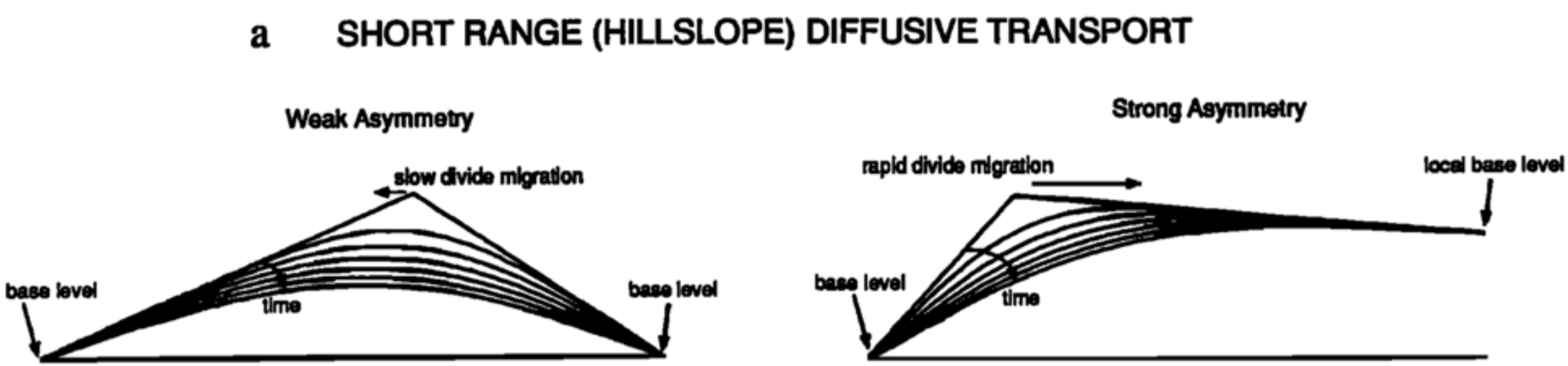
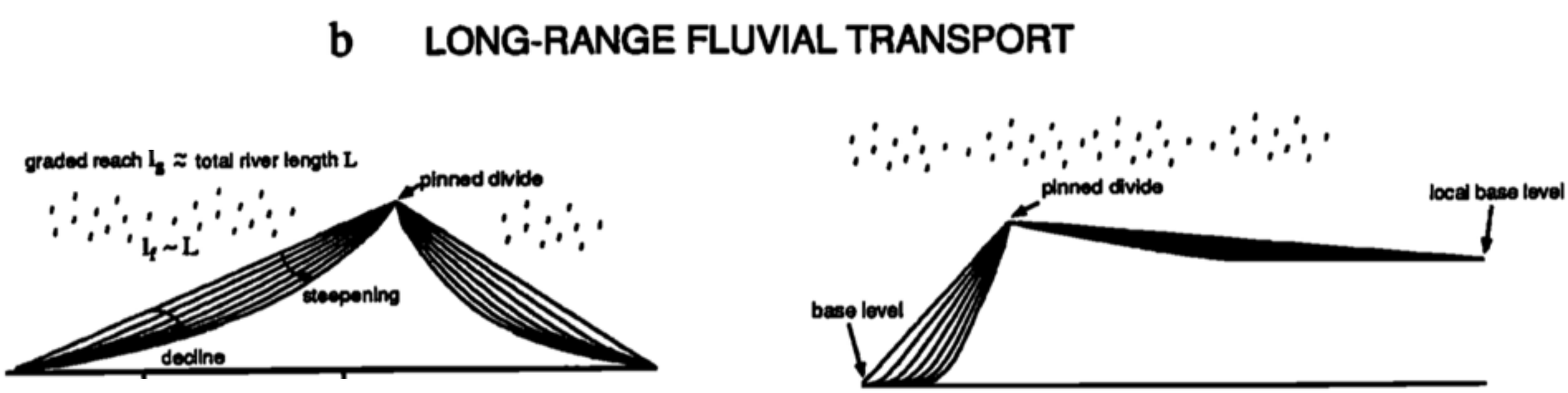
Modelos Quantitativos de Bacias Sedimentares

AGG0314

Modelos de processos superficiais em 2D

Década de 90


a SHORT RANGE (HILLSLOPE) DIFFUSIVE TRANSPORT
Weak Asymmetry
slow divide migration
base level
time
base level
Strong Asymmetry
rapid divide migration
local base level
base level
time


b LONG-RANGE FLUVIAL TRANSPORT
graded reach $l_g \approx$ total river length L
pinned divide
$l_f \sim L$
steepening
decline
pinned divide
local base level
base level


Jean Braun

Short range transport

Short range transport

- Soil creep

Short range transport

- Soil creep

Jean Braun

Short range transport

- Soil creep
- Rockfall

Jean Braun

Short range transport

- Soil creep
- Rockfall
- Landslide

Jean Braun

Short range transport

- Soil creep
- Rockfall
- Landslide

Long-range processes

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$$\frac{dh}{dt} \propto Q^m S^n$$

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declividade

Long-range processes

$$\frac{dh}{dt} \propto Q^m S^n$$

vazão de água

declividade

Long-range processes

$$\frac{dh}{dt} \propto Q^m S^n$$

vazão de água

declividade

Se assumirmos que a precipitação é constante espacialmente, o vazão de água será proporcional a área da bacia de drenagem.

Long-range processes

$$\frac{dh}{dt} \propto Q^m S^n$$

declividade

vazão de água

Se assumirmos que a precipitação é constante espacialmente, o vazão de água será proporcional a área da bacia de drenagem.

$$\frac{dh}{dt} \propto A^m S^n$$

Long-range processes

$$\frac{dh}{dt} \propto Q^m S^n$$

declividade

vazão de água

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declividade

vazão de água

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$$\frac{dh}{dt} \propto A^m S^n$$

área da bacia de drenagem

Stream-power law

$$\frac{\partial h}{\partial t} = -K_f S^n A^m$$

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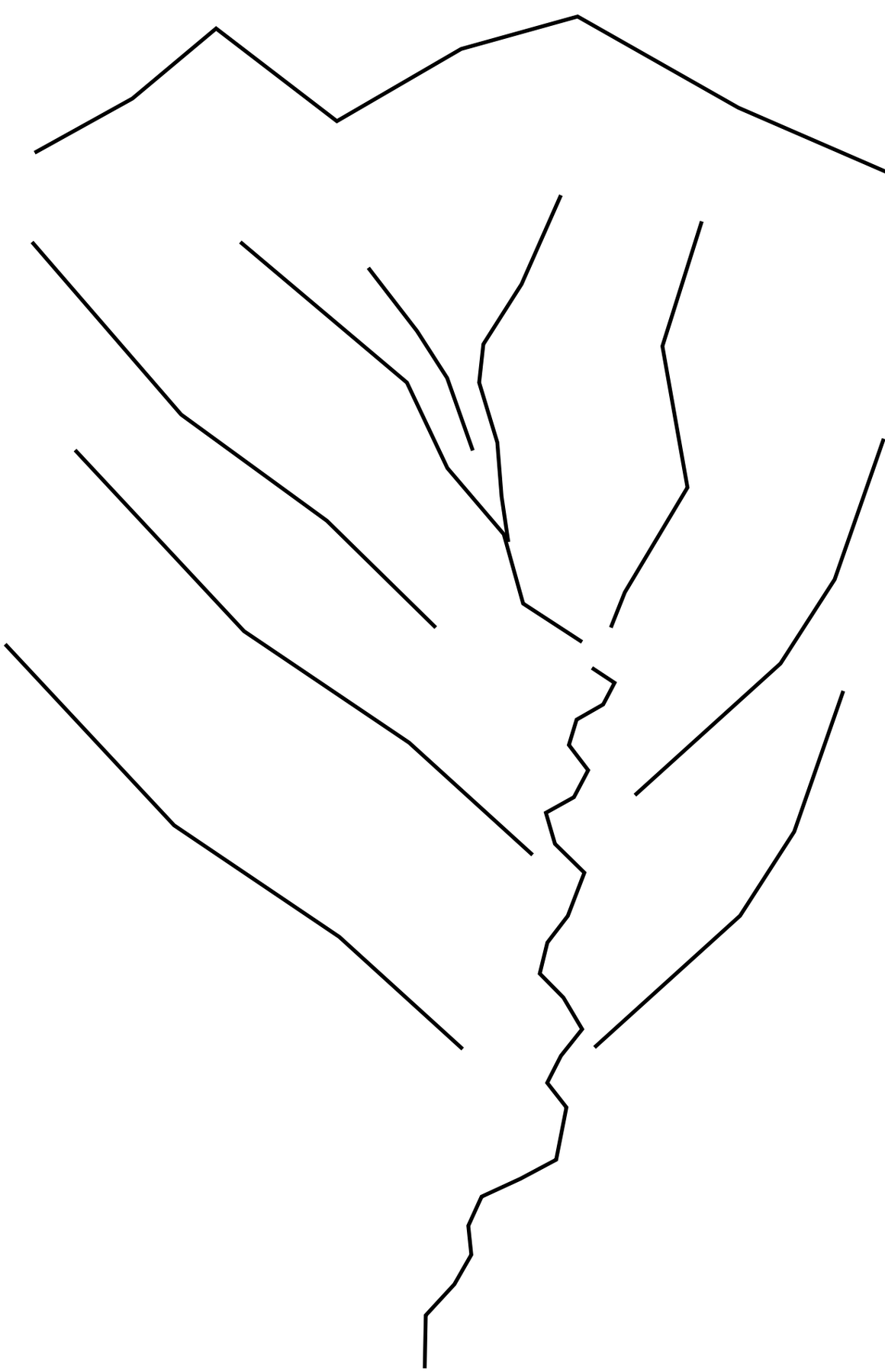

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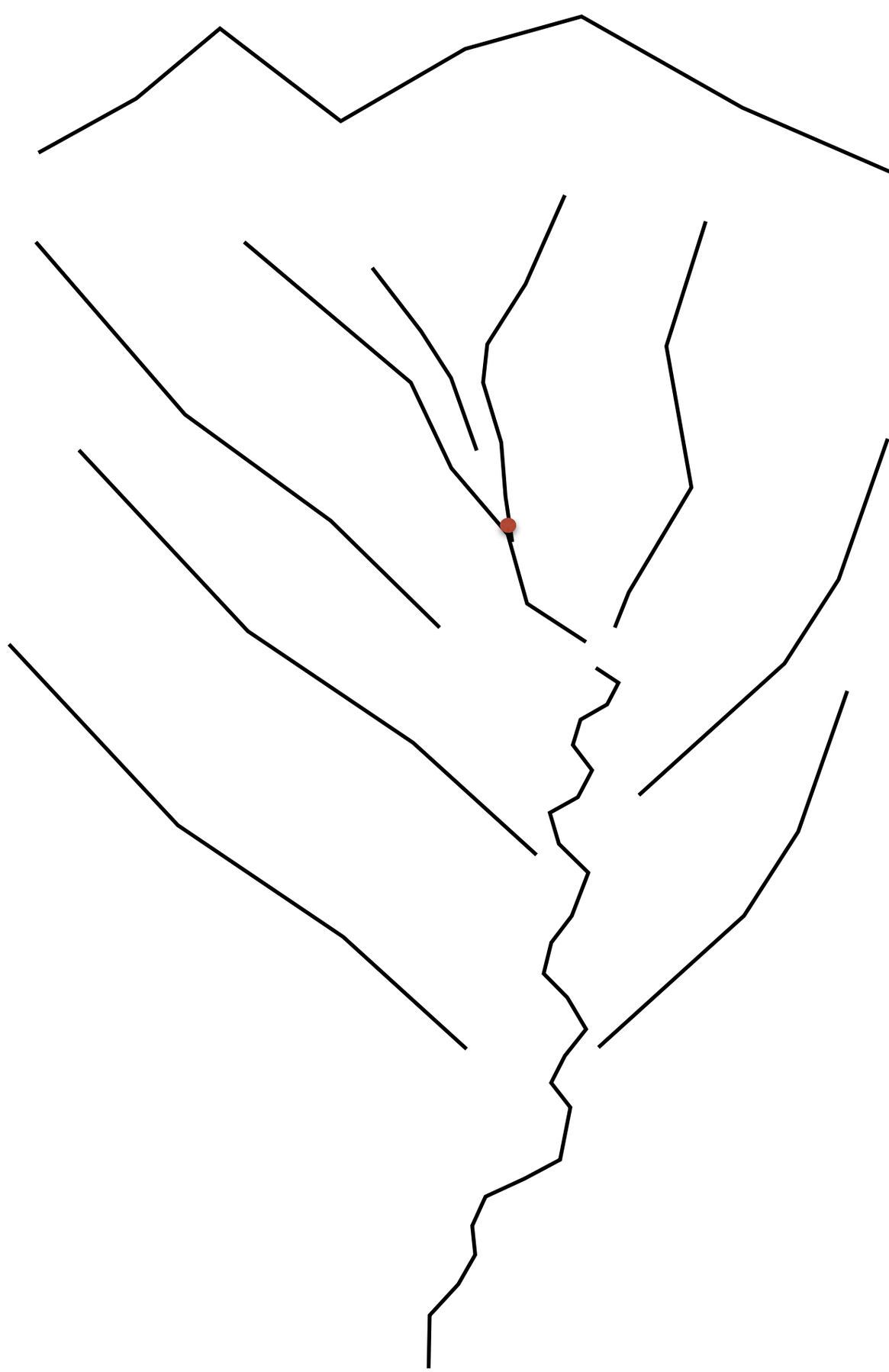

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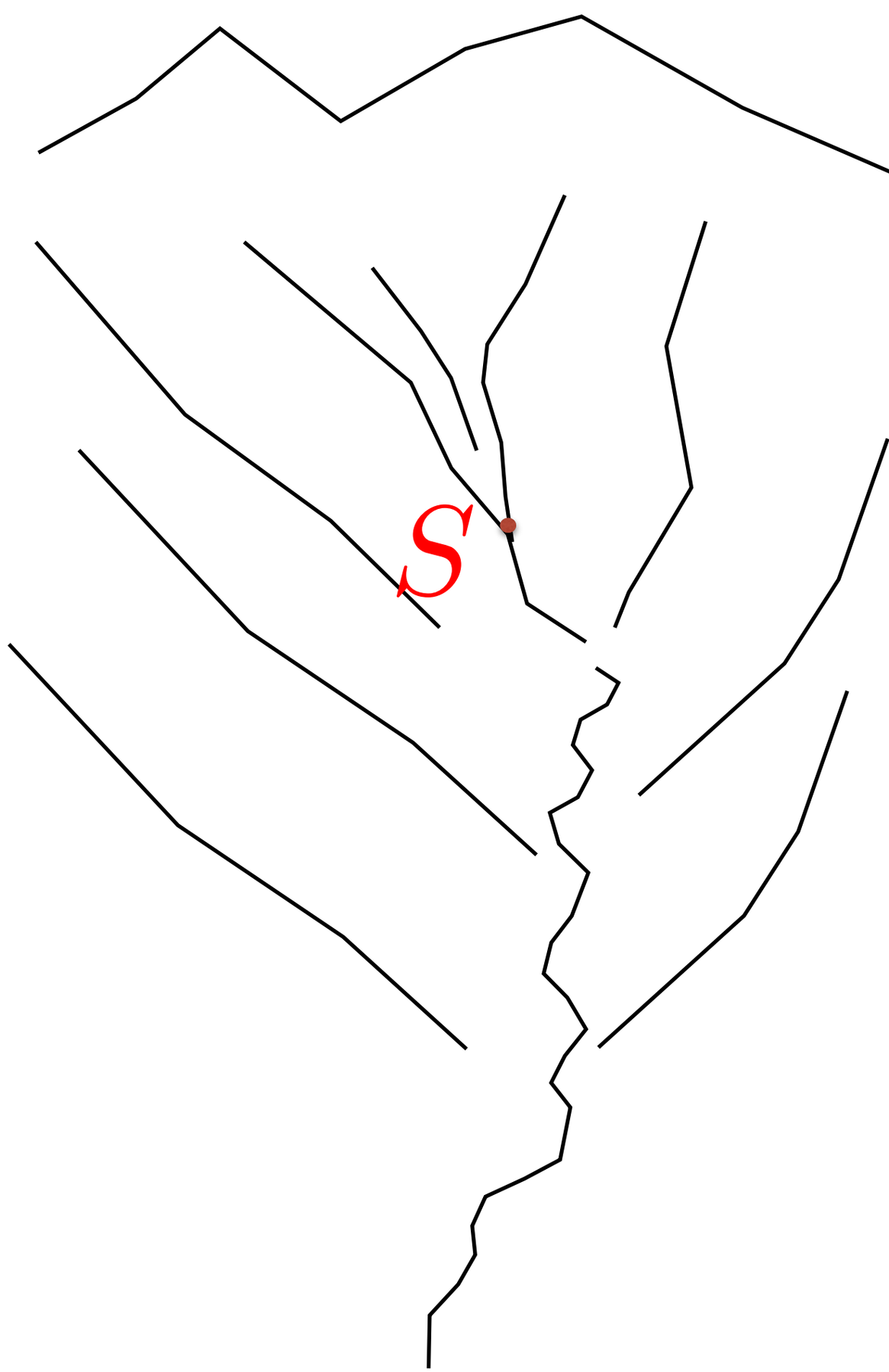

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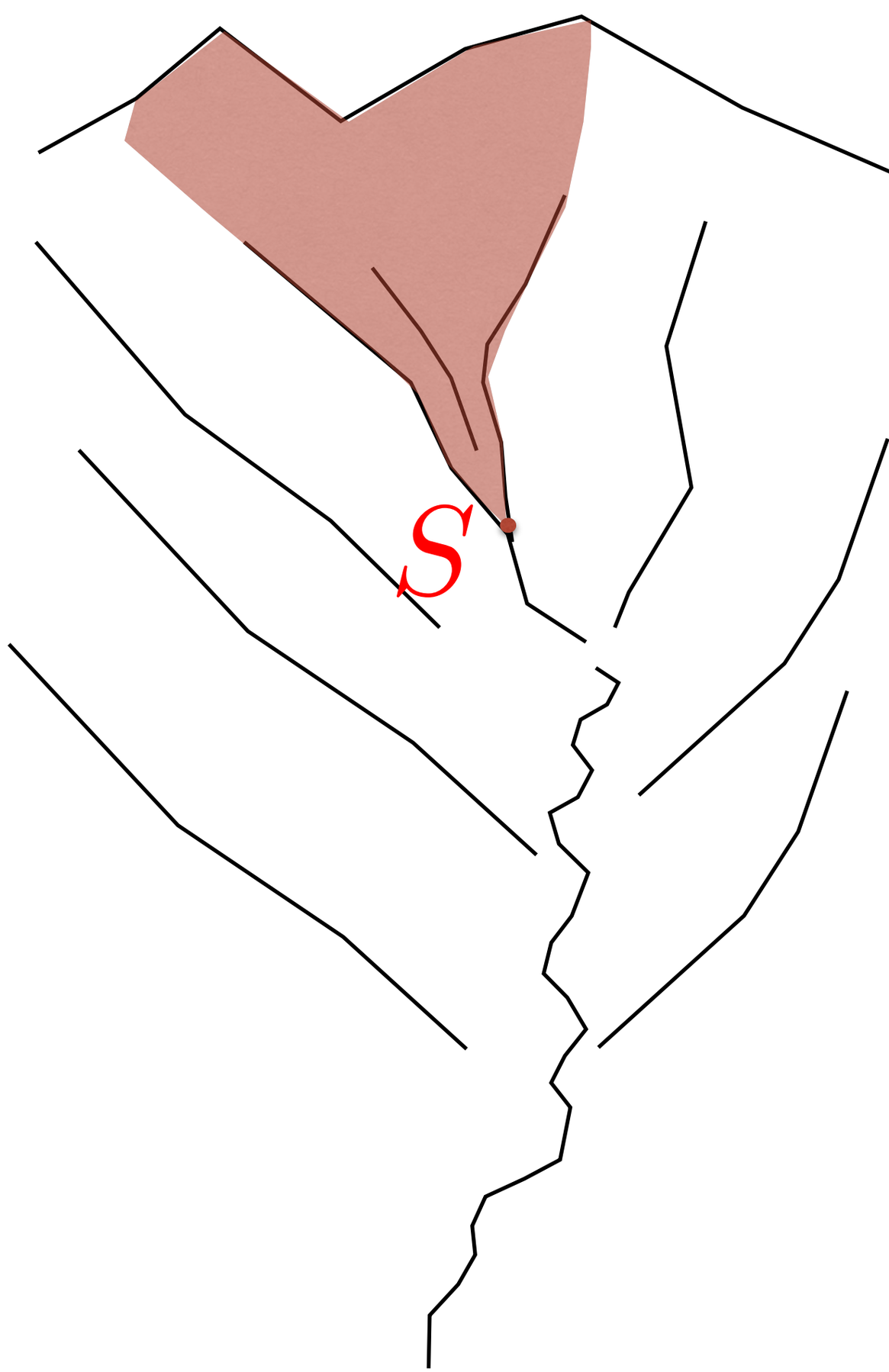

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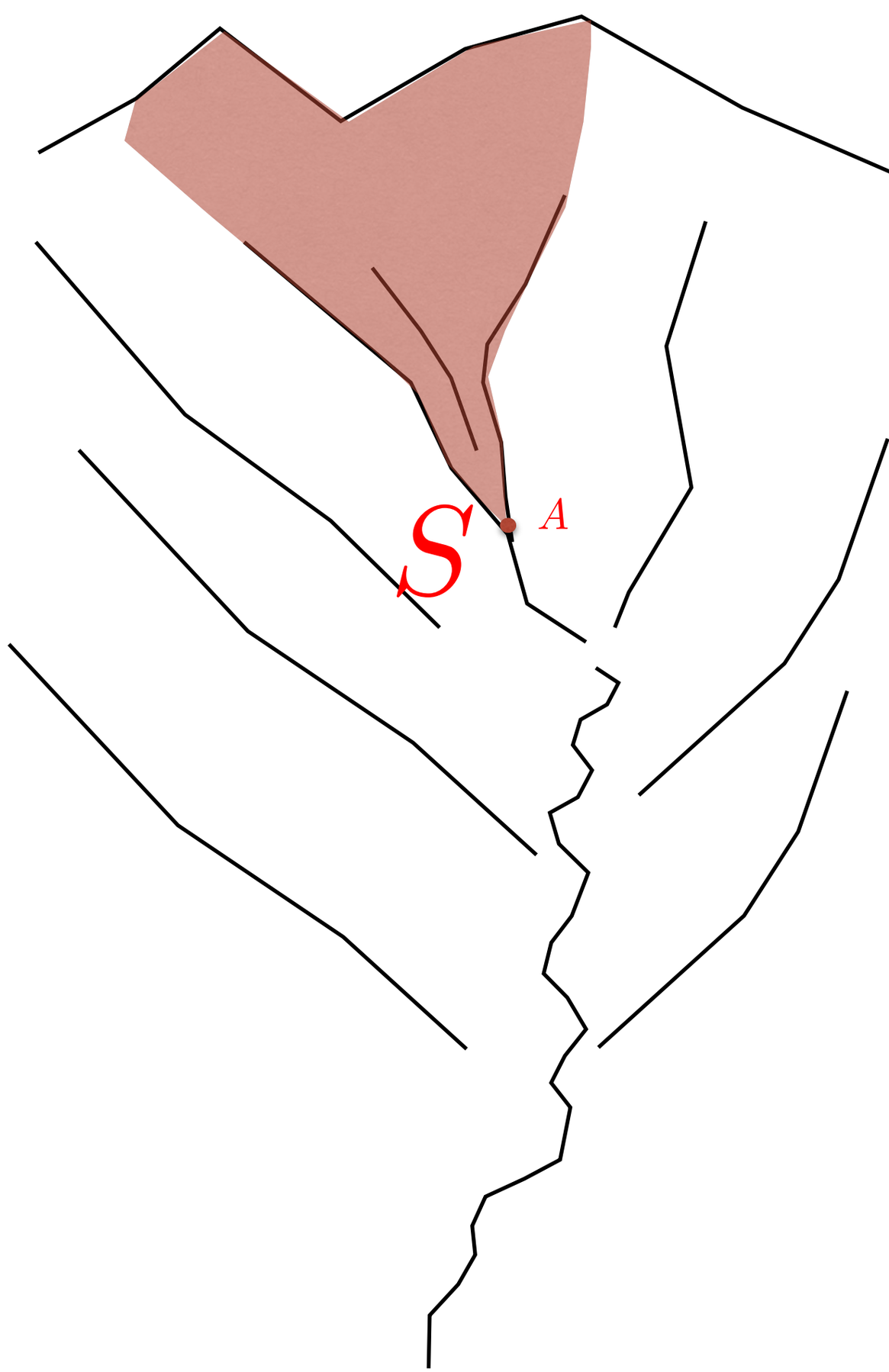

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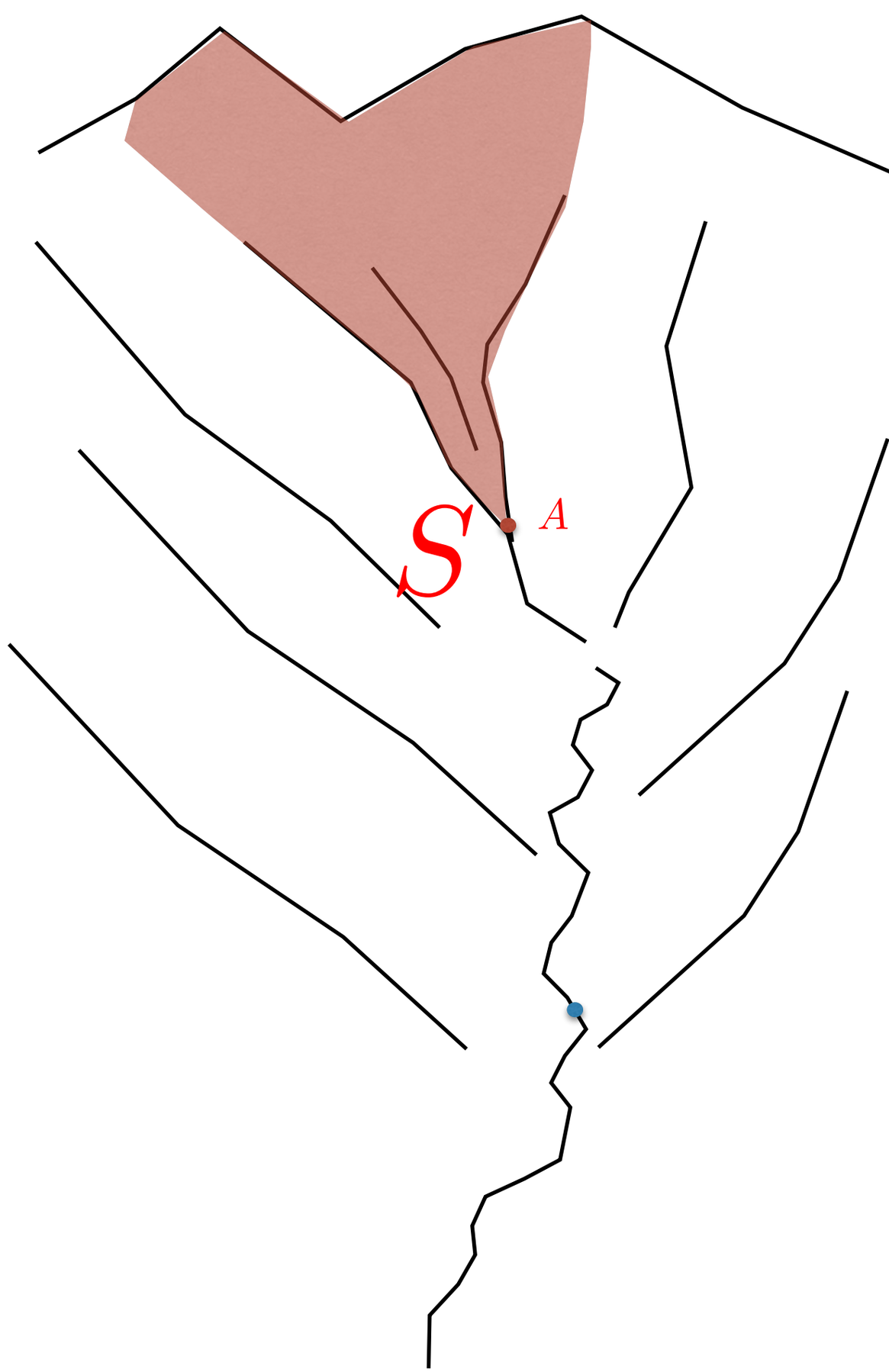

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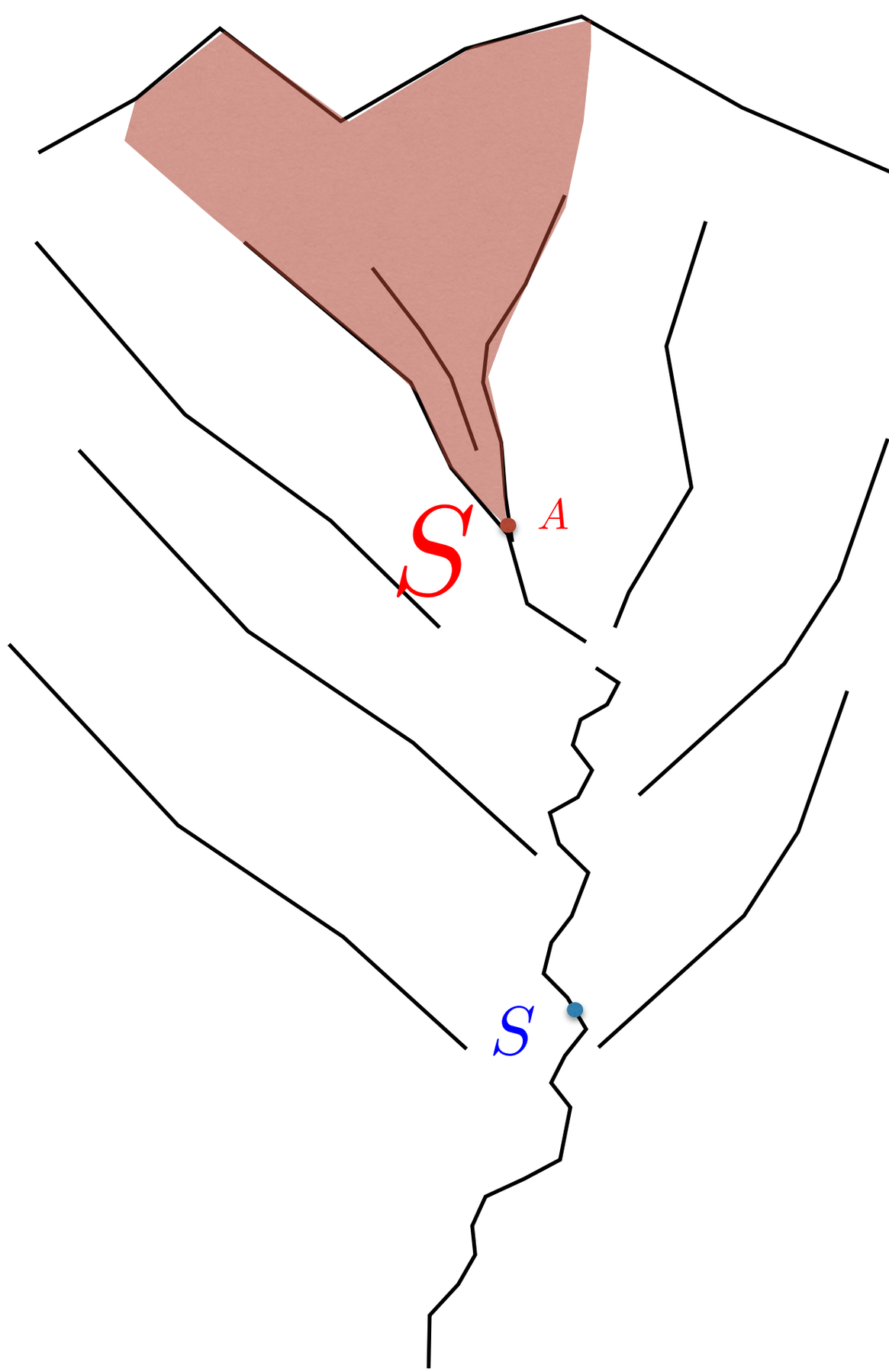

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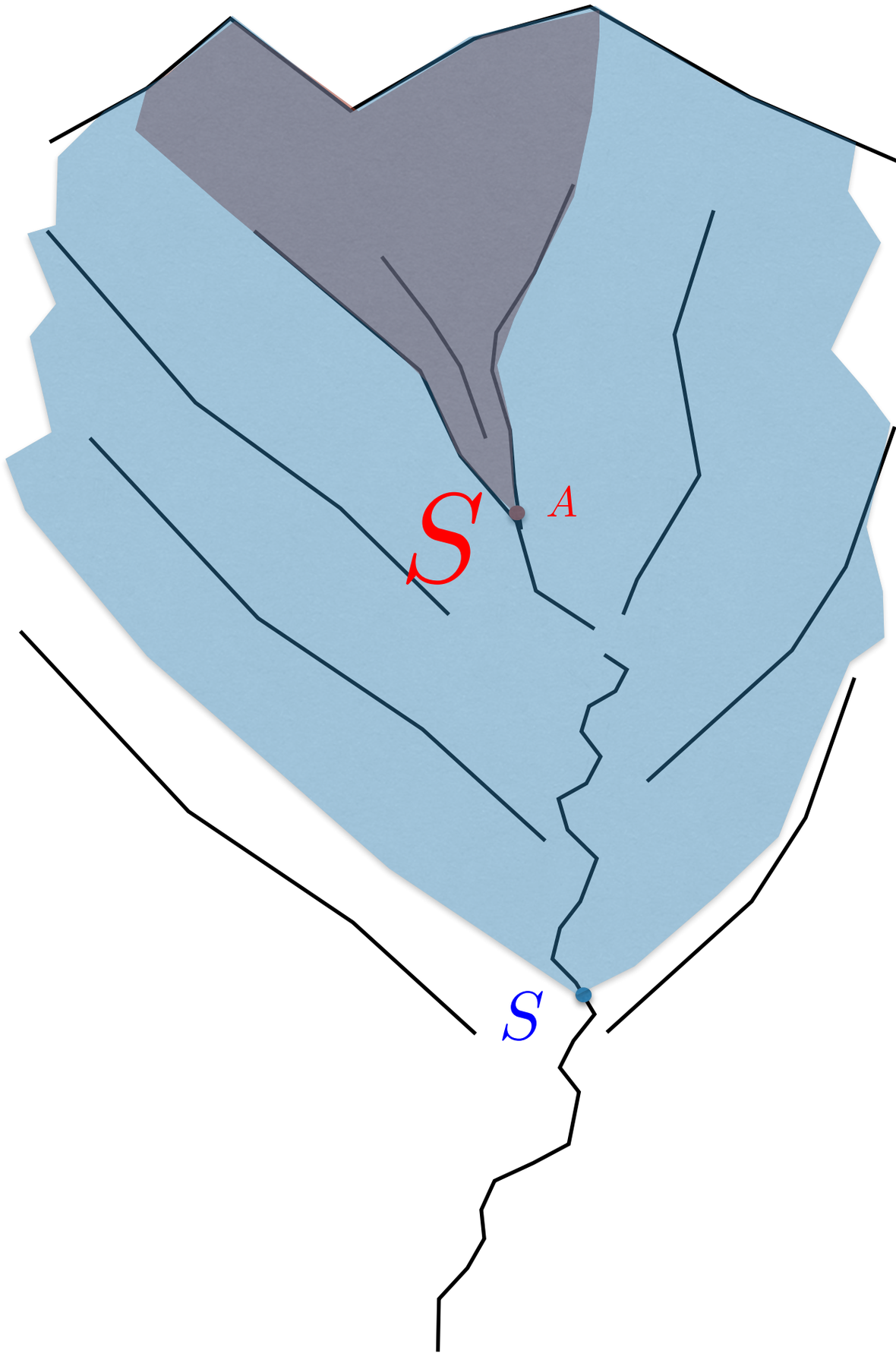

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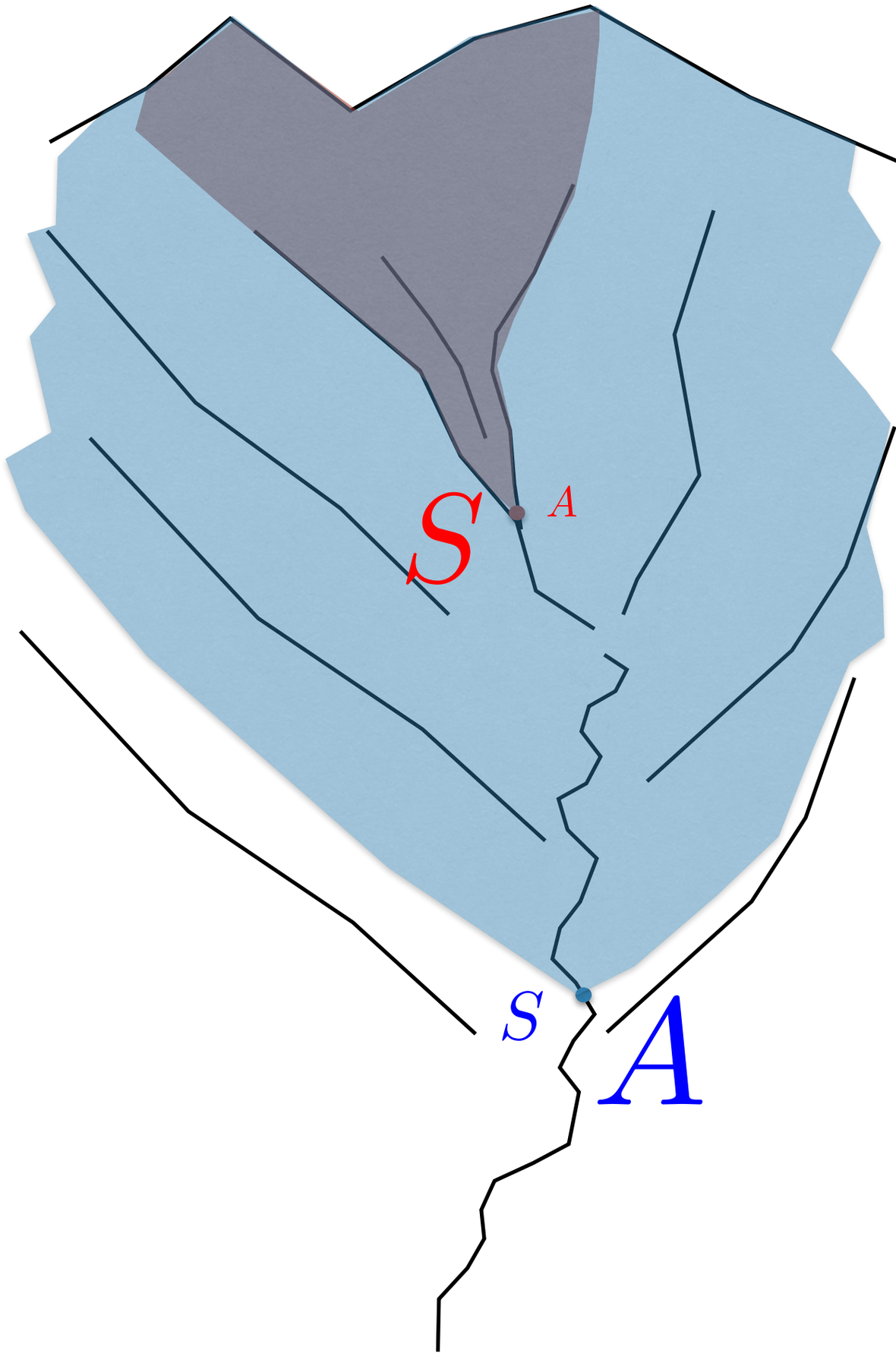
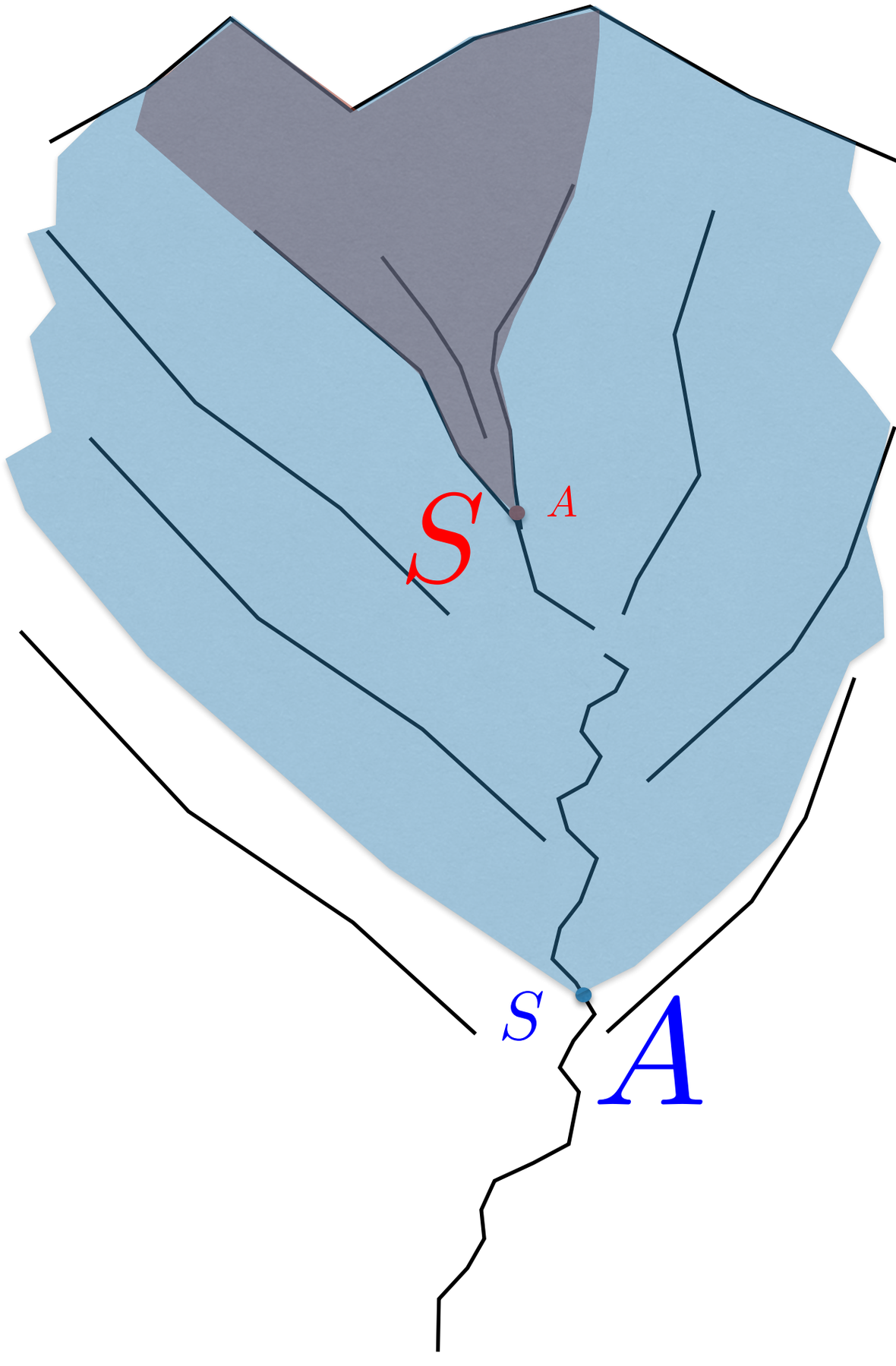


Stream-power law

$$\frac{\partial h}{\partial t} = -K_f S^n A^m$$

$$n \approx 1$$

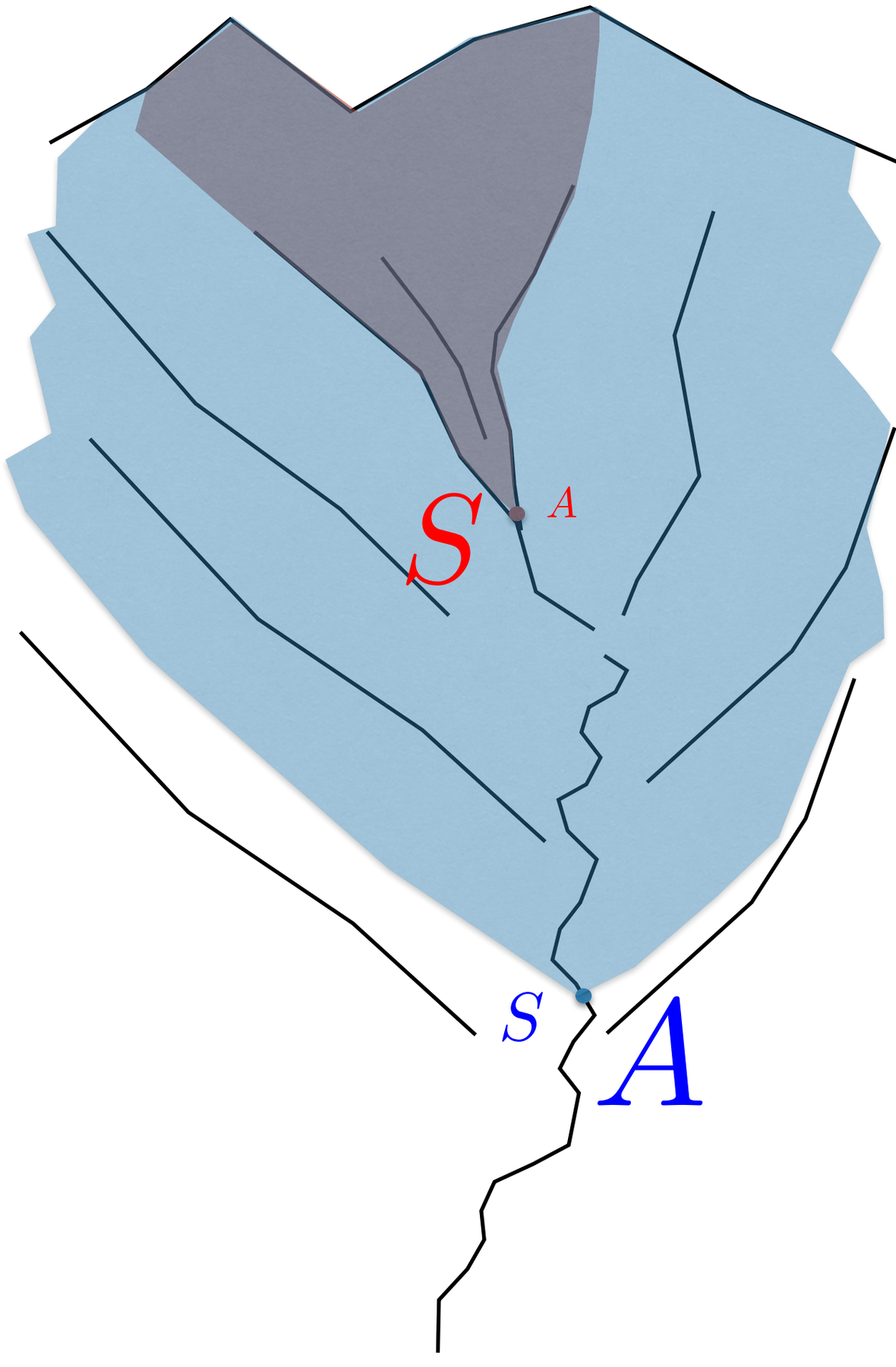


Stream-power law

$$\frac{\partial h}{\partial t} = -K_f S^n A^m$$

$n \approx 1$

$m \approx 0.5$



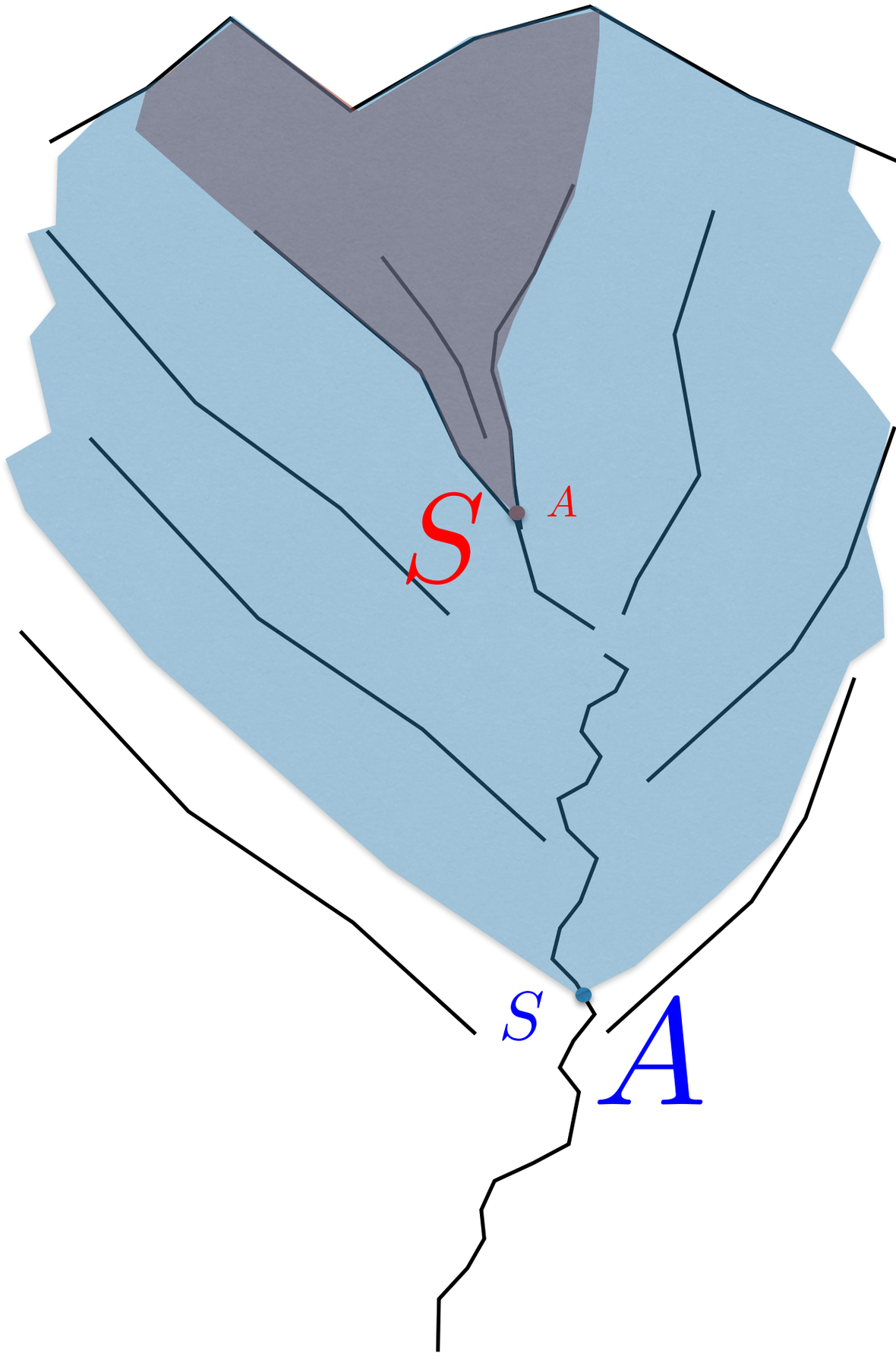
Stream-power law

$$\frac{\partial h}{\partial t} = -K_f S^n A^m$$

$$n \approx 1$$

$$m \approx 0.5$$

(Whipple & Tucker 1999)



Transport-limited incision

$$Q_{eqb} = K_t S^n A^m$$

Transport-limited incision

capacidade de transporte sedimentar

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Transport-limited incision

capacidade de transporte sedimentar

$$Q_{eqb} = K_t S^n A^m$$

Coeficiente de transporte sedimentar

Transport-limited incision

$$Q_{eqb} = K_t S^{n'} A^{m'}$$

$$\frac{\partial h}{\partial t} = -\frac{Q_{eqb} - Q_{sed}}{L_f}$$

Transport-limited incision

$$Q_{eqb} = K_t S^{n'} A^{m'}$$

capacidade máxima

$$\frac{\partial h}{\partial t} = -\frac{Q_{eqb} - Q_{sed}}{L_f}$$

Transport-limited incision

$$Q_{eqb} = K_t S^{n'} A^{m'}$$

capacidade máxima

fluxo de sedimentos

local

$$\frac{\partial h}{\partial t} = -\frac{Q_{eqb} - Q_{sed}}{L_f}$$

Transport-limited incision

$$Q_{eqb} = K_t S^{n'} A^{m'}$$

capacidade máxima

fluxo de sedimentos

$$\frac{\partial h}{\partial t} = -\frac{Q_{eqb} - Q_{sed}}{L_f}$$

local

fator de escala (depende da litologia)

Transport-limited incision

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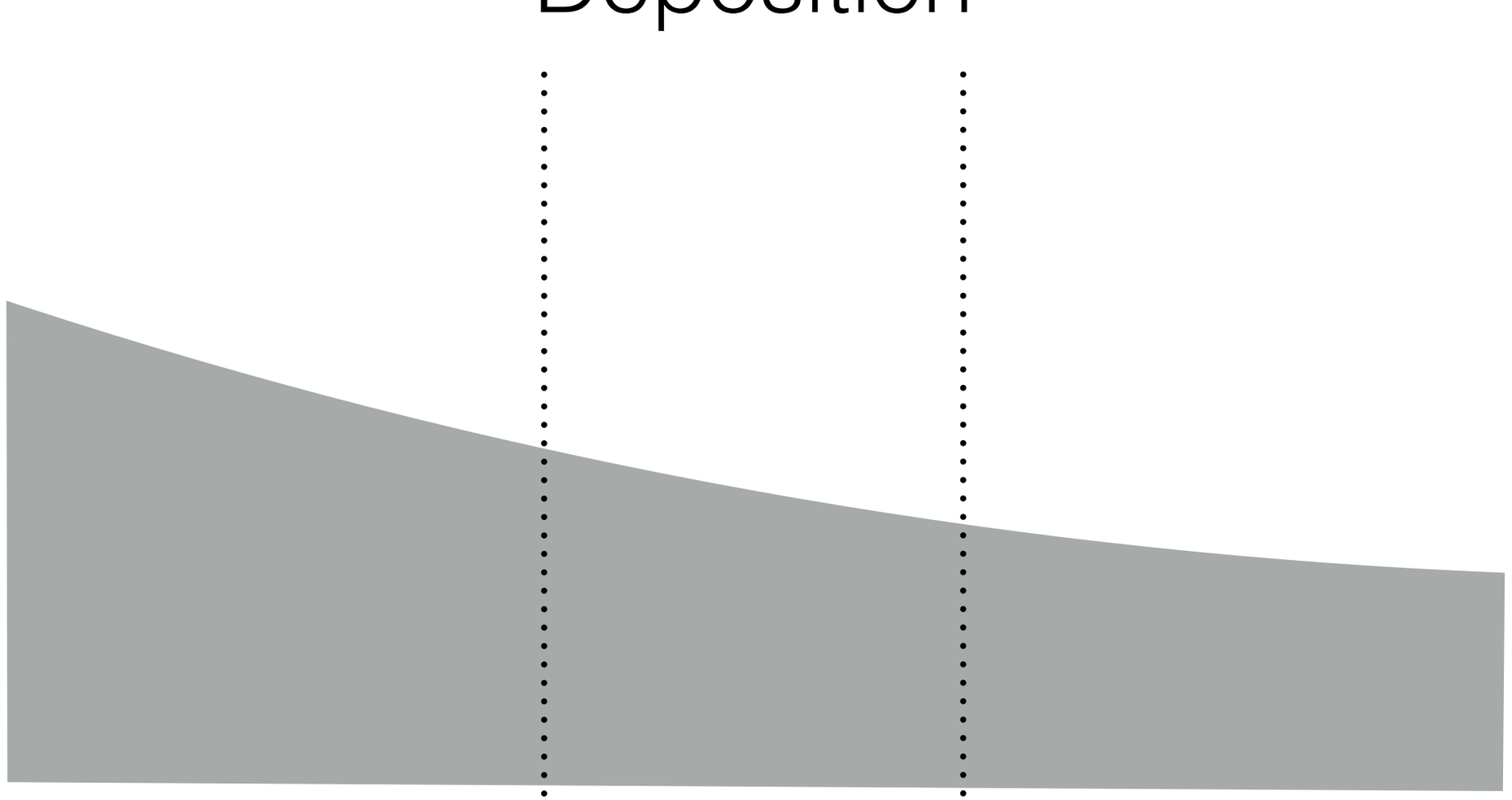

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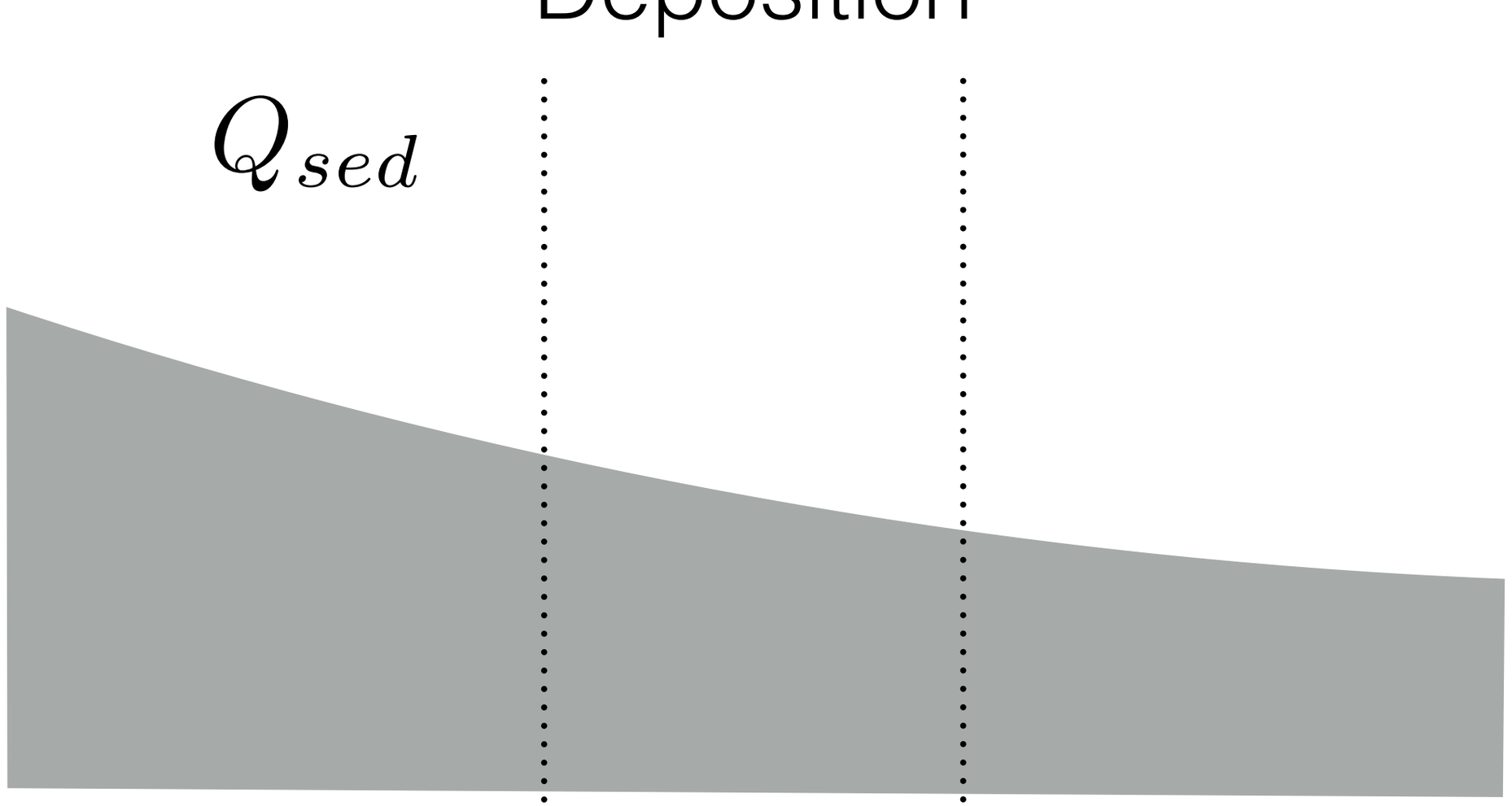

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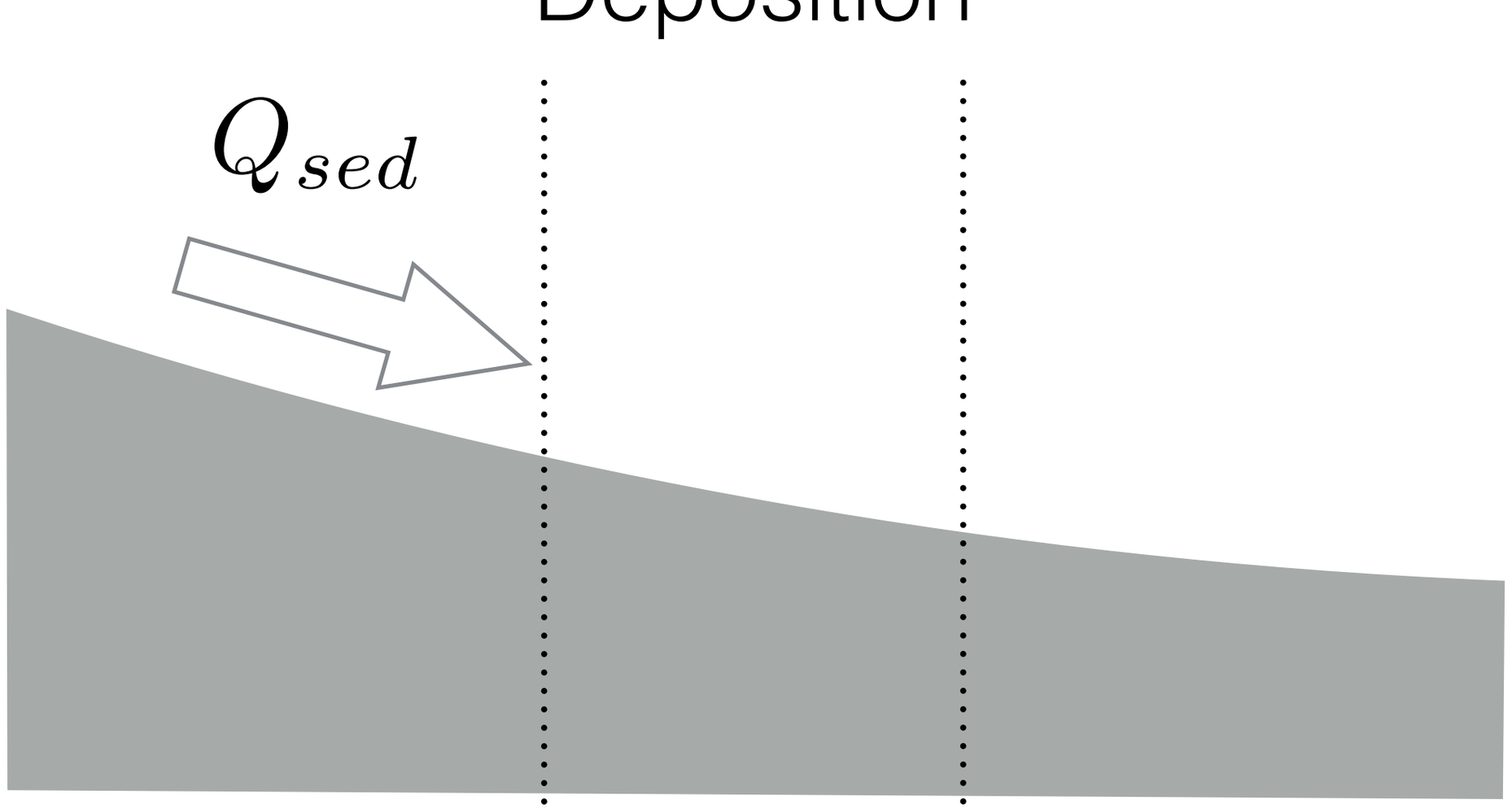

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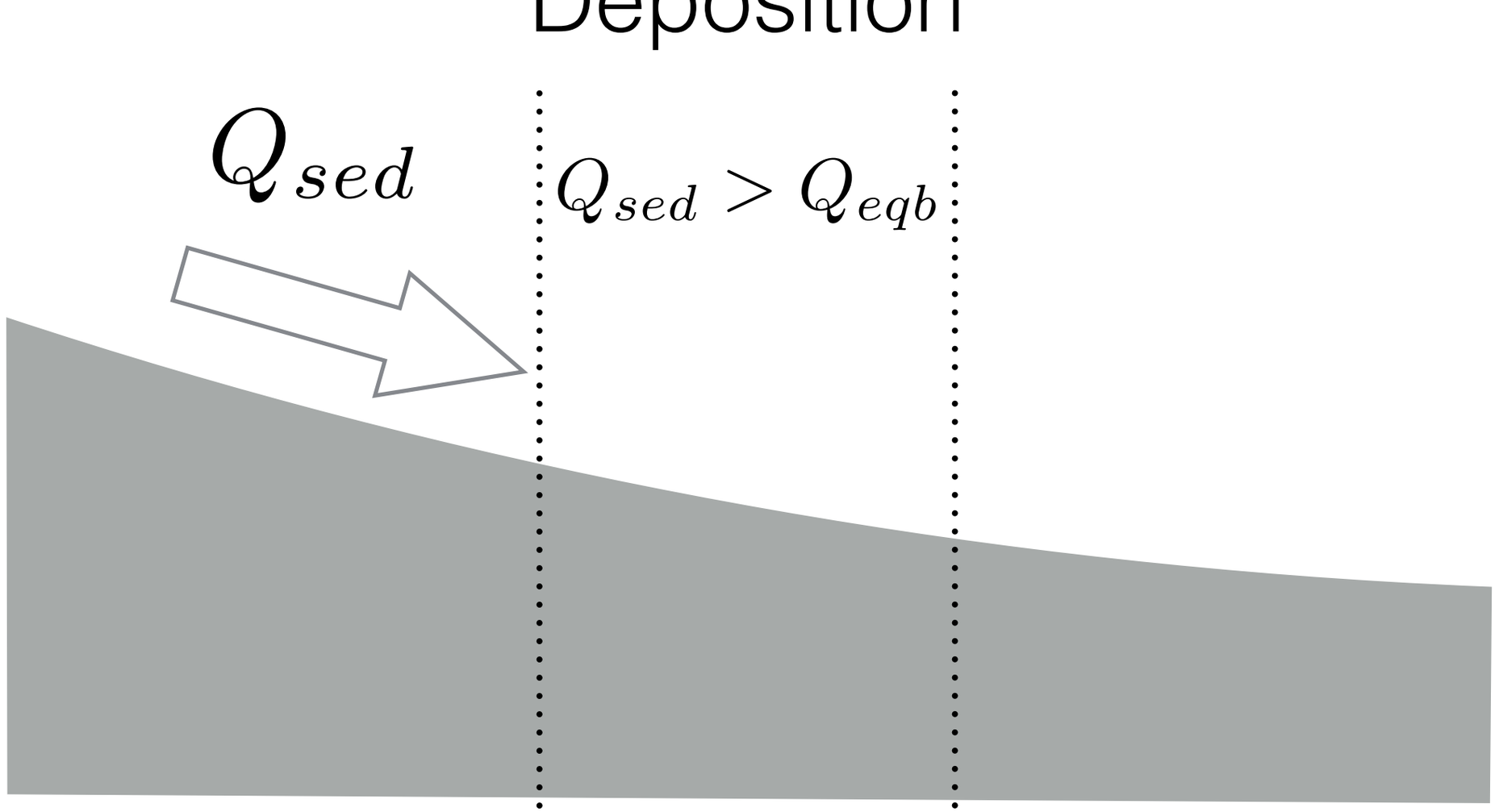

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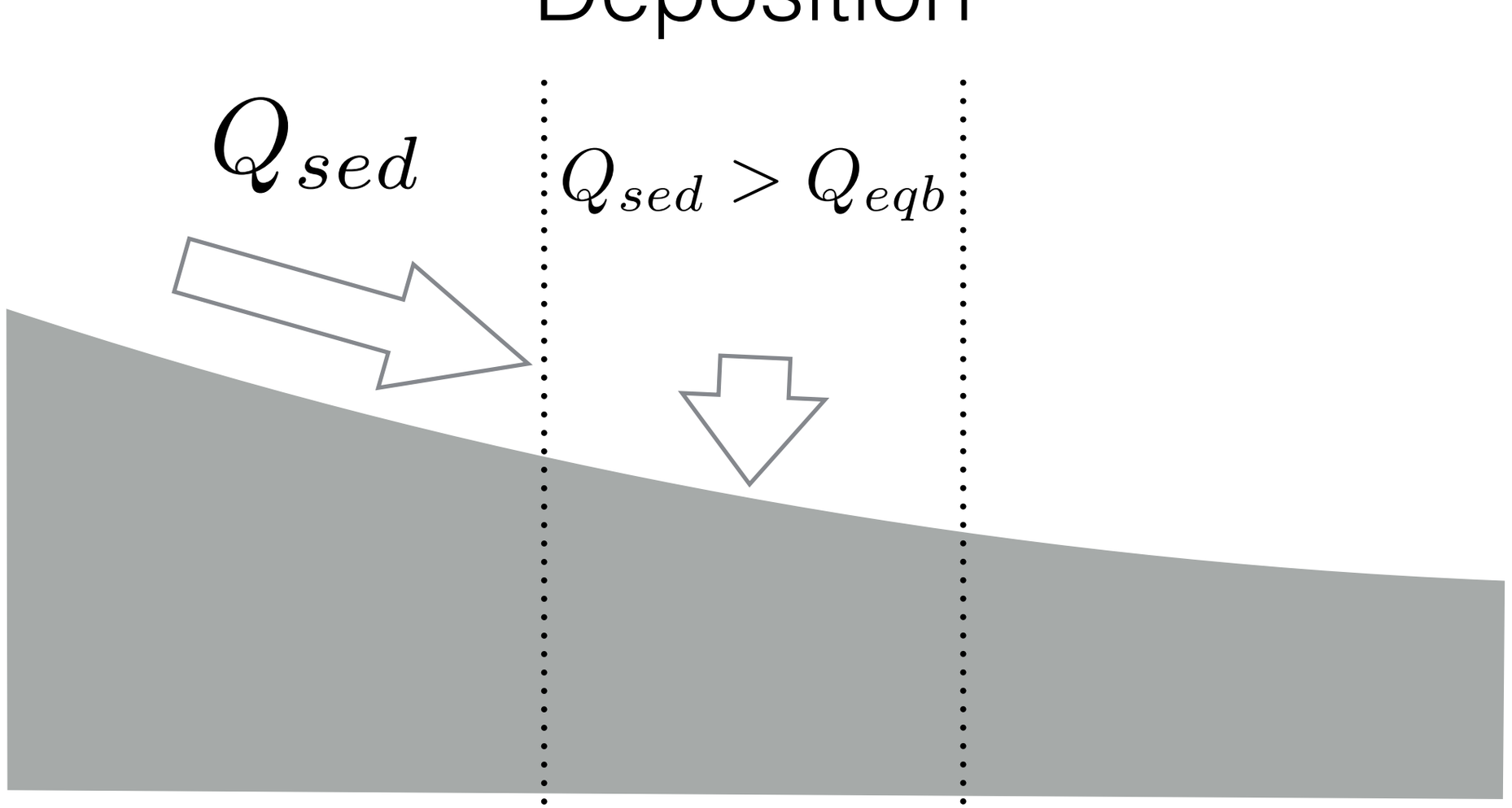

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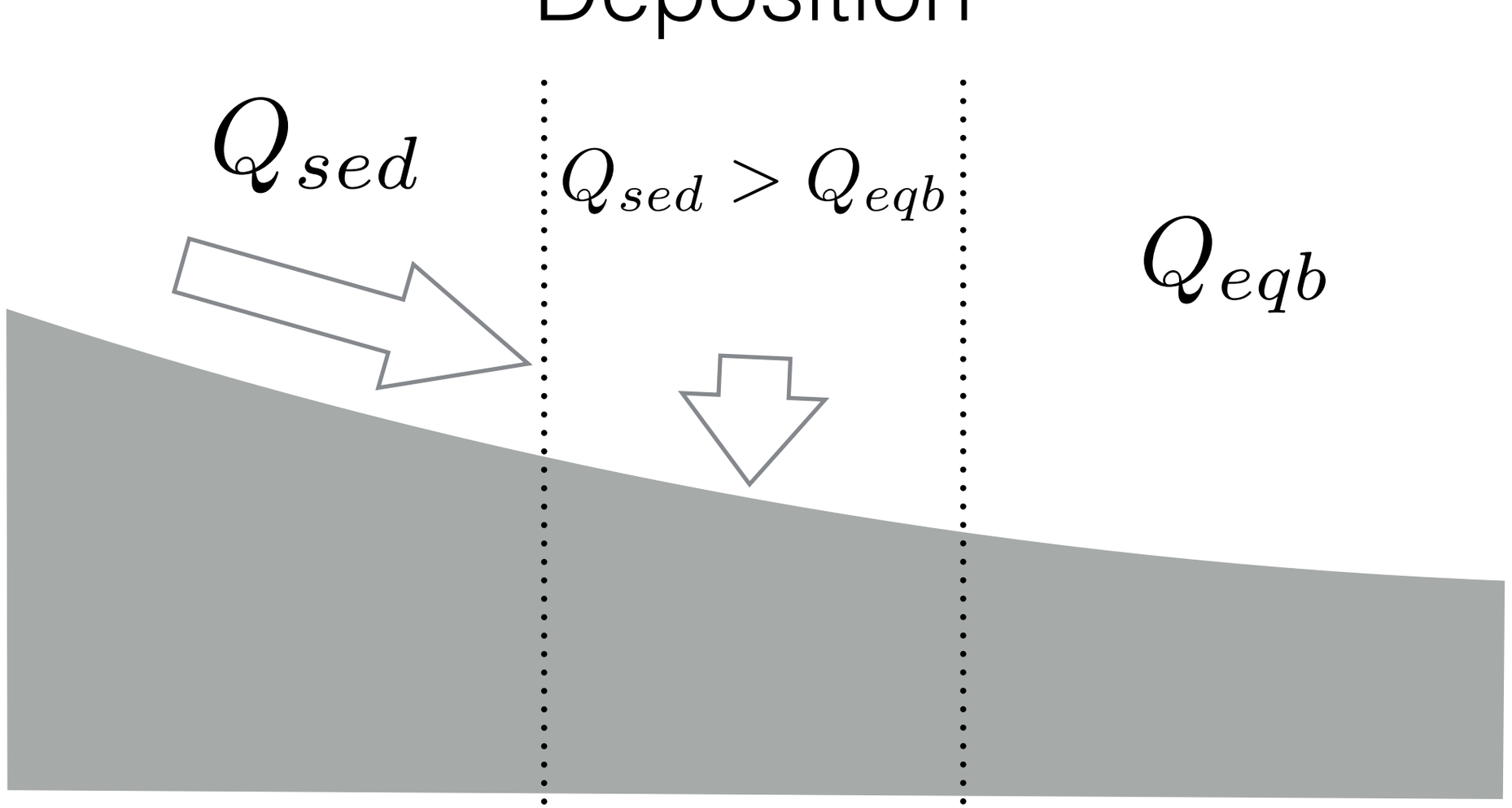

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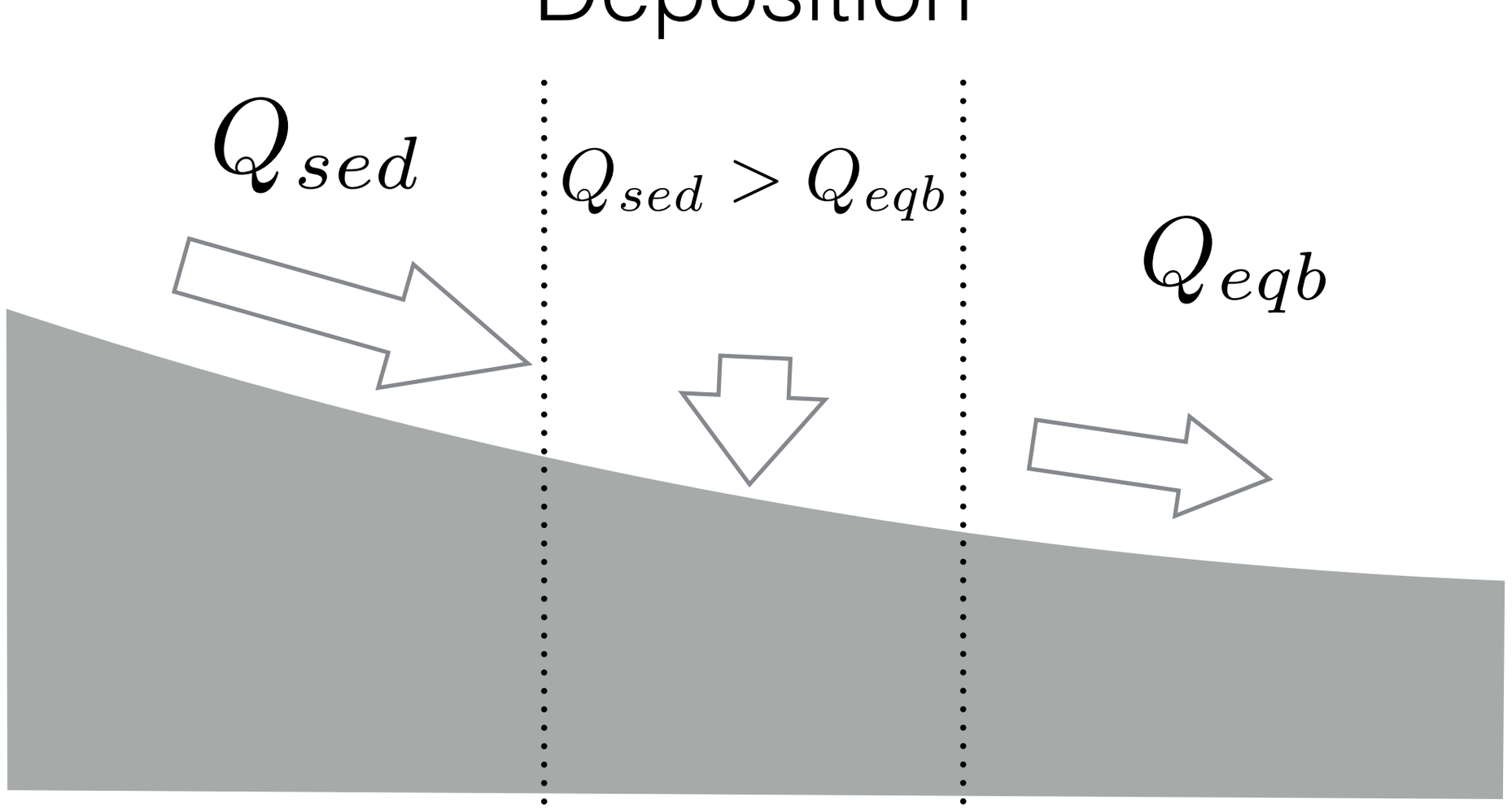

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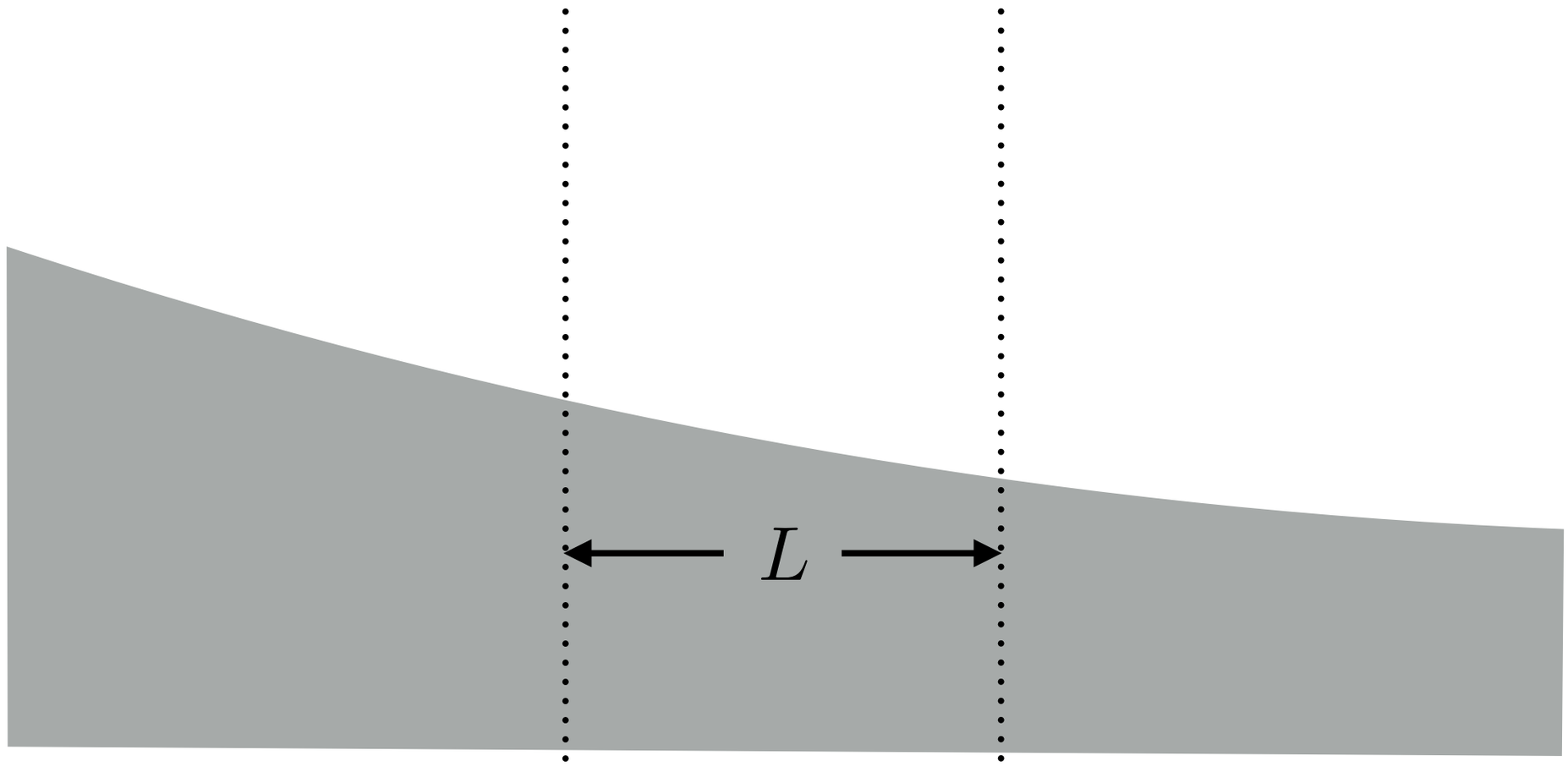
Erosion



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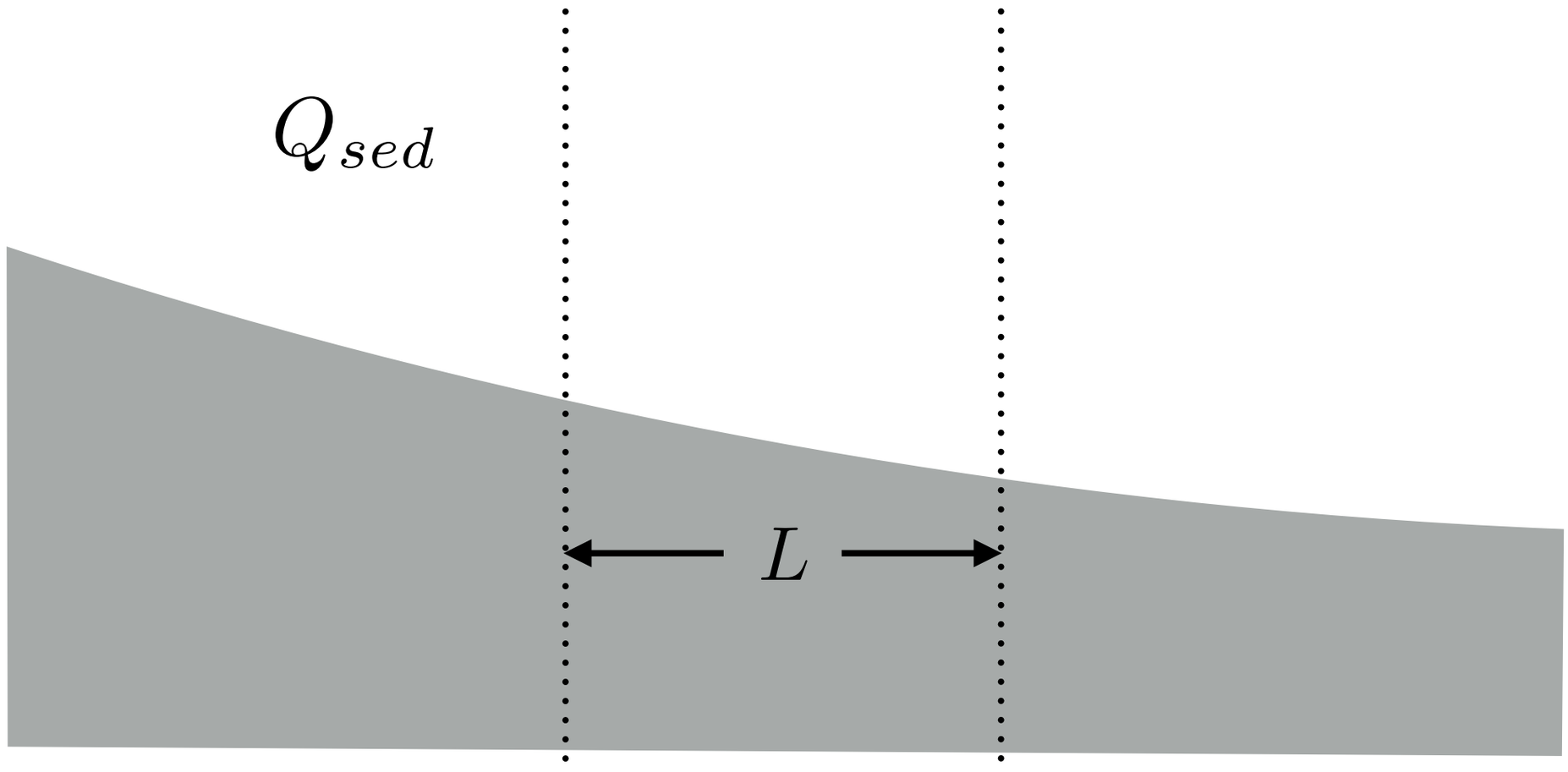

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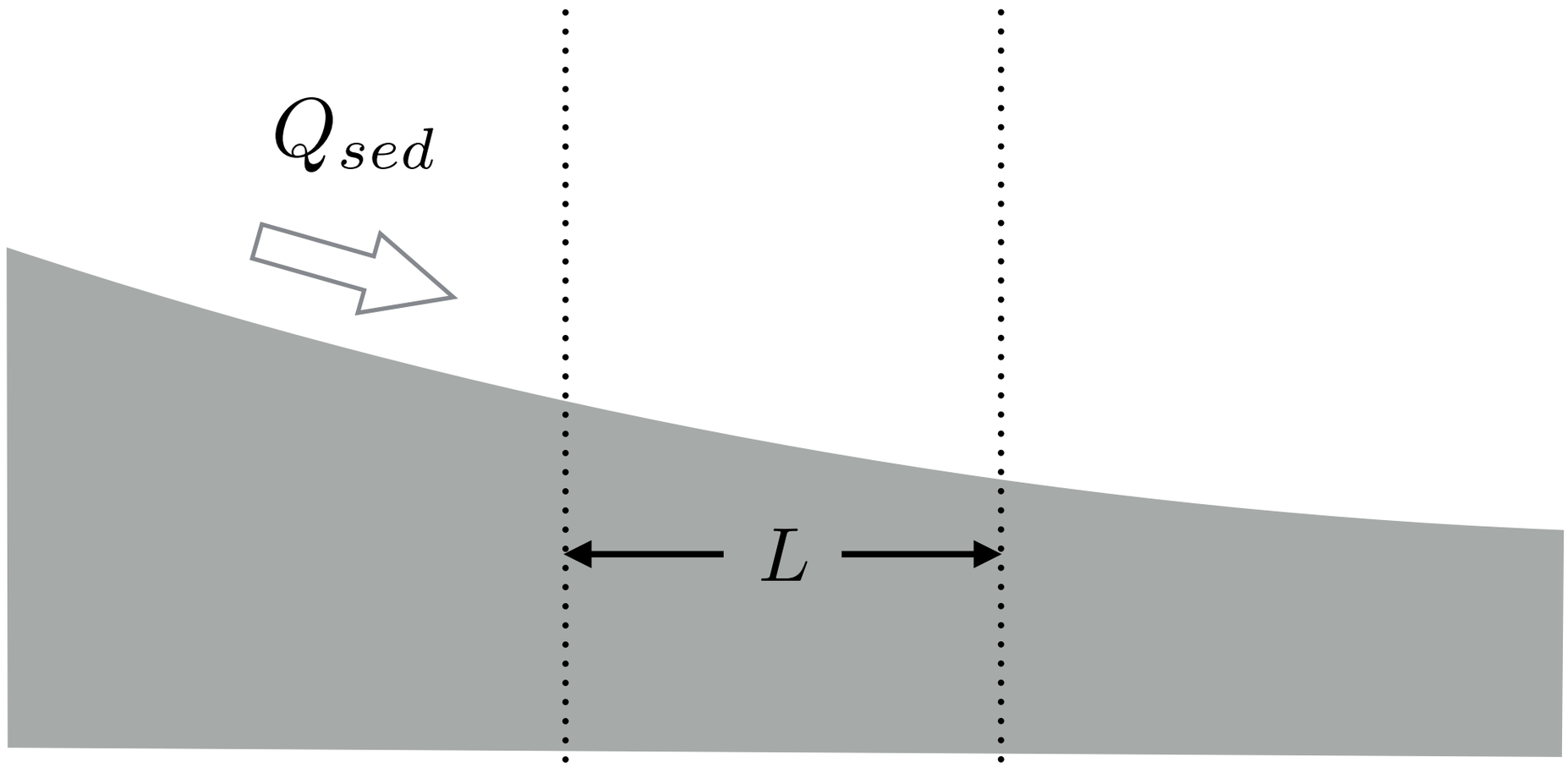

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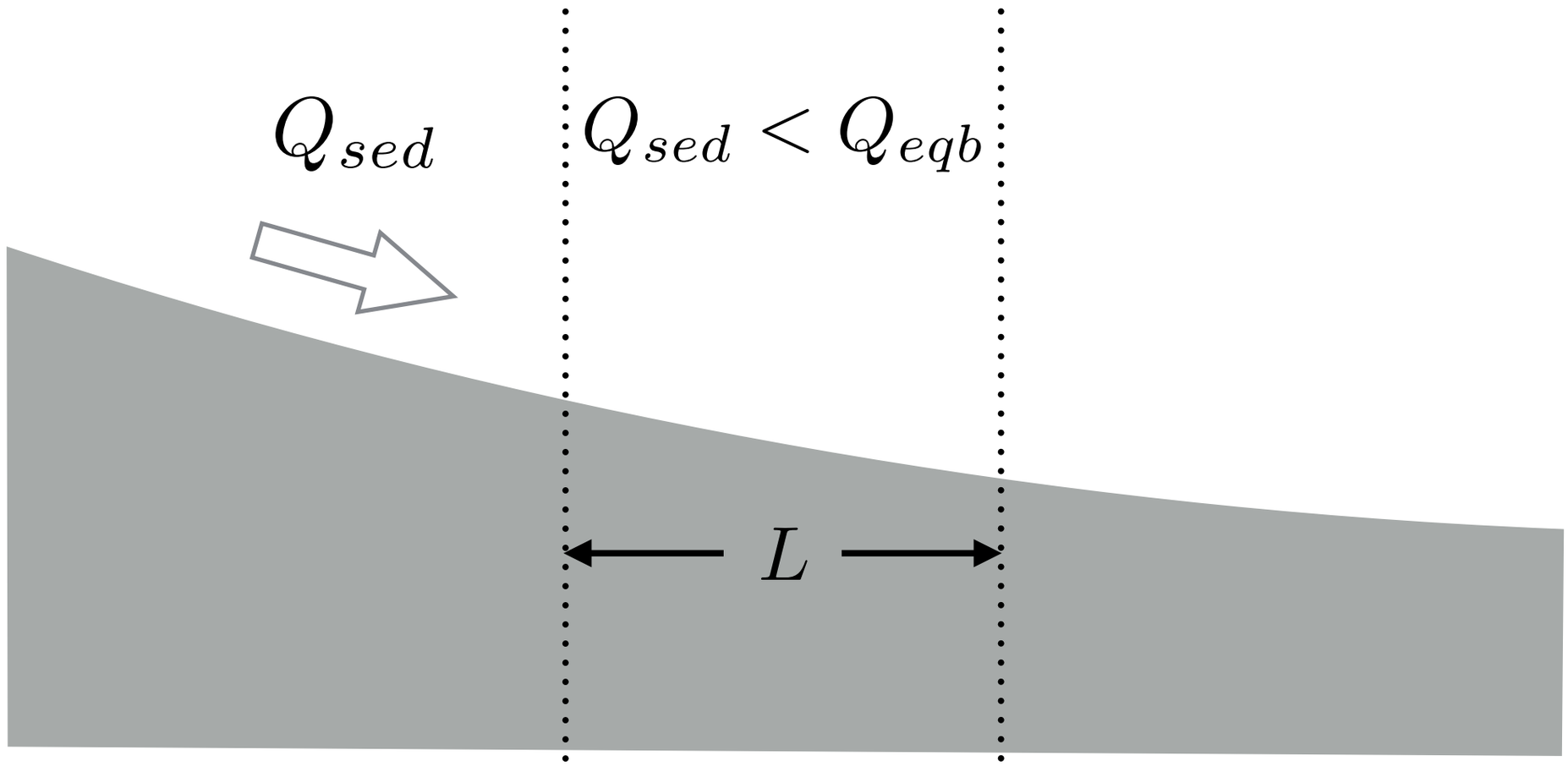

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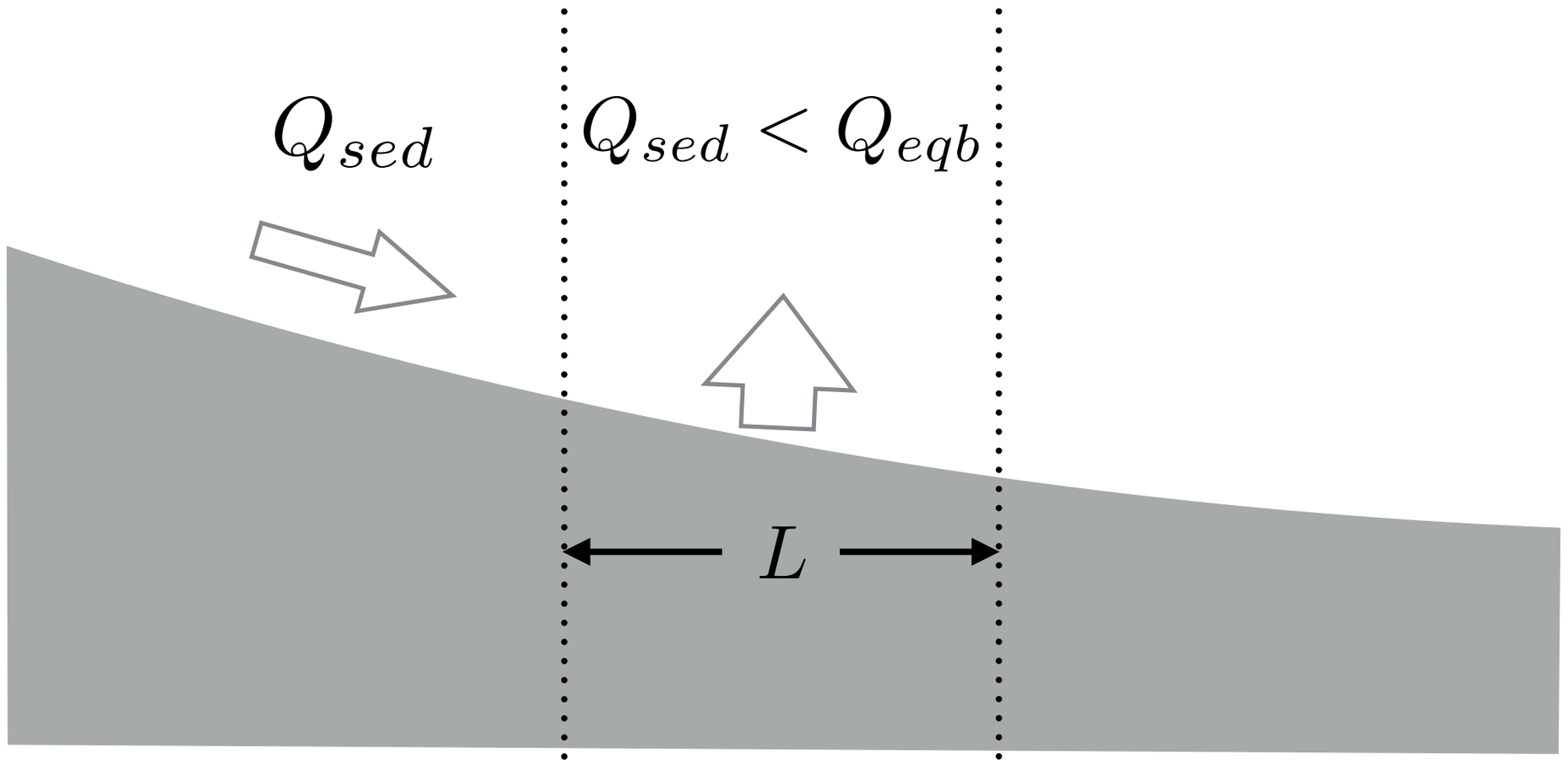

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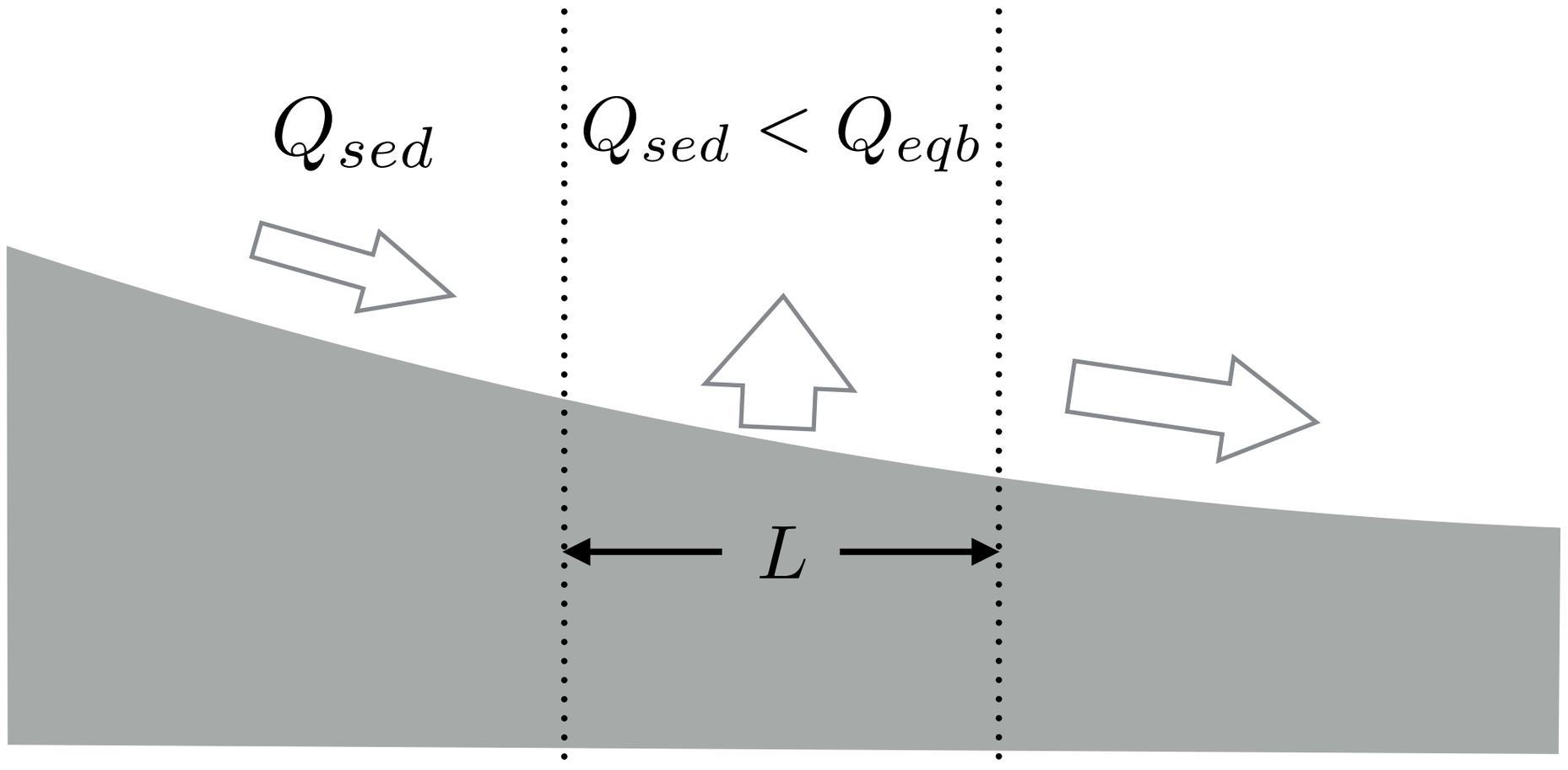

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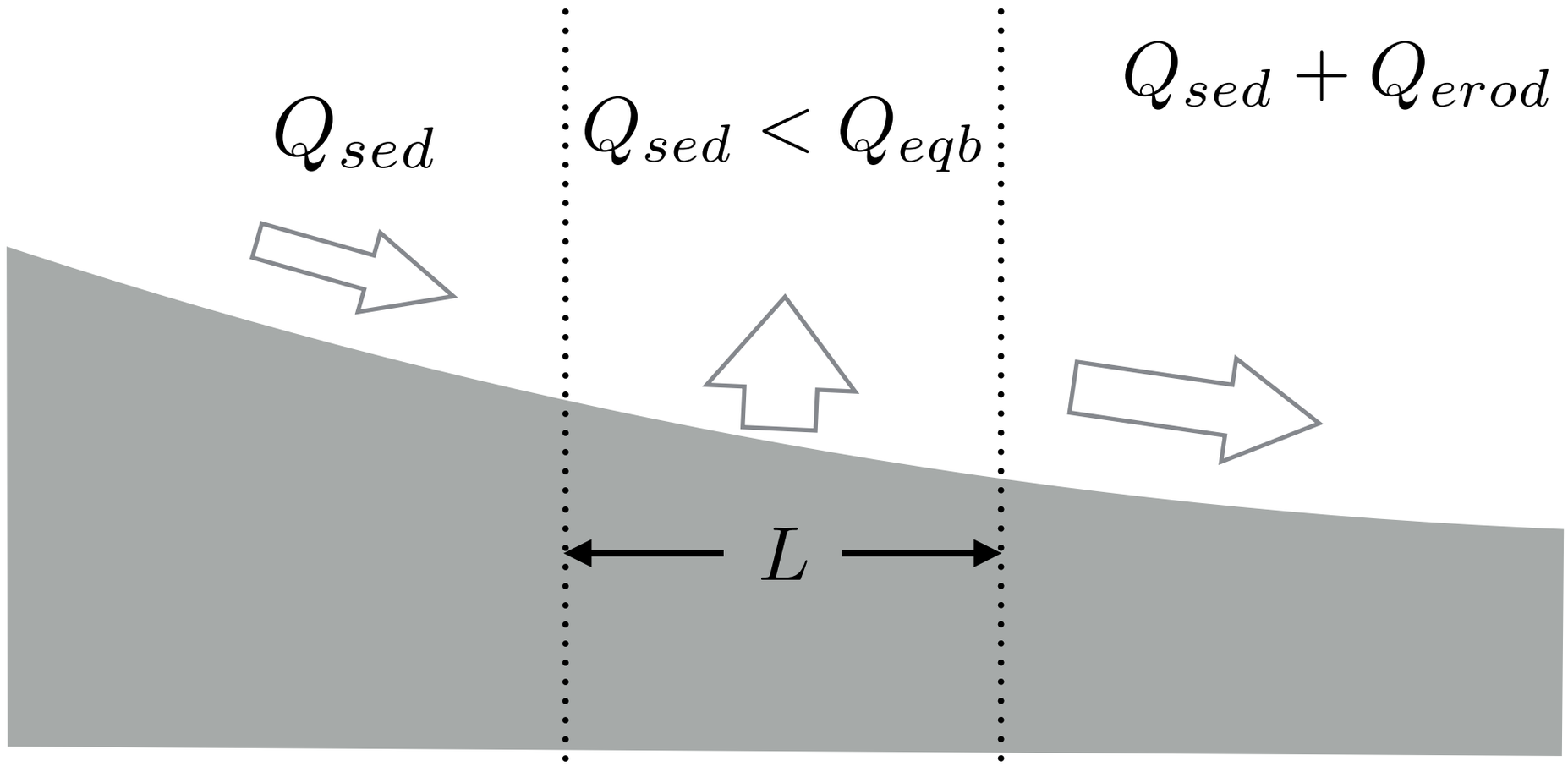

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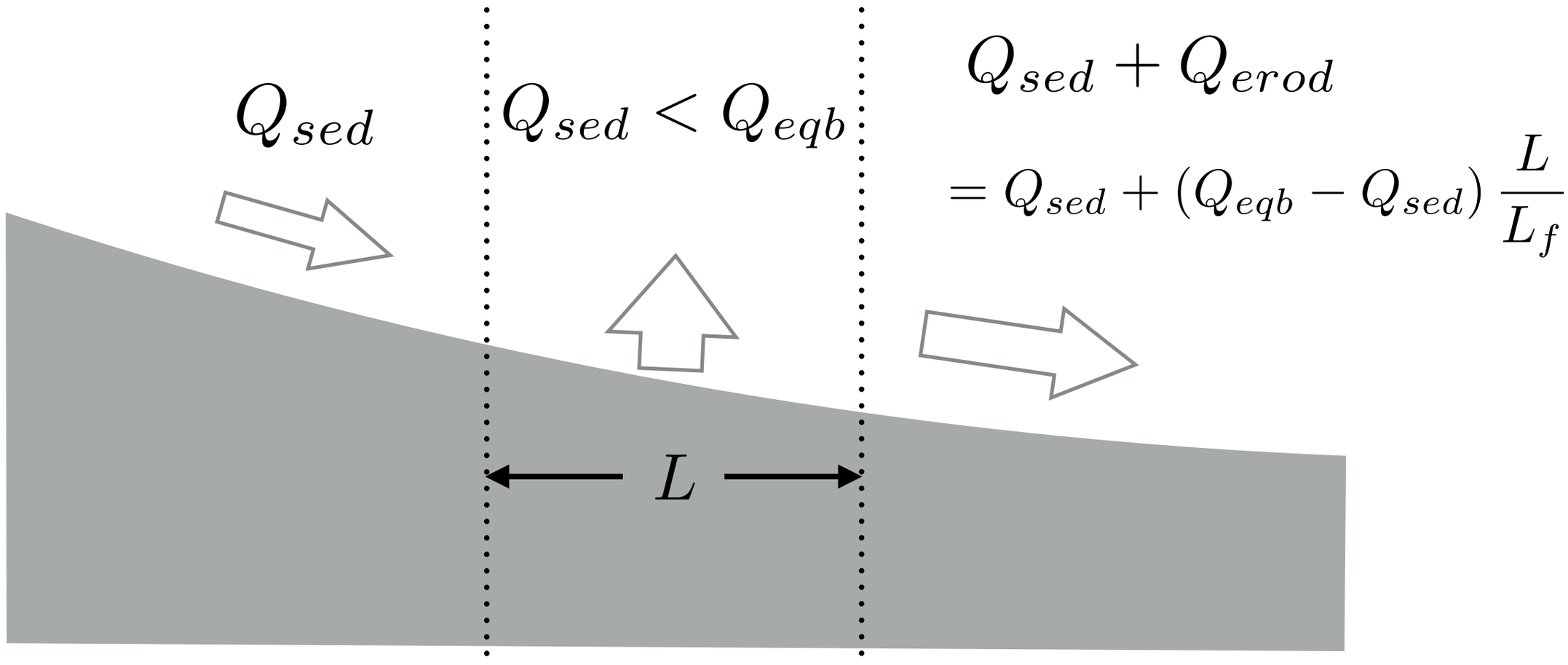

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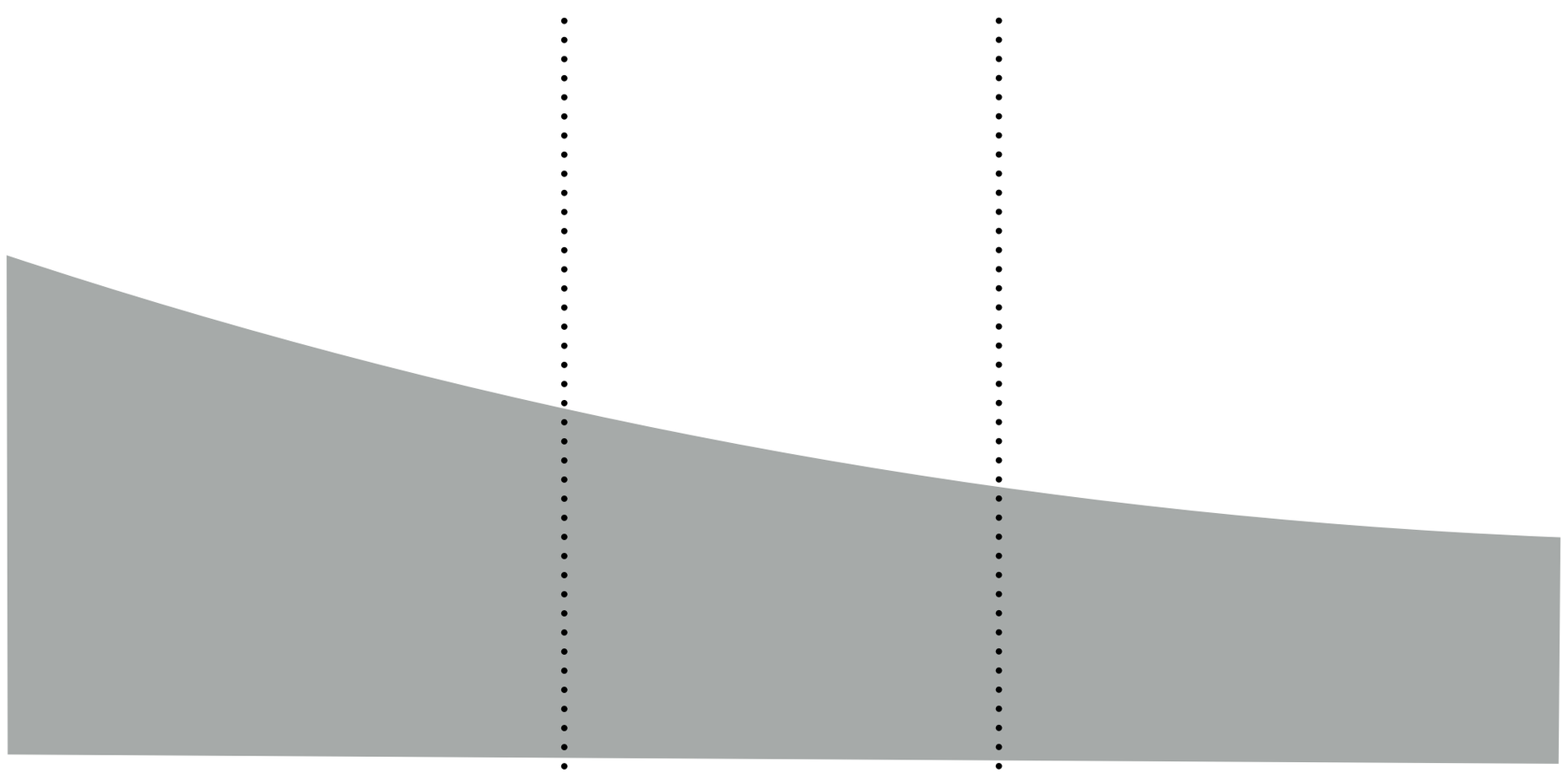
No deposition, no erosion



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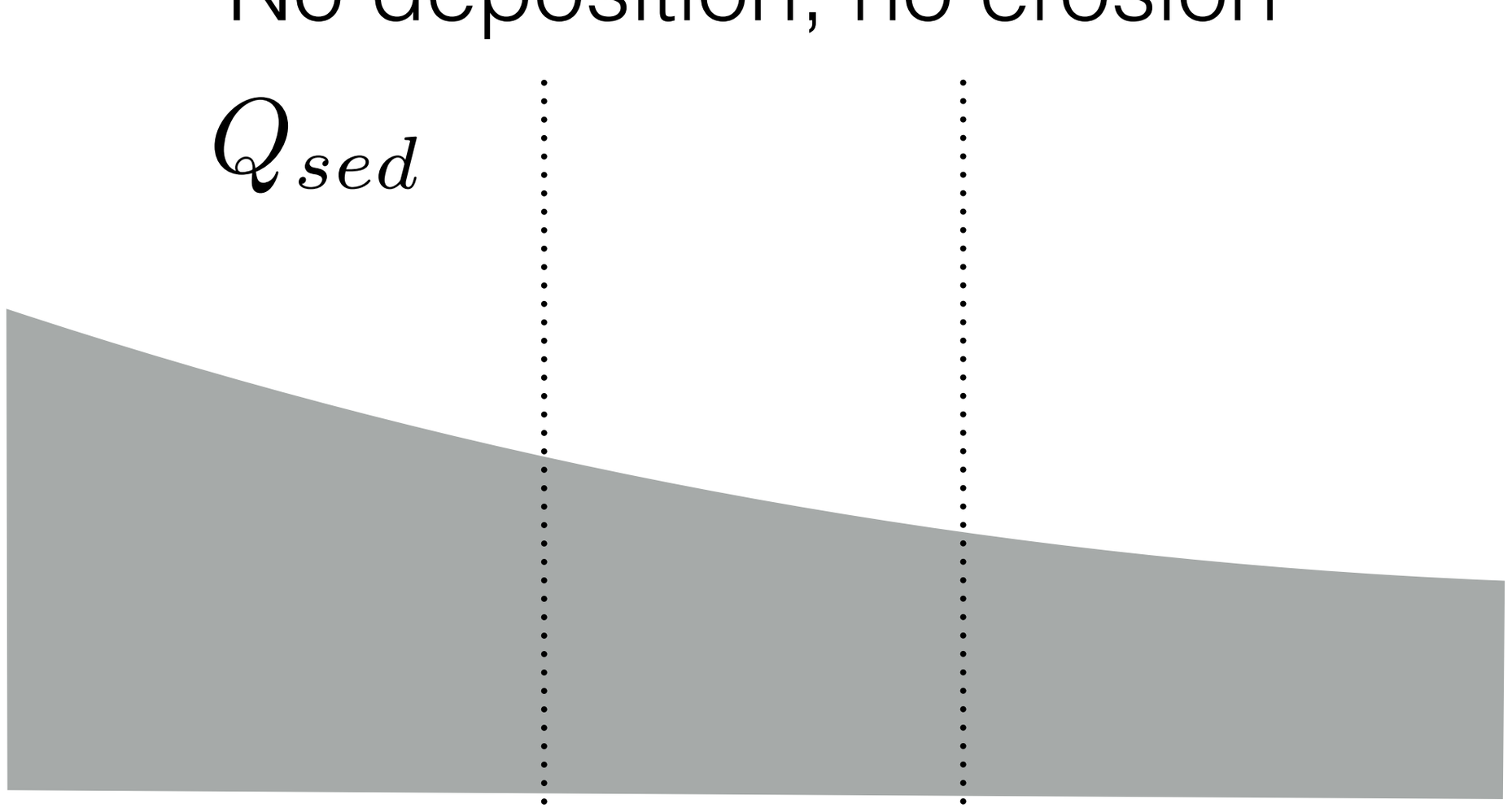

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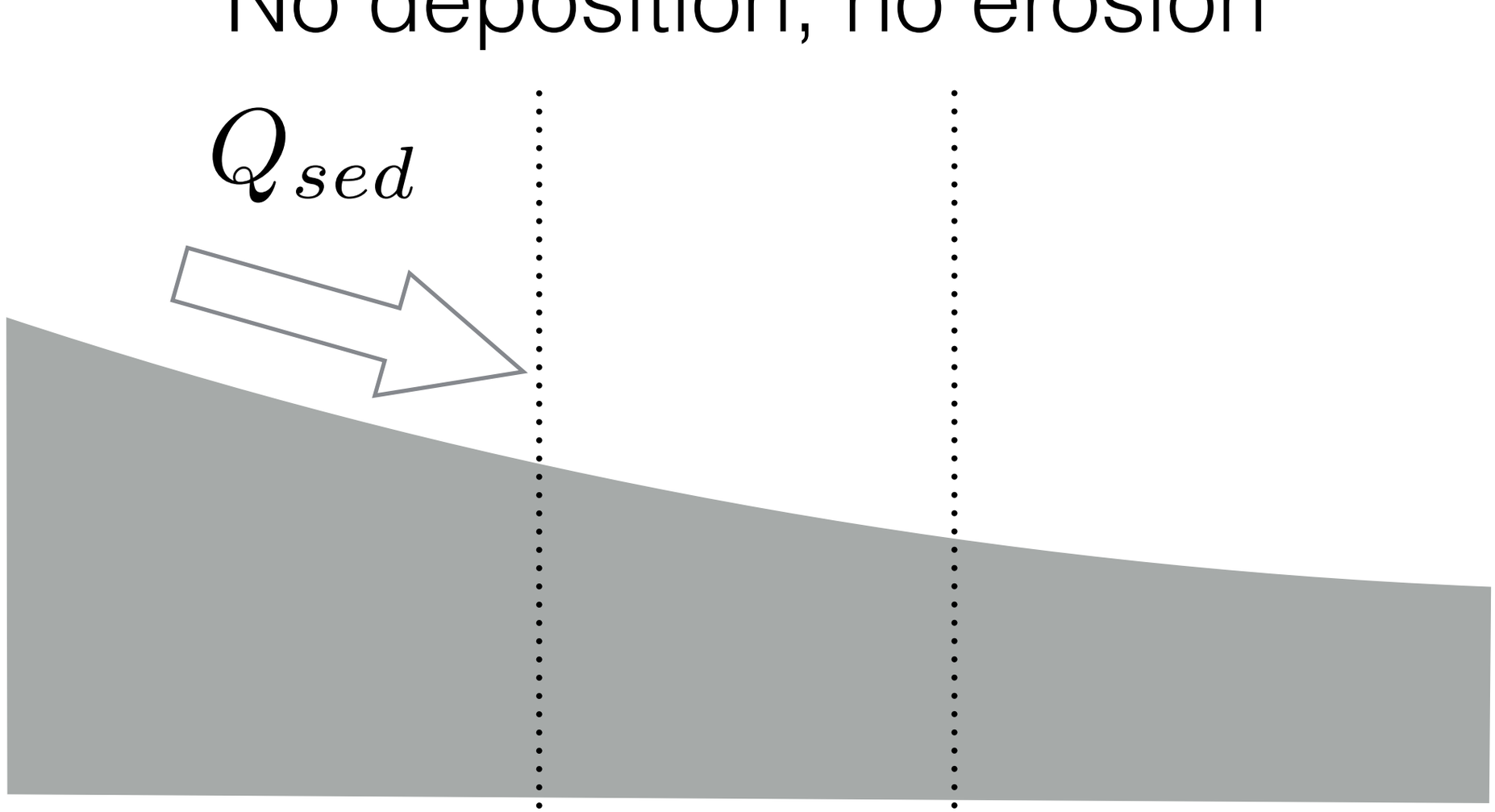

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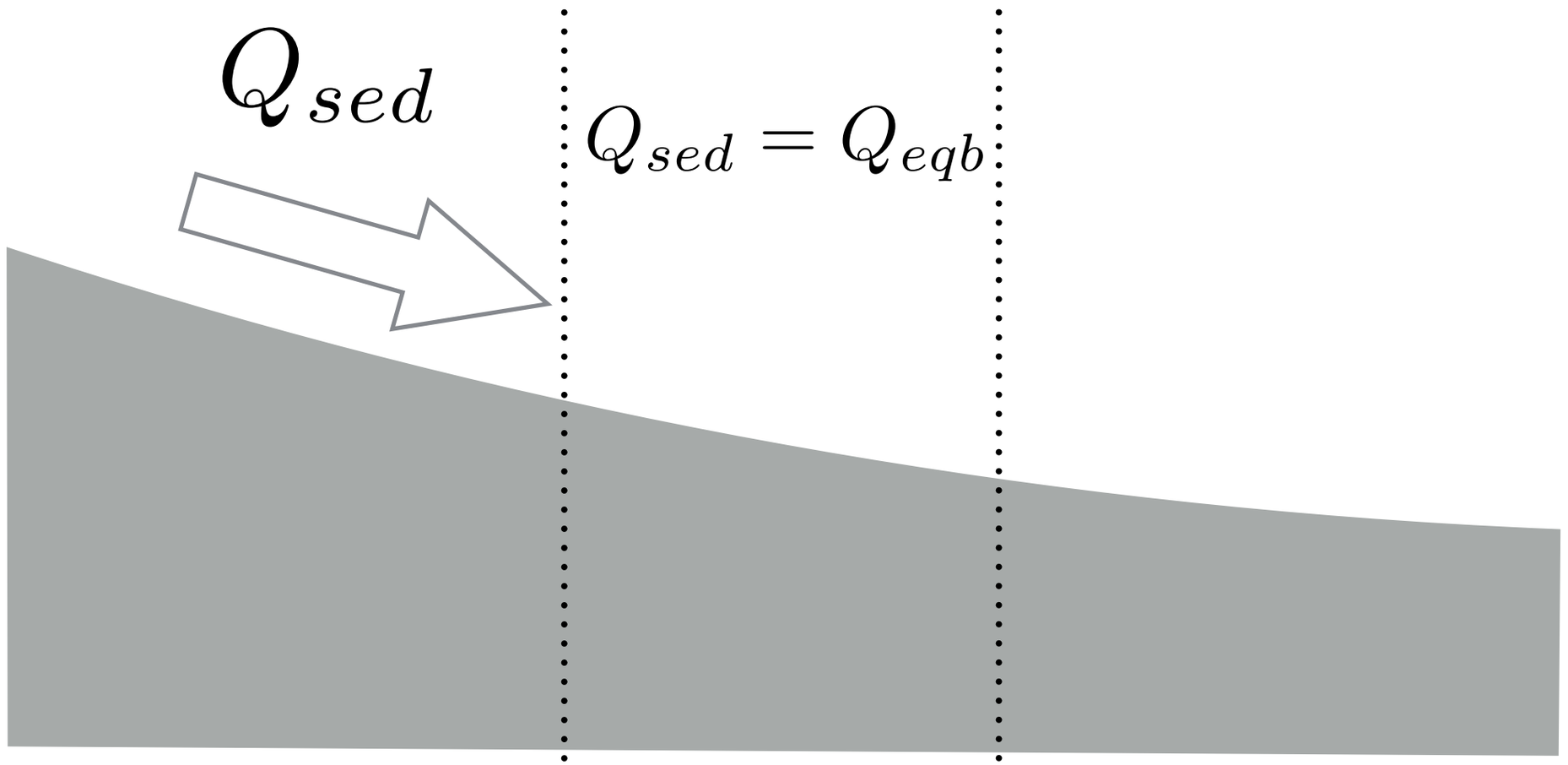

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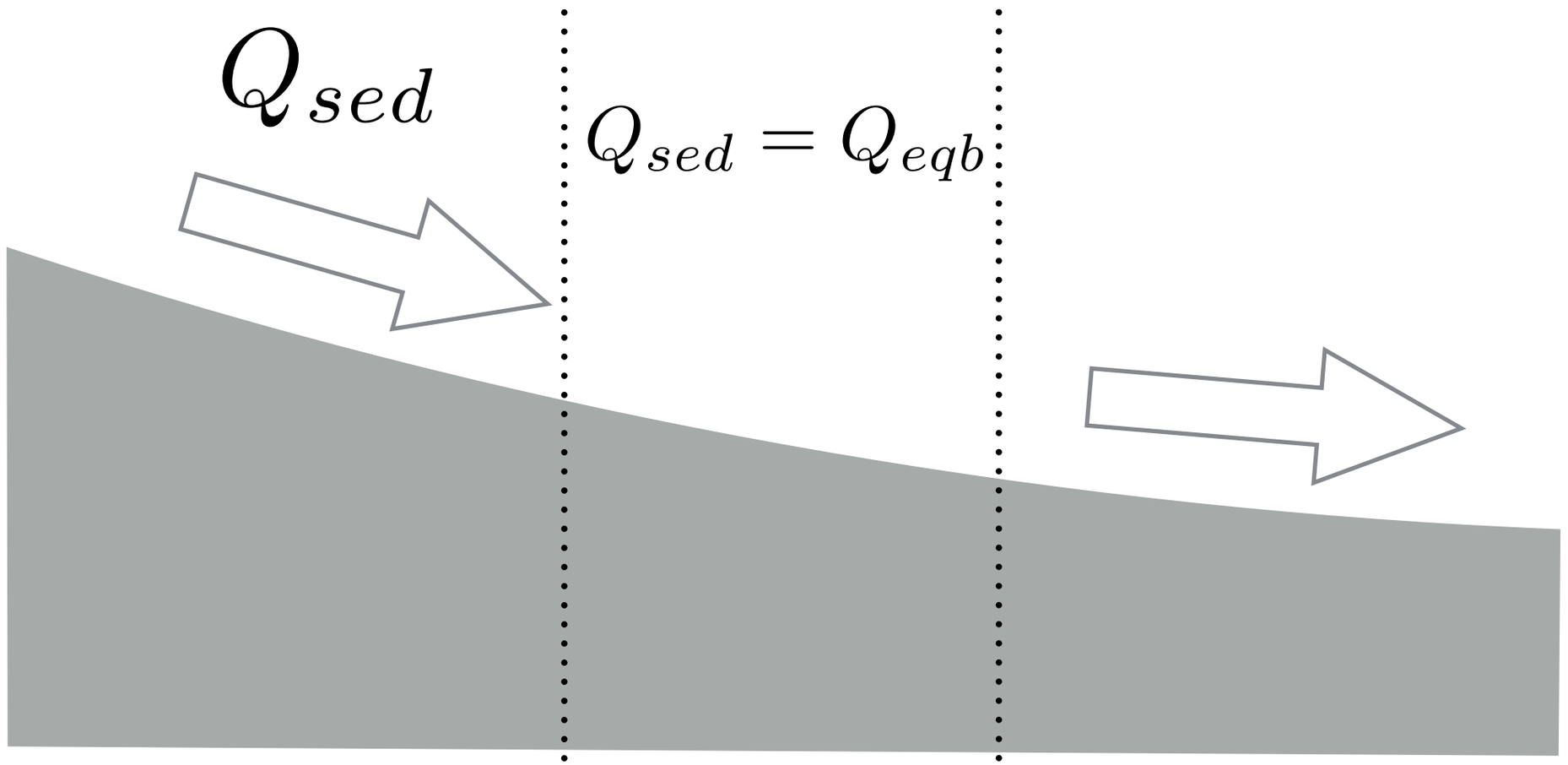

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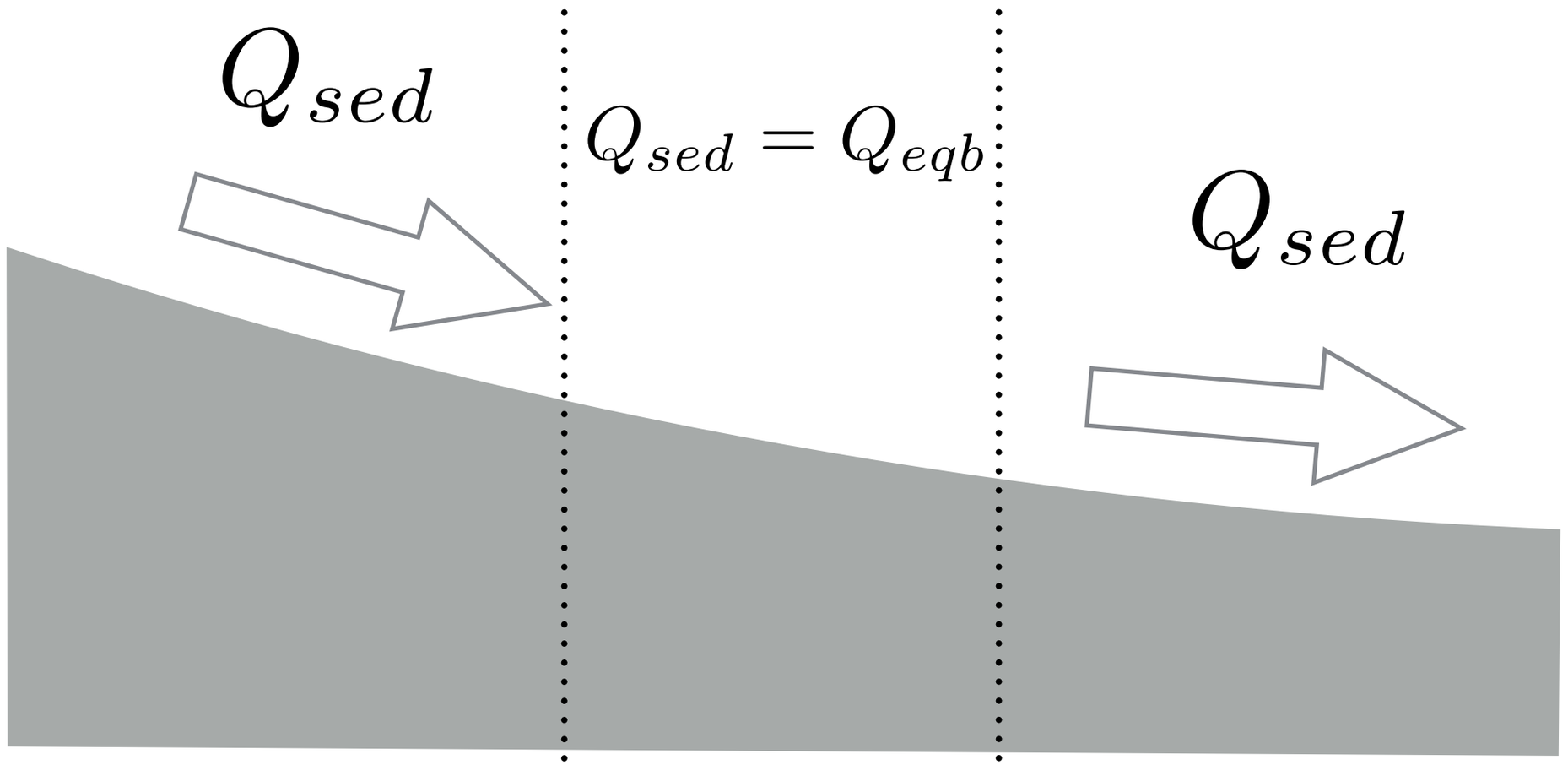
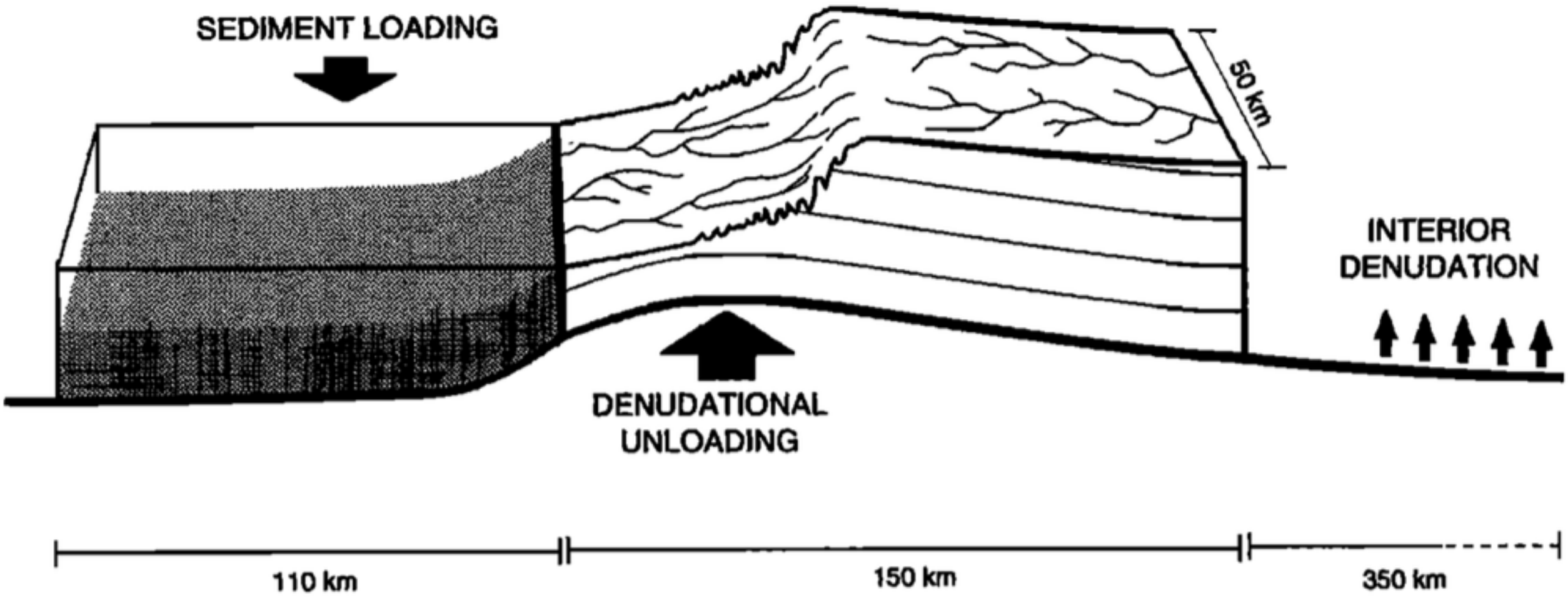
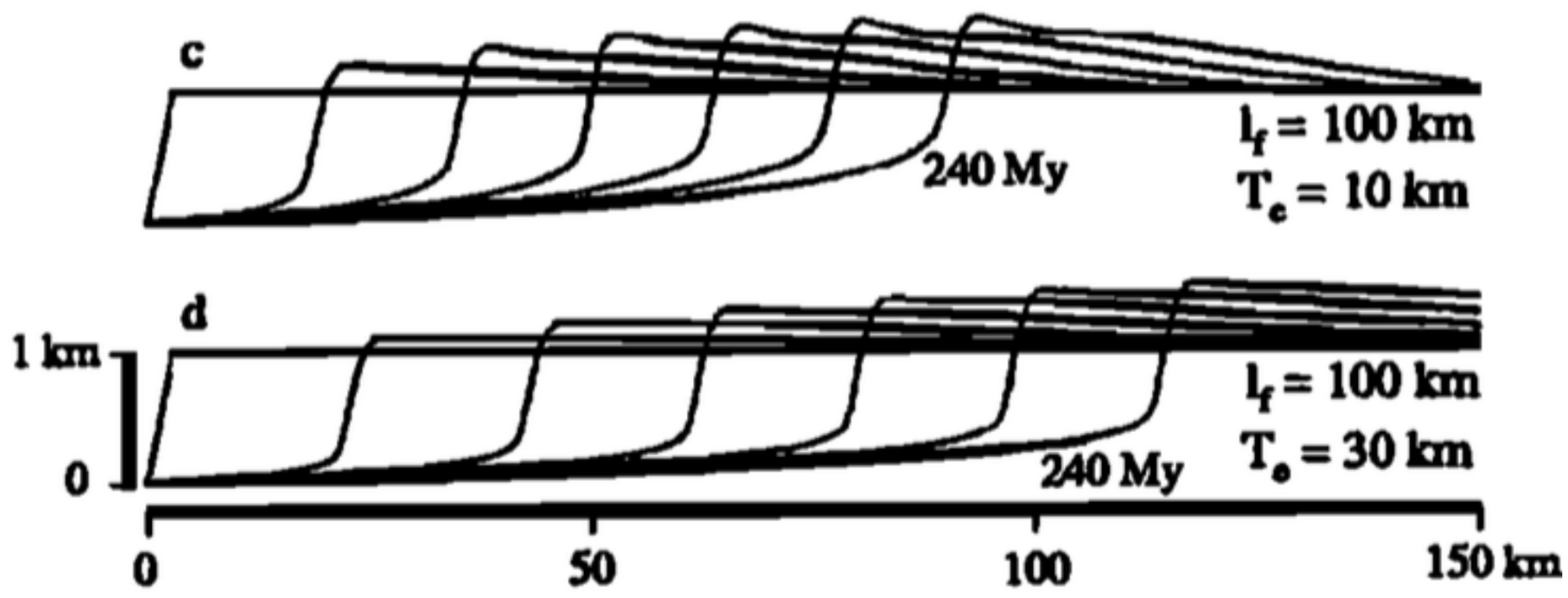




Tucker & Slingerland (1994)

Retração de escarpas x T_e



Kooi & Beaumont (1994)