlet was placed near the dog's nose, and mobile measurements were taken of the urban space during a walk. In this analysis, the NH3 and S/M/L feature values were synchronized with GPS position, and locations where localized signal changes were confirmed were extracted. Video footage was also used to check the dog's behavior and surrounding environment, and the correspondence with the FAIMS signal was recorded. Similarities and differences with observations obtained from a similar dog × FAIMS mobile measurement conducted in Tokyo were also used as reference during the discussion.

2. Measurement and Analysis Method

Measurement location: Linz, Austria (around Ars Electronica, riverside, old town, commercial streets, etc.)

Method of movement: Dog walking. The FAIMS inlet was placed near the dog's nose.

Location data: GPS data synchronized with FAIMS data.

FAIMS feature values: NH3, S, M, L. S/M/L are spectral feature values; in this report they are treated as relative signals rather than as substance-identification values.

Video: Footage taken by a collaborator was used to confirm the dog's exploring, stopping, defecating, normal walking, and other behaviors.

Time: Because the file timestamps on the video equipment differ from actual time, GPS coordinates were prioritized for matching locations. Times below are shown in Japan Standard Time.

3. Key Scenes with Notable FAIMS Signals

The main events extracted from the spatial distribution of the CSV data, together with the scenes confirmed on video, are organized below. The values in the table are the FAIMS feature values of the GPS measurement point closest to the specified coordinates, shown for reference as representative values for the local segment.

ID	Time	Location / Coordinates	FAIMS Characteristics	Scene in Video	Measurement Notes
②	10:27:55– 10:30:20 (approx.)	Start of walk / Indoors Inside Ars Electronica building (estimated)	M/L persistently high. S also relatively elevated.	Start point of the walk. Likely an indoor environment.	A sustained signal, distinct from the localized peaks seen outdoors. A likely influence from the indoor gas- phase environment, including interior finishes, people, and equipment.
①	10:35:20– 10:36:05 (approx.)	Riverside / Waterside exploration 48.307500, 14.286300	NH3, M, and L simultaneously elevated. Representative point: NH3 0.388, S 0.023, M 0.127, L 0.125	Riverside promenade. The dog brought its nose close to the grass and ground at the water's edge to investigate.	A composite event in which multiple features rose simultaneously. May reflect the effect of proximity to the ground surface, vegetation, and the water's edge.

④	10:36:50 (approx.)	Grassy area / Defecation 48.307200, 14.285400	NH3, M, and L relatively elevated. Representative point: NH3 0.296, S 0.021, M 0.106, L 0.110	Scene of the dog entering a grassy area and defecating.	In addition to the surrounding environment, the dog's own defecation behavior and the proximity of the inlet to the ground surface may have affected the signal.
⑤	10:45:15– 10:46:00 (approx.)	Riverside / Vegetation exploration 48.305500, 14.278800	NH3 stands out prominently. M/ L not as high as in ①. Representative point: NH3 0.489, S 0.017, M 0.108, L 0.092	Approached the water's edge and vegetation along the river, exploring near the ground surface.	A localized event dominated by NH3. Candidate sources include vegetation, soil, and animal- derived traces, but the source has not been identified.
⑥	11:00:10– 11:01:25 (approx.)	Old town / Stopped at an intersection 48.306000, 14.284200	NH3 elevated, with S also locally elevated. Representative point: NH3 0.355, S 0.026, M 0.088, L 0.085	Stopped at what appeared to be an intersection or small plaza in the old town.	A stopping behavior distinct from approaching vegetation. The relationship to spatial structure, airflow, and odor inflow from multiple directions is a topic for future consideration.

⑦	11:06:40– 11:09:10 (approx.)	Old town / Exploration along a building 48.304500, 14.286300	Rise dominated by NH3. M/L relatively low. Representative point: NH3 0.305, S 0.014, M 0.073, L 0.072	Explored the base of a building/shop window, near the boundary between the wall and the pavement.	A likely case of approaching localized odor information remaining along the building edge and pavement. Not conclusively attributed to marking at this stage.
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① Riverside / Waterside exploration

Time: 10:35:20–10:36:05 (approx.)

Coordinates: 48.307500, 14.286300

Nearest measurement point: 17:35:46 (coordinate difference approx. 3.2 m)

FAIMS representative values: NH3 0.3883 / S 0.0229 / M 0.1273 / L 0.1246

Signal characteristics: NH3, M, and L simultaneously elevated.

Video observation: Riverside promenade. The dog brought its nose close to the grass and ground at the water's edge to investigate.

Measurement notes: A composite event in which multiple features rose simultaneously. May reflect the effect of proximity to the ground surface, vegetation, and the water's edge.



Figure: ① Riverside / Waterside exploration

④ Grassy area / Defecation

Time: 10:36:50 (approx.)

Coordinates: 48.307200, 14.285400

Nearest measurement point: 17:36:50 (coordinate difference approx. 3.6 m)

FAIMS representative values: NH₃ 0.2962 / S 0.0208 / M 0.1059 / L 0.1095

Signal characteristics: NH₃, M, and L relatively elevated.

Video observation: Scene of the dog entering a grassy area and defecating.

Measurement notes: In addition to the surrounding environment, the dog's own defecation behavior and the proximity of the inlet to the ground surface may have affected the signal.



Figure: ④ Grassy area / Defecation

⑤ Riverside / Vegetation exploration

Time: 10:45:15–10:46:00 (approx.)

Coordinates: 48.305500, 14.278800

Nearest measurement point: 17:45:12 (coordinate difference approx. 0.8 m)

FAIMS representative values: NH₃ 0.4893 / S 0.0174 / M 0.1080 / L 0.0915

Signal characteristics: NH₃ stands out prominently. M/L not as high as in ①.

Video observation: Approached the water's edge and vegetation along the river, exploring near the ground surface.

Measurement notes: A localized event dominated by NH₃. Candidate sources include vegetation, soil, and animal-derived traces, but the source has not been identified.



Figure: ⑤ Riverside / Vegetation exploration

⑥ Old town / Stopped at an intersection

Time: 11:00:10–11:01:25 (approx.)

Coordinates: 48.306000, 14.284200

Nearest measurement point: 18:00:39 (coordinate difference approx. 2.0 m)

FAIMS representative values: NH3 0.3554 / S 0.0265 / M 0.0880 / L 0.0855

Signal characteristics: NH3 elevated, with S also locally elevated.

Video observation: Stopped at what appeared to be an intersection or small plaza in the old town.

Measurement notes: A stopping behavior distinct from approaching vegetation. The relationship to spatial structure, airflow, and odor inflow from multiple directions is a topic for future consideration.



Figure: ⑥ Old town / Stopped at an intersection

⑦ Old town / Exploration along a building

Time: 11:06:40–11:09:10 (approx.)

Coordinates: 48.304500, 14.286300

Nearest measurement point: 18:08:05 (coordinate difference approx. 9.1 m)

FAIMS representative values: NH3 0.3050 / S 0.0139 / M 0.0729 / L 0.0721

Signal characteristics: Rise dominated by NH3. M/L relatively low.

Video observation: Explored the base of a building/shop window, near the boundary between the wall and the pavement.

Measurement notes: A likely case of approaching localized odor information remaining along the building edge and pavement. Not conclusively attributed to marking at this stage.

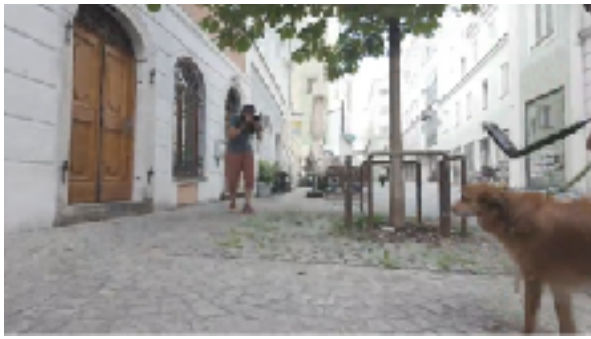


Figure: ⑦ Old town / Exploration along a building

4. Comparison Scenes

Additional scenes with notable FAIMS signals are summarized below.

ID	Coordinates	Behavior / Environment	Nearest FAIMS Values	Purpose
A	48.305657, 14.287857	Near a section with a street tree and exposed soil, the dog appeared to direct its attention toward something.	NH3 0.273 S 0.019 M 0.074 L 0.074 (18:15:28)	Useful as a comparison point not only for high FAIMS readings but also for a location where behavior changed.
B	48.305412, 14.286956	Briefly stopped near a corner / entrance to a plaza.	NH3 0.311 S 0.012 M 0.069 L 0.071 (18:17:00)	Together with intersection ⑥, a candidate for comparing stopping behavior at spatial boundaries.
C	48.304902, 14.286704	Walked normally through an open plaza. No clear ground-level exploration or stopping observed.	NH3 0.290 S 0.015 M 0.084 L 0.081 (18:09:13)	A control scene for comparison against exploration/ stopping locations.
D	48.303600, 14.288632	Walked normally along a busy commercial street.	NH3 0.263 S 0.028 M 0.093 L 0.088 (18:23:03)	A control scene in a commercial space that is information-rich for humans.
E	48.302527, 14.289511	Stopped on the paved surface in front of a building and explored near the pavement.	NH3 0.257 S 0.024 M 0.096 L 0.090 (18:26:17)	An example of localized exploration occurring even without vegetation. Cannot be explained by “vegetation alone.”



A: Near street tree / Attention behavior



C: Normal walking / Plaza



D: Normal walking / Commercial street



E: Commercial area / Pavement exploration

5. Findings from the Measurements

- Distinctive FAIMS signals did not appear uniformly across the urban space, but rather as brief, localized events.
- Along the river, events were observed in which NH₃ alone, or NH₃ together with M/L, became elevated at points where the dog approached the water's edge, vegetation, or the ground.
- During the defecation scene, NH₃ and M/L rose, confirming that the dog's own behavior, the height of the inlet, and proximity to the object can affect the FAIMS signal.
- In the old town, changes in the dog's behavior—such as stopping at intersections or exploring along buildings—were observed together with localized changes in the FAIMS signal.
- Even in scenes of normal walking through open plazas or commercial streets, moments were observed where the dog's movement and the FAIMS signal were synchronized at exploration/stopping points.
- While NH₃ tended to be elevated in common at points where the dog showed interest, the S/M/L pattern varied by location, suggesting that it may reflect different gas-phase environments—such as waterside, indoor, and building-edge settings.

6. Discussion

In the dog × FAIMS measurements conducted in Tokyo, scenes were observed where changes in the dog's behavior—such as exploring places where fallen leaves had accumulated, or stopping at intersections amid complex buildings—overlapped with changes in the FAIMS signal. In Linz as well, the dog brought its nose close to or stopped at riverside vegetation and water's edges, the base of buildings, and intersections and corners, and in some of these cases, characteristic changes were also observed in the FAIMS signal.

What stood out when overlaying the video and on-site comments was that, even when walking through the same city, humans and dogs appear to be reading different information. Whereas humans have inscribed information onto stone and architecture, leaving the city's history in a relatively fixed form, dogs can be seen as reading odors left on vegetation, soil, walls, and pavement, and adding to that information through their own marking. That information is constantly changing and being overwritten by wind and rain, microbial activity, and the behavior of other individuals.

Perhaps the city holds, alongside the “fixed history” that humans read visually, a “continuously rewritten record” that dogs read through smell. It cannot be said that FAIMS directly measures that record itself, but by having the dog choose where to sniff and having FAIMS record the chemical characteristics of the air at that location, I sensed the possibility of visualizing part of an information layer of the city that is otherwise difficult for humans to see. This map of odors can be understood as “another map of the city” that emerged from walking the city together with a dog.

Note: This report presents a preliminary analysis and does not make definitive claims about the dog's olfactory perception, the sources of odors, or components originating from marking. The discussion reflects a current interpretation built on FAIMS data, video, on-site comments, and measurement experience in Tokyo, and may be updated through more detailed time synchronization and comparative analysis in the future.