The multislope model

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Traditional approach for fitting

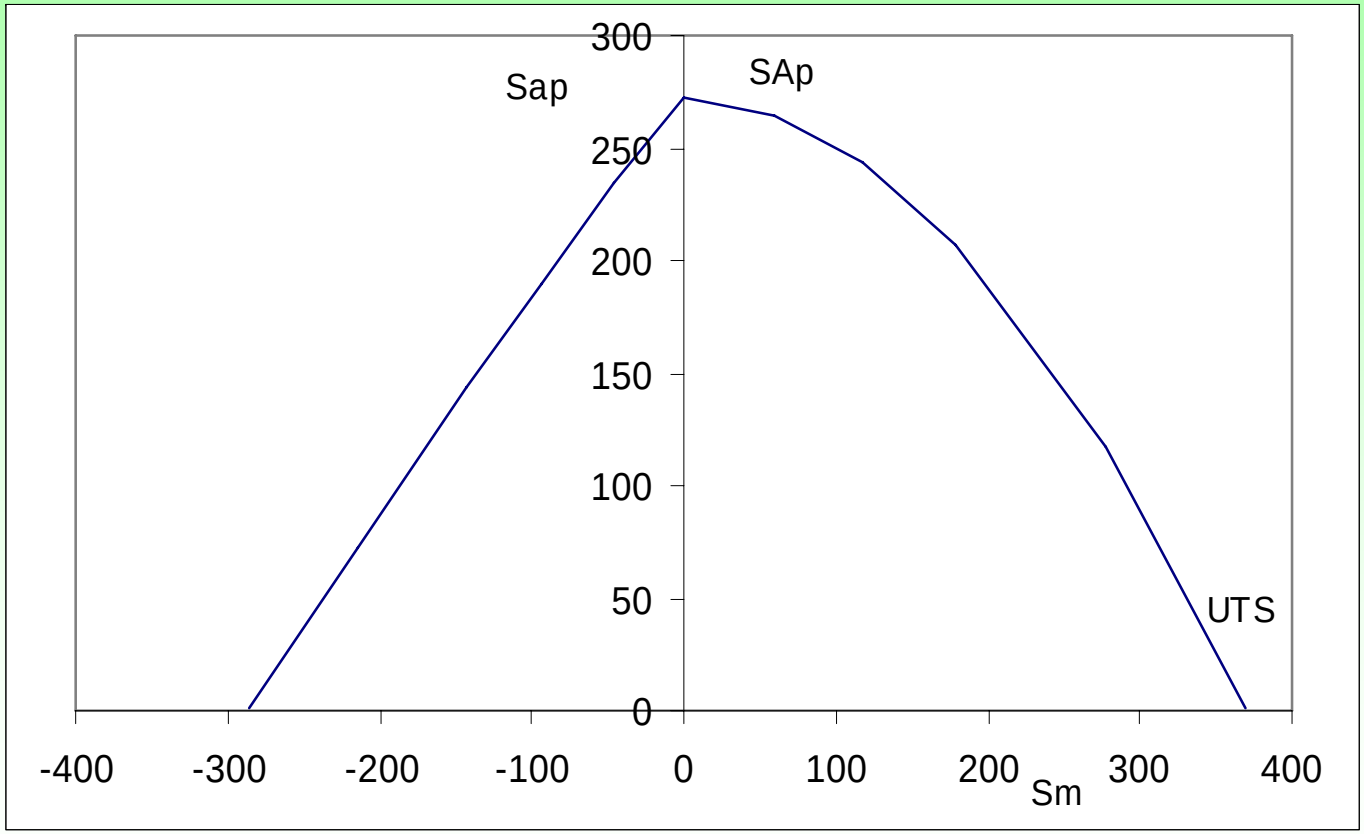
- 2-stage procedure
- S-N lines fitted per R-value
- Results combined to CL diagrams:
  - Goodman triangles if only R=-1 is measured
  - Odd shaped polygonics

New approach for fitting

- Single stage procedure
- CLD is defined for one number of cycles: Np
- Straight S-N lines for S_m=constant
- Slope of S-N lines variable with S_m

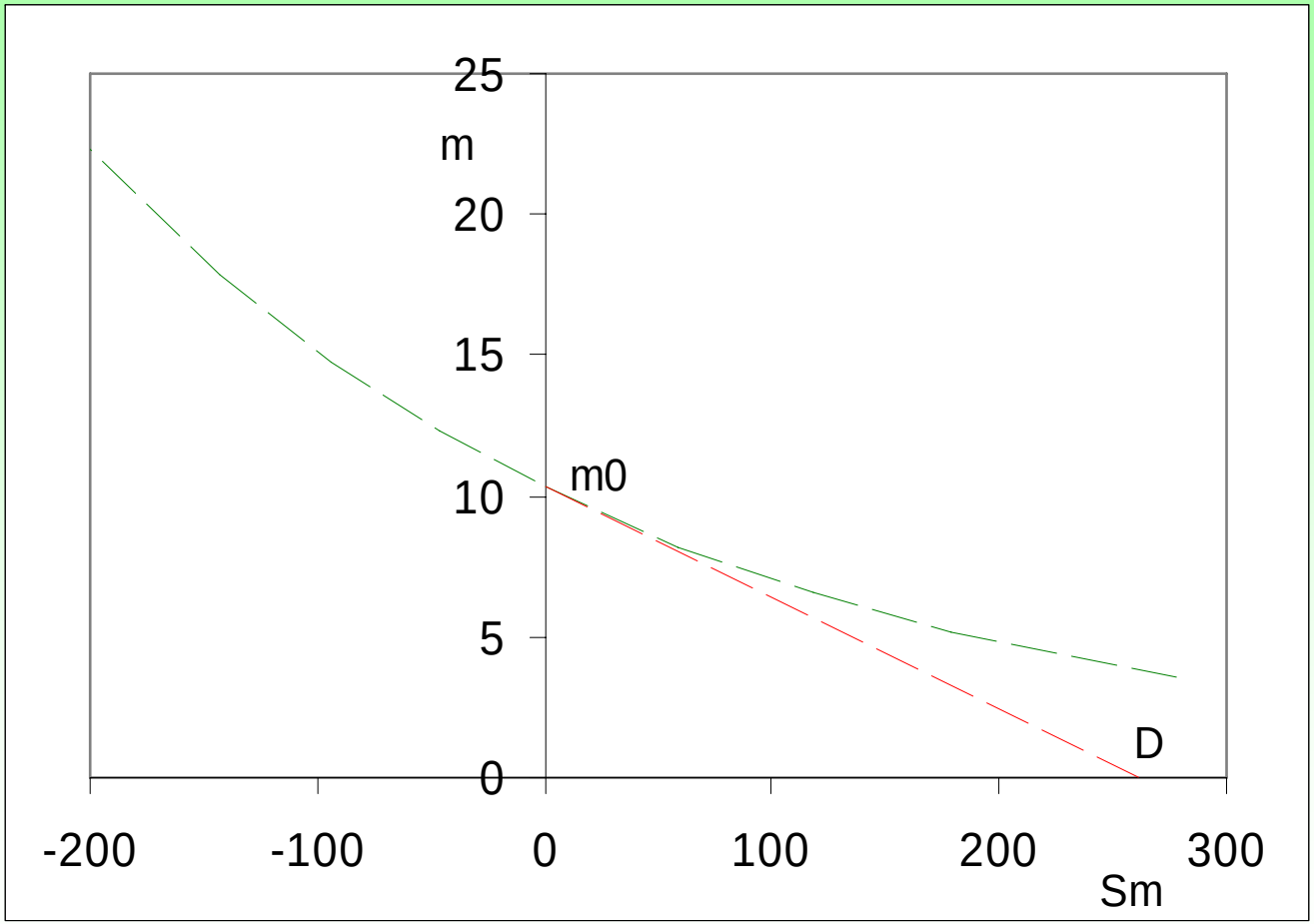
The CLD for Np

- Modified Gerber: $S_{ap} = S_{Ap} * (1 - (S_m/UTS)^{\alpha_t})$

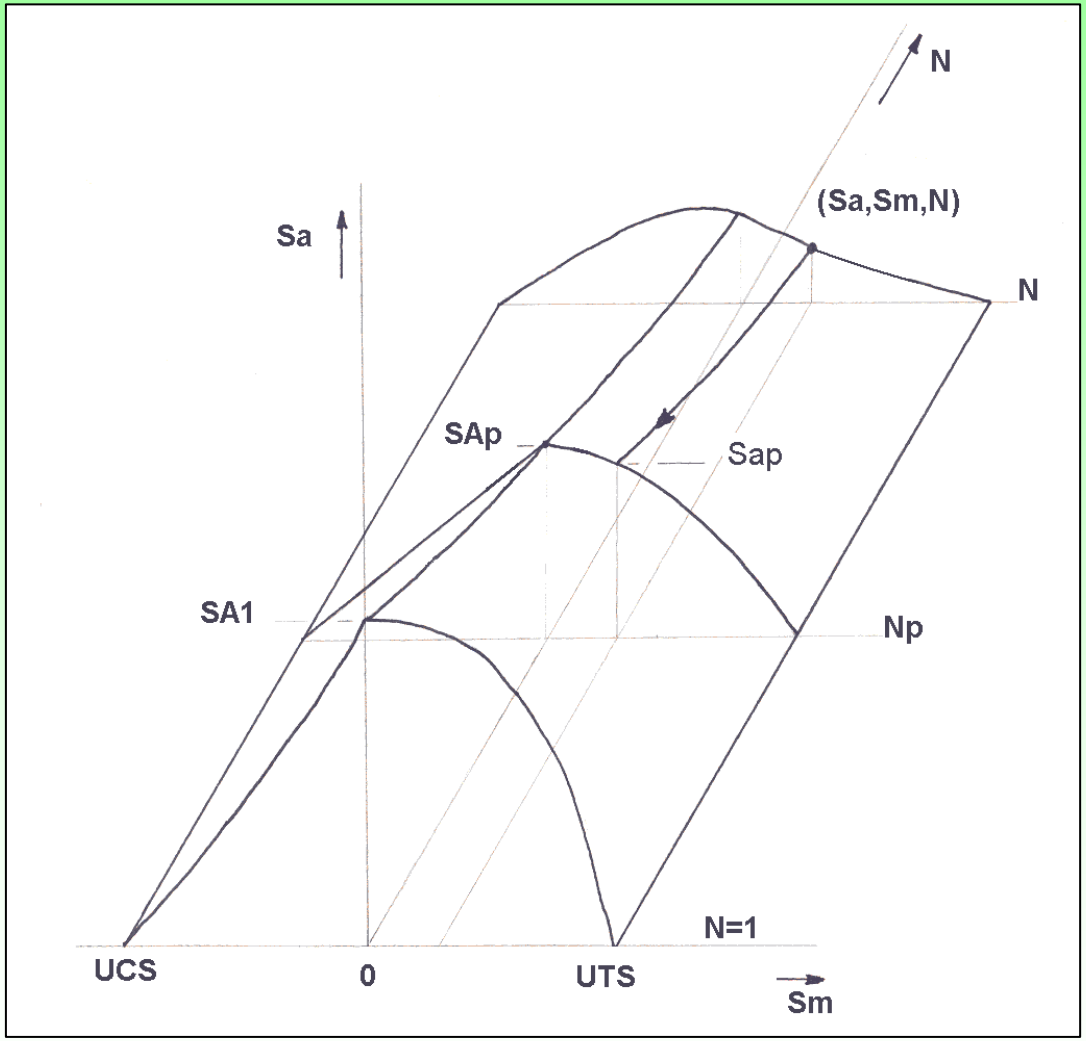


S-N line in S_m=constant plane

- Slope depends on S_m: $m = m_0 * e^{(-Sm/D)}$



Complete model



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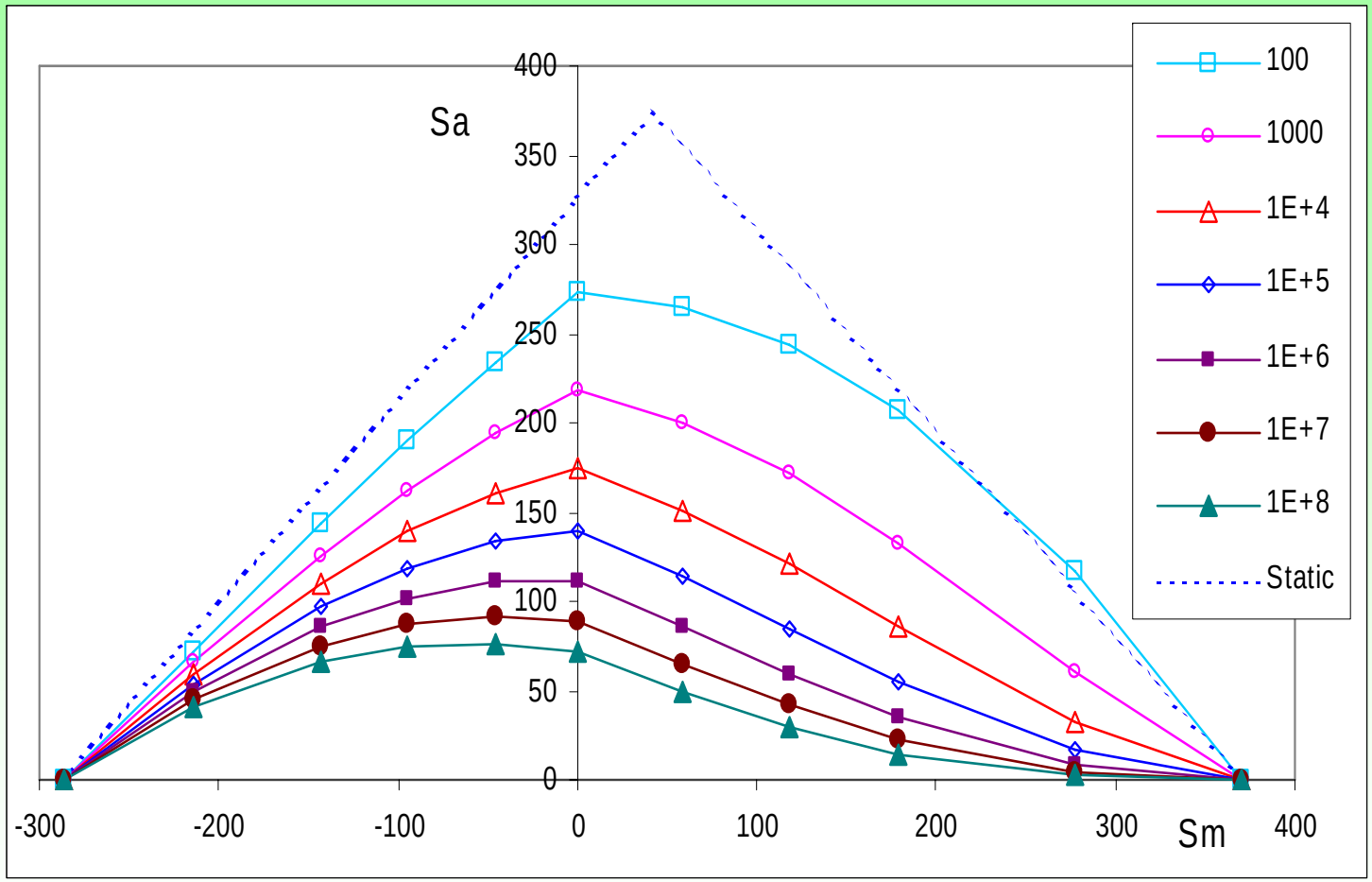
The CL Diagrams



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The model put to the test

- FACT database from 1994
- 100 coupons Triaxial Glass/Polyester
- Lifetimes between 50 and $6*10^8$ cycles
- R-values: 10; -2.5; -1; -0.4 and 0.1

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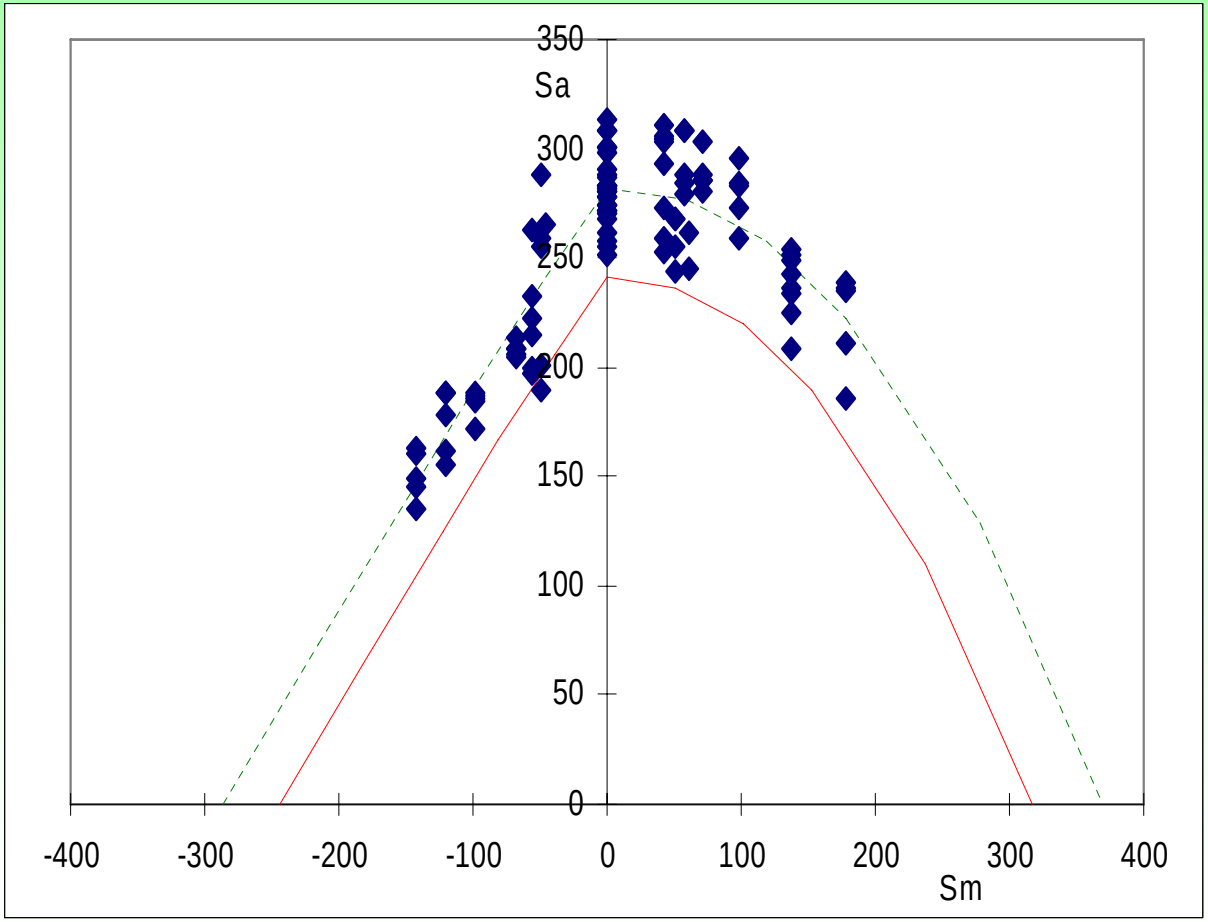
Best fit of CLD

- All points projected on Np plane



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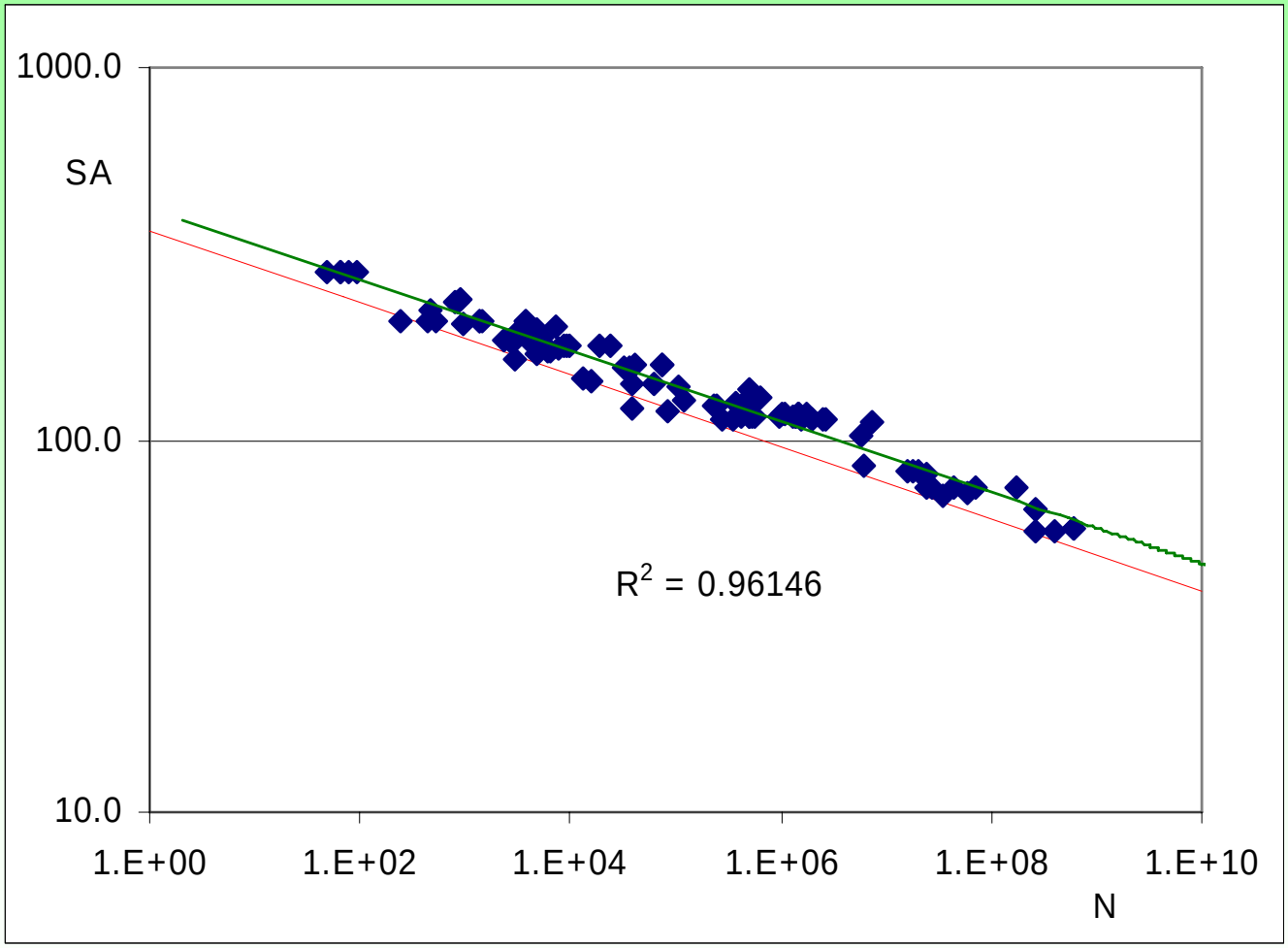
Best fit S-N line for S_m=0



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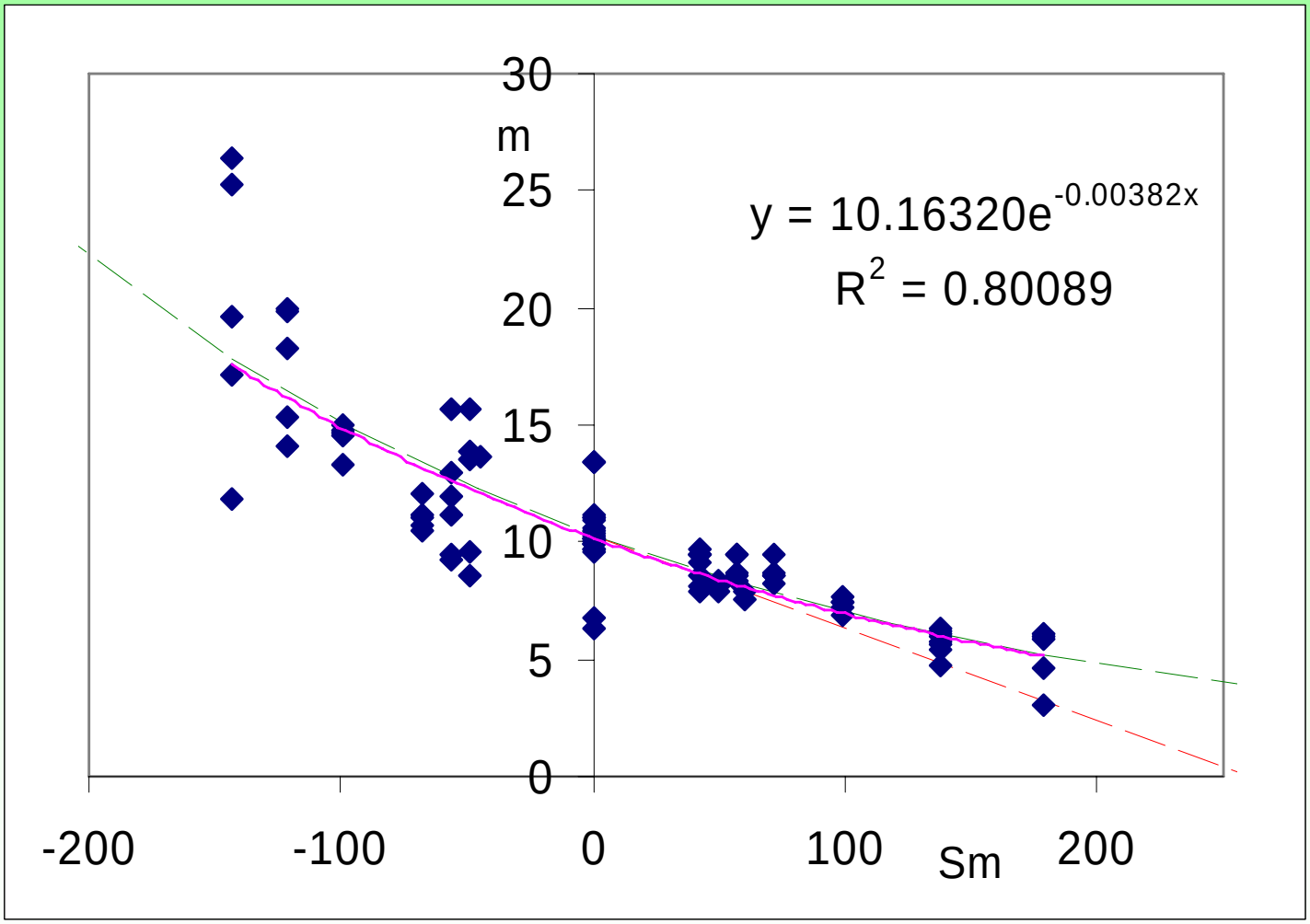
Best fit for $m=f(S_m)$



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