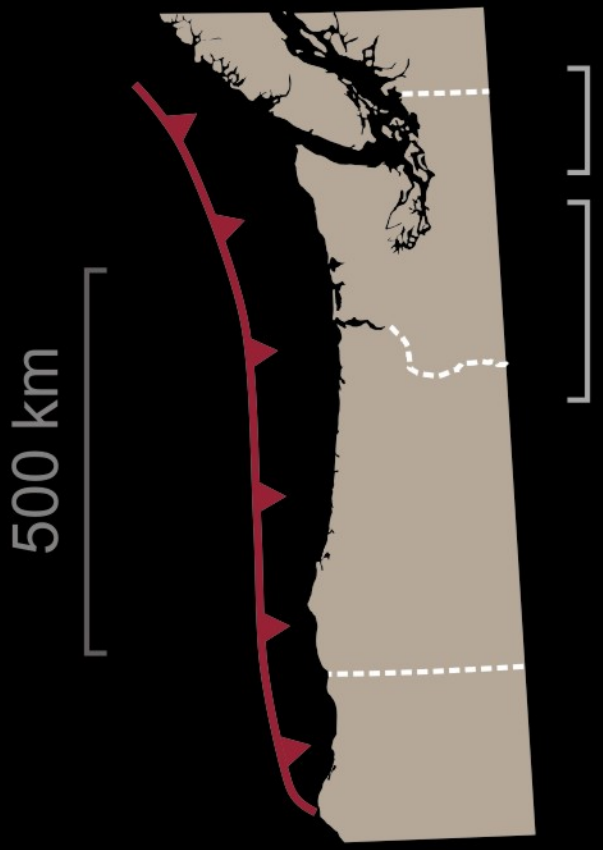
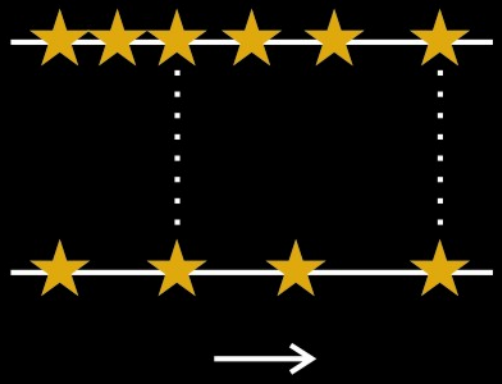
MAY 1967

LaVerne Kulm at left

Kodachrome by Gary Griggs

INDEPENDENT SOMETIMES?





M8 and M9

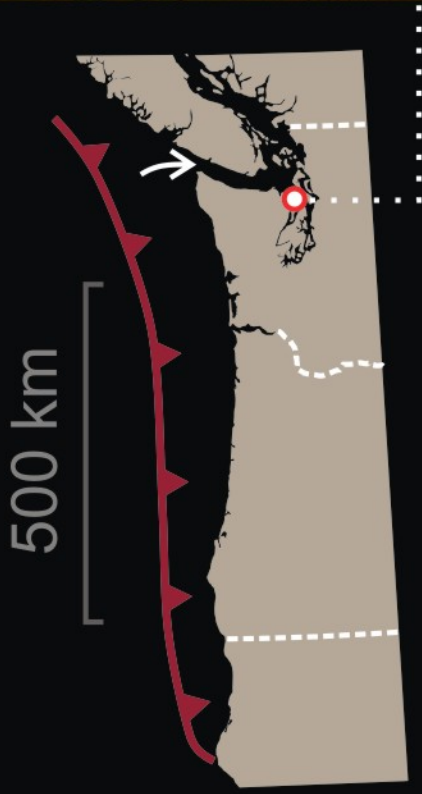
300 yr avg

same quake

500 yr avg

Time

300 YR AVG at Discovery Bay?



Harry Willams and Ian Hutchinson
(ca 2000, by Alan Nelson)

300 YR AVG at Discovery Bay?

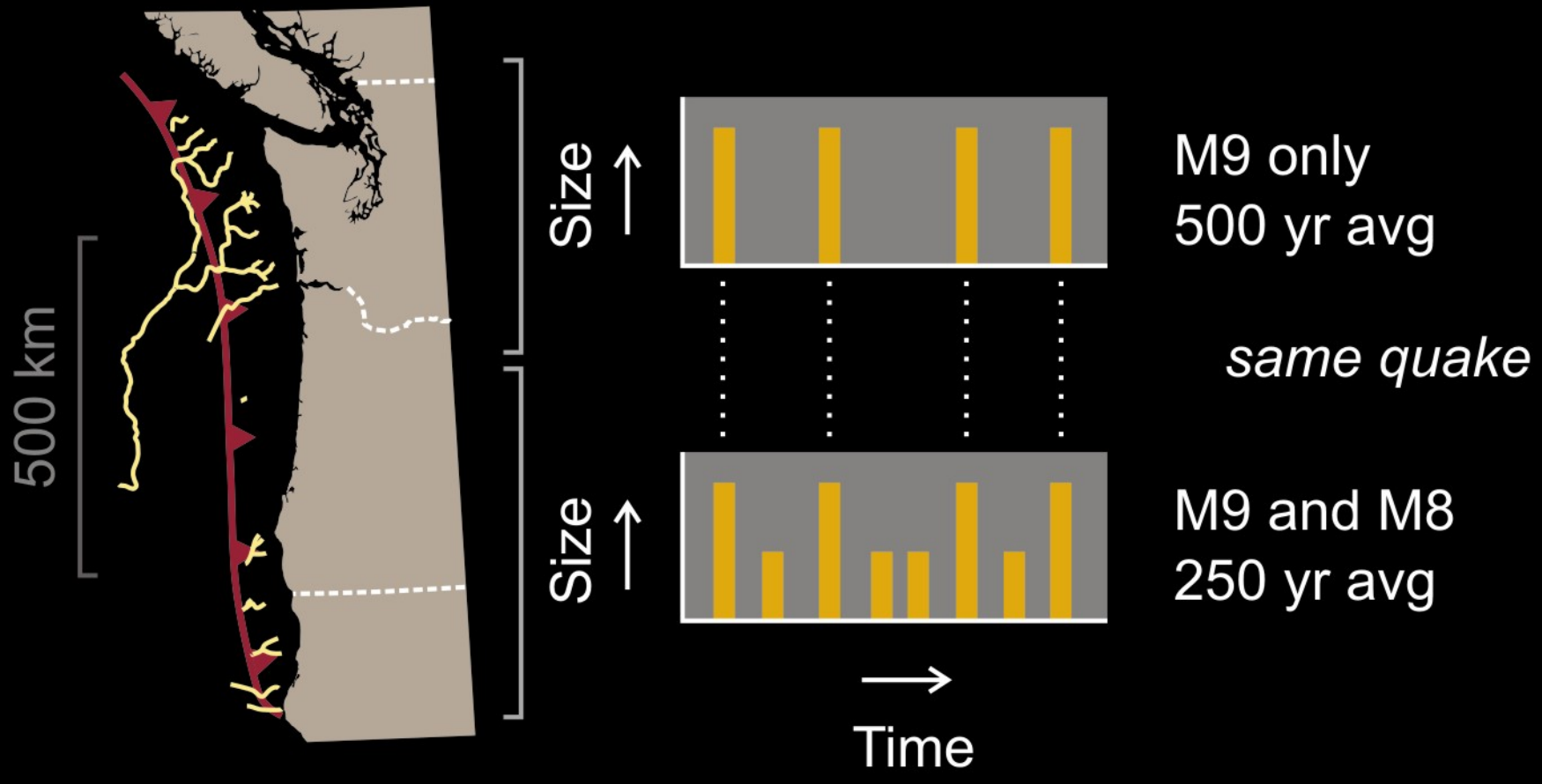
← AD 1700 tsunami

≤ 8 recurrence intervals in preceding 2,500 yr

nearby pits and cores

Alternative reading of Williams et al. (2005)

RARELY INDEPENDENT

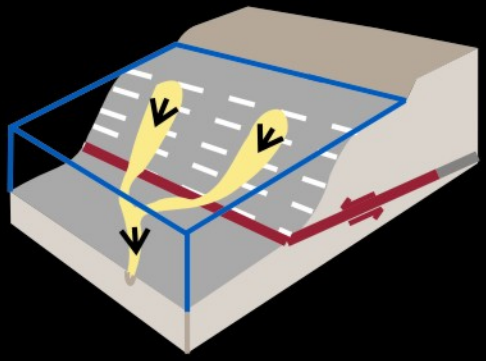


Goldfinger et al. (2008, 2012)

SENSITIVITY of northern turbidites to earthquake size and rate

Context

Confluence

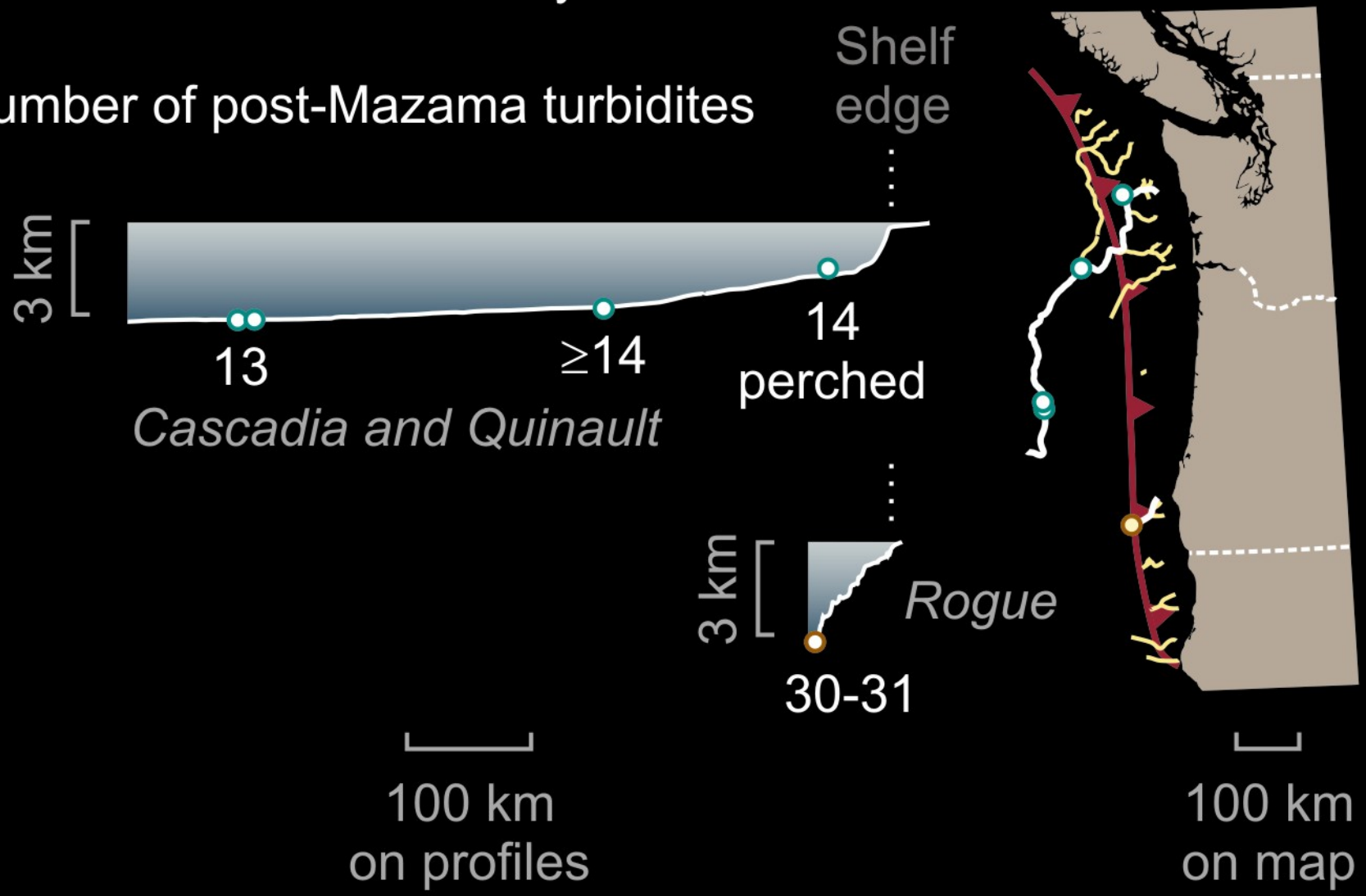


Conduits

Chronology

pubs.usgs.gov/of/2012/1043/

CONTEXT affects sensitivity to rate?

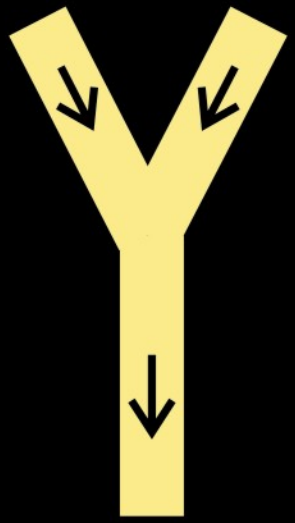


more in fig. 1 at pubs.usgs.gov/of/2012/1043/

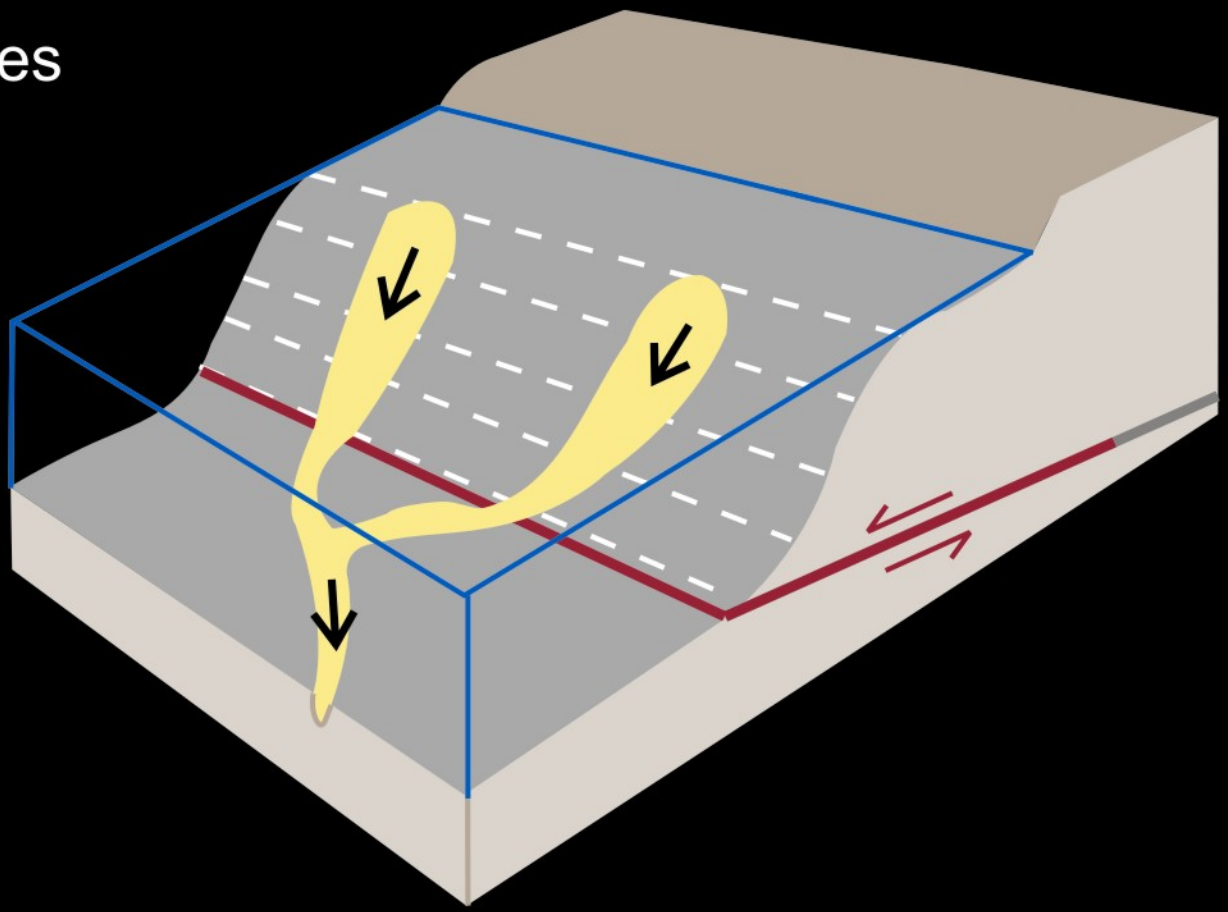
CONFLUENCE

One long rupture

Two equal tributaries



One merged flow

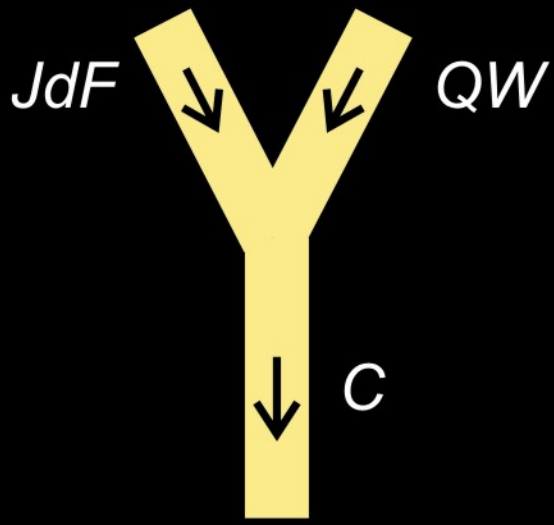


Adams (1990)

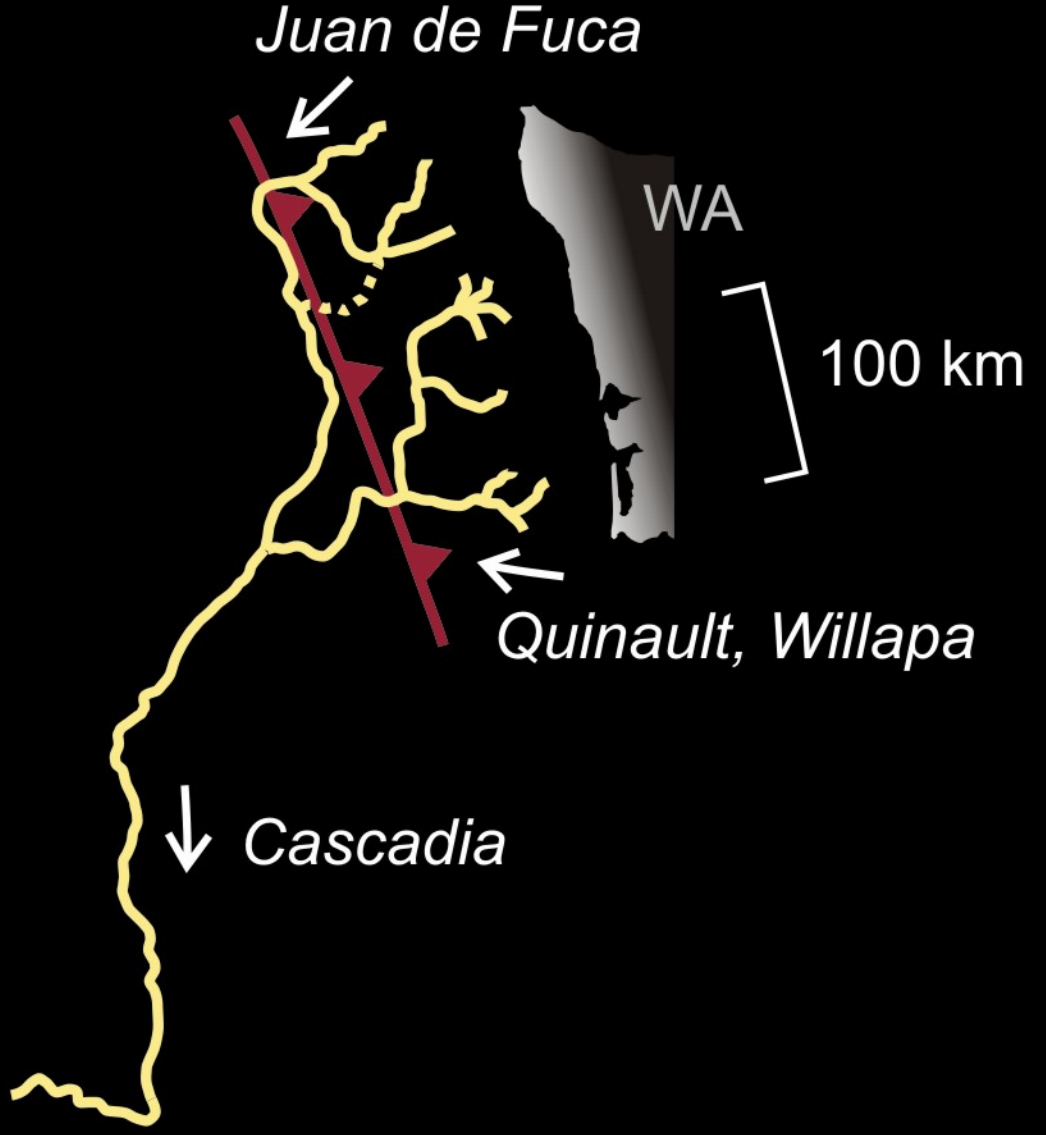
CONFLUENCE

One long rupture

Two equal tributaries

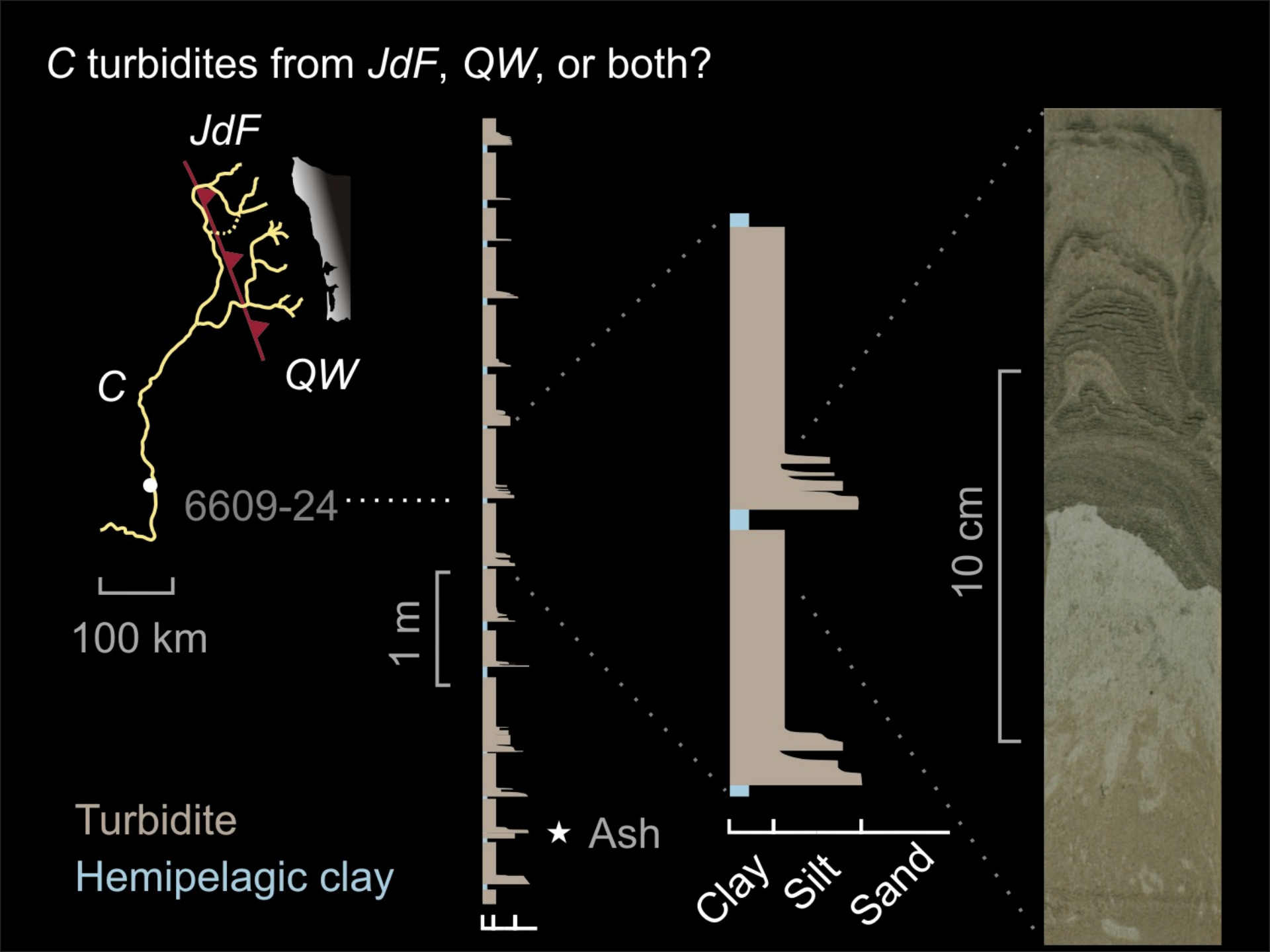


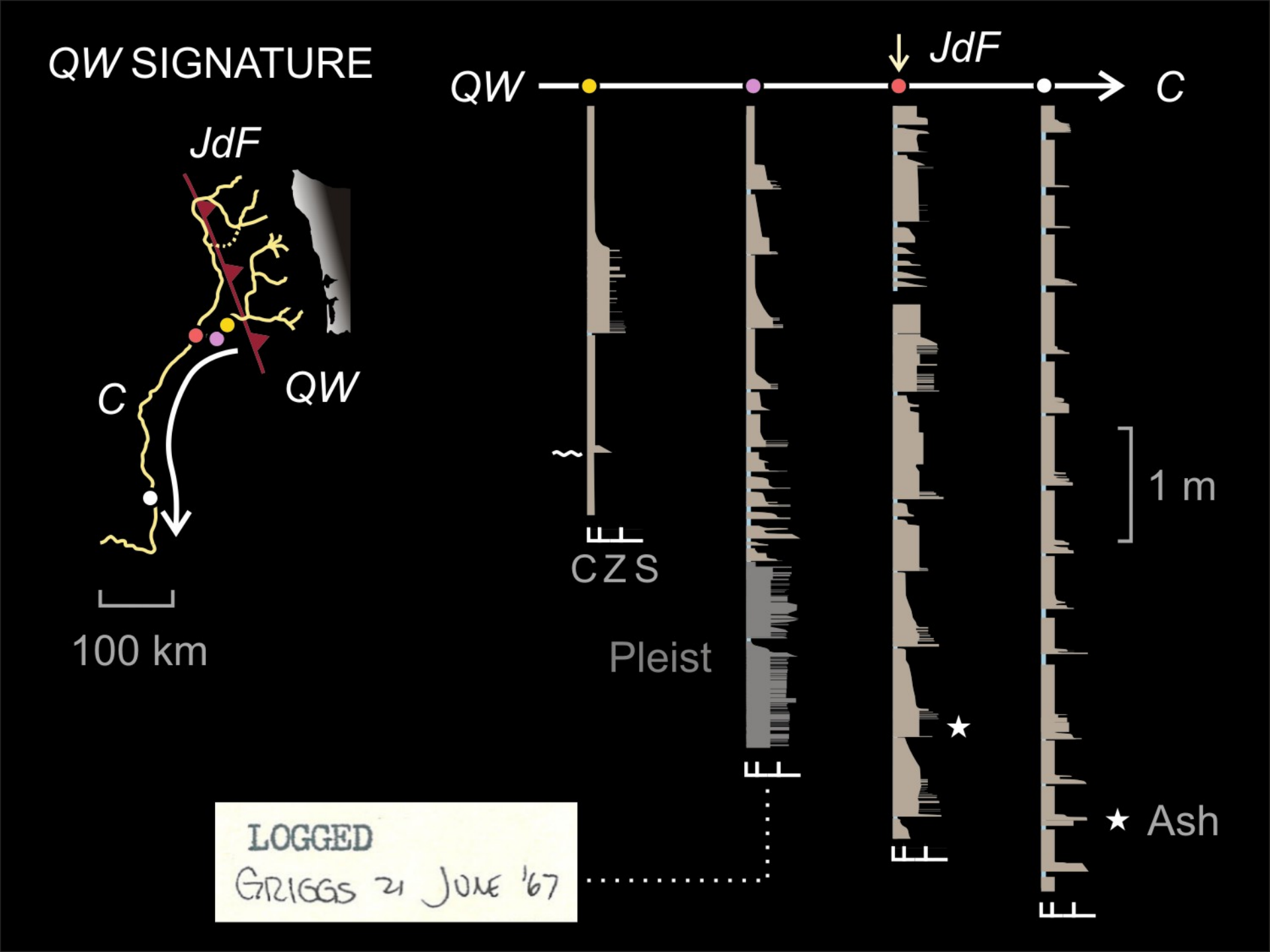
One merged flow

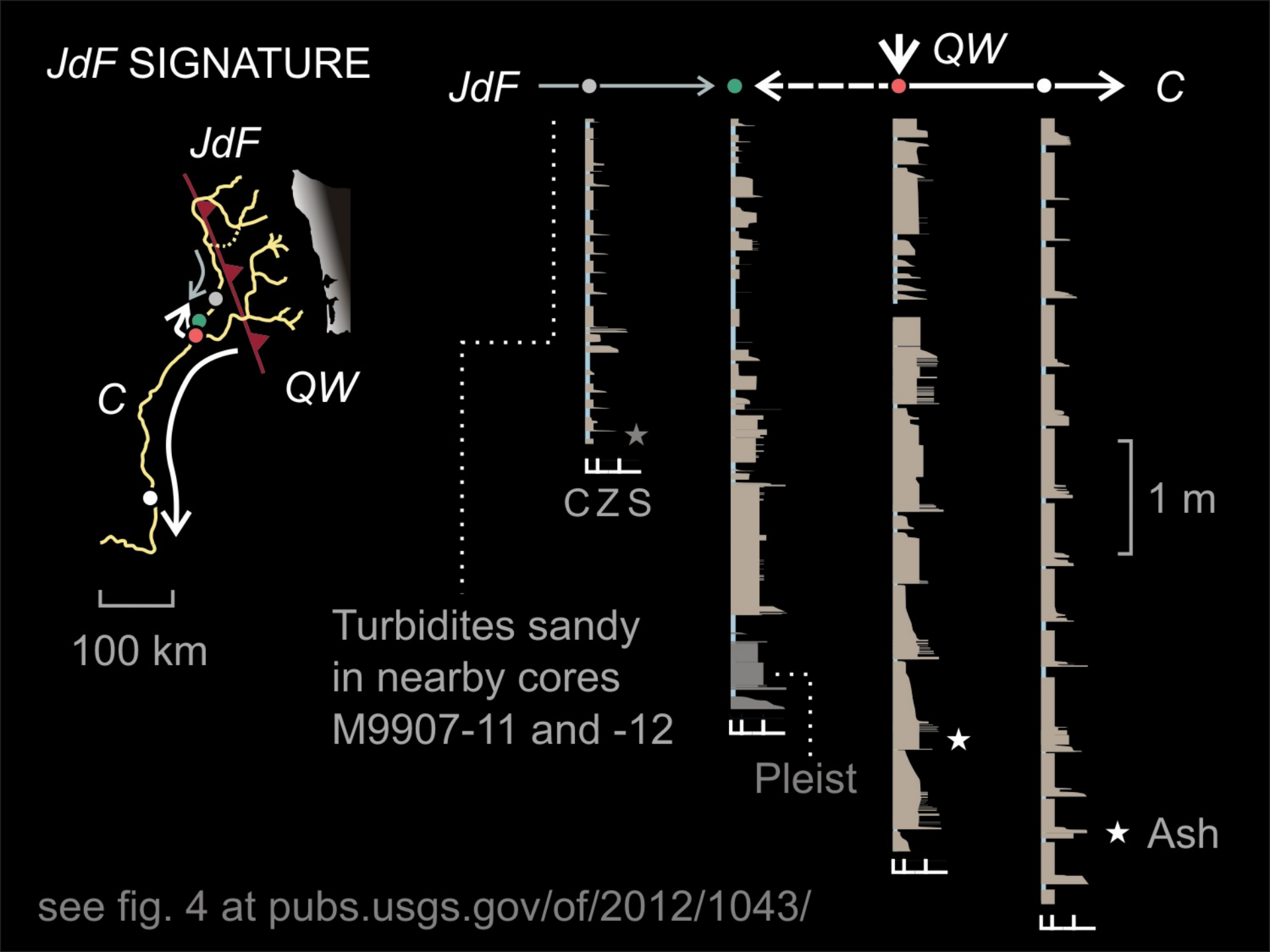


Adams (1990)

C turbidites from *JdF*, *QW*, or both?

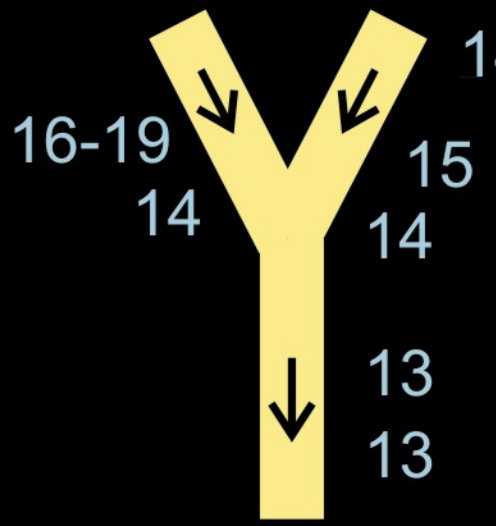



QW SIGNATURE
JdF
C
QW
100 km
QW
JdF
C
CZS
Pleist
1 m
Ash
LOGGED
GRIGGS 21 JUNE '67


JdF SIGNATURE
JdF
C
QW
100 km
JdF
QW
C
CZS
Turbidites sandy
in nearby cores
M9907-11 and -12
Pleist
1 m
Ash
see fig. 4 at pubs.usgs.gov/of/2012/1043/

LONG-HELD VIEW

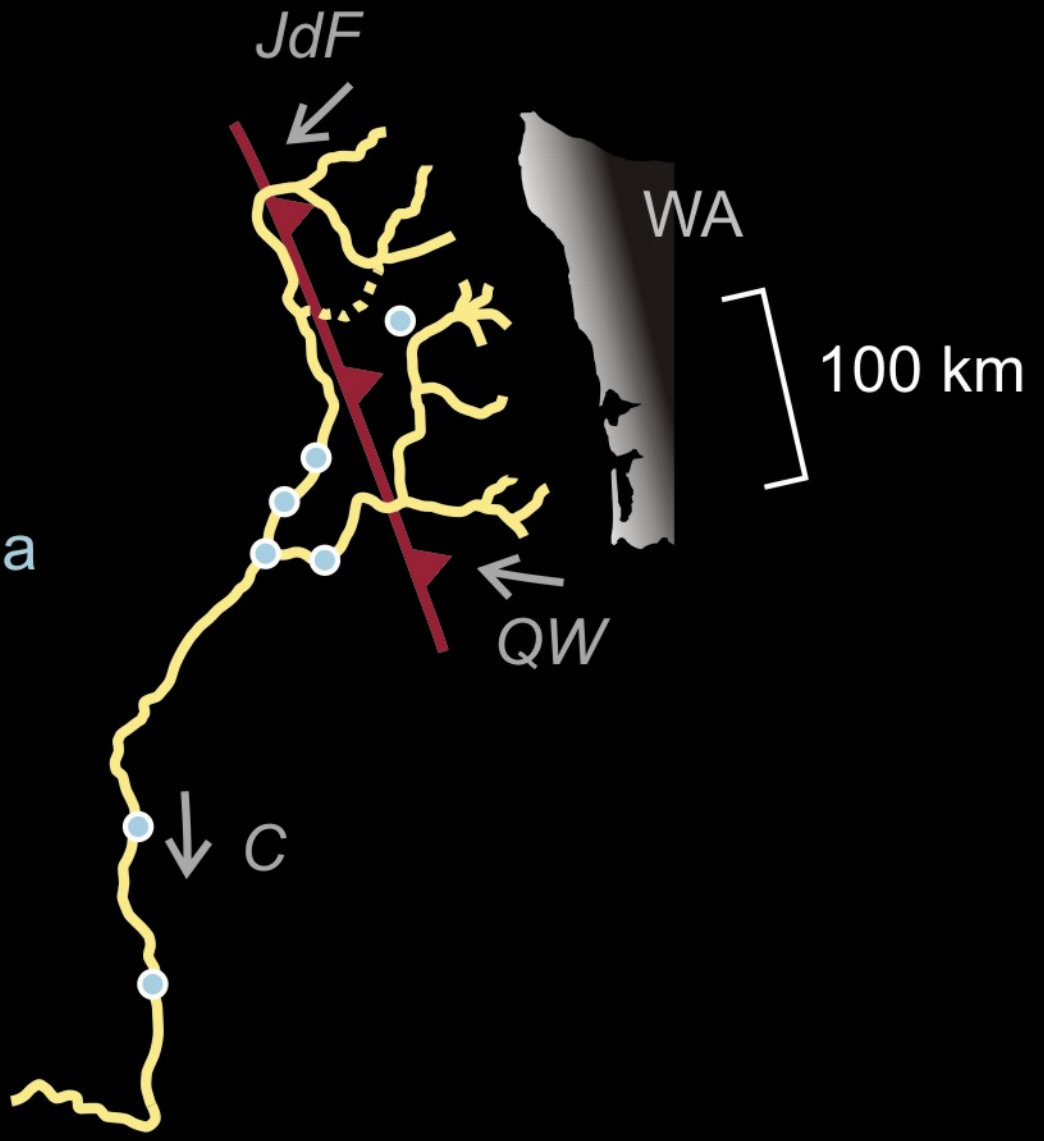
Two equal tributaries



post-Mazama flows

13 merged flows

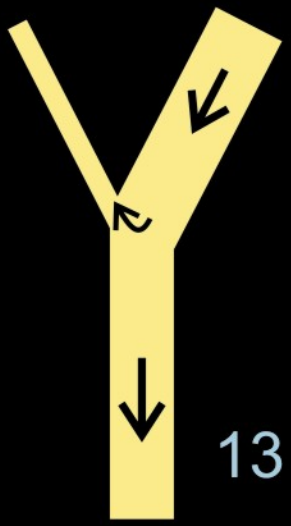
13 ruptures *JdF* + *QW*



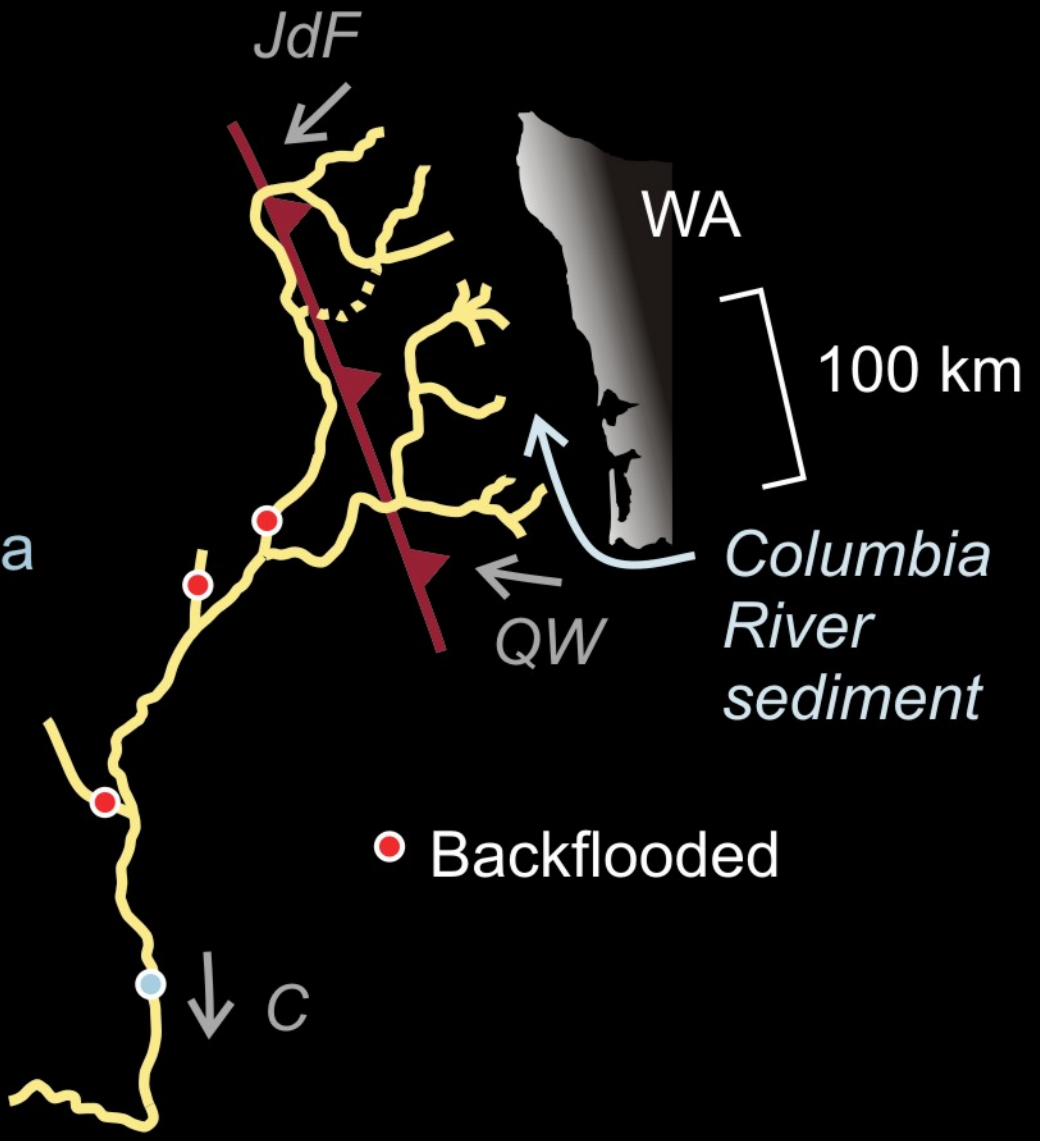
Adams (1990); data of Griggs (1969) and Barnard (1973)

ALTERNATIVE VIEW

Two unequal tributaries



post-
Mazama
flows

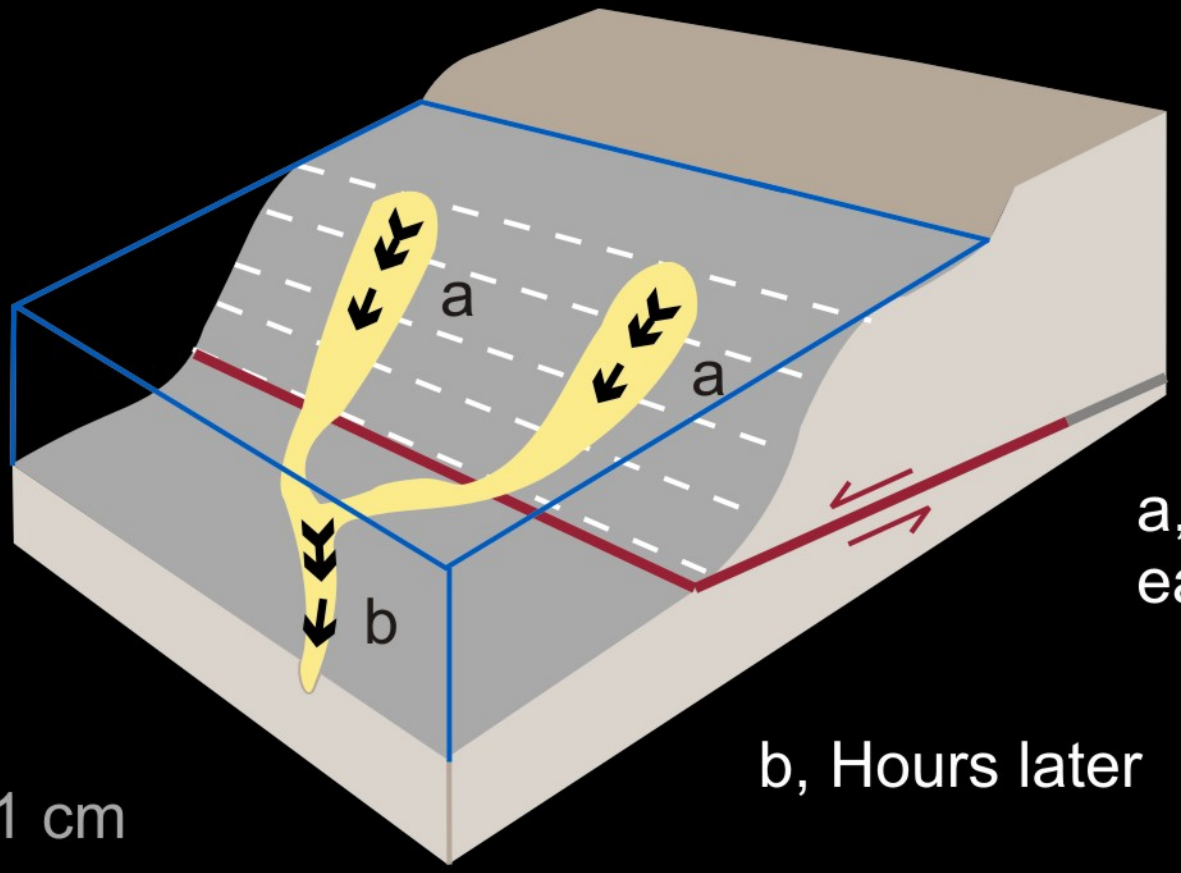


13 large *QW* flows
13 ruptures *QW* + ?

more in fig. 4 at pubs.usgs.gov/of/2012/1043/

CONDUITS

Pulses similar in multiple canyon heads

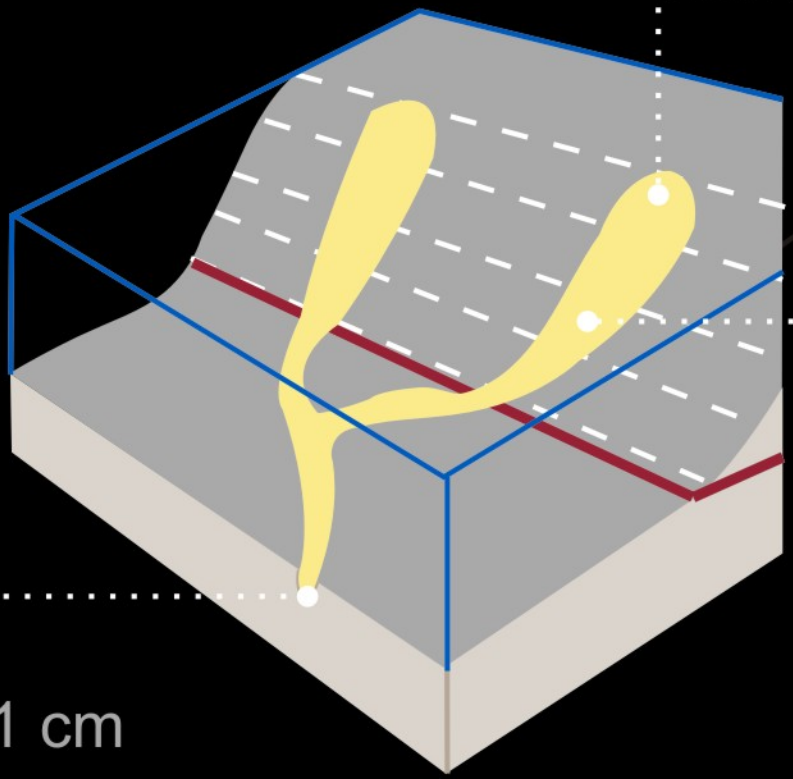


a, During earthquake

b, Hours later

ALTERNATIVE: SEISMIC DETAILS LOST

Shaking varies along and across strike



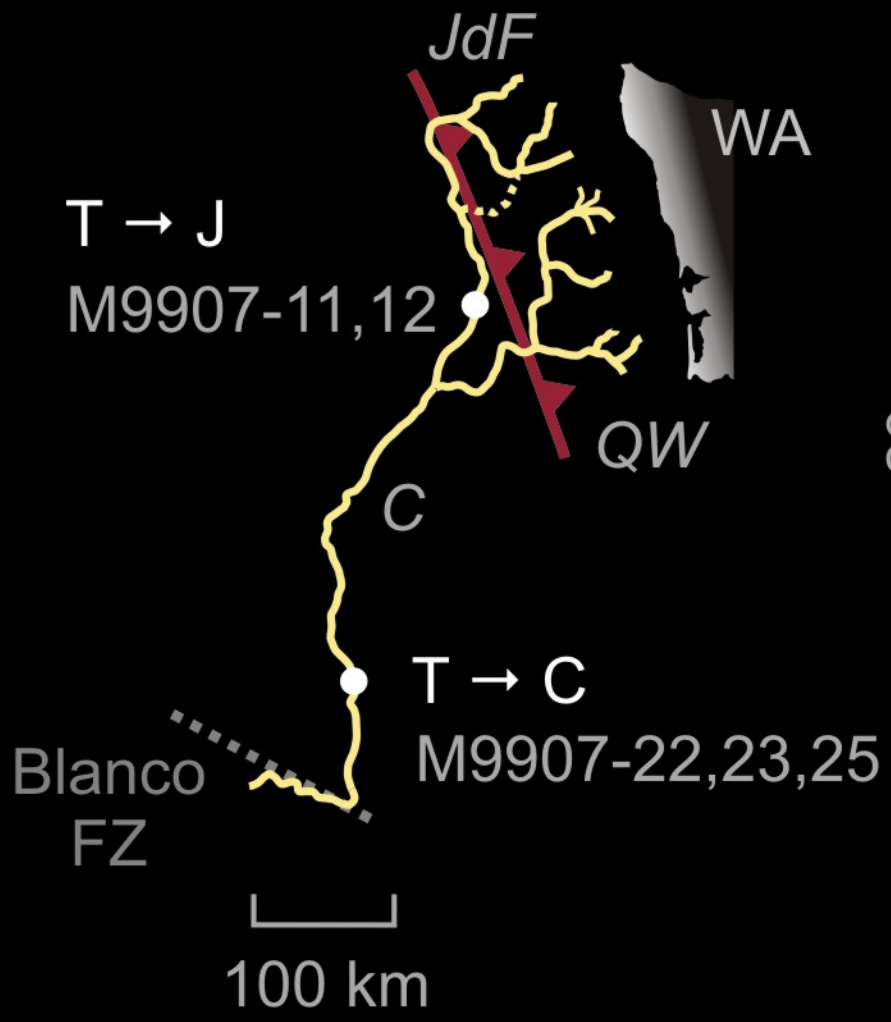
Initial mass movements respond to cumulative shaking and are prone to delay

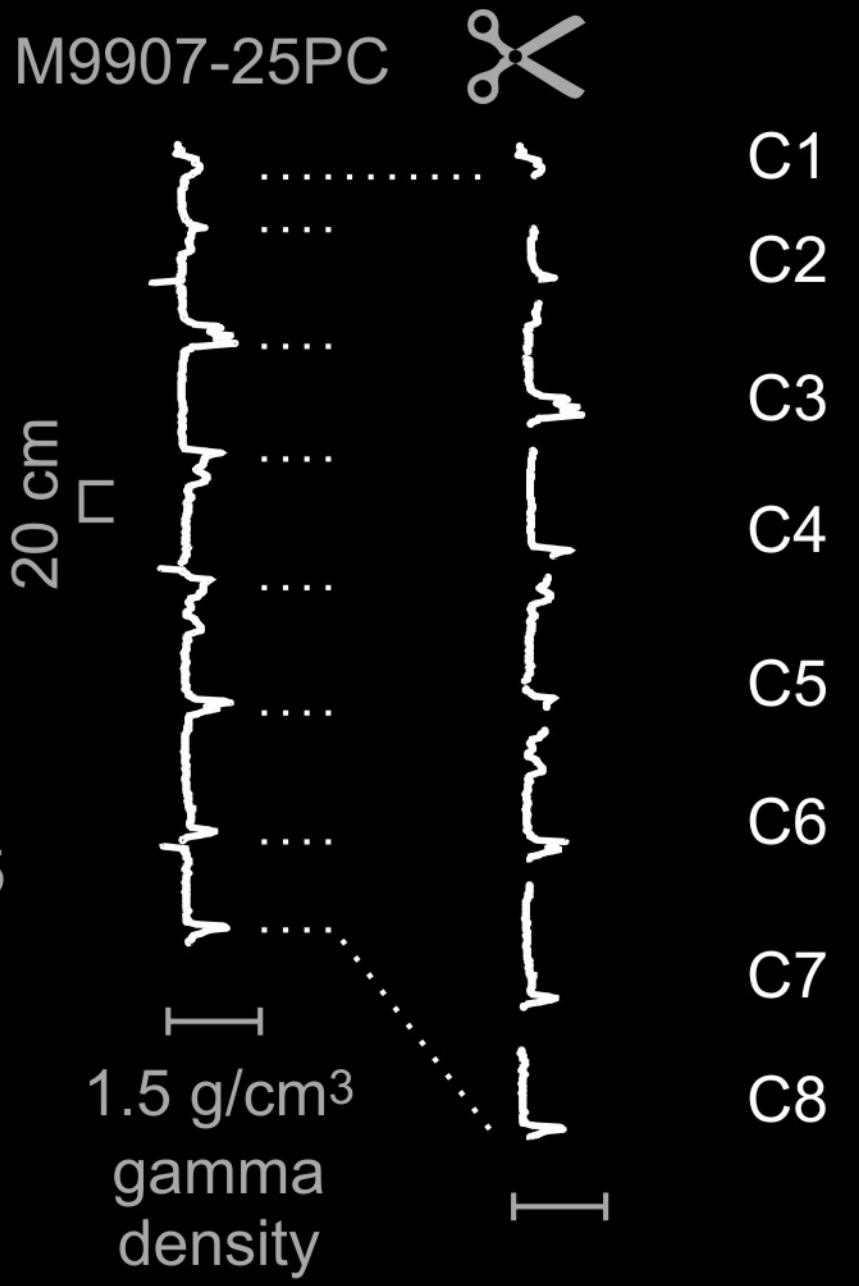
Flows transformed by

- changes in slope
- erosion of bed
- division at bends
- staggered merger

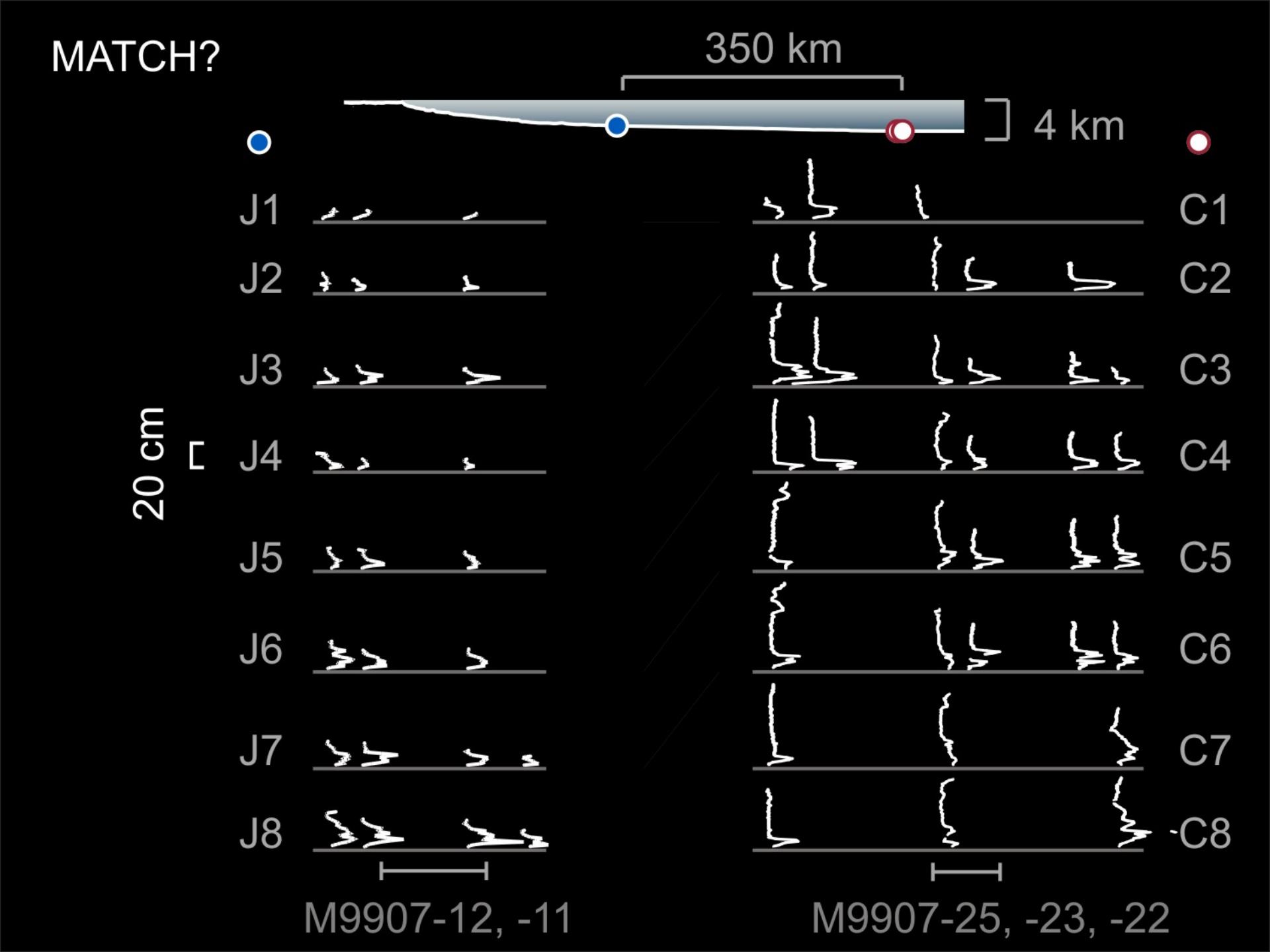
1 cm

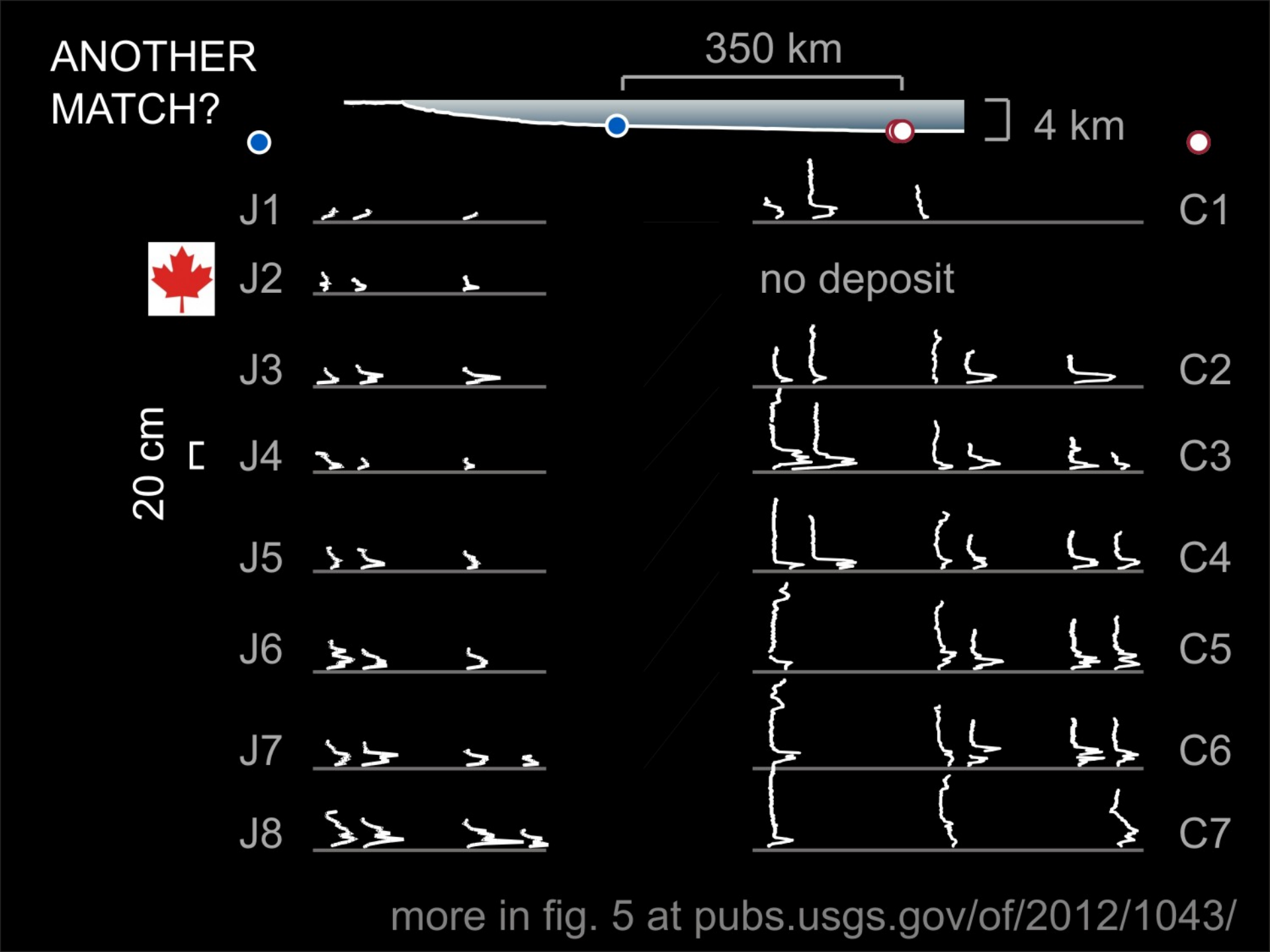
TO HELP ASK WHETHER
THE LOGS MATCH





Data of Goldfinger et al. (2012)


MATCH?
350 km
4 km
J1
J2
J3
J4
J5
J6
J7
J8
C1
C2
C3
C4
C5
C6
C7
C8
20 cm
M9907-12, -11
M9907-25, -23, -22


ANOTHER MATCH?
350 km
4 km
J1
J2
J3
J4
J5
J6
J7
J8
C1
no deposit
C2
C3
C4
C5
C6
C7
20 cm
more in fig. 5 at pubs.usgs.gov/of/2012/1043/

CHRONOLOGY

...and adjust the foram age to estimate the time of the turbidity current.

Date hemipelagic forams...

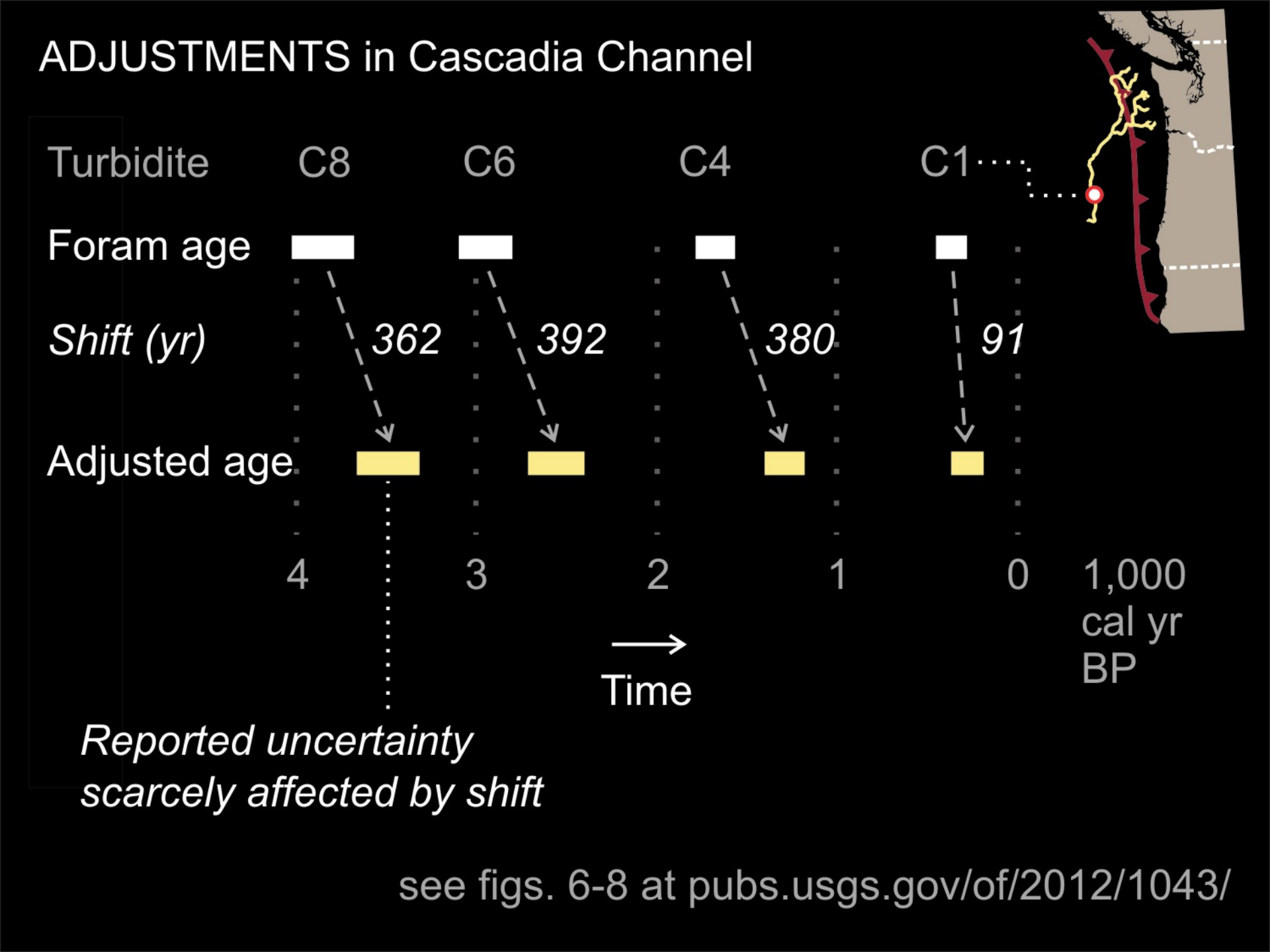
Challenges

- *Erosion and deformation*
- *Sample thickness and slow sed rate*
- *Mixing*

1 cm

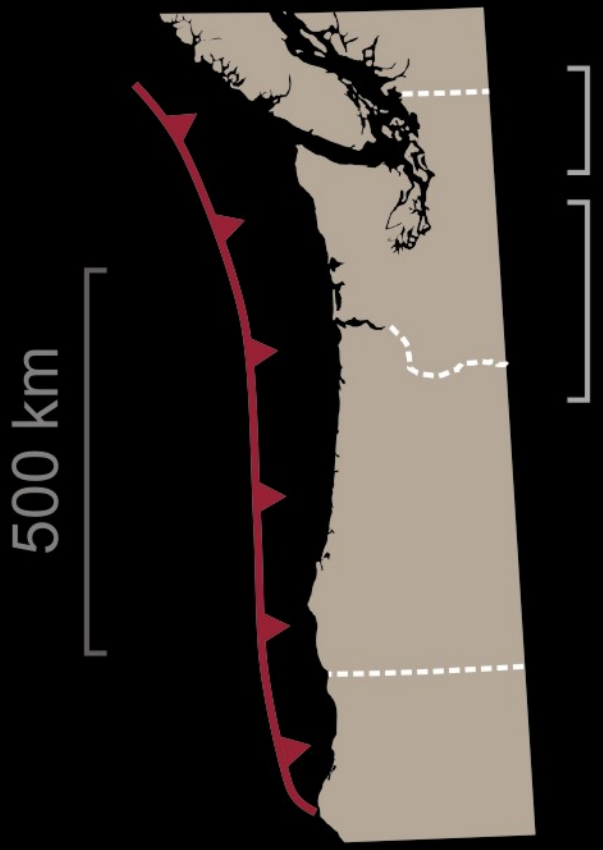
Strategy of Gutierrez-Pastor et al. (2008)

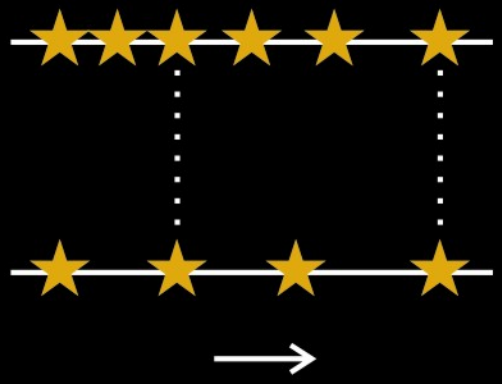
ADJUSTMENTS in Cascadia Channel



see figs. 6-8 at pubs.usgs.gov/of/2012/1043/

FOR THE LOGIC TREE





M8 and M9

300 yr avg

same quake

500 yr avg

Time

THANK-YOU

John Adams
Bill Burns
Jody Bourgeois
Bob Butler
Jason Chaytor
Jane Ciener
Jake Covault
Art Frankel
Chris Goldfinger
Tark Hamilton
Jim Hendley
Roy Hyndman
Paul Johnson
Sam Johnson
Harvey Kelsey
Steve Kirby
Pat McCrory
Ann Morey
Alan Nelson
Jim Phipps
David Piper
Garry Rogers
Ben Sheets
Uri Ten Brink
Kelin Wang
Yumei Wang
Craig Weaver
Ivan Wong

Precision depth recorder