

Underwater Explosions



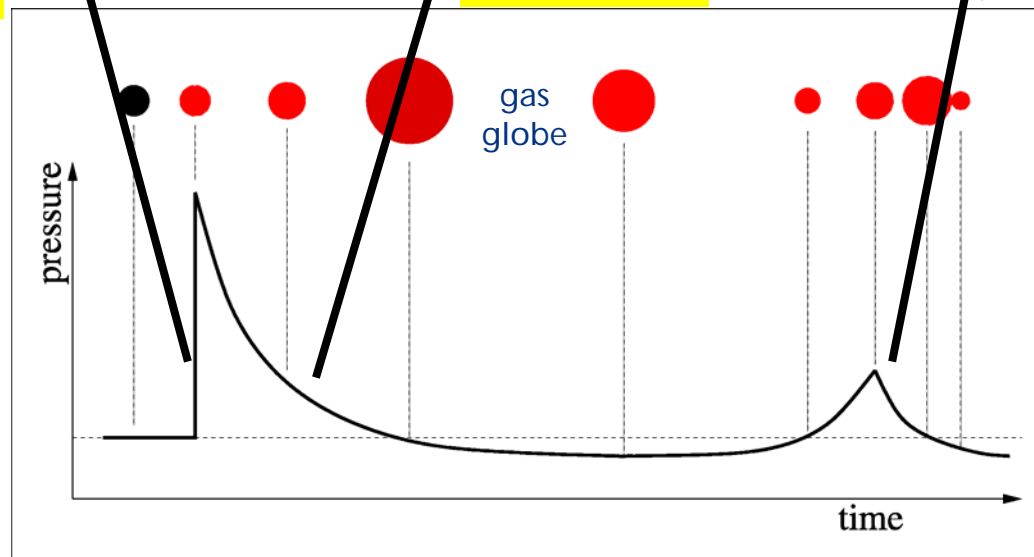
Shock wave



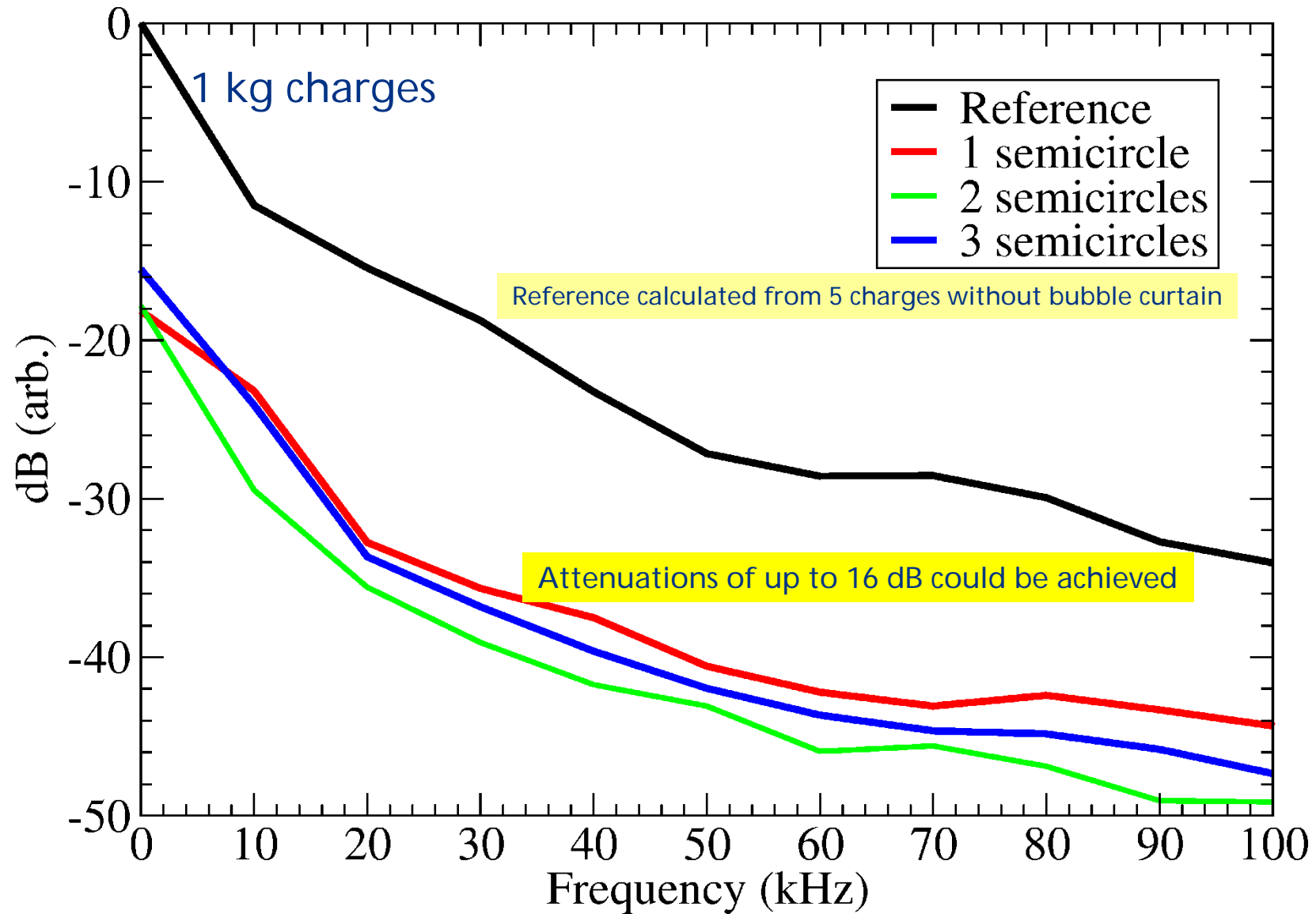
Expansion



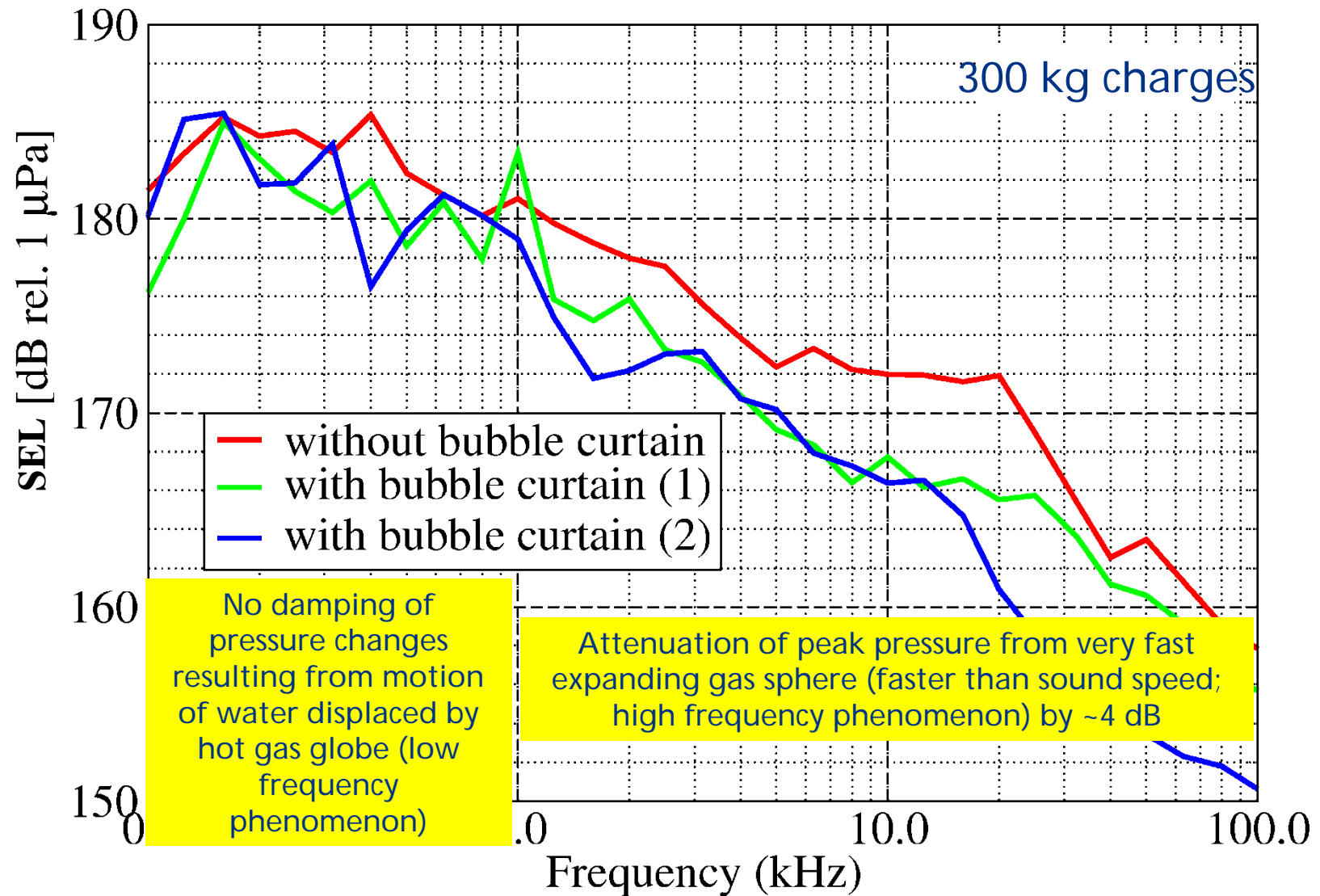
1st bubble pulse



Results 2008



Results 2009



Experiments 2010

Mines: 300 kg „Schießwolle 39“

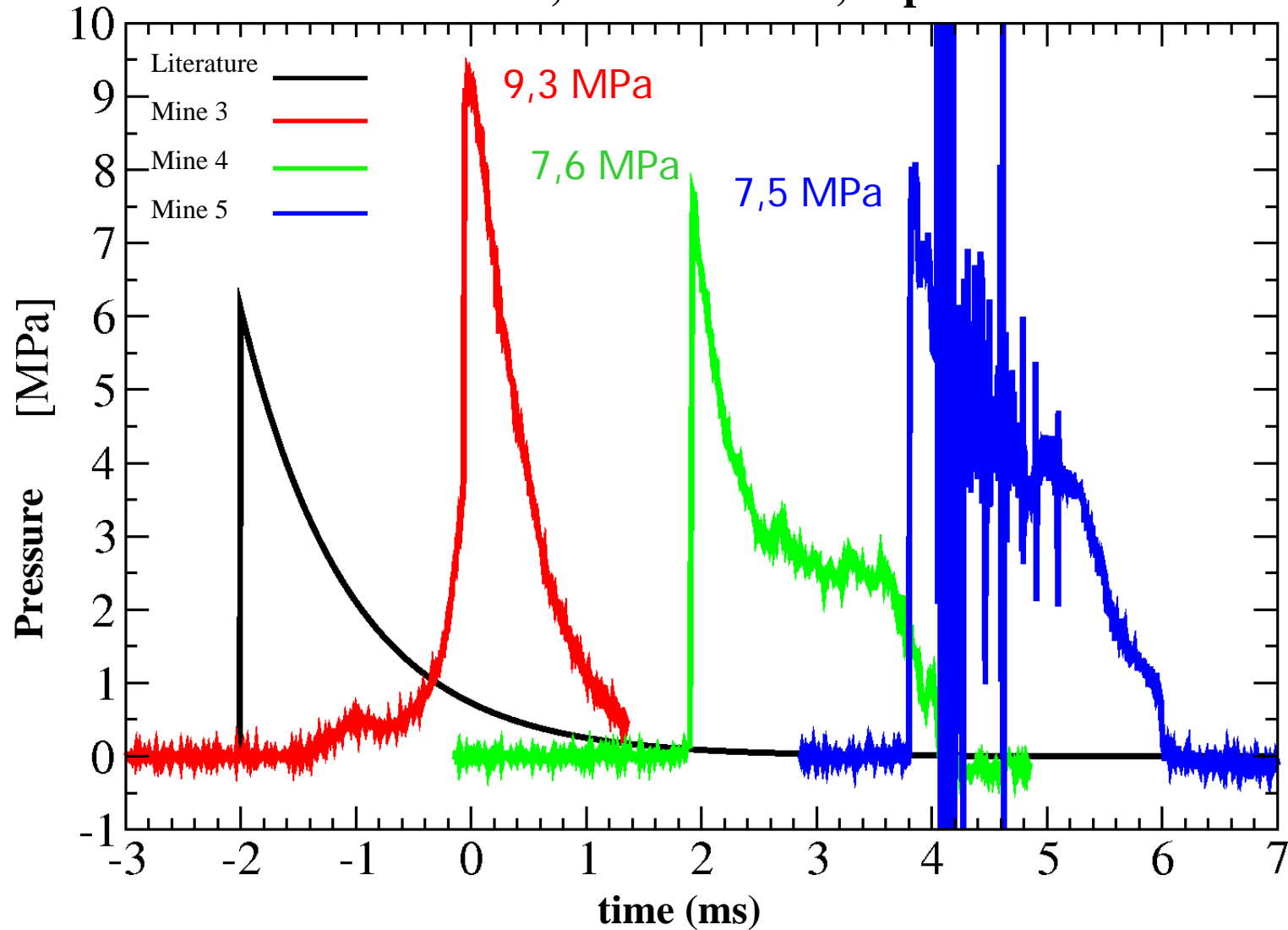
Semicircular bubble curtain, $r = 70$ m,
air flow $1 \text{ m}^3/\text{min}$ per m pipe

Pressure sensors inside and outside b.c. (distance
 45 m; 105 m),

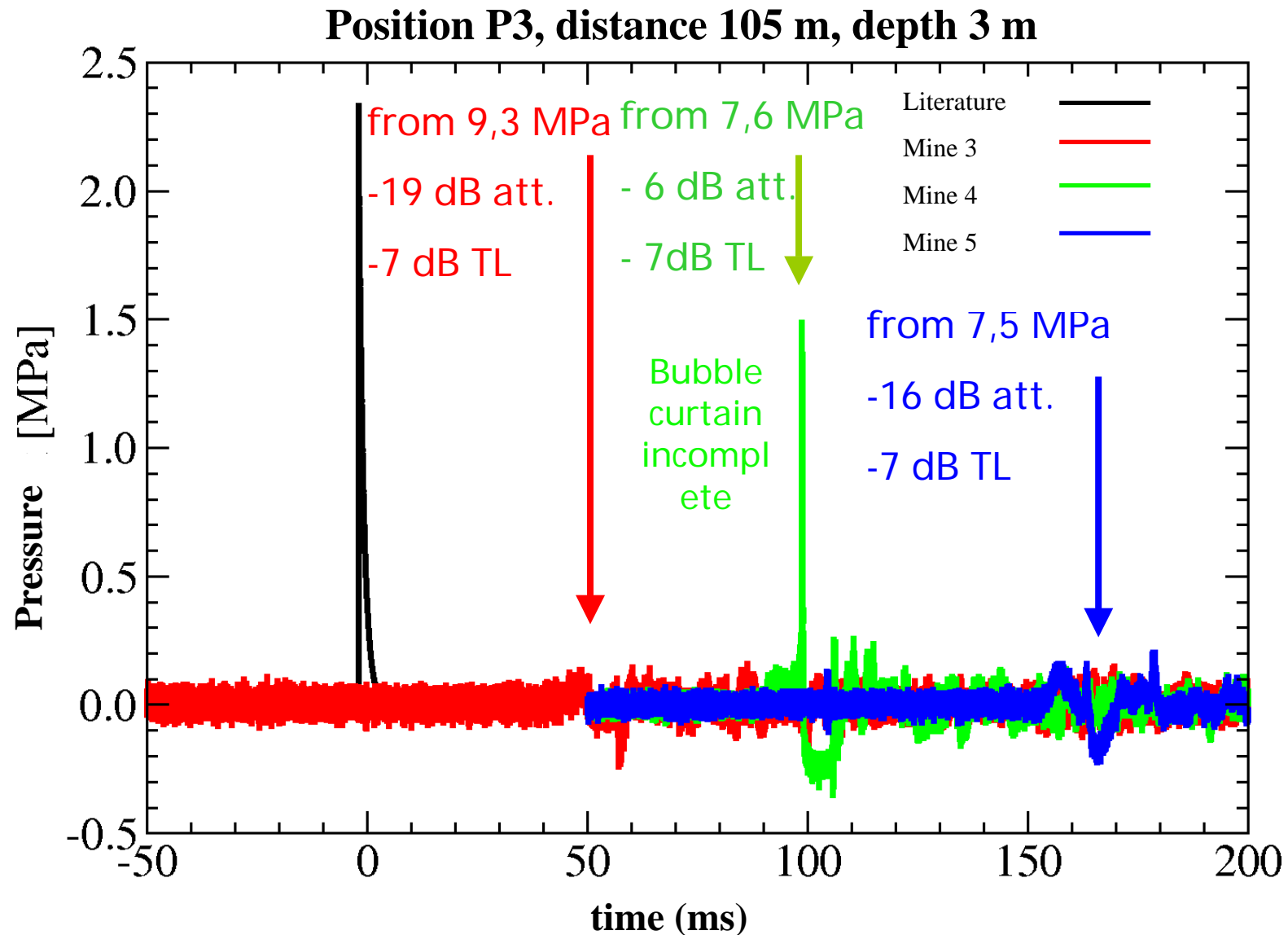
Hydrophones outside b.c. (distance 105 m)

Results 2010

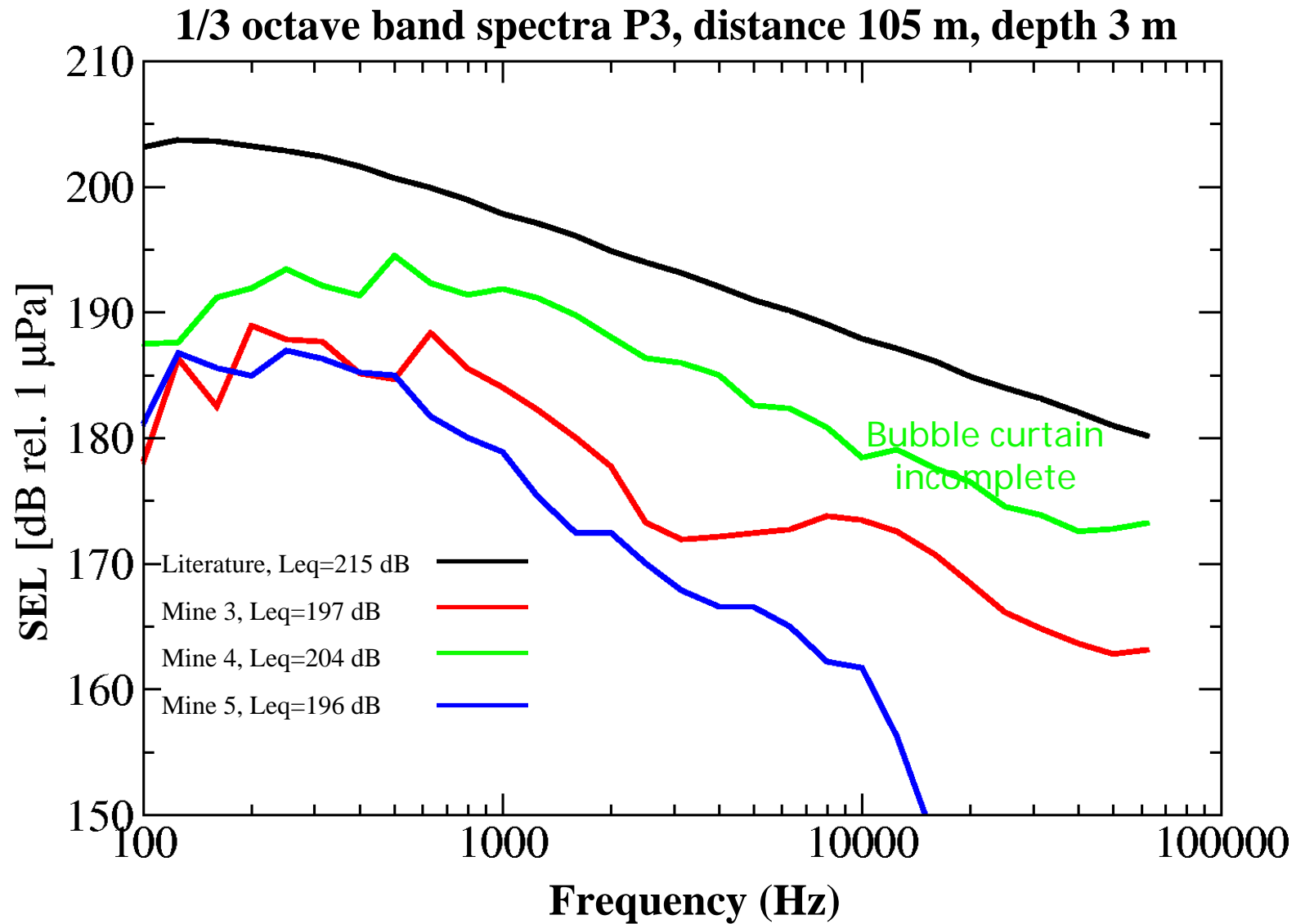
Position P1, distance 45 m, depth 4 m



Results 2010



Results 2010



Summary

- Successful trial with bubble curtain
- Attenuation of peaks ≥ 16 dB
- Attenuation 1/3 octave bands ($>500\text{Hz}$) ≥ 5 dB (compared to trial with incomplete bubble curtain)
- Attenuation $L_{\text{eq}} \geq 7$ dB