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| **Facies** | **Description** | **Interpretation** |
| Planar cross-stratified sandstones (Spx) | Yellow, pale cream planar cross-bedded sandstones, medium-grained and well sorted, well-rounded. At the base of the foresets, there is evidence of inverse grading of slightly coarser grains separated by fine-grained laminae. Rhizolith horizons occur along set-bounding surfaces at the base of the facies. Foresets are truncated at the top, asymptotic at the base with thicknesses ranging from millimetre to centimetre-scale. Foreset bases truncate against parallel set bounding surfaces approximately 1 m apart, stacked into cosets with a maximum thickness of 1-19 m. | Straight-crested dune-scale bedforms migrating as dune trains. Inverse graded and fine-grained laminae represent grainflow and grainfall, respectively. Planar set bounding surfaces indicate straight-crested dune forms (McKee & Wier 1953, Hunter 1977, Trewin, 1993; Ewing & Kocurek, 2010, Collinson & Mountney, 2019). Rhizolith horizons demonstrate periods of stabilisation within which vegetation can prevail upon dune slopes (Mountney & Thompson, 2002). |
| Trough cross-stratified sandstones (Stx) | Light grey to light pink trough cross-bedded sandstones, fine- to medium-grained, well sorted and well-rounded, with an average grain size of fine sand. At the base of the foresets, there is evidence of inverse grading of slightly coarser grains separated by fine-grained laminae. Foresets are truncated at the top, asymptotic at the base with thicknesses ranging from millimetre to centimetre-scale. The set-bounding surfaces truncate the tops of the foresets and meet at the base asymptotically; at outcrop scale, they have a convex or curved profile. Set thicknesses can reach up to 2 m and build into cosets no larger than 5 m. | Sinuous-crested dune-scale bedforms created by wind-blown sands, migrating as dune trains. Inverse graded and fine-grained laminae represent grainflow and grainfall, respectively. The trough cross-bedded nature of strata but also the curved set bounding surfaces indicate sinuosity in bedform crests (McKee & Weir 1953, Hunter 1977, Crabaugh & Kocurek, 1993, Mountney, 2012, Banham et al., 2018). |
| Pinstripe-laminated sandstone (Spsl) | Light grey to reddish brown, fine-grained, well-sorted and well-rounded sandstone. Nearly horizontal laminations with bimodal sorting (pinstripe) represent subcritical translatent strata with sporadic shallowly climbing (<8°) ripple bedform laminae. | Wind ripples developed through rhythmic wind cycles in the lee of dunes (Sharp 1963, Tanner 1964, Fryberger & Schenk, 1988), rhythmic sediment incursions may also be associated with the preservation of internal ripple laminae and an increased angle of climb. It is interpreted that this is recycling of grainflow deposits (Banham et al., 2018) in dune lee slope toes. |
| Undulous Sandstone (Su) | Red-brown, moderately sorted, very fine- to fine-grained sandstone, with sporadic lenses of argillaceous material. Undulose bed bounding surfaces define inter-and intra-facies contacts, these beds (10-30 cm thick) undulate slightly vertically with metre scale wavelengths. Mostly structureless, internally, towards the top of the facies, mottling and water escape structures are prominent. | Wind-blown sediment deposited within very shallow standing water via suspension settlement (Mountney & Thompson, 2002). Argillaceous material, water escape structures and mottling are all products of depositional and diagenetic textures that indicate a high-water table during deposition. The undulose nature of bedding contacts can be interpreted as antecedent topography from the underlying facies (Desjardins et al., 2012) or induced by surface wave action (Martel & Gibling, 1991; Mountney & Thompson, 2002, Collinson & Mountney, 2019). |
| Undulous sandstone with ripple laminations (Surl) | Dark reddy-brown sandstone of fine- to medium-grainsize. The grains are sub-rounded and poorly sorted with a minority of clay particles. Internally, mud lenses and mud drapes occur sporadically throughout the facies. Undulose bed bounding surfaces define inter-and intra-facies contacts, these beds (10-30 cm thick) undulate slightly vertically with metre scale wavelengths, with some small poorly preserved foresets at the base. Wave-ripple laminae are evident, sporadically, towards the top of the facies. | Wind-blown sediment deposited within very shallow standing water via suspension settlement (Mountney & Thompson, 2002). Mud drape material suggests settling of fines within the water column onto wind-blown sands during episodic and minor flood events (Purvis, 1991). Wave-ripple lamination indicates that wind speeds across the water-air interface are sufficient to generate oscillatory wind-ripples on the sediment-water surface (Mountney & Thompson, 2002). The undulose nature of bedding contacts can be interpreted as antecedent topography from the underlying facies (Desjardins et al., 2012) or induced by surface wave action (Martel & Gibling, 1991; Mountney & Thompson, 2002, Collinson & Mountney, 2019). |
| Structureless sandstone (Ss) | Red-cream argillaceous sandstone that forms 30-50 m wide and 0.5 to 1 m thick lenticular beds that are mostly structureless. When the facies top is preserved, poorly defined discontinuous asymmetrical ripple lamination can be observed. This facies is well cemented and bleached in some areas. The lower, concave-up bounding surface is commonly erosive and contains load casts and very sporadic rip-up clasts. No observable grading. | Episodic poorly channelised high sediment load non-Newtonian flows (Priddy & Clarke, 2020; Priddy *et al.,* 2021). Load casts at the base demonstrate rapid deposition onto a weaker substrate. Discontinuous ripples towards the top of the facies indicate waning of flow energy and sediment load, enabling lower flow regime deposition of minor bedforms. |
| Parallel-laminated siltstone (Sltpl) | Poorly consolidated, red-brown, poorly sorted, moderately rounded mud to siltstone interbedded with parallel laminated mudstone. At top of the facies, there is minor mottling and occasional poorly preserved vertical burrows. Minor evidence of cross cutting gypsum veins and nodules. | Suspension settling upon a flat surface. The mottling and burrowing are indicators of minor vegetation and habitation of deposited areas (Graziński & Uchman, 1994; Desjardins et al., 2012). |
| Parallel-laminated Gypsisol (Pgpl) | Brown to red in colour, poorly sorted, moderately rounded siltstone, Bkt horizon showing dark banding with minor mottling, some very thin gypsum lined horizontal lamination. Centimetre scale nodules of gypsum seen at the top of the horizon. By horizon, abrupt-smooth top bounding surface with By-Bkt horizon, pervasive satin-spar gypsum precipitation along parent laminations. Basal horizon, Bky is a nodular gypsum horizon with gypsum-filled slickensides, top bounding surface is abrupt-wavy. | Suspension settlement within calm shallow water creating parent sedimentary facies. Well drained gleyed vertic Gypsisol, deposited in an arid climate (Mack et al., 1993, Desjardins et al., 2012). Precipitation of evaporitic material from saline waters with mild illuviation of clay minerals in Bkt top horizon and lower Bky horizon (Tabor et al., 2017). This suggests periodic draw down of the water table, given the extensive presence of gypsum, the dominant process of draw-down is evapotranspiration. Vertic textures are produced by the high rate of evapotranspiration, leading to rapid shrink-swell contrasts (Milroy et al., 2018). |
| Ferrallitic Gleysol (Pfg) | Pale cream, poorly sorted, poorly consolidated sandstone with red/brown mottles throughout. Structureless, with no evidence of bioturbation and rooting. Grey concretions along the base of the facies. Due to its mottled appearance and nodular surface texture composed of amorphous sesquioxides, this facies is colloquially termed the ‘popcorn facies’ within the literature (Zuchuat *et al*., 2019). | Gleysol developed through fluctuating water table, not controlled by evapotranspiration, but the migration of interstitial waters leading to gleying and illuviation (Mack *et al.,* 1993, Desjardins et al., 2012, Tabor *et al.,* 2017). Quiescent periods of drainage lead to the development of amorphous nodular growth and mottled oxidisation (Buol & Eswaran, 1999). |
| Parallel-laminated inversely-graded siltstone (Slti) | Siltstone, inverse graded into very fine-grained sandstone towards the top of the unit. Parallel laminated with small fluctuations in grainsize between laminae. Grains are well-sorted and well-rounded and form beds of uniform thickness. Contacts between beds are slightly undulose and are typically poorly consolidated. | The grain size and contacts between the beds are strong indicators of suspension settlement within shallow-moderate depth water (Flemming, 2011). The difference in grain size suggests rapidly fluctuating energy levels or calibre of sediment falling out of suspension (Collinson & Mountney, 2018). However, the general reverse-grading trend also implies an increase in energy upwards, associated with a decrease in water depth or increase in flow speed. |
| Parallel-laminated sandstone (Spl) | Pink, very fine-grained sandstone that is well-sorted and moderately well-rounded. The grainsize coarsens upwards from very fine-grained at the base to fine-medium sand at the top. Beds typically thicken upwards, mostly parallel laminated internally. Facies are typically 1m thick showing parallel bedding with slightly undulose contacts between the beds. | Tractional laminations formed by turbulent flow at the limit between lower and upper flow regime . The reverse grading and thickening of the beds upwards implies a decrease in flow depth or increase in flow speed therefore increasing the transport capacity of the flow. |
| Wave-ripple-laminated sandstone (Srpl) | Light grey, moderately sorted, moderately rounded, very fine- to fine-grained sandstone. Uniform lamination turning into irregular interfingering ripple lamination, with evidence of bundled up-building and chevron style up-building. Variable directional asymmetrical ripple strata commonly juxtaposing one another, with undulating lower boundary sets and offshoot draping foresets. Some flame structures can be seen sporadically, although often relatively small (mm) in scale. There are also clear foresets that can be seen intersecting within the ripples themselves. | Wind action acting upon a water surface forms eddies which act upon suspension settled sand beds causing the ripple formation to gradually propagate upwards (Raff et al., 1977; Collinson & Mountney, 2019), creating wave ripples. |
| Wavy-bedded sandstone (Swb) | Light grey, moderately sorted, moderately- to well-rounded very fine- to fine-grained sandstone. Irregular undulous lamination with poorly preserved asymmetrical ripple forms. Siltstone laminations are present over ripple top bounding surfaces and basal set surfaces, preserving as siltstone in an undulous and wavy fabric. | Alternations of mud and sand reflect regular but long term (weeks to months) energy level variations in a lower flow regime setting (Allen, 1984), under which sinuous-crested ripples were migrating through tractional reworking of sediment (lower flow regime) (Baas et al., 2016). |
| Flaser-bedded sandstone (Sfb) | Grey, moderately to well sorted, moderately- to well-rounded fine-grained sandstone. Irregular undulous laminations of siltstone can be found throughout. Unidirectional trough cross-stratified forms can be seen throughout, draped on their foresets with siltstone (both single and double drapes). Base of the facies is characterised by double drapes, whereas simple drapes become more common upwards. | Unidirectional migration of sinuous-crested ripples through tractional reworking of sediment (lower flow regime), with mud drapes on the foresets of the sand ripples testify of abrupt drop in energy level, potentially reflecting tidal processes (Baas et al., 2016) |
| Unidirectional rippled to herringbone cross-stratified sandstone (Shcs) | Yellow-grey, moderately sorted, sub-rounded, argillaceous, very fine- to fine-grained sandstone. The internal structure at the top and base of the facies consists of occasional trough cross-stratification; however, internally a large percentage of the bedding can be identified as bidirectional trough cross-stratification. | Unidirectional to bidirectional migration of sinuous-crested ripples through tractional reworking of sediment (lower flow regime), with bidirectionality potentially reflecting tidal processes (Baas et al., 2016) |