Supplementary Information

The grain-size characteristics of individual units

The complete set of grain-size data are given in Fig. S1.

For U2a, the mean sand volume is significantly high, taking up more than 70% (Table S1). In general, they show bimodal GSDs with main mode more than 500 μm and a secondary mode around 30 μm (e.g. S1-2, Fig. 10b), therefore considered as medium-coarse sand. Compared with U2a, the silt fraction in U2b takes up the main part, c. 59%. However, the deposits within U2b show significantly different GSDs patterns. Sample S2-1 has a sand fraction with modal size of >350 μm. Sample S1-1 shows a clear bimodal grain size frequency curve with modal values of approximately 28 μm and 500 μm. Sample S2-12, instead, presents a unimodal GSD with modal value around 32 μm (Fig. 10b).

The GSDs of U3 (Samples S3-9 to S3-21) can be divided into two groups. One is unimodal in general, with modal value 27 μm and a high content of silt, up to 75% (e.g. S3-10, Fig. S2). Occasionally, coarse particles may be mixed in very low amounts (below 0.2%). Another group of sediments in the middle part of U3 in section 3 is, however, characterised by its high volume of sand (up to 75%) and a mean peak at 644 μm (e.g. S3-13, Fig. S2).

U4 in section 3 (S3-1 to S3-8) contains dominantly clayey silt with mean grain size 12 μm and illustrates unimodal GSDs with modal size 25 μm. However, sample S6-11 contains more coarse particles with its mode of >500 μm (Fig. 10a). The U-ratio varies from 0.59 to 1.13 (Table S1).

The U-ratio of U5 varies between 0.73 and 1.19. The sediments in section 3a (S3a-1 to S3a-11), consist mainly of moderate silt with additional coarse sand. They show bimodal GSDs with main peak around 26 μm and a secondary peak of >300 μm (e.g. S3a-6 and S3a-8, Fig. 10a). The sediments in section 6 (S6-1 to S6-10) with mean grain size 105 μm, consist alternatingly of clayey silt (possibly in a soil) and sand (e.g. S6-8, Fig. 10a). In section 7, two samples S7-18 and S7-19 show a fine grain size which is logic because they were taken from the soil layer of U5. Samples S7-15 to S7-17 are characterized by bimodal GSDs with their coarse fraction gradually decreasing from base to top.

The grain size of U6 (S7-1 to S7-14) shows a comparable pattern to that of U5. Sediments from the base contain more than 75% sand, but the upper part consists of silt, reaching 70%, which indicates a decreasing hydro-energy from base to top. The GSDs are bimodal with a main modal value of >300 μm at the bottom (e.g. S7-11, Fig. S2), while the upper parts show unimodal GSDs with mean modal value of c. 29 μm (e.g. S7-7, Fig. 10b).

Fig. S2 The grain size distribution of samples S3-10, S3-13 and S7-11 in U6.

**Table S1.** The parameters of U-ratio; content of sand, silt, and clay and the mean and modal values of the grain size from each unit, on average. Sample numbers in each unit are shown as well.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Units | U-ratio | Sand/% | Silt/% | Clay/% | Mean/µm | Mode 1/µm | Mode 2/µm | Sample number | Number of samples |
| U2a | 1.06 | 74 | 20 | 7 | 277 | 516 | 31 | S1-2 to S1-11; S2-2 to S2-6. | 15 |
| U2b | 1.66 | 26 | 59 | 15 | 41 | 135 | 175 | S1-1; S2-1; S3-22; S2-7 to S2-14. | 11 |
| U3 | 1.22 | 25 | 57 | 18 | 80 | 217 | 38 | S3-9 to S3-21. | 13 |
| U4 | 1.01 | 4 | 67 | 29 | 12 | 23 | 533 | S3-1 to S3-8; S6-11. | 9 |
| U5 | 0.99 | 31 | 48 | 21 | 59 | 188 | 238 | S3a-1 to S3a-11; S6-1 to S6-10; S7-15 to S7-19. | 27 |
| U6 | 1.10 | 60 | 31 | 9 | 217 | 453 | 80 | S7-1 to S7-14. | 14 |

With regard to aeolian sediments, the 44-16 μm fraction was mainly supplied by the winter monsoon during cold periods, whereas the 16-5 μm fraction was more typically transported by westerlies (Vandenberghe et al., 2006). Consequently, the ratio between these two fractions (= the U-ratio) shows high values corresponding with strong winter monsoons and low values corresponding with reduced winter monsoons ([Vandenberghe et al., 1997](file:///D:\01硕士\汉中\金星\20200328\Jinxing%20text_20200330_yx-xyw%20-jv3April20.docx#_ENREF_36); [Wang et al., 2016](file:///D:\01硕士\汉中\金星\20200328\Jinxing%20text_20200330_yx-xyw%20-jv3April20.docx#_ENREF_42)). However, U-ratios (Table S1) have been rarely reported to specify fluvial or fluvial-influenced deposits.

References

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