



Deposited via The University of Leeds.

White Rose Research Online URL for this paper:

<https://eprints.whiterose.ac.uk/id/eprint/83935/>

Version: Accepted Version

Article:

Colombera, L, Mountney, NP and McCaffrey, WD (2015) A meta-study of relationships between fluvial channel-body stacking pattern and aggradation rate: implications for sequence stratigraphy. *Geology*, 43 (4). pp. 283-286. ISSN: 0091-7613

<https://doi.org/10.1130/G36385.1>

Reuse

Items deposited in White Rose Research Online are protected by copyright, with all rights reserved unless indicated otherwise. They may be downloaded and/or printed for private study, or other acts as permitted by national copyright laws. The publisher or other rights holders may allow further reproduction and re-use of the full text version. This is indicated by the licence information on the White Rose Research Online record for the item.

Takedown

If you consider content in White Rose Research Online to be in breach of UK law, please notify us by emailing eprints@whiterose.ac.uk including the URL of the record and the reason for the withdrawal request.

1 A meta-study of relationships between fluvial channel-body
2 stacking pattern and aggradation rate: Implications for
3 sequence stratigraphy

4 **Luca Colombera***, Nigel P. Mountney, and William D. McCaffrey

5 *Fluvial & Eolian Research Group, School of Earth and Environment, University of Leeds,*
6 *LS2 9JT, Leeds, UK*

7 *E-mail: l.colombera@leeds.ac.uk

8 **ABSTRACT**

9 A quantitative comparison of 20 literature case studies of fluvial sedimentary
10 successions tests common assumptions made in published models of alluvial architecture
11 concerning (1) inverse proportionality between channel-deposit density and floodplain
12 aggradation rates, and (2) resulting characteristics of channel-body geometries and
13 connectedness. Our results do not support the relationships predicted by established
14 stratigraphy models: the data suggest that channel-body density, geometries and stacking
15 patterns are not reliable diagnostic indicators of rates of accommodation creation. Hence,
16 these architectural characteristics alone do not permit the definition of accommodation-based
17 'systems tracts' and 'settings', and this calls into question current sequence stratigraphic
18 practice in application to fluvial successions.

19 **INTRODUCTION**

20 The proportion, geometry and spatial distribution of sedimentary bodies produced by
21 in-channel deposition in fluvial successions are often cited to be dependent on floodplain
22 aggradation rate, based on the assumption that slower rates of aggradation facilitate
23 floodplain reworking by migrating and avulsing rivers (Allen 1978; Bridge and Leeder 1979).
24 Consequently, channel-body density is commonly expected to inversely correlate with

1 aggradation rate, thereby also affecting the geometry and connectedness of channel deposits.
2 These assumptions are often made on the basis of results from a suite of numerical models
3 known as the Leeder-Allen-Bridge (LAB) models of alluvial architecture (Leeder, 1978;
4 Allen 1978; Bridge and Leeder 1979).

5 Because results from the LAB models have been incorporated into influential
6 sequence-stratigraphy models (e.g., Wright and Marriott, 1993; Shanley and McCabe 1994),
7 these tenets dominate thinking in fluvial sequence stratigraphy . The distinction of ‘low-
8 accommodation’ versus ‘high-accommodation’ systems tracts in fluvial successions is
9 routinely undertaken based solely on the degree of channel amalgamation (Catuneanu et al.,
10 2009).

11 More generally, the LAB model concepts have had a significant impact on rock-
12 record interpretations. As aggradation rates are intimately linked with lithospheric
13 kinematics, eustatic fluctuations and catchment processes, obtaining a validation or rejection
14 of assumptions commonly made by advocating the LAB models has profound implications,
15 for example on the appropriateness of the use of stratigraphic variations in channel-body
16 characteristics as proxies for absolute sea-level change or variations in subsidence rates.

17 Thus, it is important to test the expected relationships between aggradation rate and
18 channel-body density, geometry and stacking pattern in the rock record. To perform a
19 meaningful test of the expected responses, 20 field examples have here been compared with
20 respect to the proportion, geometries and vertical connectivity of channel deposits, for
21 different values of aggradation rate and under different conditions of change in aggradation
22 rates.

23 **METHODS**

24 A comparative study is undertaken based on literature-derived data collated from 20
25 ancient fluvial depositional systems into a relational database – the Fluvial Architecture

1 Knowledge Transfer System (FAKTS) – which digitizes classified sedimentary units in a
2 hierarchical scheme (Colombera et al., 2012; supplementary material). At the largest scale of
3 observation FAKTS characterizes fluvial architecture in terms of units termed ‘depositional
4 elements’ and classified as ‘channel complex’ or ‘floodplain’ units, depending on the
5 interpreted origin of their deposits. Geometric attributes are used to characterize each
6 individual depositional element, and the spatial relationships between each of them are stored
7 in the form of transitions (e.g., unit 2 vertically stacked on unit 1; unit 3 updip of unit 4). The
8 subdivision of stratigraphic volumes into depositional elements is based in part upon the
9 application of geometric criteria; this provides a way to assign amalgamated channel bodies
10 objectively into discrete units (see supplementary material). The floodplain domain is
11 subdivided into geometric packages that vertically and laterally neighbor the channel
12 complexes.

13 Within the database, stratigraphic volumes to which depositional elements belong are
14 classified on several attributes, of which one is average aggradation rate, based on data
15 compiled from the literature. For this work, the division of the successions into intervals is
16 driven by the existing temporal constraints. Values of aggradation rates attributed to the
17 stratigraphic intervals are variably based on published geochronometric data, correlation of
18 biostratigraphically constrained strata and on magnetostratigraphic control.

19 For outcrop datasets comprising 2D or pseudo-3D architectural panels depicting the
20 sedimentary architecture of strata composed of channel and floodplain deposits, depositional-
21 element proportions are based on cross-sectional areas estimated as the product of the lateral
22 and vertical extent of the elements; thickness-based proportions are instead derived from 1D
23 datasets.

24 This approach is subject to several limitations. Full control on spatial variability of
25 architectural products and of the boundary conditions that govern the deposystems is lacking.

1 Also, a limitation is associated with the inclusion of data from published summary datasets of
2 channel-body geometries, because for these datasets the geometric criteria cannot be checked,
3 making comparisons with other datasets less reliable. Stored average aggradation rates are
4 affected by the variable degree and types of uncertainty to which the different temporal
5 constraints are subject, i.e. connected with radiometric dating error, magnetostratigraphic
6 correlation, biostratigraphic correlation, and, in some cases, to correlation of bounding
7 surfaces outside the considered study areas (see digital repository, tab. DR2). Furthermore,
8 aggradation rates have been averaged over different time scales for different stratigraphic
9 volumes. Generally, however, stratigraphic volumes considered in this study are the product
10 of deposition at the 10^{-1} - 10^1 Myr timescale, and are 10^1 - 10^2 m thick: these spatial and
11 temporal scales make the results comparable with volumes simulated by the LAB models.
12 Also, aggradation rates have not been corrected for sediment compaction; as the abundance
13 of fine-grained and organic deposits in floodplain settings renders overbank units generally
14 more compactable than sand-prone channel bodies, differential compaction might alter any
15 relationships that may exist between channel-body properties and aggradation rates. Further
16 limitations are inherent in the variability in dataset quality. Uncertainty relates to restricted
17 outcrop continuity or lack of 3D control, for example where channel-complex widths may not
18 entirely be exposed due to outcrop termination, or may be exposed at different angles with
19 the channel-body axis. The reliability of interpretations is also variable; notably, uncertainty
20 may arise from recognition of channel and floodplain deposits in certain datasets, as based for
21 example on photo-interpretation or subsurface studies.

22 **RESULTS**

23 We have compared the evolution of different fluvial successions that record vertical
24 changes in channel-deposit proportions concurrent with temporal changes in overall
25 aggradation rates (Fig. 1). Potential relationships between aggradation rate and channel-

1 deposit proportion are also evaluated across all the successions; this is of use to assess
2 whether accommodation itself is a parameter with general predictive value, such that it
3 determines architectural differences observable between different sedimentary basins. This
4 approach therefore also serves as a test of whether high- and low-accommodation ‘settings’
5 can be genuinely identified based on channel-body stacking density (Leckie and Boyd, 2003;
6 Catuneanu, 2006).

7 The timescale dependency of aggradation rates is not expressly accounted for by
8 either LAB or sequence stratigraphy models (Miall, 2014). Aggradation rates depend on the
9 time over which they have been estimated, as the longer the time embodied by a succession,
10 the higher the probability that it incorporates significant breaks in sedimentation or longer
11 average durations of such hiatuses (Sadler, 1981). Thus, to enable comparisons between and
12 within different timescales, results are presented by classifying stratigraphic volumes on the
13 timescale over which aggradation rates were estimated (Fig. 1).

14 Of 20 deposystems considered, which cover different tectonic, physiographic and
15 depositional settings and typify different scenarios of accommodation generation, 15 provide
16 data on the proportion of channel and floodplain deposits; 9 of these are suitable for
17 investigation of their temporal evolution (i.e., changes in aggradation rates through time are
18 documented). Of 18 tracked variations (i.e., changes between two stratigraphic volumes
19 within a system), 11 are particularly significant, as they involve pairs of stratigraphic
20 volumes whose aggradation rate values are evaluated either over corresponding timescales or
21 in such way that the largest aggradation rate value of the pair is estimated over a longer
22 timescale (Fig. 1). Only 6/18 of any variations and 4/11 of timescale-relevant variations
23 clearly display increase in aggradation rate matched by decrease in channel-body proportion,
24 or vice versa.

1 Considering data from all 36 volumes associated with the 15 systems studied (Fig. 1),
2 no consistent trend exists between channel proportion and aggradation rate, as evaluated both
3 across all volumes (Pearson's correlation coefficient = -0.043 , p-value = 0.81) and for
4 timescale-matching groups (cf. supplementary material).

5 The distributions of channel-complex thicknesses and widths from 21 stratigraphic
6 volumes associated with 15 different systems were also studied (Fig. 2). The maximum
7 thickness of each channel-complex has been considered, whereas width distributions have
8 been constructed from data of real widths (i.e., channel-complex width orthogonal to mean
9 paleoflow), apparent widths (i.e., element width seen obliquely to mean paleoflow) and
10 measured widths of incompletely exposed elements (e.g., due to outcrop termination). No
11 significant relationships are observed between mean channel-complex thickness and mean
12 aggradation rate (Pearson's $R = -0.130$, p-value = 0.59), or between mean channel-complex
13 width and mean aggradation rate ($R = -0.054$, p-value = 0.82).

14 Traditional stratigraphic models predict the development of more sheet-like channel
15 bodies under slower aggradation. Counter to what is predicted by these models, FAKTS
16 datasets for which temporal changes are documented demonstrate variations in mean
17 channel-complex width to be more often of the same sign as changes in aggradation rate (i.e.,
18 more commonly, channel-complexes become on average wider as aggradation accelerates,
19 and vice versa): comparison with Figure 1 reveals that this result likely relates to a positive
20 relationship between channel-complex proportion and size (i.e., channel-complex size reflects
21 the effect of channel-deposit amalgamation).

22 Data on the spatial arrangement of channel complexes within the stratigraphic
23 volumes have been used to derive information about the degree of channel amalgamation and
24 vertical channel-deposit connectivity. This information is provided by values of channel-
25 complex 'connected thickness' – defined as the sum of the thicknesses of vertically stacked

1 channel complexes, with the admissible condition of a channel complex being included in
2 more than one stack. The connected thickness is a proxy for channel-body stacking density,
3 which is commonly predicted to be higher for slower rates of aggradation. No evident
4 relationship is found between the mean or maximum connected thickness and the mean
5 aggradation rate, when evaluated across different systems (Fig. 3). Instead, for systems whose
6 evolution is tracked, 5 of 6 variations in mean connected thickness have the same sign as
7 changes in mean aggradation rate. Again this reflects the effect of increased channel-deposit
8 proportions on amalgamation.

9 **DISCUSSION**

10 Terrestrial accommodation can be seen as the volume within the elevation difference
11 between the long-term river equilibrium profile and the topography (Posamentier and Vail,
12 1988; Muto and Swenson, 2005; citations therein). However, in agreement with most authors,
13 we practically quantify accommodation as a vertical distance, and we infer rates of creation
14 of accommodation on the basis of aggradation rates (cf. 'realized accommodation'; Cross,
15 1988; Muto and Steel, 2000).

16 For the studied fluvial systems, temporal variations in aggradation rate do not serve as
17 good predictors of changes in channel-deposit proportion through the inverse relationship
18 often implied by stratigraphic models. Furthermore, the results show that changes toward
19 sheet-or ribbon-like channel-complex geometries do not appear to occur with corresponding
20 decreases or increases in aggradation rate. Relationships between mean aggradation rate and
21 channel-complex vertical connectivity also contradict those predicted by common
22 stratigraphic models. These considerations suggest that sequence stratigraphic models that
23 interpret temporal changes in channel proportions, geometry and stacking pattern in terms of
24 changes in the rate of creation of accommodation may be of limited value. Recognition of
25 'high'- or 'low'-accommodation systems tracts (cf. Catuneanu et al., 2009) based solely on

1 patterns of channel-body amalgamation may be misleading for interpretations of basin
2 evolution, as floodplain cannibalization may not be the norm in causing high channel density
3 and channel-body sheet-like geometries, at least when evaluated at the spatial and temporal
4 scales to which the LAB models refer. Equally, the ability to infer the ratio between
5 accommodation and sediment supply (A/S; e.g., Martinsen et al., 1999) on the basis of
6 channel proportions requires re-evaluation, especially given that the rate of creation of
7 terrestrial accommodation depends on sediment supply rate, in contrast to contexts where the
8 concept of sea-level-based accommodation is applicable (cf. Prince and Burgess, 2013). The
9 results presented here support the claim of Gibling et al. (2011) that it is dangerous to infer
10 accommodation conditions from the degree of channel-body amalgamation, and further
11 support a recommendation that terms such as high- or low-accommodation systems tracts be
12 avoided, when their recognition is based solely on channel-body density. Instead, the use of
13 non-genetic terms in absence of temporal constraints or evidence of specific controls is
14 recommended. Moreover, the lack of relationships between channel-complex properties and
15 aggradation rates across all studied stratigraphic volumes, whose mean aggradation rates
16 collectively span two orders of magnitude, provides evidence against the practicability of
17 inferring low- or high-accommodation settings as is commonly attempted (cf. Leckie and
18 Boyd, 2003; Catuneanu, 2006).

19 Decades of research on autogenic dynamics of fluvial systems and allogenic controls
20 on their behavior have offered insight as to why the LAB models have limited applicability
21 and thus current terrestrial sequence stratigraphy practice may be inadequate, and this is not
22 attributable to one single explanation. For example, it is acknowledged that the LAB models
23 do not account for the effect of the relationship between aggradation rate and avulsion
24 frequency. As avulsions are favored by gradient advantage generated by channel-belt
25 aggradation, avulsion frequency depends on the rate of generation of channel-belt super-

1 elevation, which is driven by differential sedimentation between channel belts and the
2 adjacent floodplain, and appears to be scaled to aggradation rate (Heller and Paola, 1996). If
3 avulsion frequency relates to aggradation rate following a direct proportionality to r^b , where r
4 is aggradation rate and $b > 1$, then an increase in channel density is expected in response to an
5 increase in aggradation rate (Bryant et al., 1995; Heller and Paola, 1996). Furthermore, the
6 proportion of channel deposits in a stratigraphic volume and the sheet- or ribbon-like
7 geometry of channel bodies will also depend on channel size and rate of lateral migration
8 (Bristow and Best, 1993). Upstream controls on sub-aerial accommodation include the rates
9 of solid and liquid discharge to the fluvial system; so, depending on the relative dominance of
10 the different drivers for the generation of accommodation, different scenarios involving
11 changes in aggradation rate, formative channel size and rates of river mobility through
12 migration and avulsion can be envisaged. This is also suggestive of how LAB-type responses
13 can be determined by variations in the relative dominance of different river systems that
14 deposit sediment in the same basin but variably respond to different sets of downstream and
15 upstream controls and have different autogenic dynamics. These considerations do not aim to
16 provide an exhaustive explanation of why and where the tested principles do not work, but
17 simply to illustrate how fluvial systems respond in a complex manner to changes in a number
18 of controlling parameters. It is the complex interplay of multiple controls that likely explains
19 the results presented here.

20 **CONCLUSIONS**

21 Data from ancient sedimentary successions suggest that the evolution of fluvial
22 systems subject to variable aggradation rates does not routinely follow the pattern expected
23 by common stratigraphic models, whereby a negative relationship between aggradation rate
24 and channel-deposit density is expected: observations on channel-body density, geometries
25 and stacking patterns do not prove to be reliably diagnostic of rates of creation of

1 accommodation. Consequently, the use of channel-body characteristics alone for the
2 identification of high- and low-accommodation systems tracts and settings does not appear to
3 be justified, calling into question fluvial sequence stratigraphy models and practices that draw
4 heavily upon the principles tested by this study. Rejection of paradigms relating channel-
5 body properties to accommodation states is relevant to a range of geologic disciplines,
6 because research in many fields has often relied on them to interpret stratigraphic variations
7 in channel-body stacking density in terms of changes in processes such as rates of crustal
8 stretching or eustatic fluctuations.

9 **ACKNOWLEDGMENTS**

10 We would like to acknowledge the FRG-ERG sponsors (Areva, BHPBilliton,
11 ConocoPhillips, Nexen, Saudi Aramco, Shell, Tullow Oil, Woodside, YPF) for financial
12 support of this project. P. Burgess, M. Gibling, G. Nichols, B. Willis and two anonymous
13 reviewers are thanked for their constructive comments.

14 **REFERENCES CITED**

- 15 Allen, J.R.L., 1978, Studies in fluvial sedimentation: an exploratory quantitative model for
16 the architecture of avulsion-controlled alluvial suites: *Sedimentary Geology*, v. 21, p.
17 129–147, doi:10.1016/0037-0738(78)90002-7.
- 18 Bridge, J.S., and Leeder, M.R., 1979, A simulation model of alluvial stratigraphy:
19 *Sedimentology*, v. 26, p. 617–644, doi:10.1111/j.1365-3091.1979.tb00935.x.
- 20 Bristow, C.S., and Best, J.L., 1993, Braided rivers: Perspectives and problems, *in* Best, J.L.,
21 and Bristow, C.S., eds., *Braided rivers*: Geological Society of London, Special
22 Publications, v. 75, p. 1–11.
- 23 Bryant, M., Falk, P., and Paola, C., 1995, Experimental study of avulsion frequency and rate
24 of deposition: *Geology*, v. 23, p. 365–368, doi:10.1130/0091-
25 7613(1995)023<0365:ESOAF>2.3.CO;2.

- 1 Catuneanu, O., 2006, Principles of sequence stratigraphy: Amsterdam, Elsevier Publishing,
2 375 p.
- 3 Catuneanu, O., et al., 2009, Towards the standardization of sequence stratigraphy: Earth-
4 Science Reviews, v. 92, p. 1–33, doi:10.1016/j.earscirev.2008.10.003.
- 5 Colombera, L., Mountney, N.P., and McCaffrey, W.D., 2012, A relational database for the
6 digitization of fluvial architecture concepts and example applications: Petroleum
7 Geoscience, v. 18, p. 129–140, doi:10.1144/1354-079311-021.
- 8 Cross, T.A., 1988, Controls on coal distribution in transgressive–regressive cycles, Upper
9 Cretaceous Western Interior, U.S.A., *in* Wilgus, C.K., Hastings, B.S., Kendall,
10 C.G.St.C., Posamentier, H.W., Ross, C.A., and Van Wagoner, J.C., eds., Sea level
11 changes: An integrated approach: SEPM Special Publication, v. 42, p. 371–380.
- 12 Gibling, M.R., Fielding, C.R., and Sinha, R., 2011, Alluvial valleys and alluvial sequences:
13 towards a geomorphic assessment, *in* Davidson, S., Leleu, S., and North, C.P., eds.,
14 From river to rock record: the preservation of fluvial sediments and their subsequent
15 interpretation: Tulsa, Oklahoma, SEPM Special Publication, v. 97, p. 423–447.
- 16 Heller, P.L., and Paola, C., 1996, Downstream changes in alluvial architecture: An
17 exploration of controls on channel-stacking patterns: Journal of Sedimentary Research,
18 v. 66, p. 297–306.
- 19 Leckie, D.A., and Boyd, R., 2003, Towards a nonmarine sequence stratigraphic model:
20 American Association of Petroleum Geologists Annual Convention, Salt Lake City, 11–
21 14 May 2003, Official Program, v. 12, p. A101.
- 22 Leeder, M.R., 1978, A quantitative stratigraphic model for alluvium, with special reference to
23 channel deposit density and interconnectedness, *in* Miall, A.D., ed., Fluvial
24 sedimentology: Canadian Society of Petroleum Geologists Memoir, v. 5, p. 587–596.

- 1 Martinsen, O.J., Ryseth, A.L.F., Helland-Hansen, W., Flesche, H., Torkildsen, G., and Idil,
2 S., 1999, Stratigraphic base level and fluvial architecture: Ericson Sandstone
3 (Campanian), Rock Springs Uplift, SW Wyoming, USA: *Sedimentology*, v. 46, p. 235–
4 263, doi:10.1046/j.1365-3091.1999.00208.x.
- 5 Miall, A.D., 2014, Updating uniformitarianism: stratigraphy as just a set of ‘frozen
6 accidents’, *in* Smith, D.G., Bailey, R.J., Burgess, P.M., and Fraser, A.J., eds., *Strata and
7 time: Probing the gaps in our understanding*: Geological Society of London, Special
8 Publications, v. 404, SP404–4.
- 9 Muto, T., and Steel, R.J., 2000, The accommodation concept in sequence stratigraphy: Some
10 dimensional problems and possible redefinition: *Sedimentary Geology*, v. 130, p. 1–10,
11 doi:10.1016/S0037-0738(99)00107-4.
- 12 Muto, T., and Swenson, J.B., 2005, Large-scale fluvial grade as a nonequilibrium state in
13 linked depositional systems: Theory and experiment: *Journal of Geophysical Research*:
14 *Earth Surface* (2003–2012), 110(F3), doi:10.1029/2005JF000284.
- 15 Posamentier, H.W., and Vail, P.R., 1988, Eustatic controls on clastic deposition II – sequence
16 and systems tract models, *in* Wilgus, C.K., Posamentier, H.W., Ross, C.K., and Kendall,
17 C.G. St.C., eds., *Sea-level changes: An integrated approach*: SEPM Special Publication,
18 v. 42, p. 125–154.
- 19 Prince, G.D., and Burgess, P.M., 2013, Numerical Modeling of Falling-Stage Topset
20 Aggradation: Implications for Distinguishing Between Forced and Unforced Regressions
21 In the Geological Record: *Journal of Sedimentary Research*, v. 83, p. 767–781, doi:
22 10.2110/jsr.2013.62
- 23 Sadler, P.M., 1981, Sediment accumulation rates and the completeness of stratigraphic
24 sections: *The Journal of Geology*, v. 89, p. 569–584, doi:10.1086/628623.

1 Shanley, K.W., and McCabe, P.J., 1994, Perspectives on the sequence stratigraphy of
2 continental strata: AAPG Bulletin, v. 78, p. 544–568.

3 Wright, P.V., and Marriott, S.B., 1993, The sequence stratigraphy of fluvial depositional
4 systems: The role of floodplain sediment storage: Sedimentary Geology, v. 86, p. 203–
5 210, doi:10.1016/0037-0738(93)90022-W.

6 **FIGURE CAPTIONS**

7 Figure 1. Cross-plot of channel-body proportion and mean aggradation rate for different
8 stratigraphic volumes. Each point represents a stratigraphic volume, and its shape indicates
9 the timescale over which the aggradation rate was evaluated. Data representing intervals from
10 the same depositional system are joined by arrowed lines to indicate temporal evolution. Each
11 arrowed line represents a change (N = 18), pointing in the up-section stratigraphic direction.
12 See digital repository for data and material on age uncertainty.

13 Figure 2. Box plots of channel-complex thickness (A) and width (B) distributions for
14 different stratigraphic volumes, ordered by mean aggradation rate. The boxes are colored
15 according to the timescale over which the aggradation rate was evaluated, as in legend. Width
16 distributions also incorporate uncorrected values of apparent and incomplete observations
17 (see text). The boxes represent interquartile ranges, the horizontal bars within them represent
18 median values, and the spots represent outliers. Deposystem evolution can be deduced by
19 referring to the case-study identifiers and Figure 1.

20 Figure 3. Cross-plots of minimum and mean channel-complex thickness and mean and
21 maximum channel-complex ‘connected’ thickness against mean aggradation rate for different
22 stratigraphic volumes. Each vertical line represents the thickness and connected thickness
23 distribution of each stratigraphic volume. The numeric indices denote the FAKTS case-study
24 successions used for this analysis: deposystem evolution can be deduced by referring to these
25 case-study indices and Figure 1.

Publisher: GSA
Journal: GEOL: Geology
DOI:10.1130/G36385.1

1 ¹GSA Data Repository item 2015xxx, containing method details, data and ancillary
2 information is available online at www.geosociety.org/pubs/ft2015.htm, or on request from
3 editing@geosociety.org or Documents Secretary, GSA, P.O. Box 9140, Boulder, CO 80301,
4 USA.

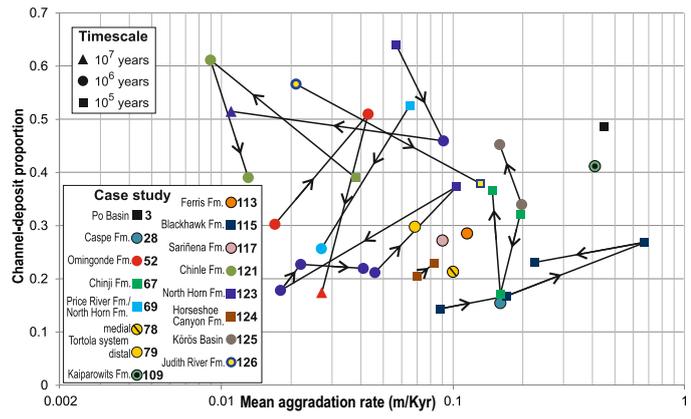


Figure 1

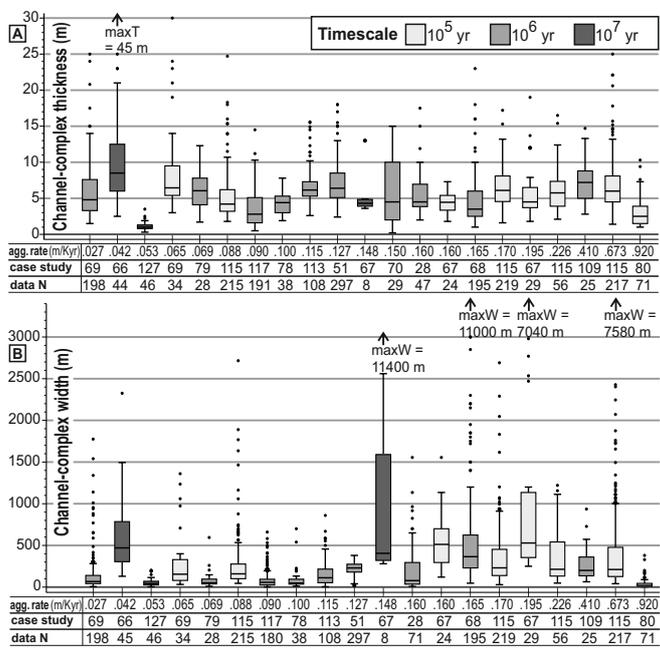


Figure 2

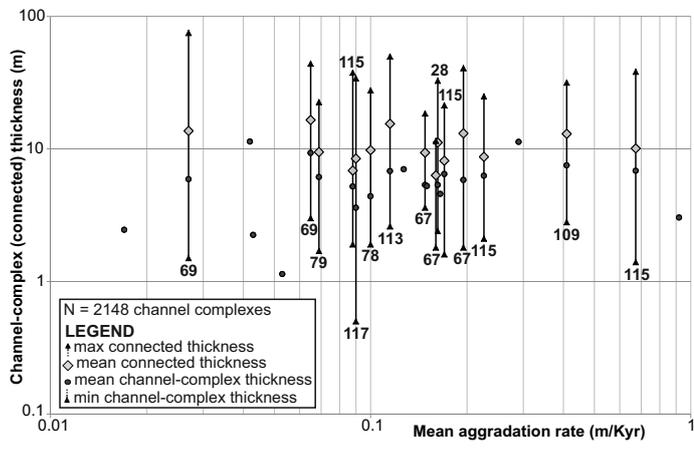


Figure 3