Valve permeability, k

k_op

k_cl

close

open

dP across valve

Time (scaled)

0.000 0.005 0.010 0.015 0.020

dP across valve

Pore pressure (scaled)

1.0 0.8 0.6 0.4 0.2 0.0

closed

Updip mass flux (scaled)

5 4 3 2 1 0

0.0 0.2 0.4 0.6 0.8 1.0

<-- Downdip X (scaled) Updip -->

4

Valve is closed:

Model LFEs sources: toy fault-valves*

- Acts as a low-permeability barrier to fluid circulation in the fault zone

- Pore-pressure differential across valve increases until…

- … the valve breaks open,

generating an LFE

Valve is open:

- Accumulated pore-pressure gradient is released in a flux pulse

- Pore-pressure differential across valve decreases slowly until…

- … valve heals, and is closed again

^ Click on the animation to run it! ^

*in a pore-pressure-diffusive fault zone, see next slide

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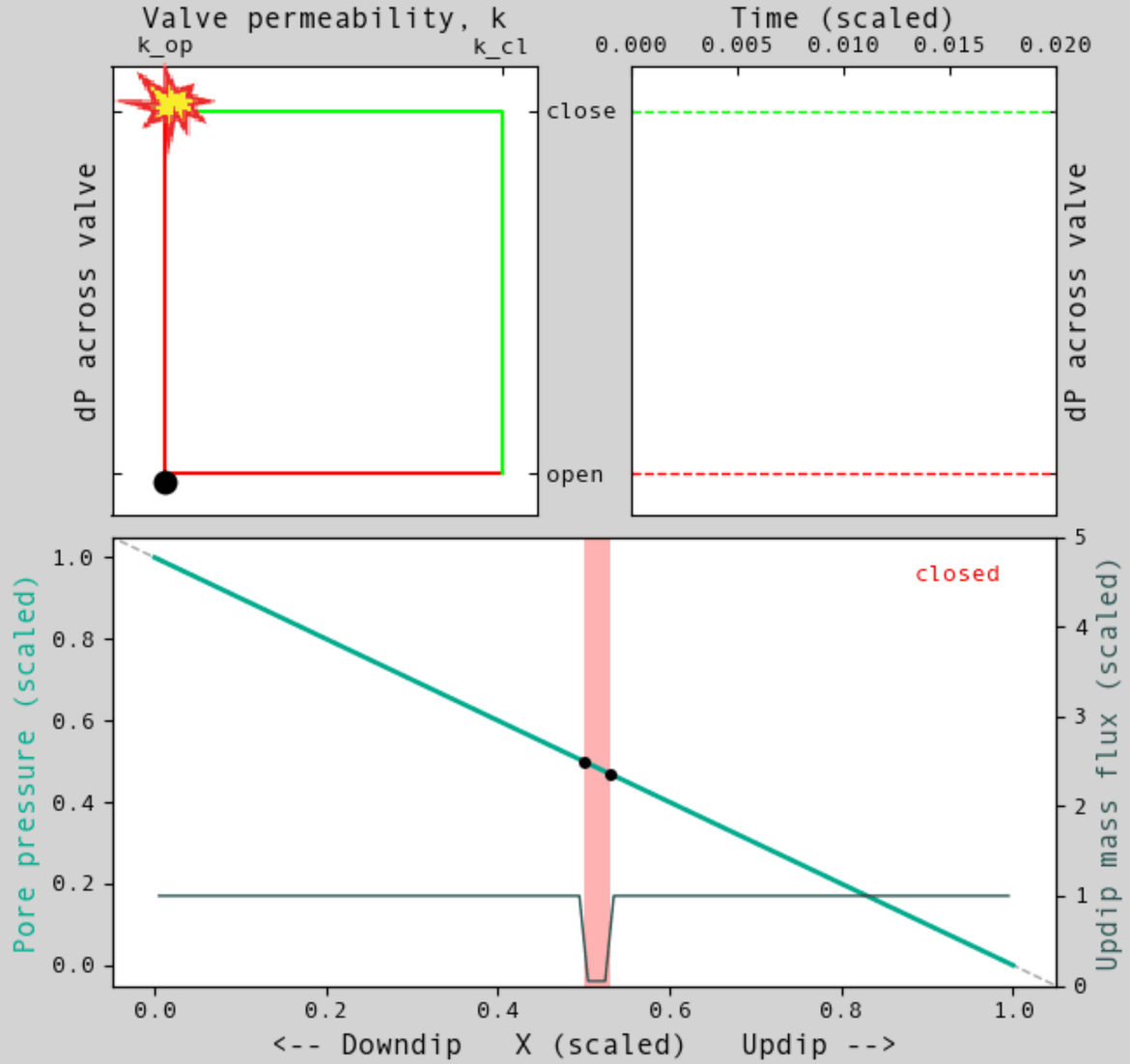

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Valve is open:

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- … valve heals, and is closed again

*in a pore-pressure-diffusive fault zone, see next slide

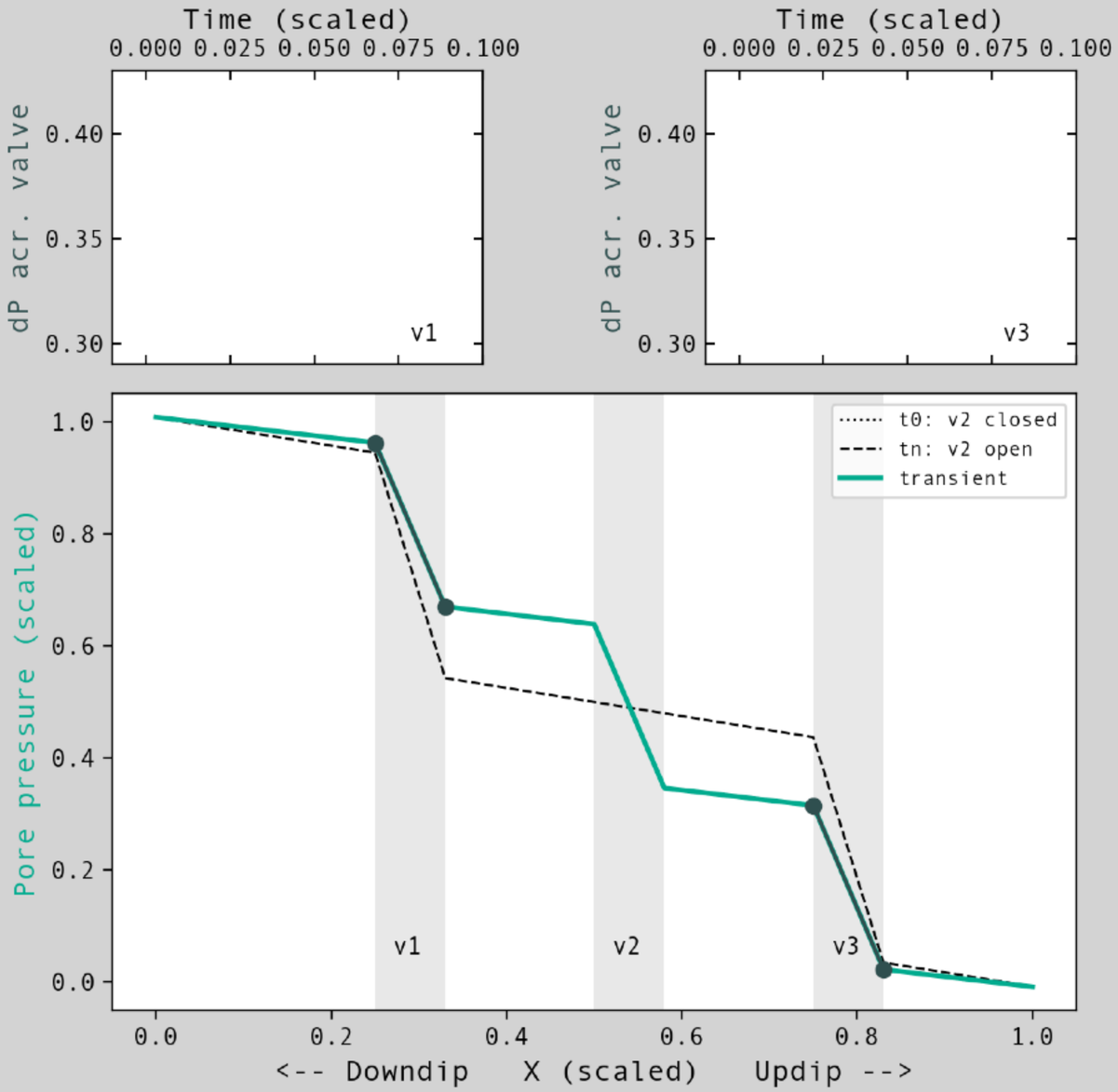
Valves interact through pore-pressure transients

In our 1D, fluid-saturated, permeable fault zone, pore-pressure diffuses.

When a valve breaks open:

- A pore-pressure transient propagates to neighboring valves

- Neighboring valves are brought closer to breaking: cascading interaction.



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