

**Monday, April 13, 2020**

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**Spot Name: I-70 Roadcut**

Created: April 13, 2020

Last Modified: May 7, 2020

Images:

Measured Section Location and I-70 Road Cut Relationship:

Caption:

Image is a perspective view from an Uncrewed Aircraft System (UAS, DJI Phantom 3 Professional) toward the north, showing the outcrop exposure of the measured section and the relationship to the equivalent, nearly complete I-70 road cut.

Equivalent Carmel Measured Section Exposure:

Caption:

Image is a photopan of a roadcut on I-70 that shows the most of the equivalent portion of the measured section through the top Jurassic Navajo Sandstone (lower right) through Interval V (highest portion right of center) of the measured section. Road cut appears to be missing intervals W and X from measured section. Outcrop is ~150 m northeast from the measured section.

**Saturday, May 2, 2020**

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**Spot Name: Carmel Measured Section**

Created: May 2, 2020

Last Modified: May 11, 2020

**Spot Name: A**

Created: May 2, 2020

Last Modified: May 20, 2020

Notes:

Well-sorted, well-rounded, fine-grained quartz arenite. Large-scale (m-scale) trough cross-stratification that form eolian dune sets.

Surface Feature Type: Strat Interval

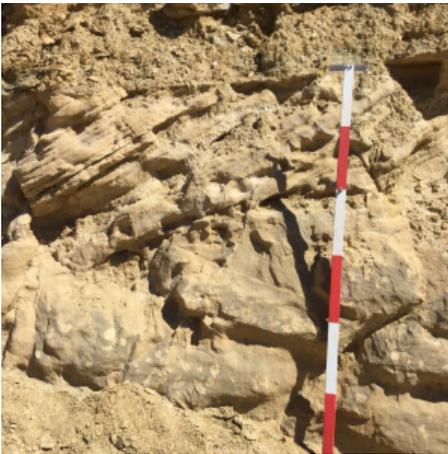
Images:

A2:



**Caption:**  
Hand-sample of interval A. Note the well-sorted texture.

**A1:**



**Caption:**  
Outcrop image from the uppermost portion of the Jurassic Navajo Sandstone showing 1) m-scale planar-tabular to trough cross-stratification within the eolian dune sets, and 2) the sharp, flat contact with the overlying Jurassic Carmel Formation (at the top of the Jacob's Staff). For scale, the Jacob's Staff is 1.5 m total, with 25 cm red or white color bands.

**Spot Name: B**

Created: May 2, 2020  
Last Modified: May 20, 2020

**Notes:**

Skeletal wackestone, with planar to wavy lamination, interbedded with carbonate mudstone. Lithology 1 (wackestone) accounts for ~80-90% of interval and on average is ~20 cm thick. Lithology 2 (mudstone) is ~10-20% of the interval and is 5-20 cm thick (average is ~10 cm).

Surface Feature Type: Strat Interval

Images:

**B1:**



**Caption:**

Image of Interval B. Note the interbedded and tabular-continuous nature of the interval. Coarser beds are planar to planar-wavy laminated, with some containing shell fragments (see hand-sample image). For scale, ~10 cm scale card at left center.

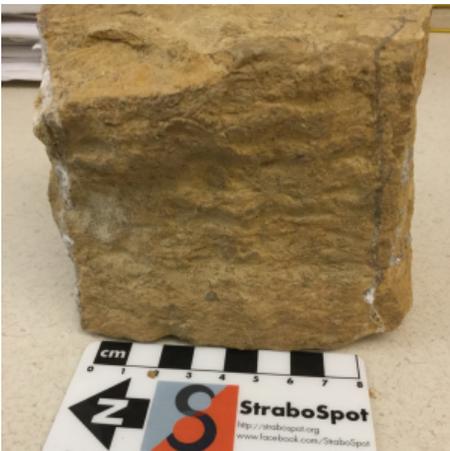
**B2:**



**Caption:**

Close-up view of beds in interval B.

**B3:**



**Caption:**

Hand-sample collected from bed of interval B. Note the shell fragments (near base) and the vertical calcite joint at right.

**Spot Name: C**

Created: May 2, 2020  
Last Modified: May 20, 2020

Notes:

Skeletal wackestone that contains minor lenses of mudstone. Proportion of mudstone increases up section, with the mudstone (lithology 2) accounting for ~20% of the interval.

Surface Feature Type: Strat Interval  
Images:

C1:



Caption:

Outcrop image of the uppermost Interval B (yellow-tan, planar laminated) and Interval C (planar laminated, to wavy bedded). Contains lenses of muddy sediment which become more abundant towards the top. Contains disarticulated bivalve shells and shell casts.

C2:



Caption:

Hand-samples from Interval C. The sample on the left contains bivalve shell casts and small burrows(?). The sample on the right contains a 2-3 mm calcite vein.

**Spot Name: D**

Created: May 2, 2020  
Last Modified: May 20, 2020

Notes:

Unexposed/covered interval

Surface Feature Type: Strat Interval

## Spot Name: E

Created: May 2, 2020

Last Modified: May 20, 2020

Notes:

Skeletal packstone, fossil content increases up to coquina in some areas.

Surface Feature Type: Strat Interval

Images:

E1:



Caption:

Outcrop image of Interval E. Note the flat top and bottom contacts, and tabular nature of the bed.

E2:



Caption:

Hand sample collected from Interval E. Note the shells/shell fragments.

## Spot Name: F

Created: May 2, 2020

Last Modified: May 20, 2020

Notes:

Unexposed/covered interval

Surface Feature Type: Strat Interval

## Spot Name: G

Created: May 2, 2020

Last Modified: May 20, 2020

### Notes:

Very fine calcareous sandstone interbedded with siltstone. Sandstone is ripple laminated. Interbed proportion does not change up-section and accounts for ~45% of the interval. The siltstone beds are 10 cm on average.

Surface Feature Type: Strat Interval

### Images:

#### G1:



#### Caption:

Close-up view of calcareous-sandstone beds of Interval G. Note the symmetric ripple lamination.

#### G2:



#### Caption:

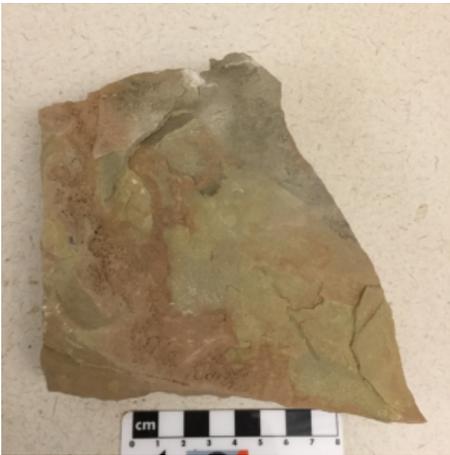
Zoomed-out view of photo G1. Note the poorly exposed nature of the silty interbeds, and the thickness variation of the sandstone bed.

#### G3:



**Caption:**  
Outcrop image of Interval G. Note the thin (~5-20 cm) calcareous-sandstone beds interbedded with recessive mudstone.

**G4:**



**Caption:**  
Top-down view of hand sample collected from Interval G.

**G5:**



**Caption:**  
Side view of hand sample from Interval G. Note the finely laminated, ripple-laminated structure.

**Spot Name: H**

Created: May 2, 2020  
Last Modified: May 20, 2020

**Notes:**

Consists of two thick beds (~30-40 cm) of carbonate grainstone. Contacts between beds are sharp and undulatory.

Surface Feature Type: Strat Interval  
Images:

H1:



**Caption:**  
Outcrop image of Interval H. Note the two thick beds that make up this interval, and that each bed contains faint horizontal lamination and exhibit undulatory top and bottom surfaces.

H2:



**Caption:**  
Top-down view of hand sample collected from Interval H.

H3:



**Caption:**

Side view of hand sample from Interval H. Note the massive/structureless nature of the sample.

**Spot Name: I**

Created: May 2, 2020

Last Modified: May 20, 2020

**Notes:**

Very fine calcareous sandstone, planar-laminated.

Surface Feature Type: Strat Interval

**Images:**

I1:



**Caption:**

Outcrop image of Interval I. Note the fine planar lamination.

I2:



**Caption:**  
Top-down view of hand sample collected from Interval I.

I3:



**Caption:**  
Side view of hand sample from interval I. Note the fine planar lamination and the tan color of the fresh face.

## Spot Name: J

Created: May 2, 2020  
Last Modified: May 20, 2020

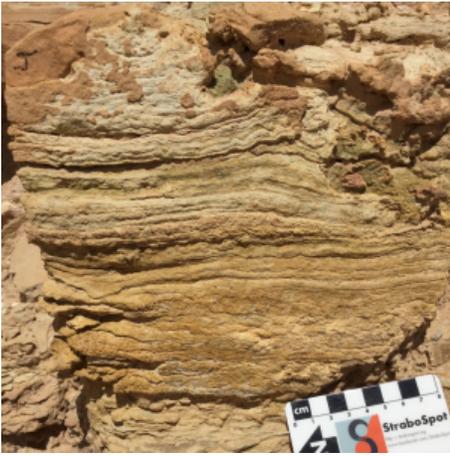
Notes:

Mudstone

Surface Feature Type: Strat Interval

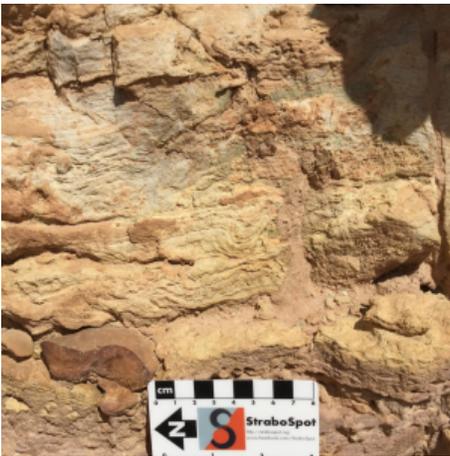
Images:

J1:



**Caption:**  
Outcrop image of Interval J. Image shows the planar lamination to wavy "crinkled" lamination and possibly soft sediment deformation towards top.

**J2:**



**Caption:**  
Outcrop image of Interval J showing lamination and soft sediment deformation.

**J3:**



**Caption:**  
Top-down view of hand sample from Interval J.

J4:



**Caption:**

Side-view of hand sample from Interval J.

## Spot Name: K

Created: May 2, 2020

Last Modified: May 20, 2020

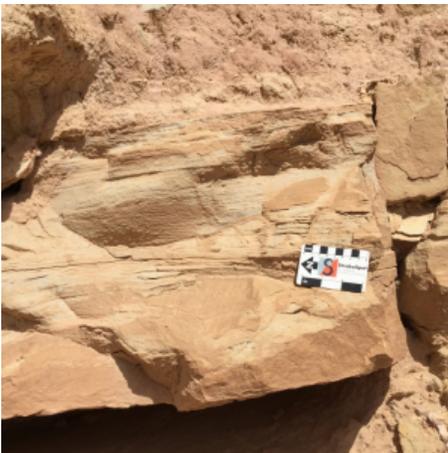
**Notes:**

**Mudstone**

**Surface Feature Type: Strat Interval**

**Images:**

K1:



**Caption:**

Outcrop image of Interval K, showing the planar to swaley/low-angle laminated structure that is faint towards the base and become more defined towards the top. Note also the sharp contact with the overlying Interval L.

## Spot Name: L

Created: May 2, 2020

Last Modified: May 20, 2020

**Notes:**

**Carbonate grainstone**

# STRABOSPOT FIELD BOOK

Surface Feature Type: Strat Interval

Images:

L1:



**Caption:**  
Outcrop image of Interval L.

L2:



**Caption:**  
Top-down view of hand sample collected from Interval L.

L3:



**Caption:**  
Side-view of hand sample from Interval L.

**Spot Name: M**

Created: May 2, 2020  
Last Modified: May 20, 2020

**Notes:**

Consists of two thick beds of planar-laminated very fine-grained calcareous sandstone.

Surface Feature Type: Strat Interval  
Images:

M1:



**Caption:**

Outcrop image of Interval M. Note the thick-bedded (20-30 cm) nature of this package composed of 2 main beds. Pitted weathering in upper bed possibly indicates bioturbation.

M2:



**Caption:**

Top-down view of hand sample collected from Interval M. Note the grey fresh color.

M3:



**Caption:**  
Side-view of hand sample collected from Interval M. Note the finely laminated structure and grey fresh color.

## Spot Name: N

Created: May 2, 2020  
Last Modified: May 20, 2020

### Notes:

Thick beds of calcareous very fine-grained sandstone interbedded with brick red siltstone.

Surface Feature Type: Strat Interval  
Images:

### N1:



**Caption:**  
Outcrop image of Interval N and Interval O. Note the interbedded nature of the interval consisting of calcareous sandstone interbedded with siltstone. For scale, note the ~10 cm scale card near the center of the image.

### N2:



**Caption:**  
Close-up view of sandstone in Interval N showing 5-6 mm wide gypsum veins oriented primarily parallel to bedding.

**N3:**



**Caption:**  
Hand samples collected from Interval N.

**N4:**



**Caption:**  
Close-up of hand sample 1 from Interval N showing gypsum vein.

**N5:**



**Caption:**  
Close-up of hand sample 2 from Interval N showing gypsum vein.

## Spot Name: O

Created: May 2, 2020  
Last Modified: May 20, 2020

**Notes:**

Mudstone

Surface Feature Type: Strat Interval  
Images:

O1:



**Caption:**  
Outcrop image showing spheroidal-weathering mudstone with gypsum veins.

O2:



**Caption:**  
Close-up image of Interval O showing the massive/structureless mudstone with 3-5 mm gypsum veins.

O3:



**Caption:**  
Image of hand sample collected from Interval O, from the uppermost portion of the interval at the contact with the overlying interval P.

## Spot Name: P

Created: May 2, 2020  
Last Modified: May 20, 2020

Notes:

Nodular gypsum

Surface Feature Type: Strat Interval

Images:

P1:



**Caption:**  
Outcrop image of Interval P up to Interval Q (Interval Q-R contact at top of image). Note the poor exposure and for scale refer to ~10 cm scale card near the center of the photo.

**P2:**



**Caption:**  
Close-up image of Interval P showing the nodular nature of the gypsum.

**P3:**



**Caption:**  
Close-up image of Interval P showing the nodular nature of the gypsum.

P4:



**Caption:**  
Top-down view of hand sample collected from Interval P.

P5:



**Caption:**  
Side view of hand sample collected from Interval P.

## Spot Name: Q

Created: May 2, 2020

Last Modified: May 20, 2020

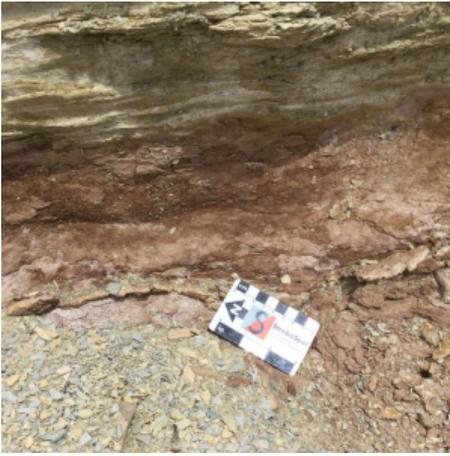
Notes:

Mudstone

Surface Feature Type: Strat Interval

Images:

Q1:



**Caption:**

Outcrop image of Interval Q showing the brick red color and massive/structureless nature of the bulk of the Interval, with a thin (2-3 cm) sand layer towards the bottom and possibly faint horizontal lamination towards top.

**Spot Name: R**

Created: May 2, 2020

Last Modified: May 20, 2020

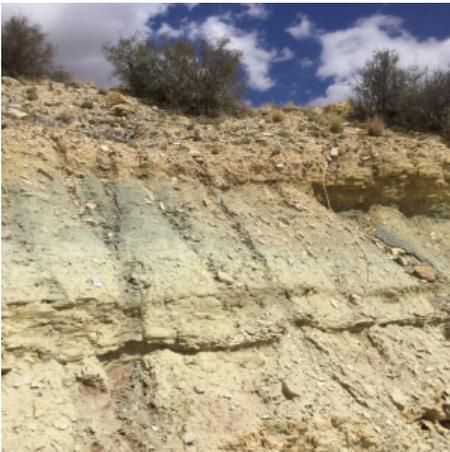
**Notes:**

Siltstone

Surface Feature Type: Strat Interval

**Images:**

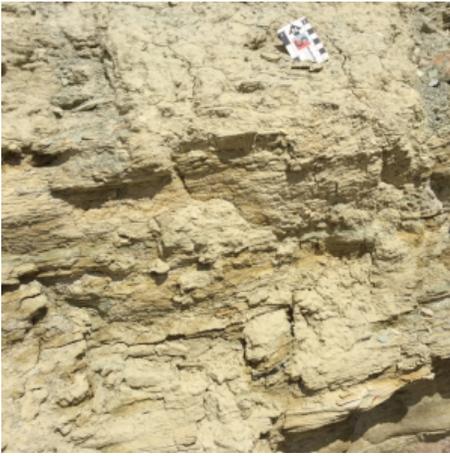
R1:



**Caption:**

Outcrop image of Intervals Q-S: Q is poorly exposed red mudstone in lower left; R is tan planar laminated-bedded siltstone that fines upward to the poorly exposed medium-grey siltstone to mudstone; and S is the tan planar bedded siltstone in the upper third of the outcrop.

R2:



**Caption:**  
Close-up view of Interval R showing the planar laminated structure.

**R3:**



**Caption:**  
Additional close-up view of Interval R.

**R4:**



**Caption:**  
Top down view of hand samples from Interval R

**R5:**



**Caption:**  
Side-view of hand samples from interval R. Note the planar laminated to ripple(?) laminated structure.

## Spot Name: S

Created: May 2, 2020  
Last Modified: May 20, 2020

**Notes:**

Siltstone

Surface Feature Type: Strat Interval  
Images:

S1:



**Caption:**  
Outcrop image of Interval S, showing the planar laminated-bedded structure of the interval.

S2:



**Caption:**  
Close-up view from image S1.

**S3:**



**Caption:**  
Top-down view of hand samples collected from Interval S. Note the faint burrow structures(?) that occur on the surface of the two left samples.

**S4:**



**Caption:**  
Side view of hand sample from Interval S.

**Spot Name: T**

Created: May 2, 2020  
Last Modified: May 20, 2020

**Notes:**

Thin-bedded planar-laminated to bedded and ripple laminated carbonate mudstone.

Surface Feature Type: Strat Interval  
Images:

T2:



**Caption:**  
Close-up view of image T1, showing the laminated to thinly bedded and ripple-laminated structure.

T1:



**Caption:**  
Outcrop image of the uppermost portion of Interval S, Interval T, and the lowermost portion (planar bedded) of Interval U. Note the undulatory lower contact between Interval S and T, and the sharp contact between T and U. The change in bed thickness marks the transition to Interval U.

T3:



**Caption:**  
Top-down view of hand sample collected from Interval T.

T4:



**Caption:**  
Side view of hand sample from Interval T.

## Spot Name: U

Created: May 2, 2020

Last Modified: May 20, 2020

### Notes:

Thin-bedded planar to wavy to ripple laminated carbonate mudstone. Contains the silt-draped ripples and oxidation rinds. Also exhibits a vuggy texture.

Surface Feature Type: Strat Interval

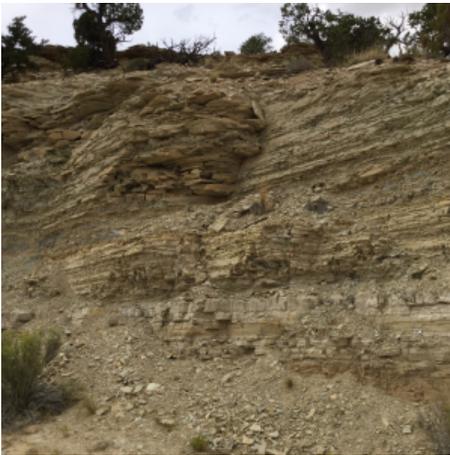
### Images:

U1:



**Caption:**  
Outcrop image of Interval U, showing the overall package of beds including the silt-draped ripples (near the scale card).

**U2:**



**Caption:**  
Zoomed-out view of photo U1 showing the thin-bedded nature of the Interval and the variability in bed thickness and weathering profile.

**U3:**



**Caption:**  
Side-view of hand sample collected from Interval U. Note the planar to wavy lamination, the ripple-laminated top, and the vuggy texture.

U4:

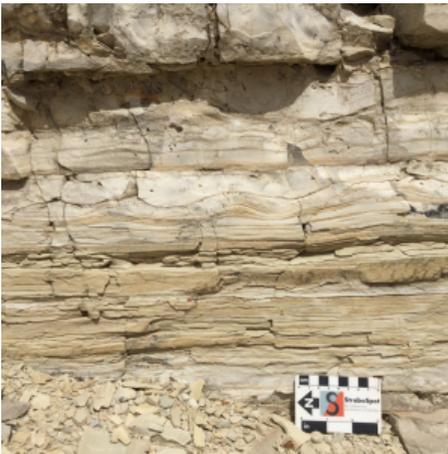


**Caption:**  
Additional side-view of hand sample collected from Interval U showing a fresh face of the carbonate mudstone.

## Spot Name: Draped Ripples

Created: May 2, 2020  
Last Modified: May 20, 2020  
Longitude: 18.785864  
Latitude: 552.317652  
Images:

Draped Ripples 1:



**Caption:**  
Outcrop image showing the symmetric ripples draped by siltstone.

Draped Ripples 2:



**Caption:**  
Close-up view of draped ripples.

## **Spot Name: Oxidation Rinds**

Created: May 2, 2020  
Last Modified: May 20, 2020  
Longitude: 18.556072  
Latitude: 582.457444  
Images:

### Oxidation Rinds 3:



**Caption:**  
Additional outcrop image of the oxidation rinds.

### Oxidation Rinds 2:



**Caption:**

**Additional outcrop image showing the oxidation rinds defined by the tan coloration that surrounds grey coloration. Coloration is parallel to bed boundaries and joints, possibly indicating boundaries and joints acted as preferential fluid flow pathways for oxidizing fluids in late diagenesis.**

**Oxidation Rinds 1:**



**Caption:**

**Outcrop image showing the oxidation rinds (tan coloration surrounding grey). Tan coloration seems to coincide with vertical and horizontal joints, though coloration patterns cross-cut lithology in the lower third of the photo.**

**Spot Name: V**

Created: May 2, 2020

Last Modified: May 20, 2020

**Notes:**

Planar to wavy/lenticular bedded carbonate mudstone with faint planar lamination and ripple lamination.

Surface Feature Type: Strat Interval

Images:

V1:



**Caption:**  
Outcrop image of Intervals V and W. Note the dm-scale beds that make up this package.

**V2:**



**Caption:**  
Close-up image of image V1 showing the planar to wavy/lenticular bedding.

**V3:**



**Caption:**  
Additional close-up image of Interval V. Showing the faint planar internal lamination, and planar to lenticular scour surfaces that separate beds.

V4:



**Caption:**  
Top-down view of hand sample collected from Interval V.

V5:



**Caption:**  
Side-view of hand sample collected from Interval V.

V6:



**Caption:**  
Additional side-view of hand sample collected from Interval V. Arrow indicates stratigraphic up, and also points to ripple crest on upper surface.

**Spot Name: W**

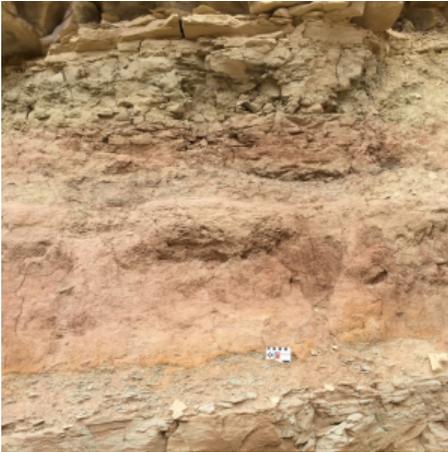
Created: May 2, 2020  
Last Modified: May 20, 2020

Notes:

Red to grey mudstone-siltstone.

Surface Feature Type: Strat Interval  
Images:

W1:



**Caption:**  
Outcrop image of Interval W, showing color horizons contained within the mudstone-siltstone interval.

W2:



**Caption:**  
Close-up view of Interval W showing an internal surface between the lowermost grey mudstone-siltstone and red mudstone-siltstone, at the orange coloration.

W3:



**Caption:**  
Additional outcrop image of Interval V-X, showing the sharp boundaries between the intervals.

## Spot Name: X

Created: May 2, 2020  
Last Modified: May 20, 2020

**Notes:**

Medium- (at base) to thin-bedded (up-section) massive/structureless carbonate mudstone.

Surface Feature Type: Strat Interval  
Images:

X1:



**Caption:**  
Outcrop image of Interval W and X. Note the sharp contact between the two intervals and the change in bed thickness at the base (20-30 cm) to the top (5-10 cm). For scale, image contains a ~10 cm scale card towards lower right corner.

X2:



**Caption:**  
**Top-down view of hand sample collected from Interval X.**

**X3:**



**Caption:**  
**Side-view of hand sample from Interval X. Note the lack of internal lamination.**