Informal R51 ASEP Group

Assessment of the OICA ASEP method

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04.11.2008

Side conditions

- Anchor point is measured Lwot_i.
- Slopes are max/min values (6/3 dB per 1000 min-1 for 2. gear and 7/3 dB per 1000 min-1 for 3. gear.
- Tolerance is 3 dB.
- Only vehicles with manual transmissions are considered, because the application of the OICA method for vehicles with automatic transmission is unclear.
- Engine speeds are related to Lmax.
- In order to assess the “property preservation” with respect to ECE R51-02 by the OICA method the result for ECE R51-02 was calculated from the OICA limit curves.
- Since the limit curves represent limits for measurement results the calculated R51-02 results were compared with the current limit values increased by 1.5 dB to take into account tolerance and rounding.

Examples

- The following figures show selected examples.
- Figures 1 and 2 show the results for high powered sports cars (pmr > 200 kW/t). Both vehicles have Lurban values close to 73 dB (72.8/73.5 dB). Vehicle 1-3 fulfills the current limit value while vehicle 200-16 exceeds the current limit by more than 5 dB.
- Interestingly enough vehicle 200-16 would become legal and not be rejected by the OICA method, while vehicle 1-3, which is about 10 dB quieter than vehicle 200-16 at low engine speeds and thus in real traffic, would be rejected by the OICA method.
- The main reason for these differences is the difference in the engine speed for the anchor point (n_i) in relation to the engine speed for the current method.

Results for vehicle 1-3 (pmr = 246)

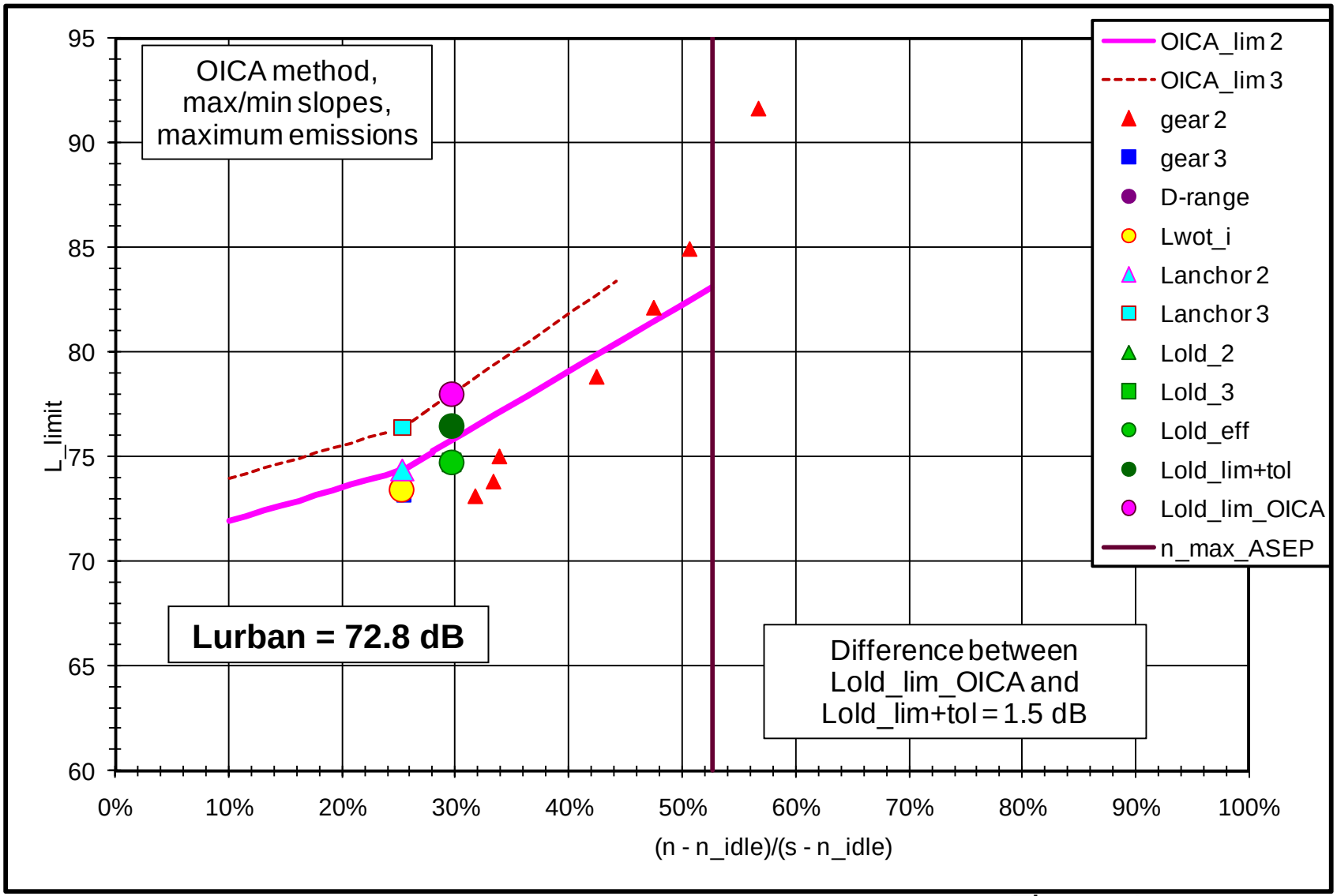

Figure 1

Results for vehicle 200-16 (pmr > 239)

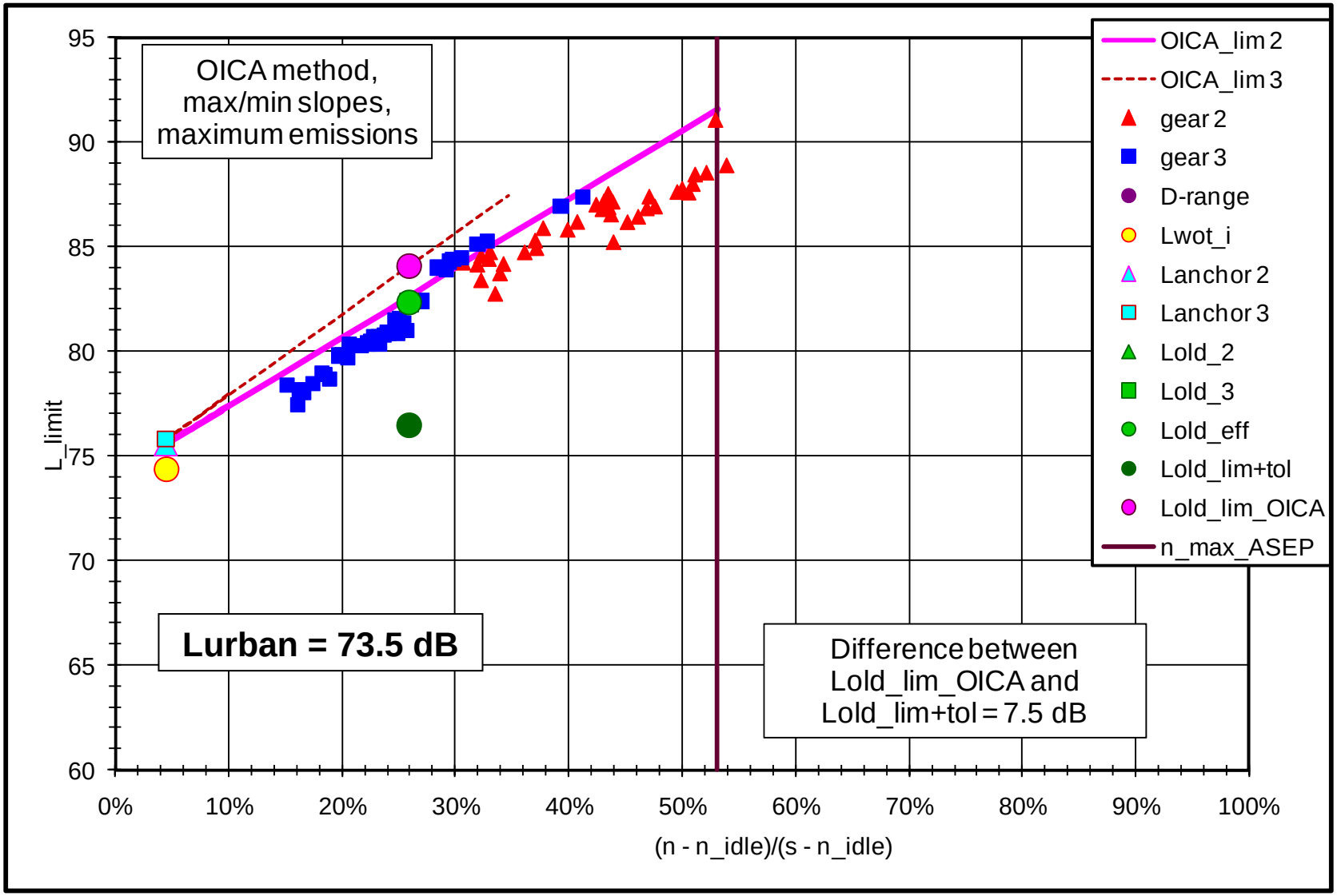

Figure 2

Examples

- Figures 3 and 4 show the results for high performance cars (pmr 150-170 kW/t). Vehicle 1-30 is 4 dB quieter for the current method and 3.4 dB for Lurban. Its sound behaviour over engine speed is absolutely linear.
- The sound behaviour of vehicle 200-14 is obviously tuned for the current method. The engine speed dependency is nonlinear. With a very steep slope at engine speeds right above the engine speed for the old method.
- It is obvious that vehicle 1-30 is quieter in urban traffic than vehicle 200-14.
- Despite of this, vehicle 200-14 gets more than twice as much allowance (10 dB) compared to the old method than vehicle 1-30.
- Most likely the tuning measures for vehicle 200-14 can be skipped for the new annex 3 and the OICA ASEP method.

Results for vehicle 1-30 (pmr = 151)

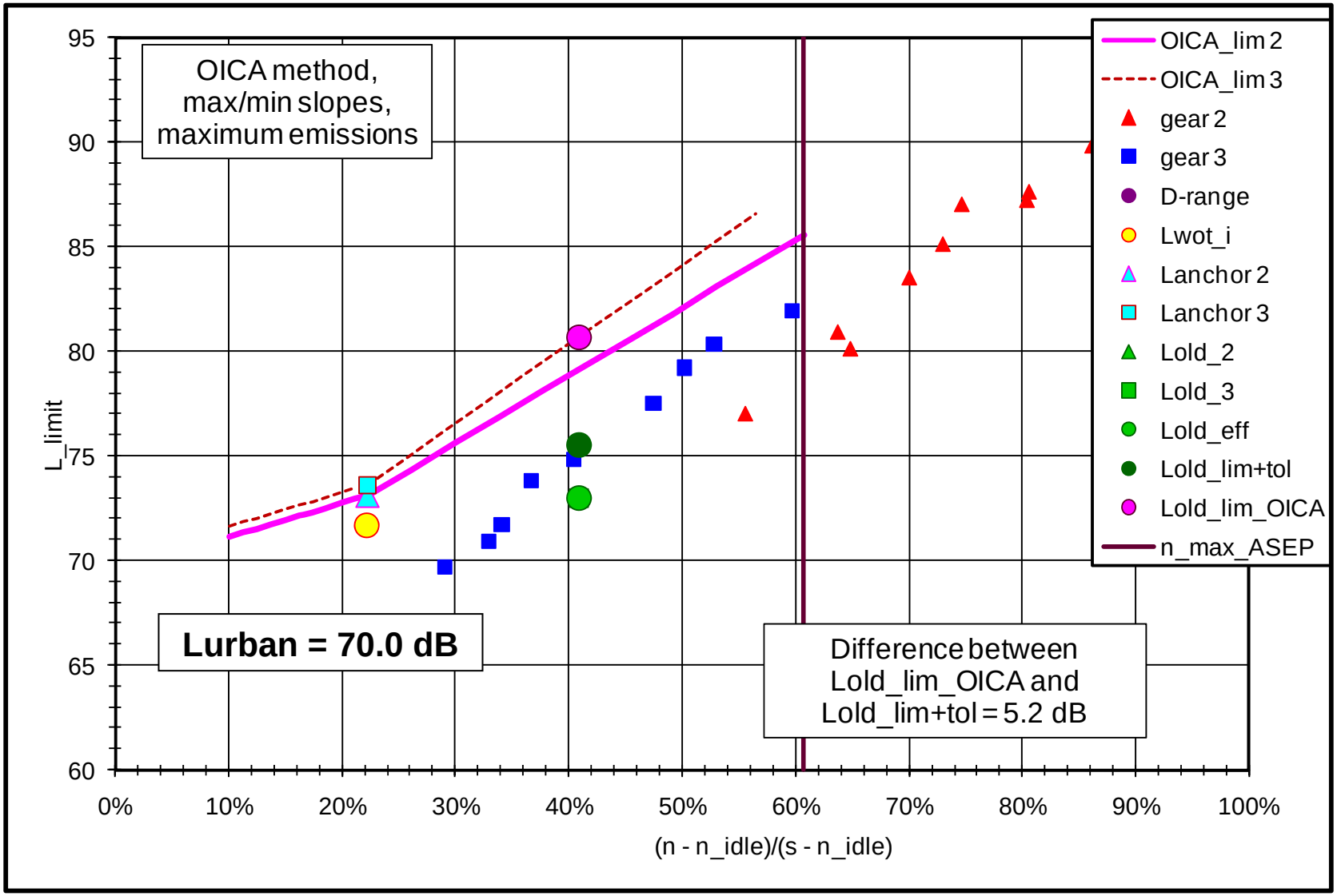

Figure 3

Results for vehicle 200-14 (pmr = 166)

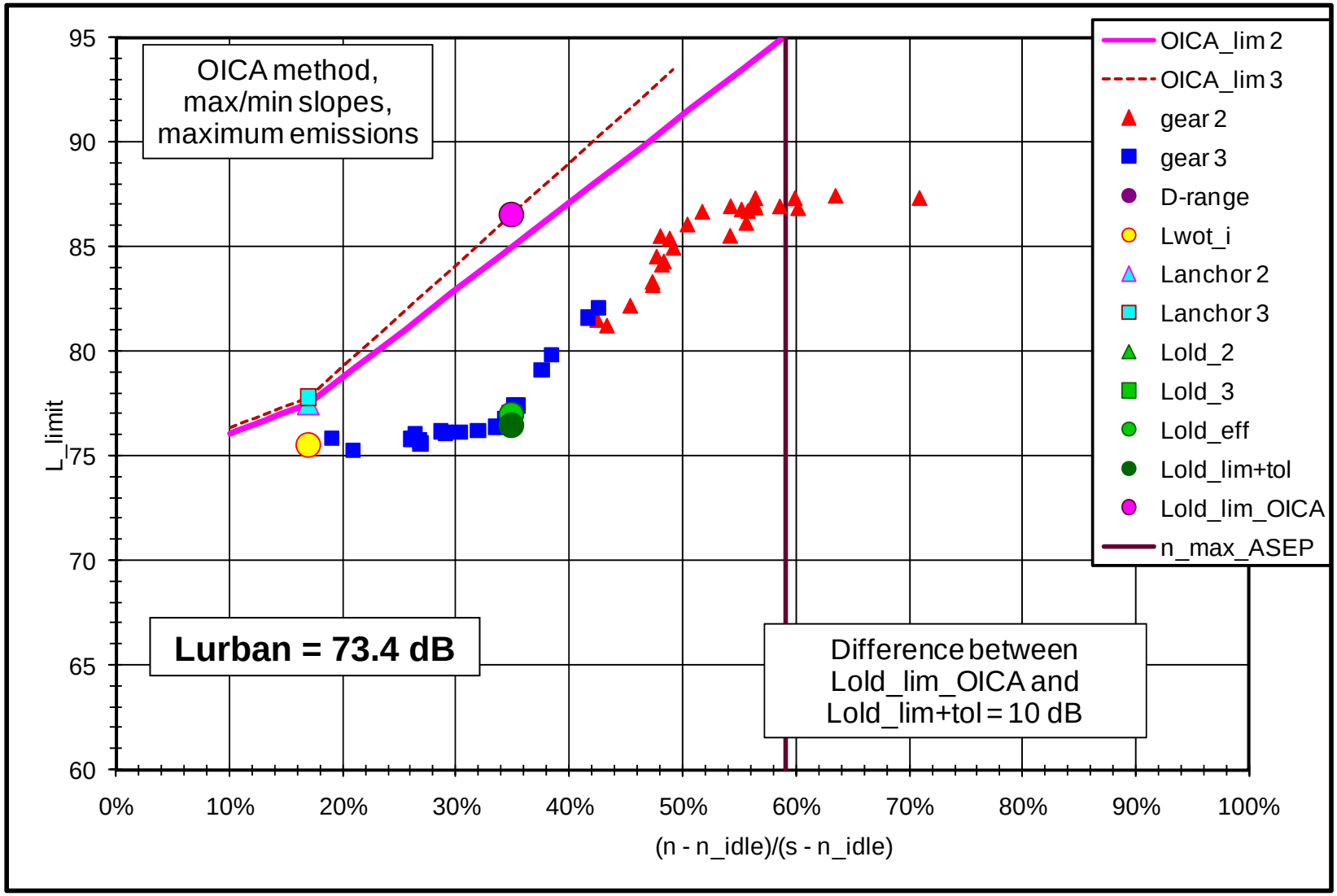

Figure 4

Examples

- Figures 5 and 6 show the results for cars with pmr values of 122 and 134 kW/t. Vehicle 1-38 is 1.2 dB quieter for the current method and 3.3 dB for Lurban.
- Also vehicle 1-35 is obviously tuned for the current method. The engine speed dependency is nonlinear. The sound emission of this vehicle is 6 dB higher for Lwot_i than for vehicle 1-38.
- But the ranking for the OICA method is complementary. There is a risk that vehicle 1-38 will be rejected by the OICA method and the OICA method gives no allowance in relation to the old method for this vehicle, while vehicle 1-35 gets an allowance of 8.3 dB mainly due to the high Lwot_i value at low engine speed compared to the current method.

Results for vehicle 1-38 (pmr = 122)

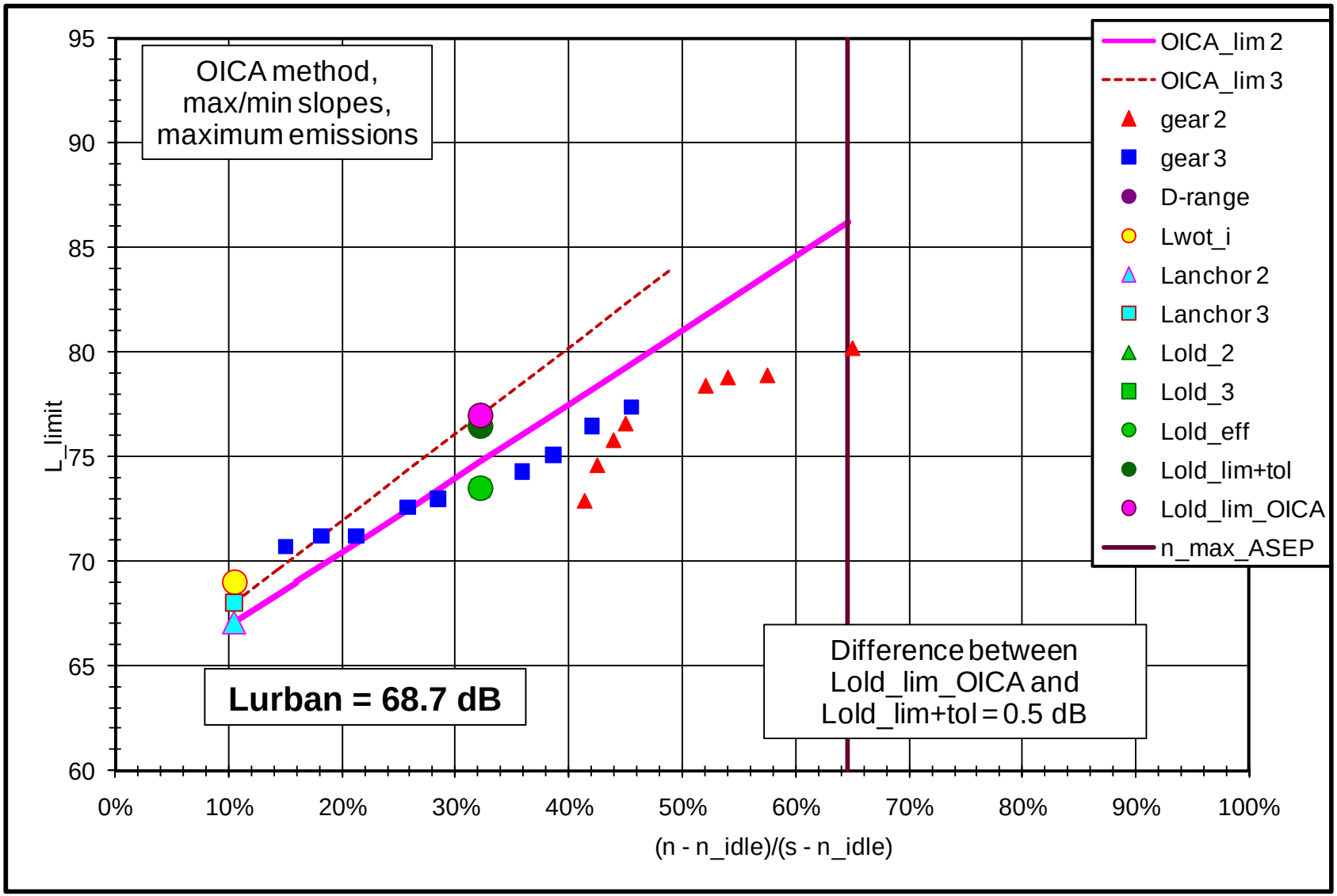

Figure 5

Results for vehicle 1-35 (pmr = 134)

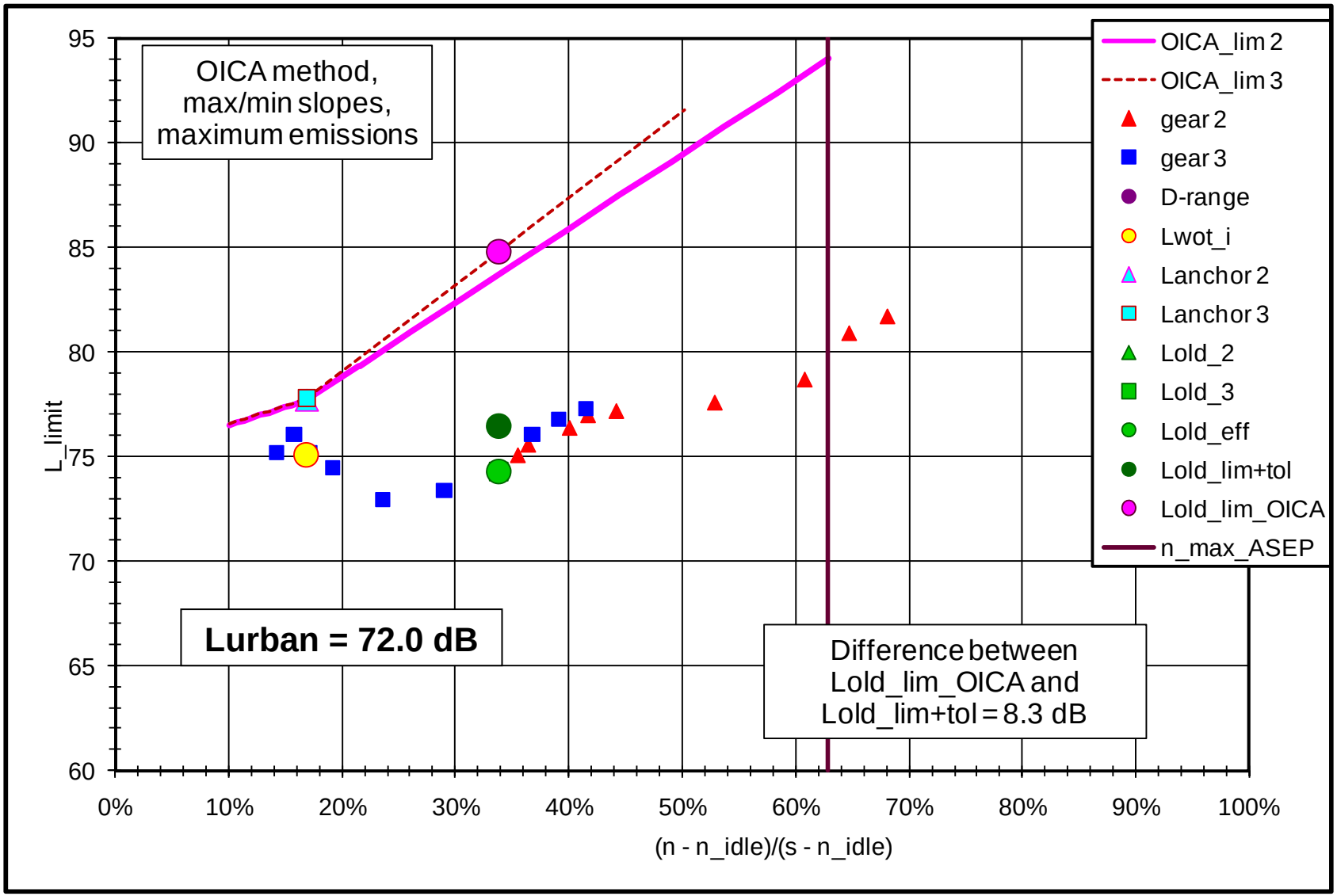

Figure 6

Examples

- **Figures 7 and 8 show the results for cars with pmr values of 90 and 112 kW/t. Vehicle 99-21 is 3.4 dB quieter for the current method and 2.5 dB for Lurban.**
- **Both vehicles show linear speed dependency of the sound emission and are no vehicles of concern.**
- **But the ranking with respect to the OICA method is completely different. The OICA method gives no allowance in relation to the old method for vehicle 99-21, while vehicle 200-8 gets an allowance of 9.8 dB mainly due to the differences in n_old.**

Results for vehicle 99-21 (pmr = 90)

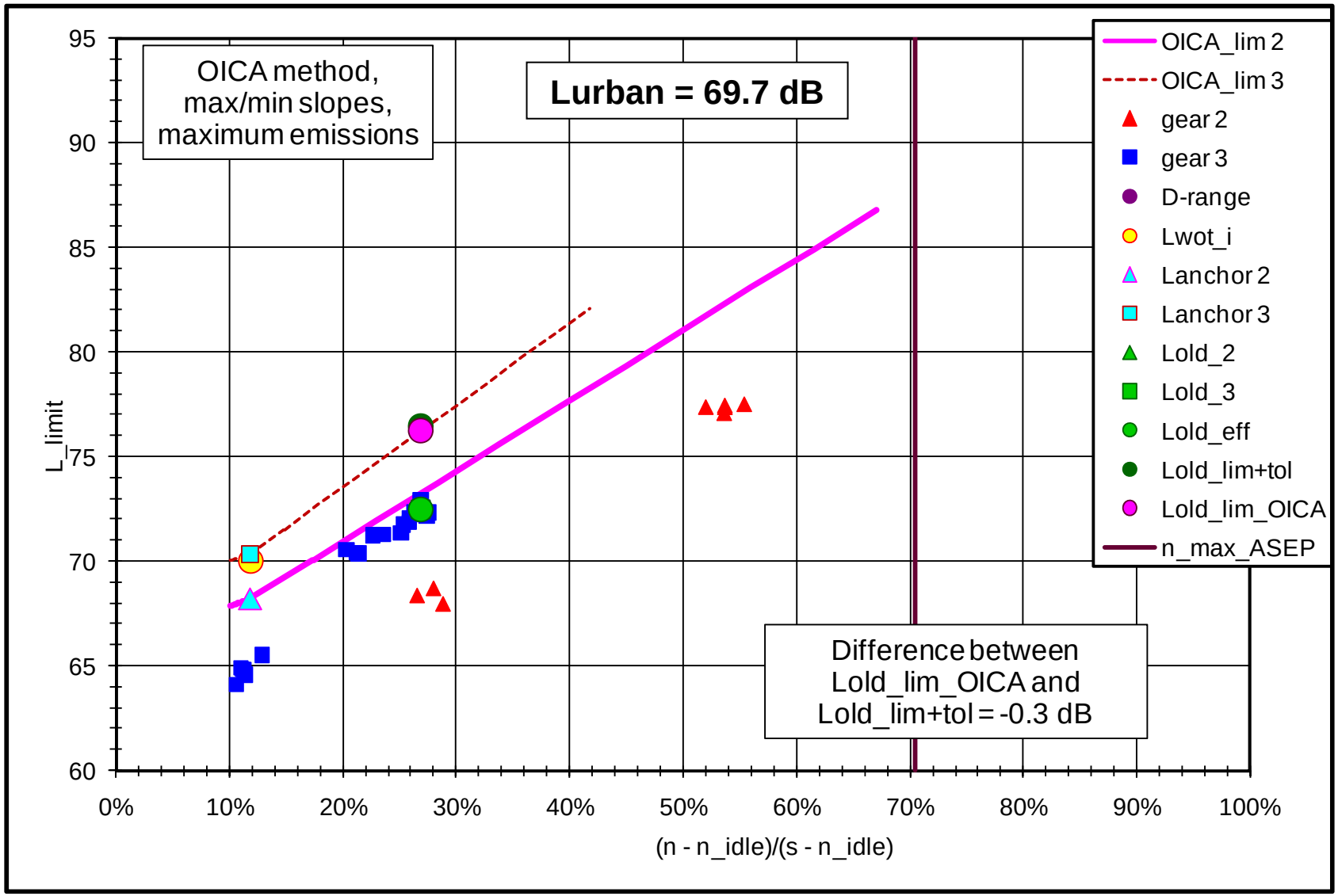

Figure 7

Results for vehicle 200-8 (pmr = 112)

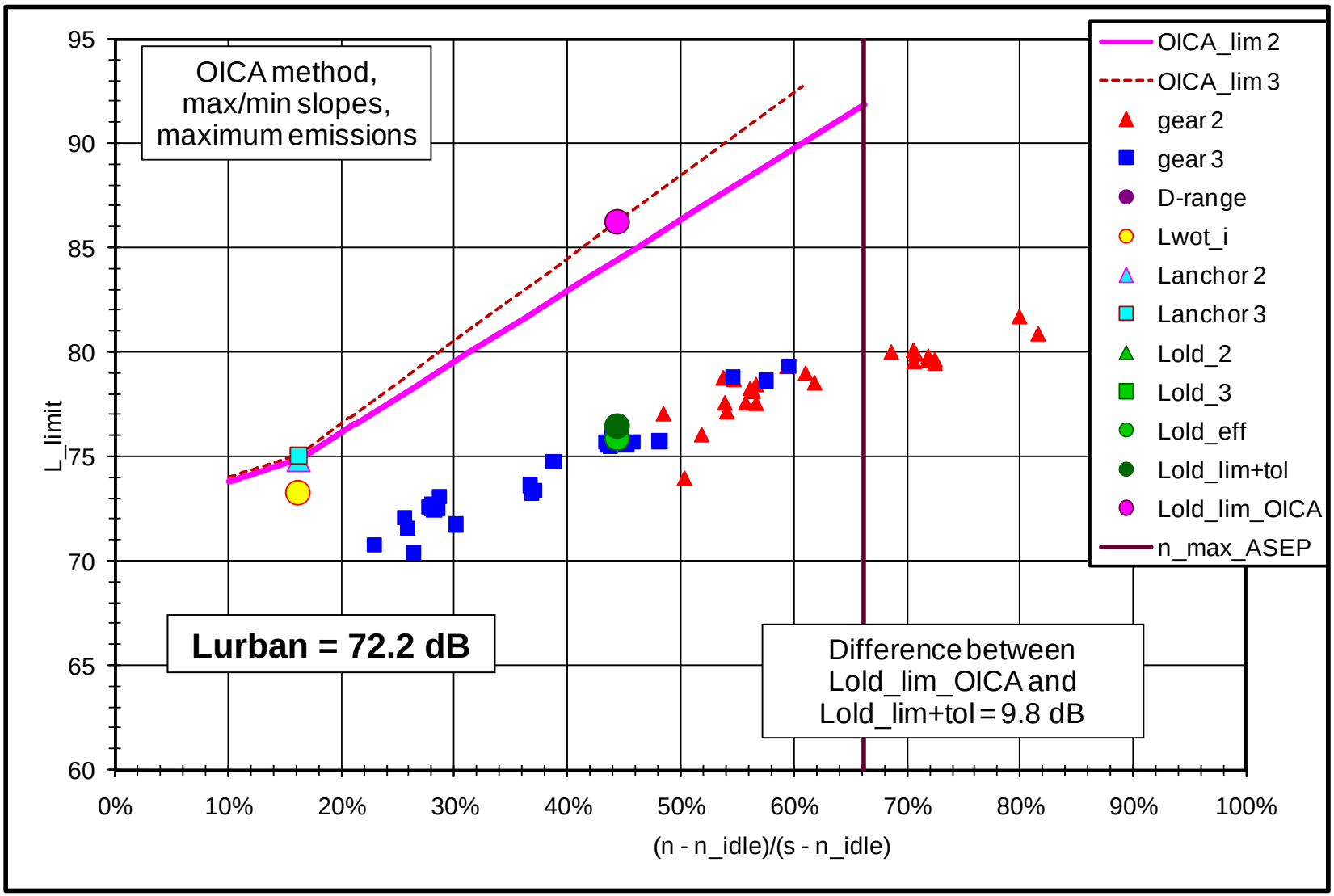

Figure 8

Overview of allowances

- Figure 9 shows the allowances of the OICA method in relation to the old method in dB versus power to mass ratio.
- At least in the range from 50 to 170 kW/t an increase of the allowance with increasing pmr can be seen.
- The average allowance is 3.5 dB.
- Figure 10 shows the inverse cumulative frequency distribution.
- Figure 11 shows the allowances versus Lwot_i. At least 55% of the variances of the allowances can be explained by Lwot_i but with a counterproductive trend.
- The correlation is even better with Lwot (figure 12, r^2 = 67.6%)

Overview of allowances

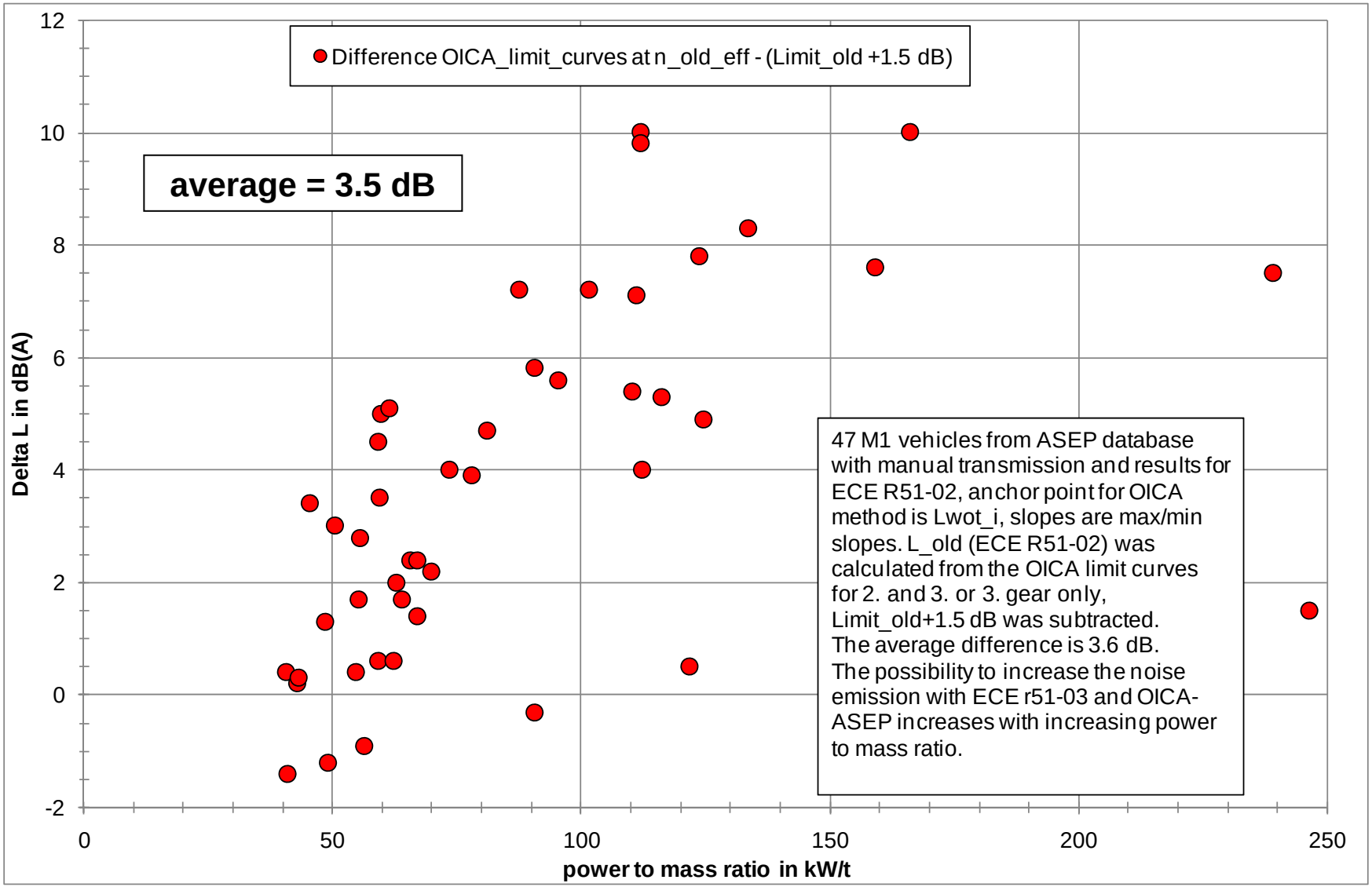

Figure 9

Cumulative frequency distribution

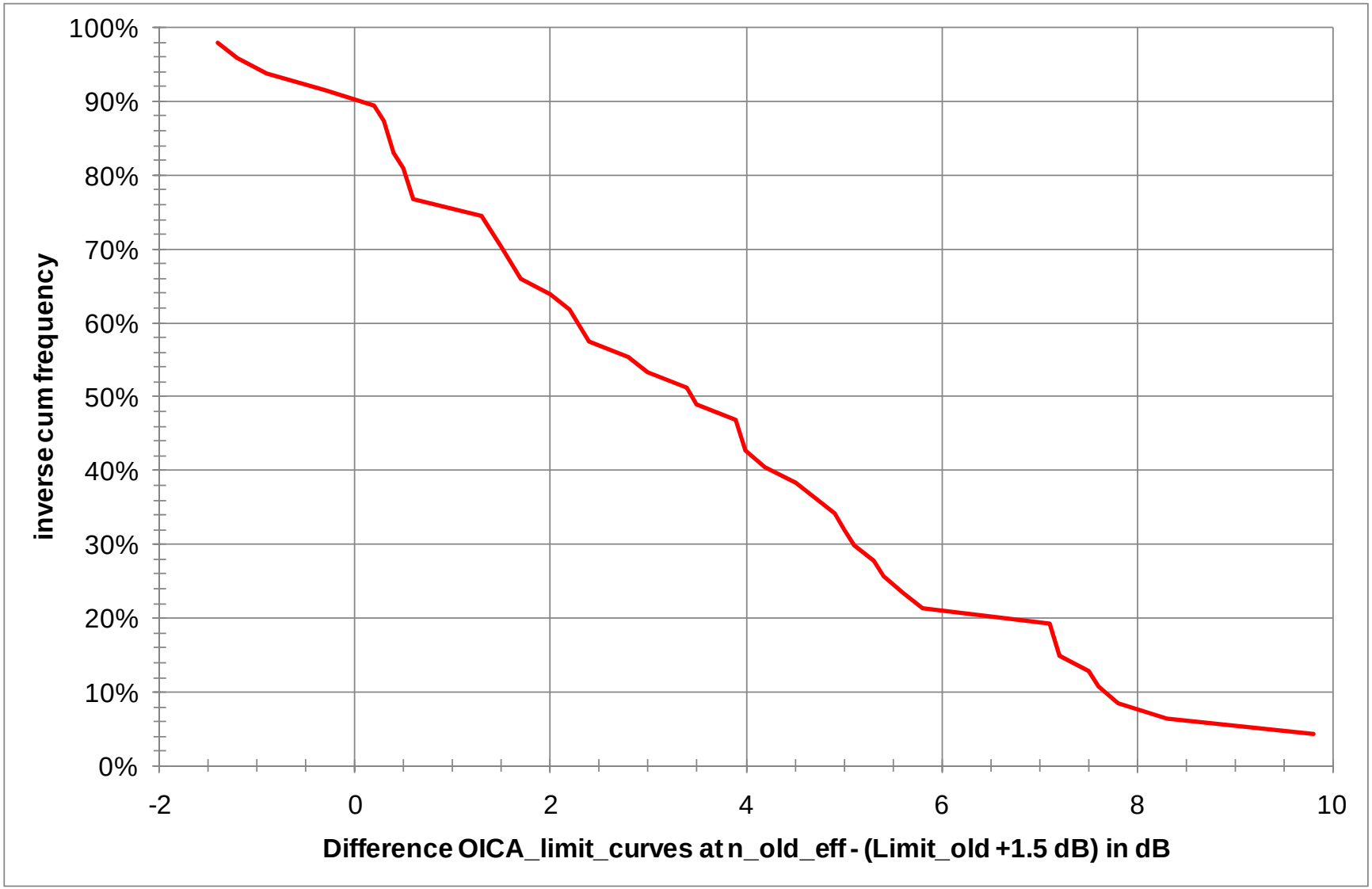

Figure 10

Allowance versus Lwot_i

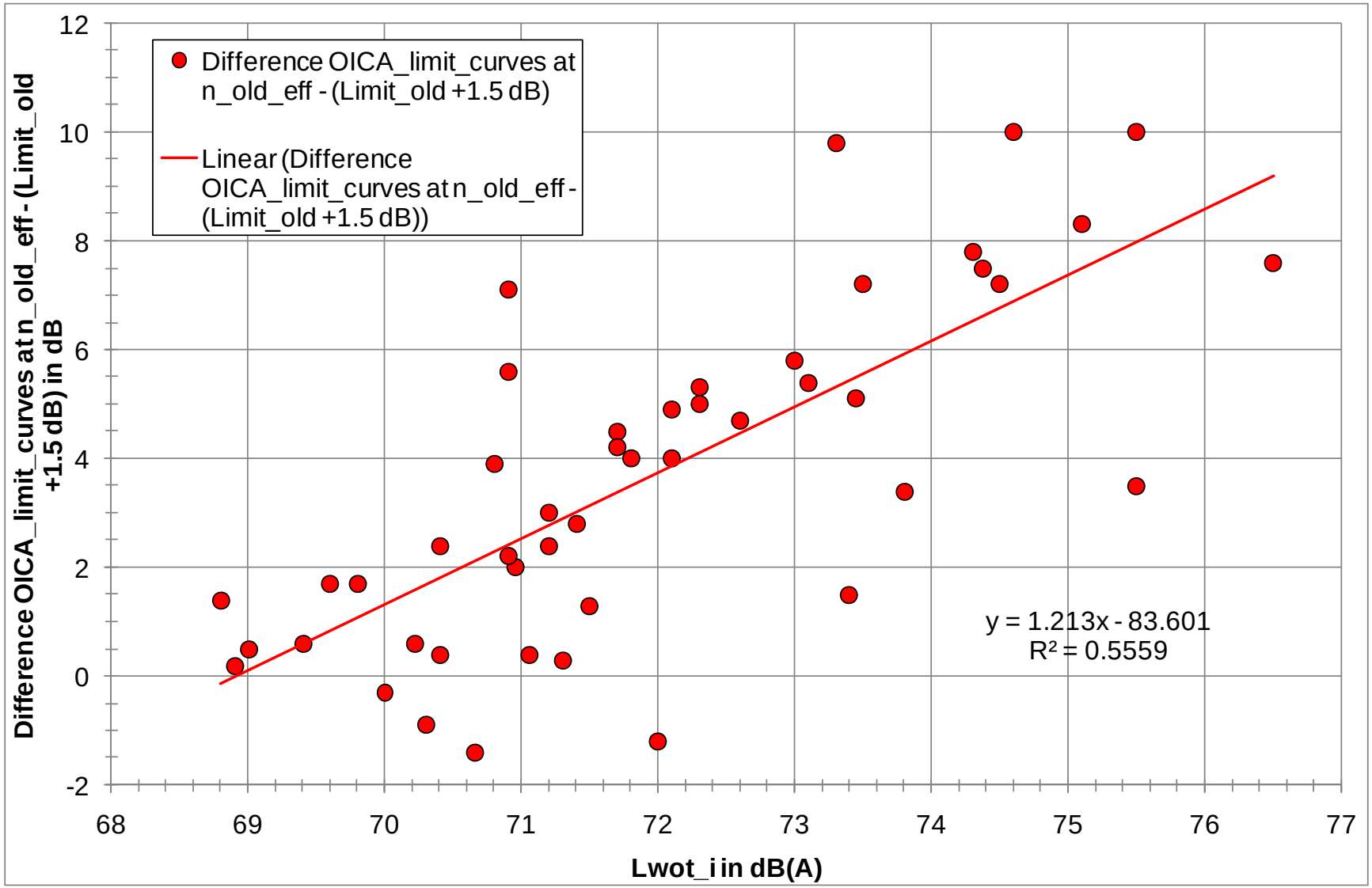

Figure 11

Allowance versus Lwot

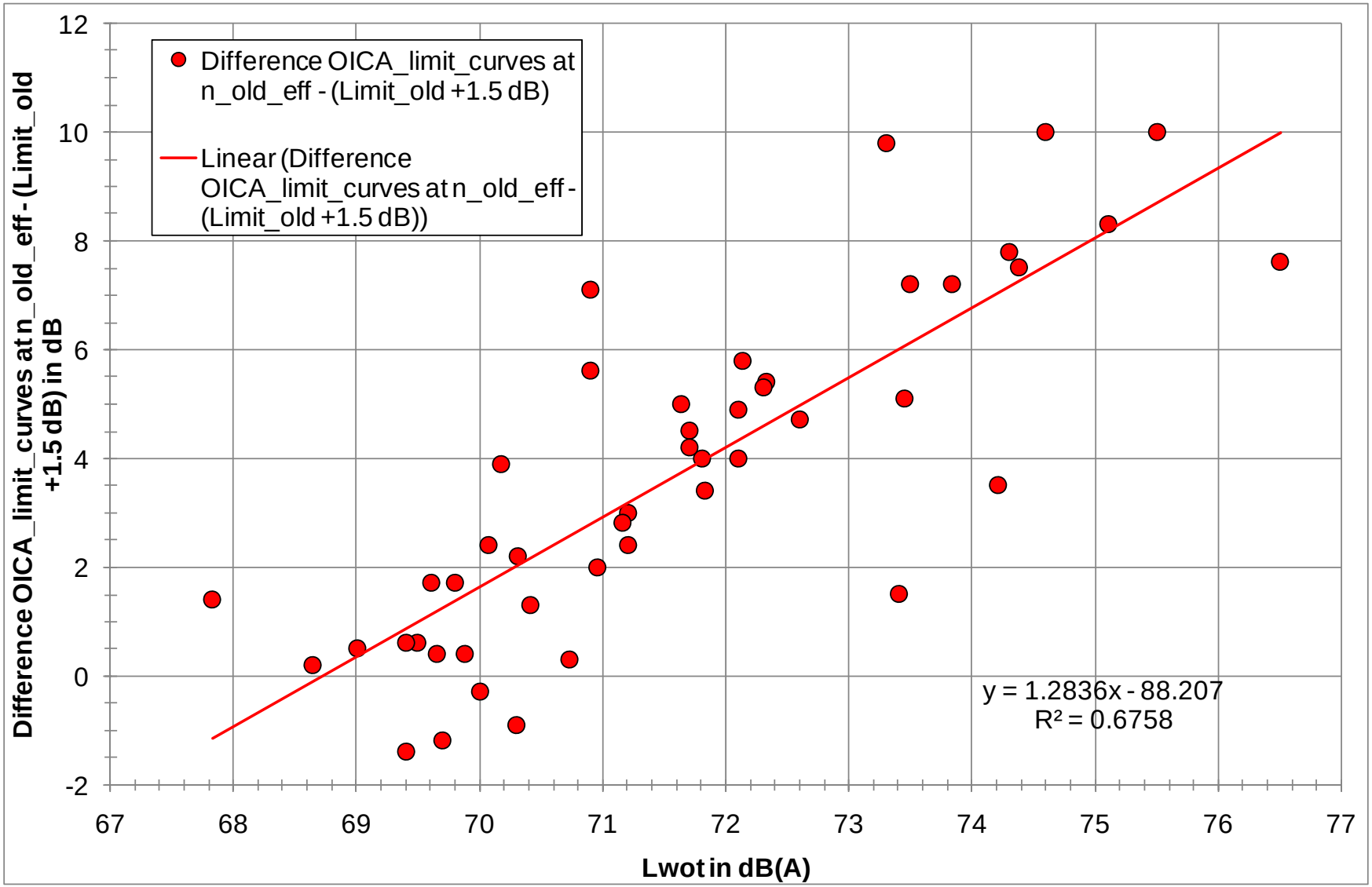

Figure 12

Remarks and Conclusions

- **The application of the OICA method for vehicles with automatic transmission needs to be described more precisely.**
- **The OICA method allows vehicles to become more noisy in the future compared to the current method.**
- **There is a trend that the allowance increases with increasing pmr and increasing Lwot_i and can reach values up to 10 dB.**
- **Vehicles of similar pmr but different sound emission are treated totally differently depending on Lwot, n_i, n_old. In most cases the quieter vehicle gets no or less allowance than the louder one.**

End

Thank You