Tectonic Controls on Eocene Deltaic Architecture, Jaca Basin, Spanish Pyrenees

Volume 2

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2005

Thesis submitted for the degree of Doctor of Philosophy

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Total materials: 1 printed volume and 1 CD

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Appendix I:

Key for Logs

Appendix I: Key for Logs

This key describes the meanings of all the colours, patterned fills and symbols used on the summary logs (Appendix II) and the graphic logs (Appendix III). Two different coloured fills were used for each lithofacies. Those with a lithology pattern were used on the larger-scale graphic logs, to emphasise the relationship between lithology and facies; those with just plain colour were used on the smaller-scale summary logs, for clarity.

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Key for Logs

Facies associations

- FA1: offshore marine marls
- FA2: offshore–transtion zone marls and sandstones
- FA3: lower shoreface sandstones
- FA4: upper shoreface and delta front sandstones
- FA5: proximal delta front channelised sandstones
- FA6: marginal marine clays and sandstones
- FA7: carbonate ramp limestones
- FA8: tidal flat sandstones
- FA9: fan delta front conglomerates
- FA10: alluvial fan conglomerates
- FA11: fluvial sandstones and floodplain fines
- FA12: fluvial sandstones and red soils

Lithofacies

- Pure marls facies
- Silty and sandy marls facies
- Marly silts and sandstones facies
- Very fossiliferous sandy marls and sandstones facies
- Fine, well bioturbated sandstones facies
- Intensively symmetrically rippled sandstones facies
- Medium, cross-laminated sandstones facies
- Coarse, cross-bedded sandstones facies
- Bioclastic limestones facies
- Sandy bioclastic limestones facies
- Coral limestones facies
- Parallel-laminated sand stones facies
- Matrix-supported conglomerates facies
- Clast-supported conglomerates facies
- Grey and yellow clays and silts facies
- Brightly coloured clays and silts facies
- Very fine, colour-mottled sandstones facies
- Symmetrically rippled, coloured sandstones facies
- Fine, cross-laminated coloured sandstones facies
- Medium, cross-bedded coloured sandstones facies

Lithologies

- Marl
- Marls and clays
- Claystone
- Marls and silts
- Clays and silts
- Siltstone
- Marls and sands
- Clays and sands
- Marls, silts and sands
- Clays, silts and sands
- Silts and sands
- Sandstone
- Conglomerate
- Breccia
- Sandy breccia
- Marly limestone
- Silty limestone
- Silty and sandy limestone
- Sandy limestone
- Limestone

Sedimentary structures

- Thinly-bedded
- Channel-like form to bed
- Symmetrical ripples
- Asymmetrical ripples
- Asymmetrical dunes
- Parallel laminated
- Planar cross-laminated
- Trough cross-laminated
- Planar cross-bedded

	Trough cross-bedded		Groove casts on base of bed		Load structures
	Herringbone cross-laminated		Flute casts on base of bed		General wet sediment deformation
	Flaser bedding		Dessication cracks	to	Structures are transitional between two types

Sediment colour and composition

G	Grey coloured	R	Red coloured	M	Rich in muscovite
Y?	Very pale yellow coloured	RR	Very strong red coloured	C	Chert grains
Y	Yellow coloured	Gn	Green coloured		Hollow, spherical iron rich nodules
O	Orange coloured	R/Y/G	Colour mottling between these colours	Cr	Sandstone is well cemented
R?	Very pale red coloured	R&Y&G	Bed is a mixture of these colours		

Clasts

	Small pebbles (4 – 10 mm)		Cobbles (64 – 256 mm)		Large rip-up clasts (30 – 64 mm)
	Medium pebbles (10 – 30 mm)		Small rip-up clasts (4 – 10 mm)		Cobble-sized rip-up clasts (64 – 256 mm)
	Large pebbles (30 – 64 mm)		Medium rip-up clasts (10 – 30 mm)		Pebble horizon

Trace fossils and fossils

	General bioturbation		*Chlamys*-type bivalves; fragmented; heavily fragmented		*Gryphaea*
	Burrows		Oysters; fragmented		*Alveolina*
	Estrellichnus jacaensis traces		Echinoids; fragmented		Oyster colony
	Ophiomorpha rudis traces		Miscellaneous foraminifera; fragmented		Colonial corals; fragmented
	Worm tubes		Bryozoans		Solitary corals
	Miscellaneous shells; fragmented; heavily fragmented		Bivalves		Plant debris
	Nummulites; fragmented; heavily fragmented		Gastropods		

Miscellaneous

?	Probable feature / poorly exposed bed		Formation boundary	3XX1-12	Photographs
??	Possible feature / very poorly exposed bed	3XX01	Sandstone sample, taken for compositional analysis	30 090	Strike and dip reading
or	Feature observed could be of one type or another	3XX02*f*	Fossil sample, taken for identification	90 150	Strike and dip reading from a vertical bed
	Vertical gradation between two particular features	3XX03*c*	Clay sample	80 060	Strike and dip reading from an overturned bed

Appendix II:

Summary Logs

Appendix II: Summary Logs

These summary logs have been are drawn at a vertical scale of 1 cm = 40 m, which represents a 10-times vertical compression of the original field logs. They are intended to clearly show the general trends of each particular section. For clarity, the facies have been simplified by eliminating or amalgamating discrete facies packages of less than 1.2 m thickness, and facies associations have been interpreted (Chapter 3). Only the most important notes and symbols have been included, for example those describing marker beds or constraining formation boundaries. Some palaeocurrent rose diagrams have been merged into one figure.

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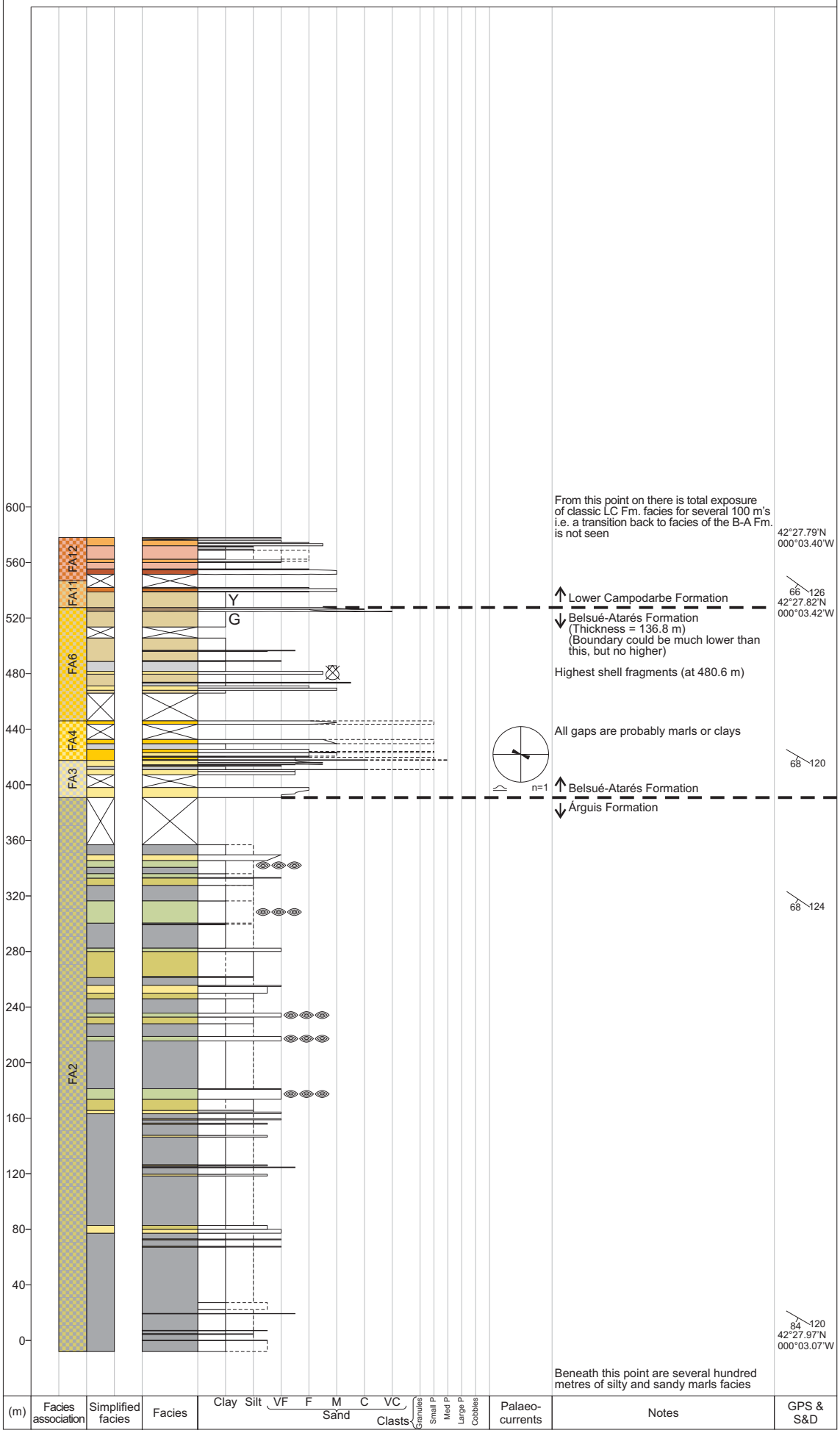
Sector: Far NE Jaca Basin	**Albella**	Page: 1 of 1
Date Logged: 14/6/03	**Summary Version**	Logged By: Jamie Moss



Sector: Far NE Jaca Basin	**Ligüerre de Ara** **Summary Version**	Page: 1 of 1
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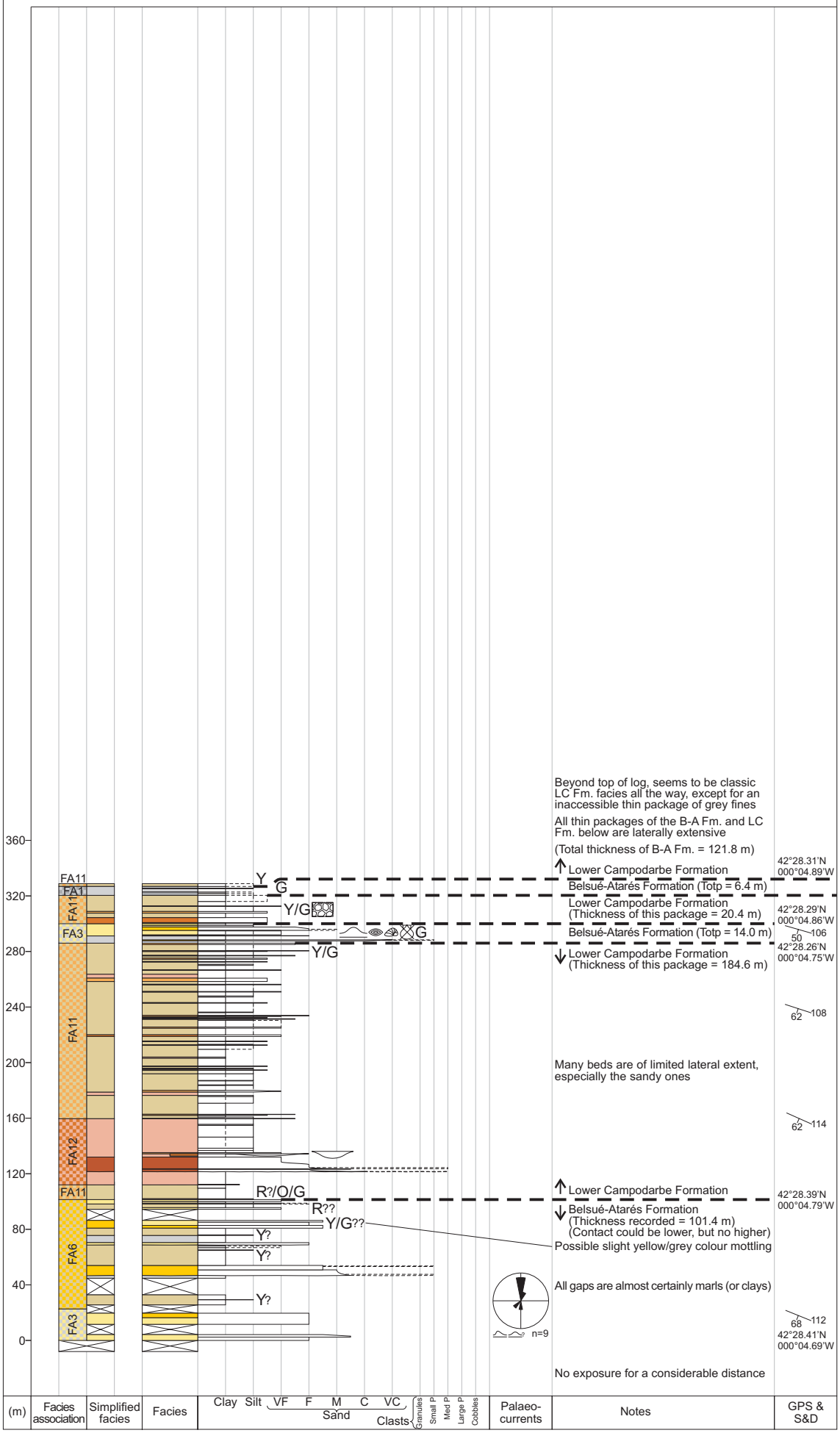
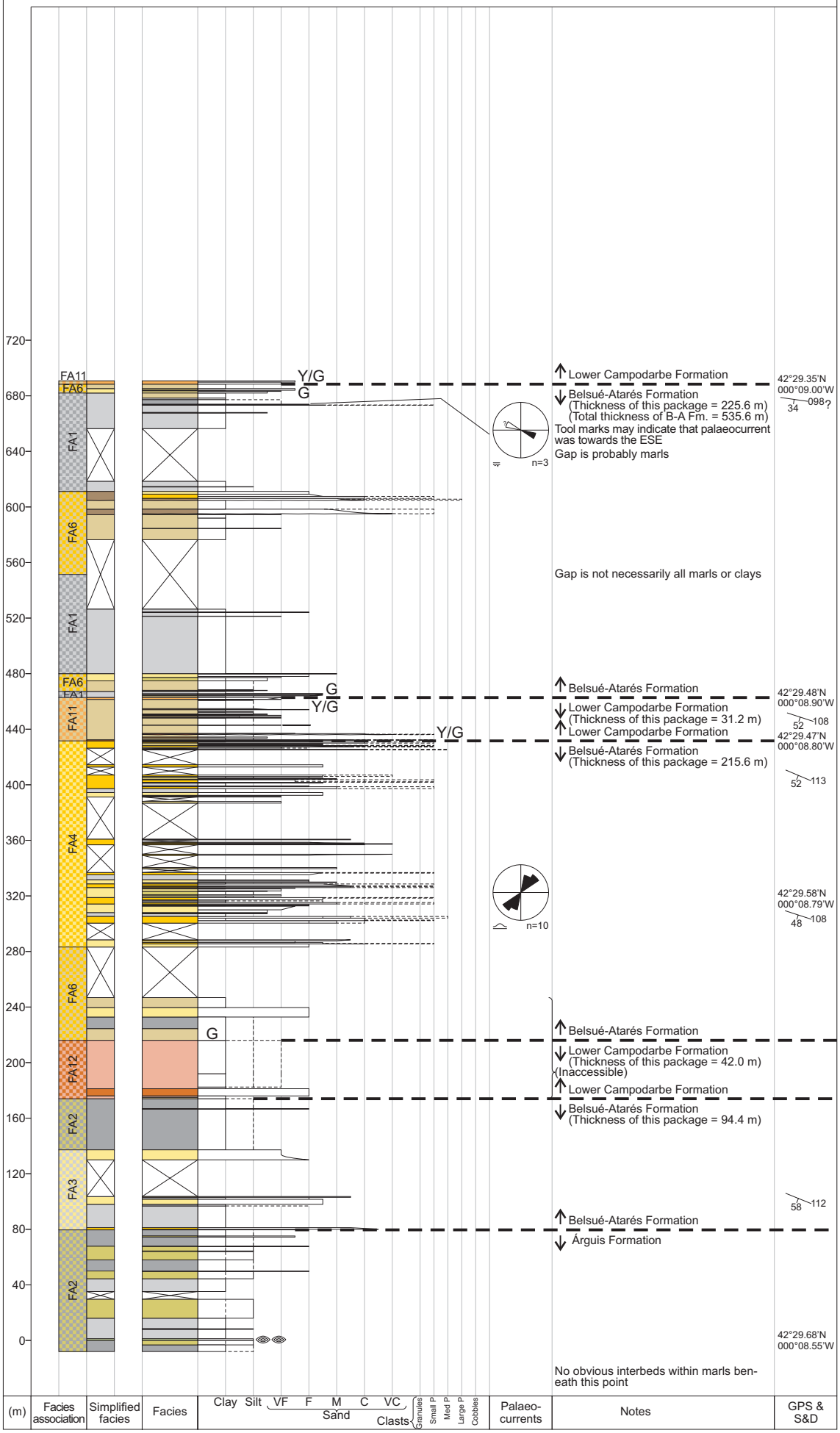


Sector: Far NE Jaca Basin	**Lardiés**	Page: 1 of 1
Dates Logged: 16-17/6/03	**Summary Version**	Logged By: Jamie Moss



Sector: NE Jaca Basin	**Fablo**	Page: 1 of 1
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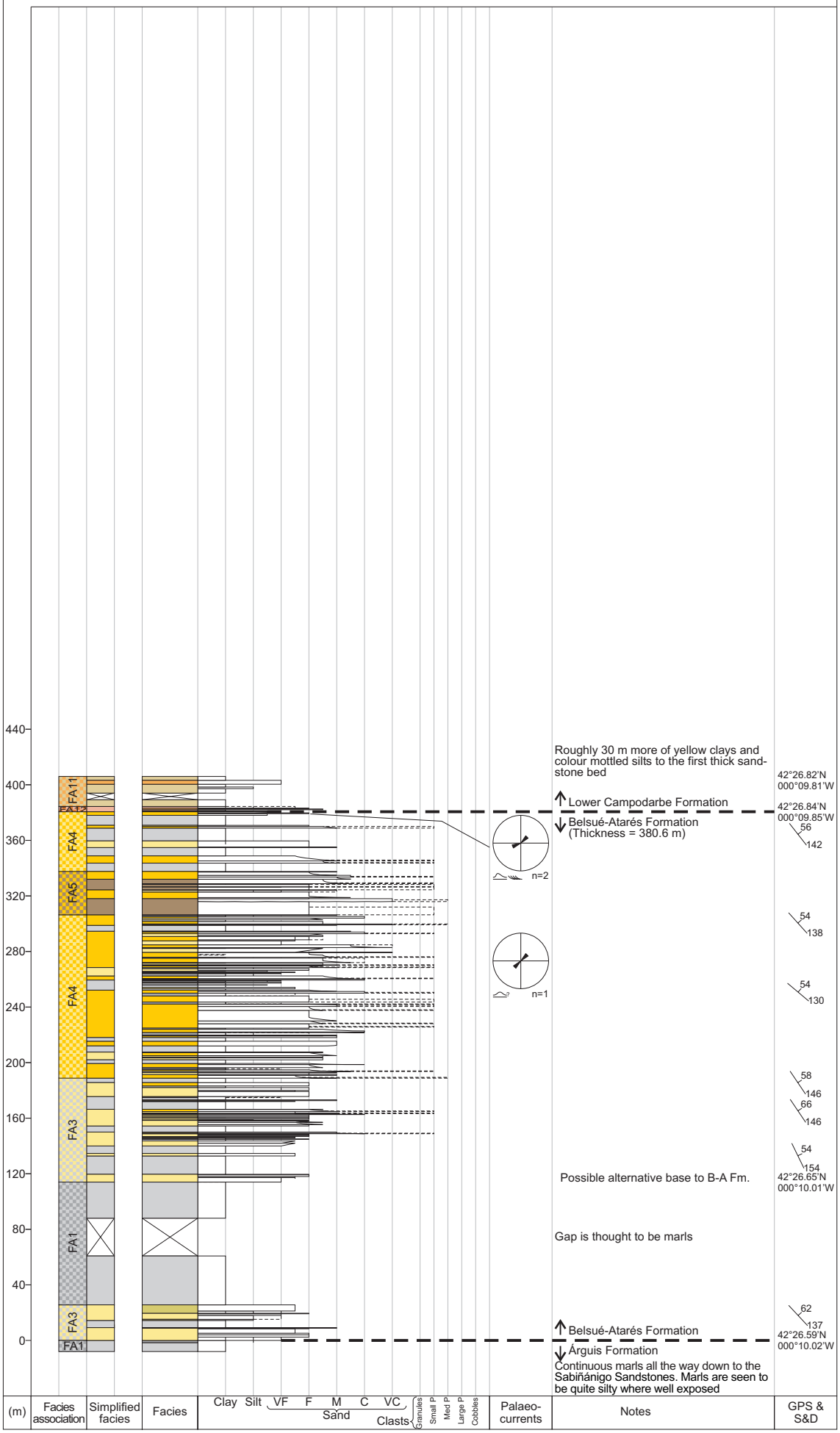

Sector: NE Jaca Basin	**Fanlillo**	Page: 1 of 1
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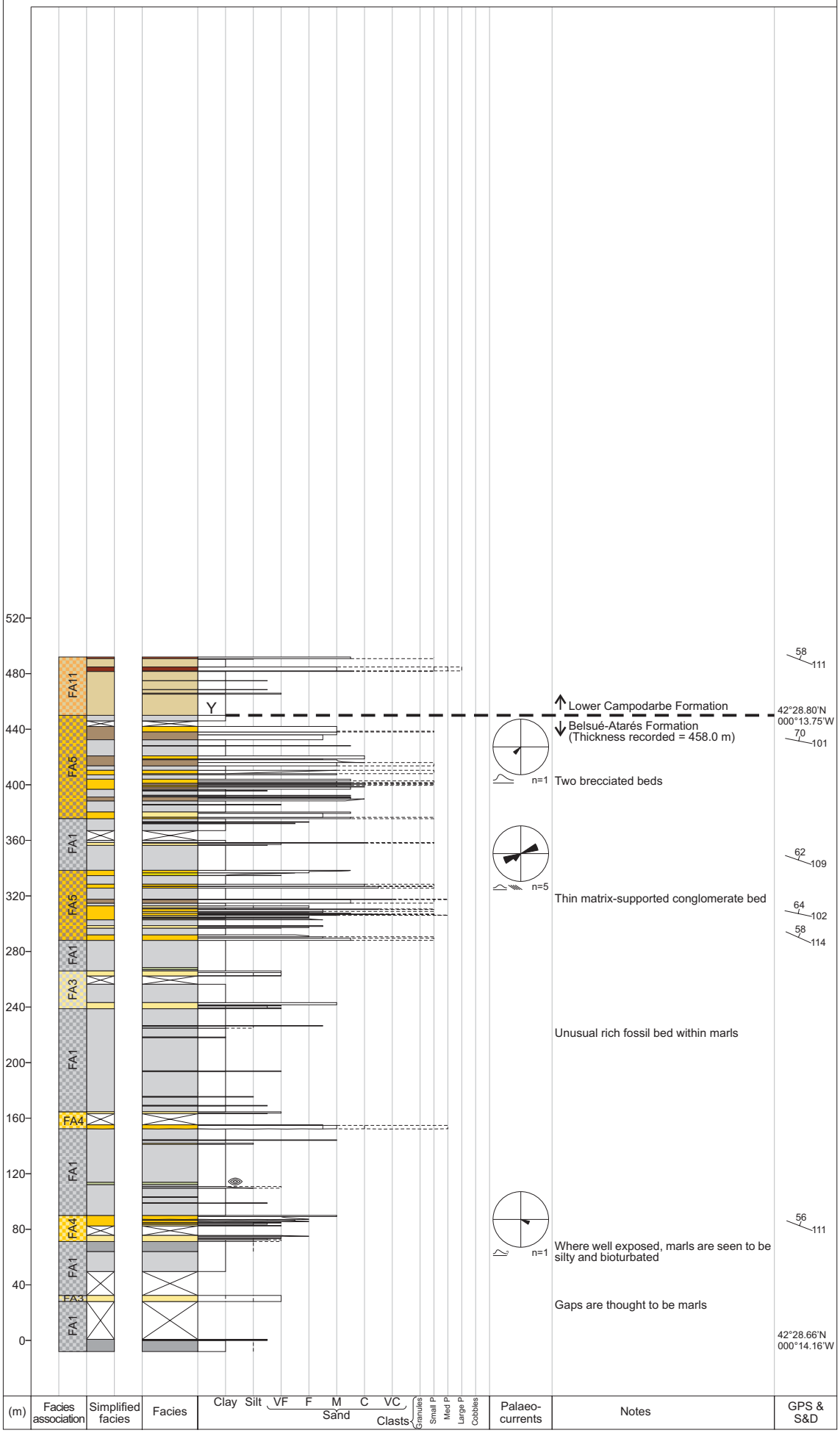

Sector: NE Jaca Basin	**Yebra de Basa**	Page: 1 of 1
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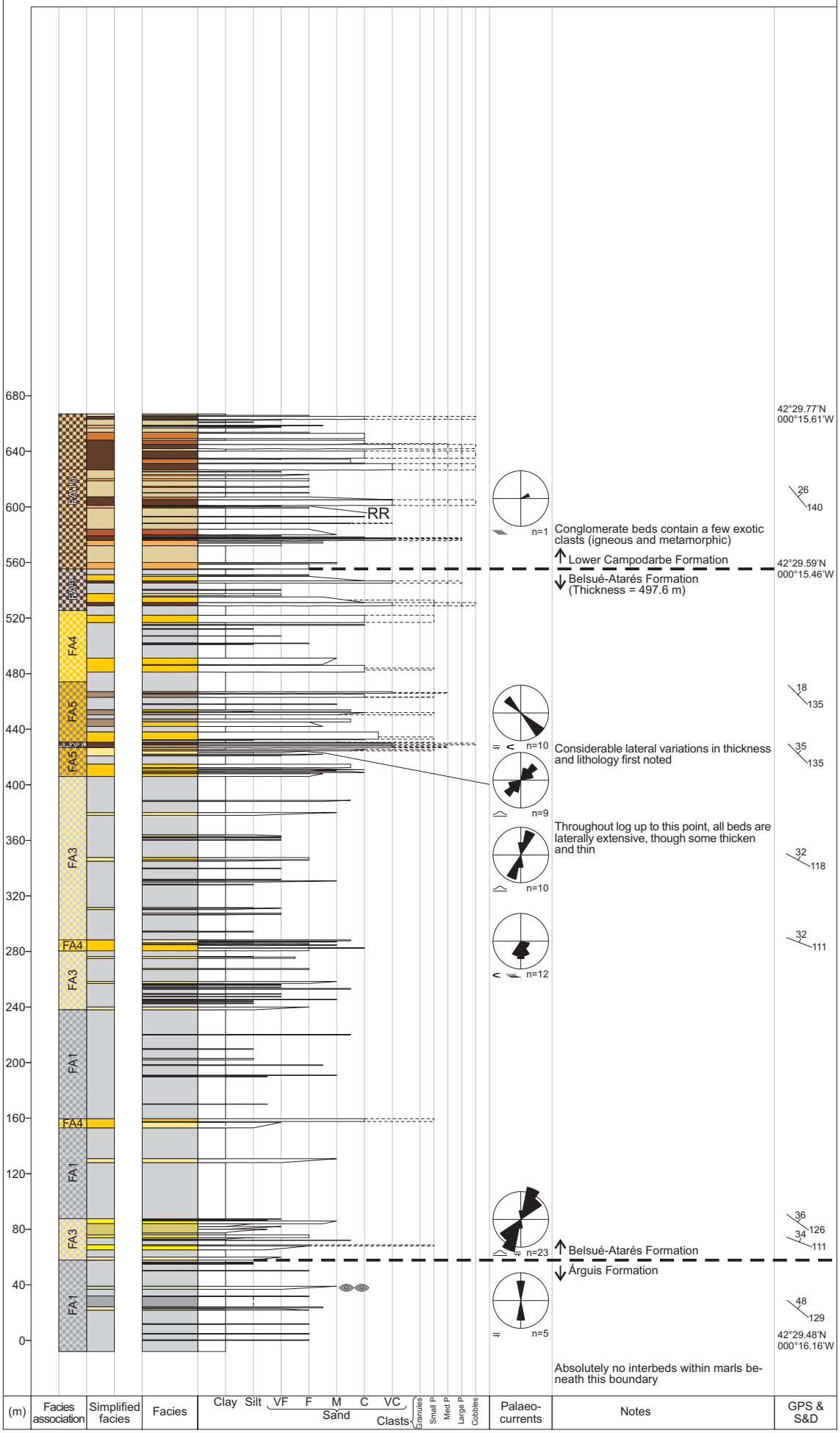
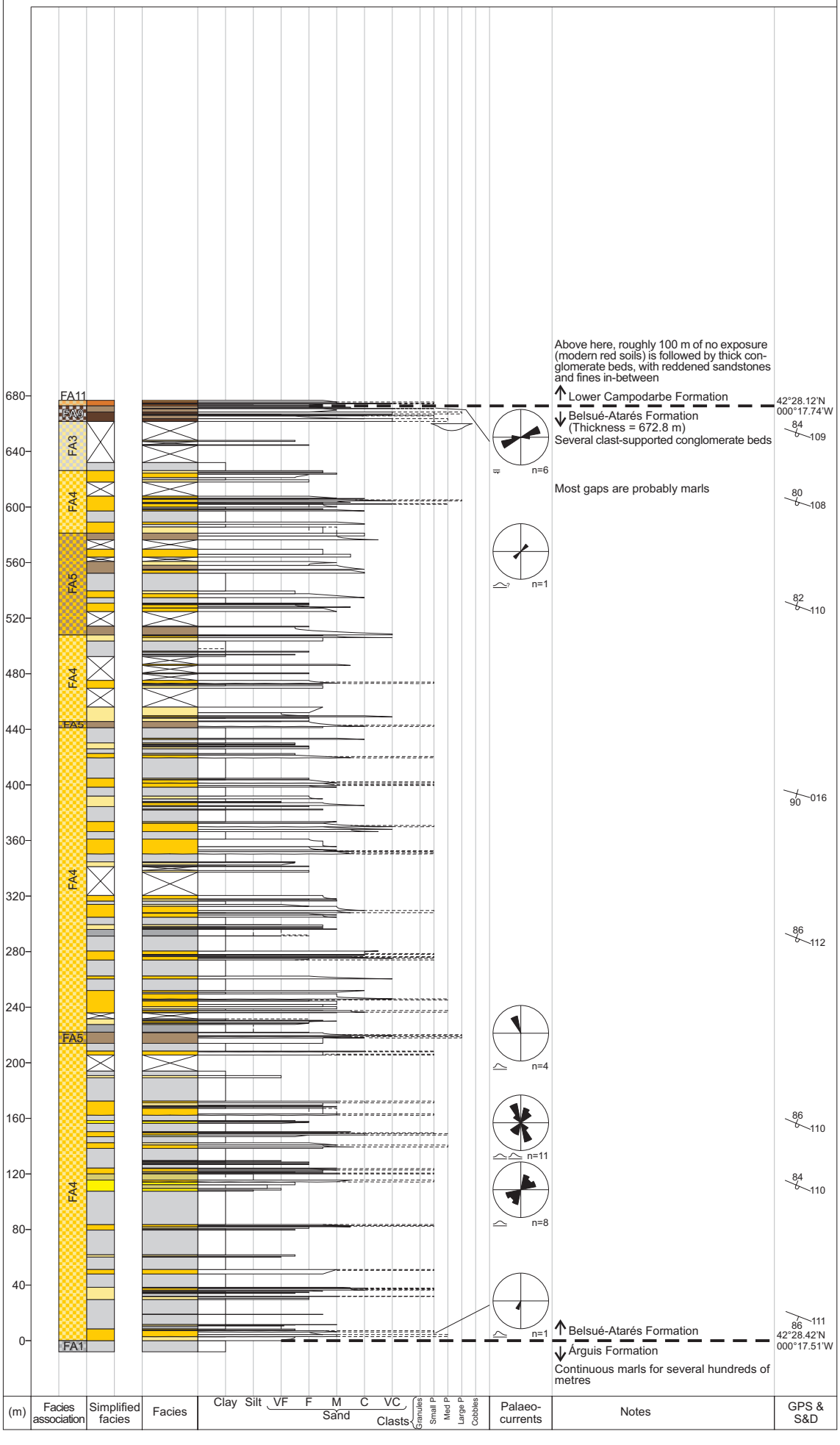
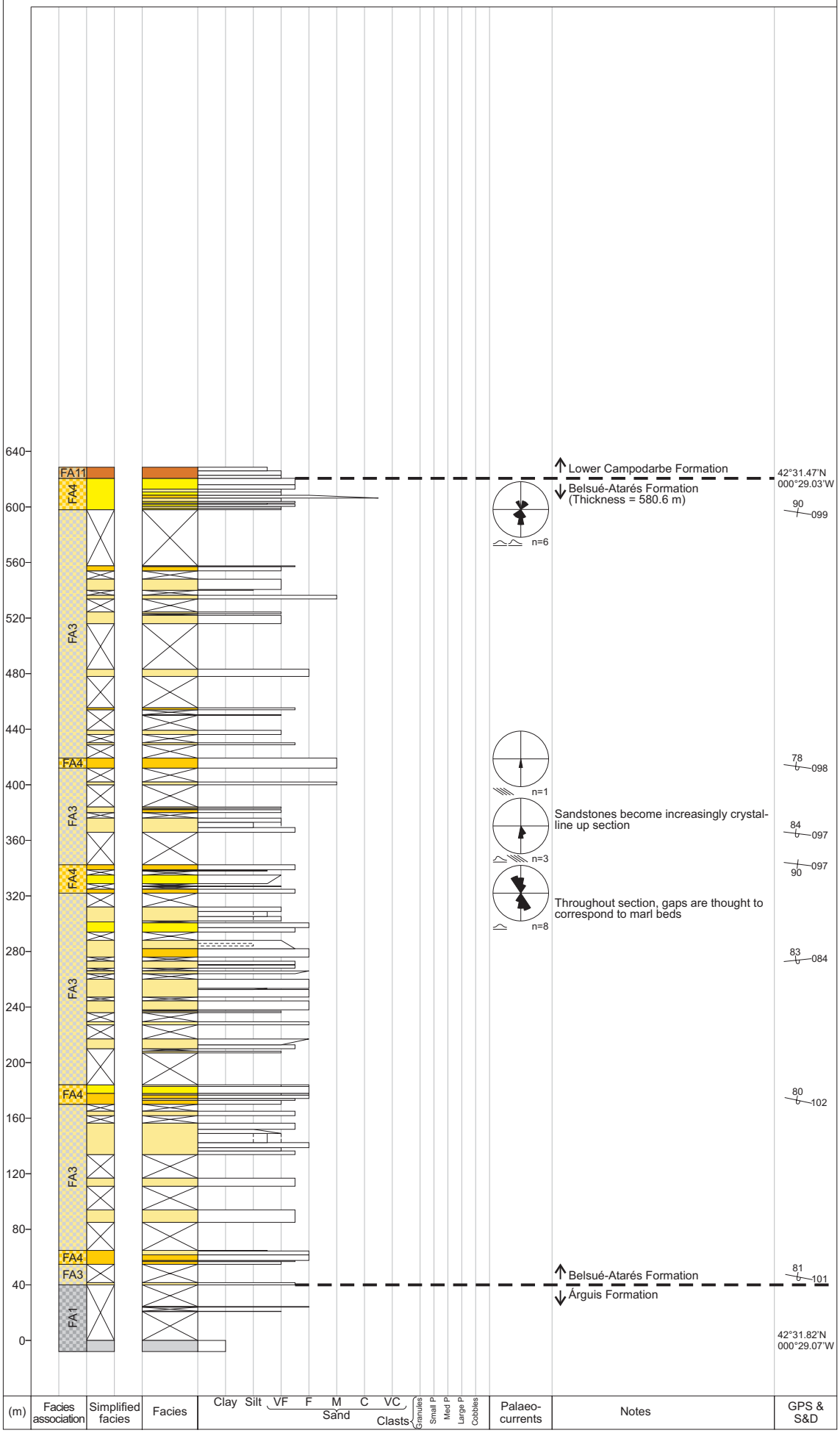


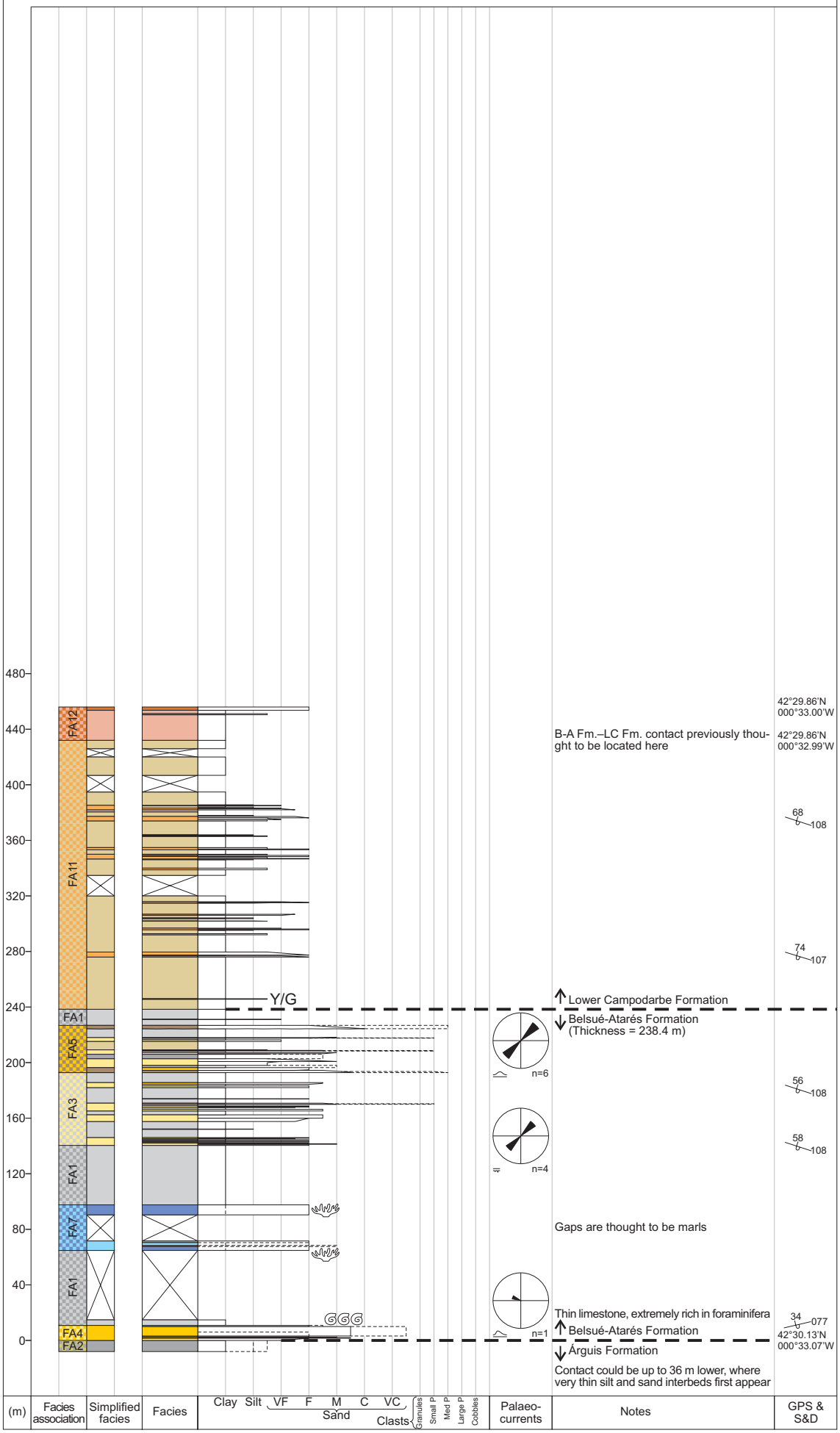
Sector: NE Jaca Basin	**San Julián de Basa**	Page: 1 of 1
Dates Logged: 29-31/5/03	**Summary Version**	Logged By: Jamie Moss



Sector: Northern Jaca Basin	**Navasa**	Page: 1 of 1
Dates Logged: 19/5/02 & 6/5/03	**Summary Version**	Logged By: Jamie Moss & Stuart Jones



Sector: Northern Jaca Basin	**Bernués**	Page: 1 of 1
Dates Logged: 10-11/5/03	**Summary Version**	Logged By: Jamie Moss



Sector: Northern Jaca Basin	**Peña Oroel**	Page: 1 of 1
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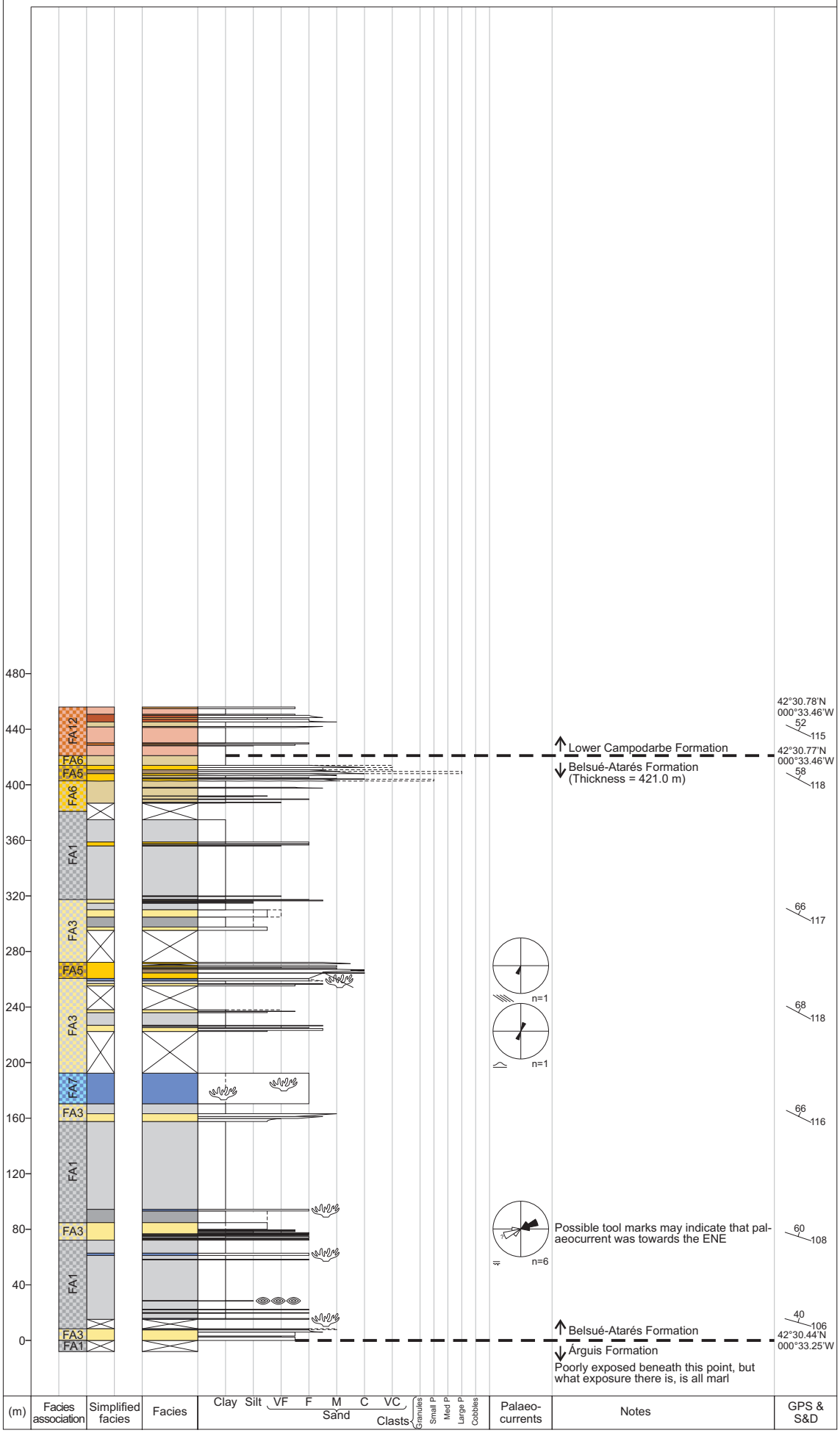

Sector: Northern Jaca Basin	**Jaca**	Page: 1 of 1
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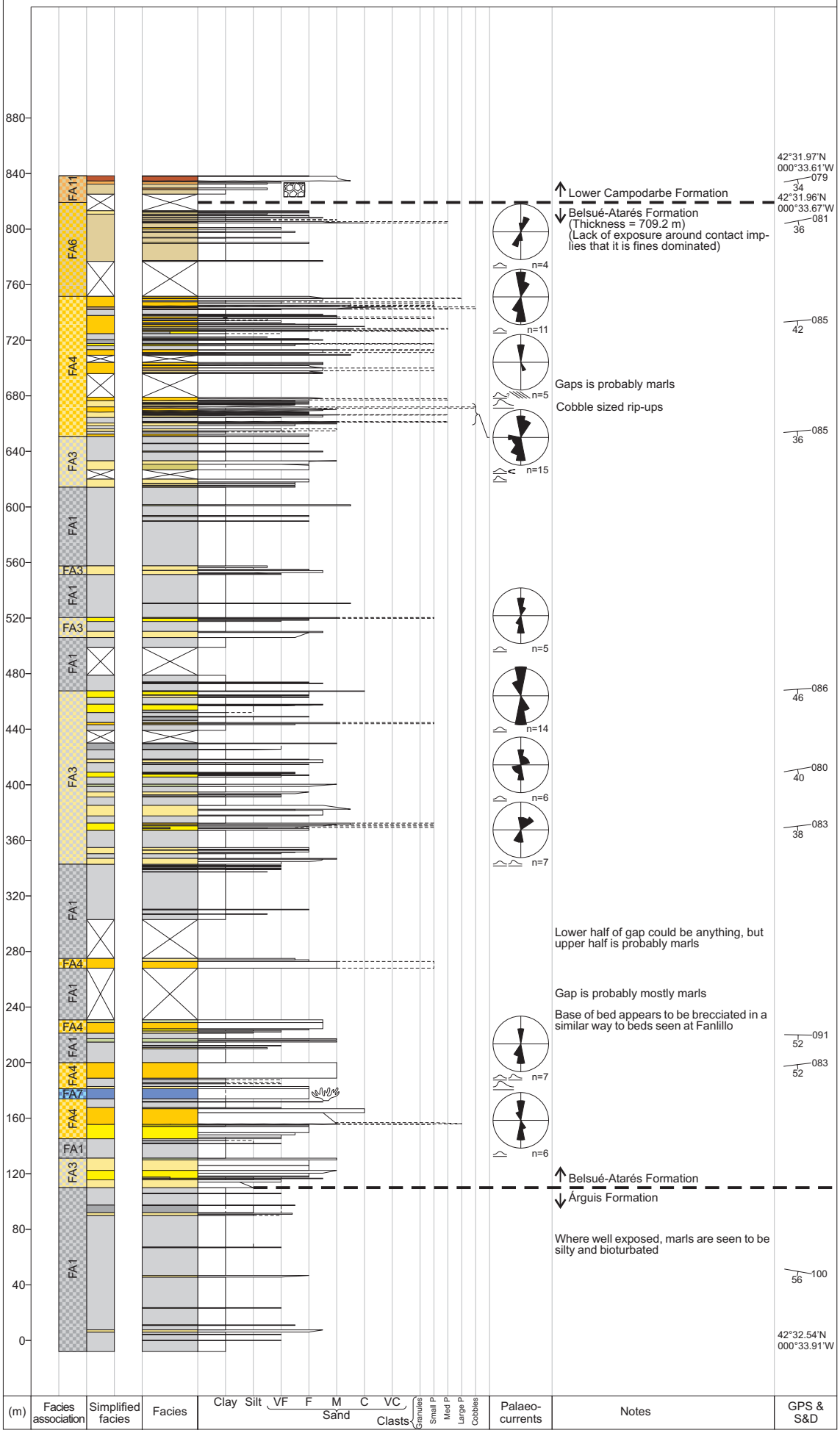
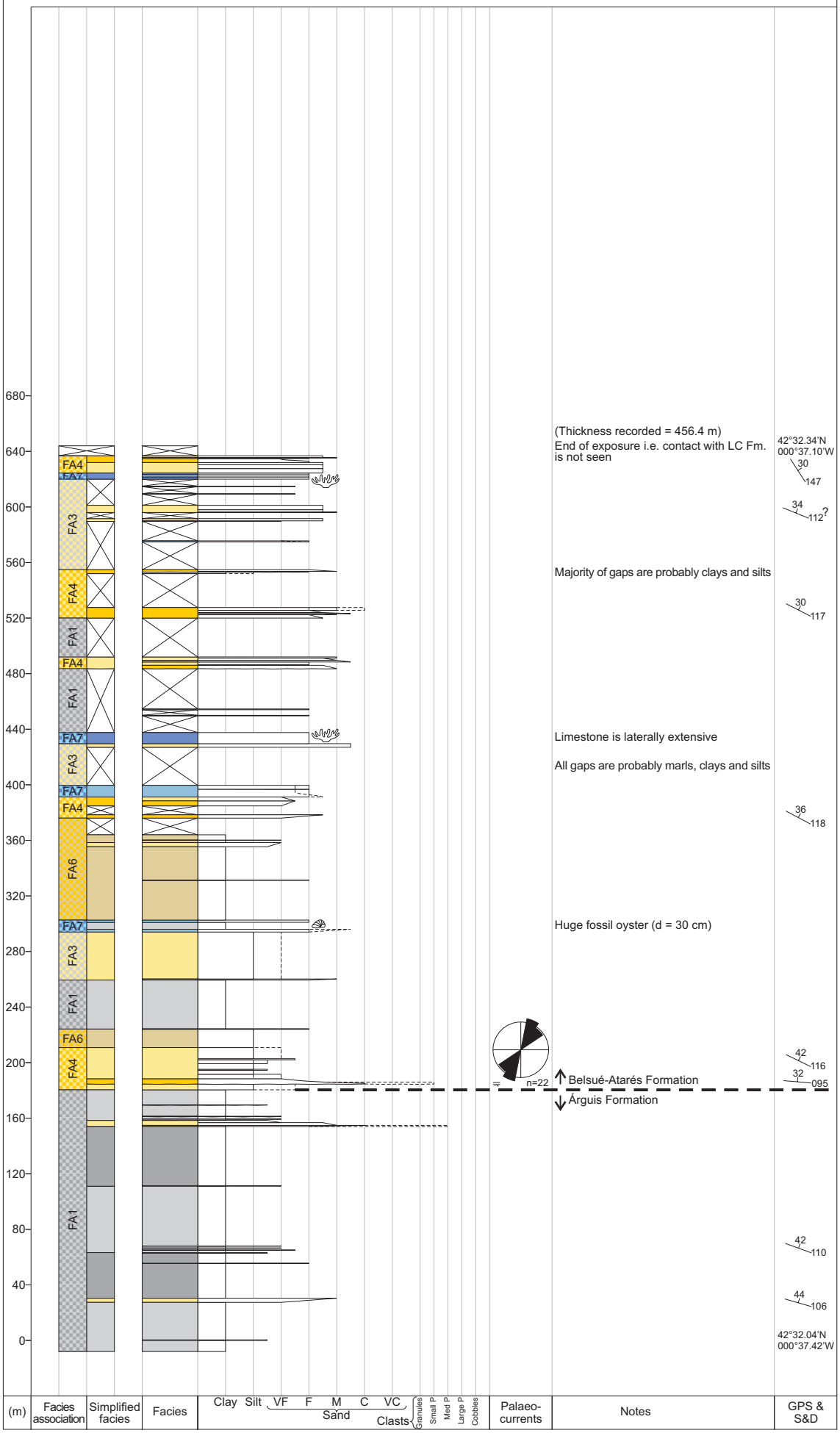


Sector: Northern Jaca Basin	**Atarés**	Page: 1 of 1
Dates Logged: 4-7/5/03	**Summary Version**	Logged By: Jamie Moss



Sector: Western Jaca Basin	**Binacua**	Page: 1 of 1
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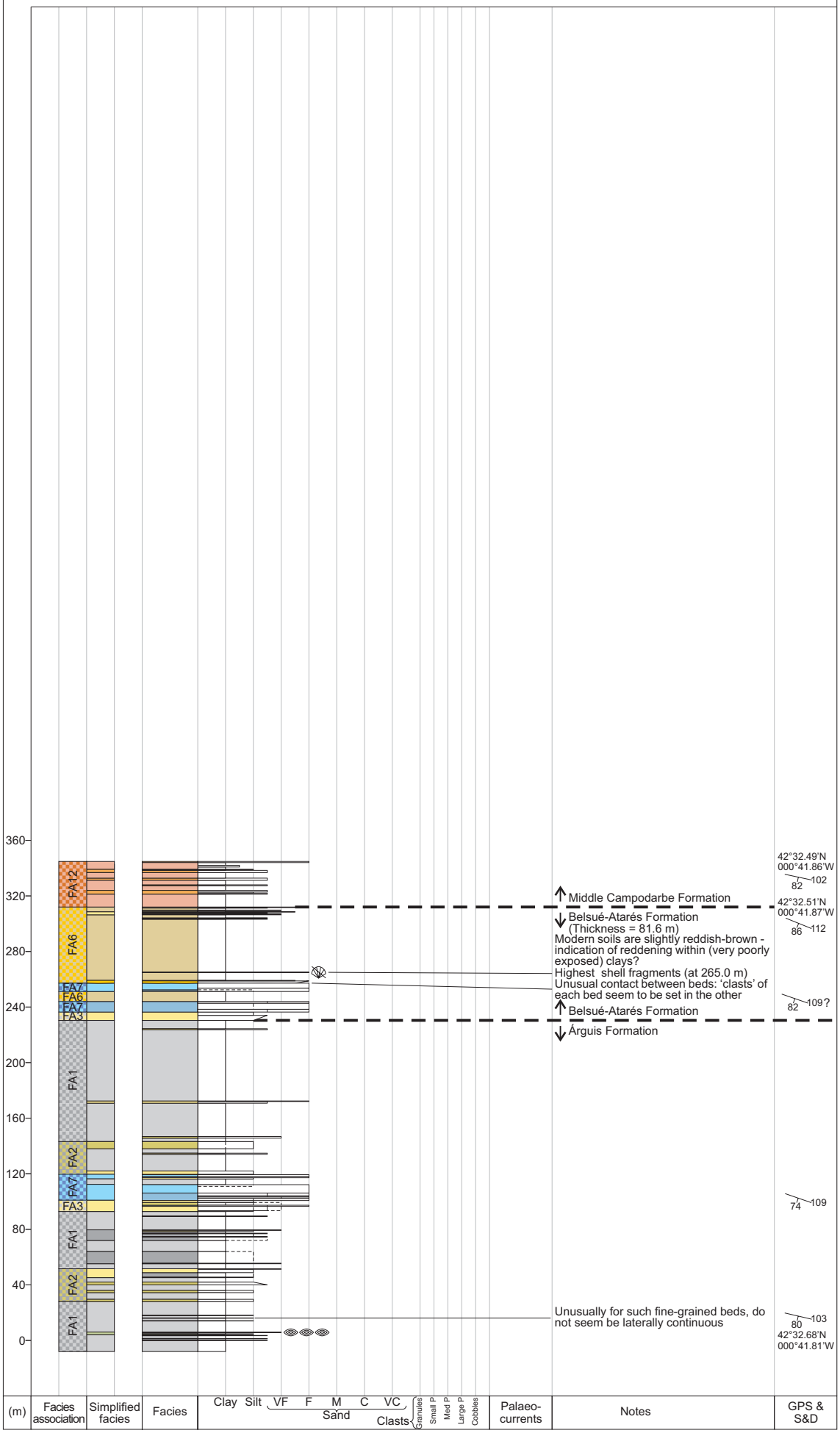

Sector: Western Jaca Basin	**Alastuey** **Summary Version**	Page: 1 of 1
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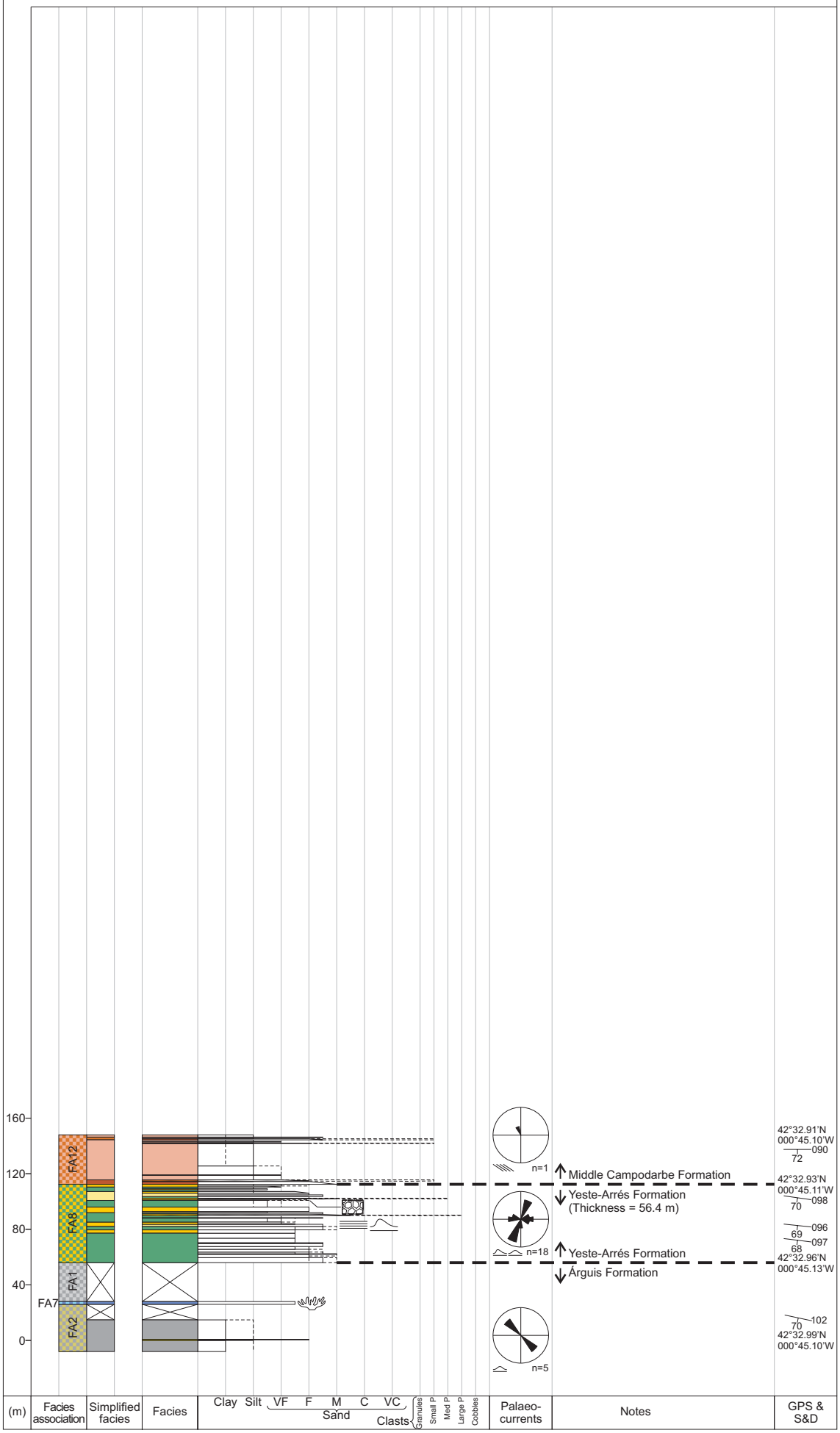
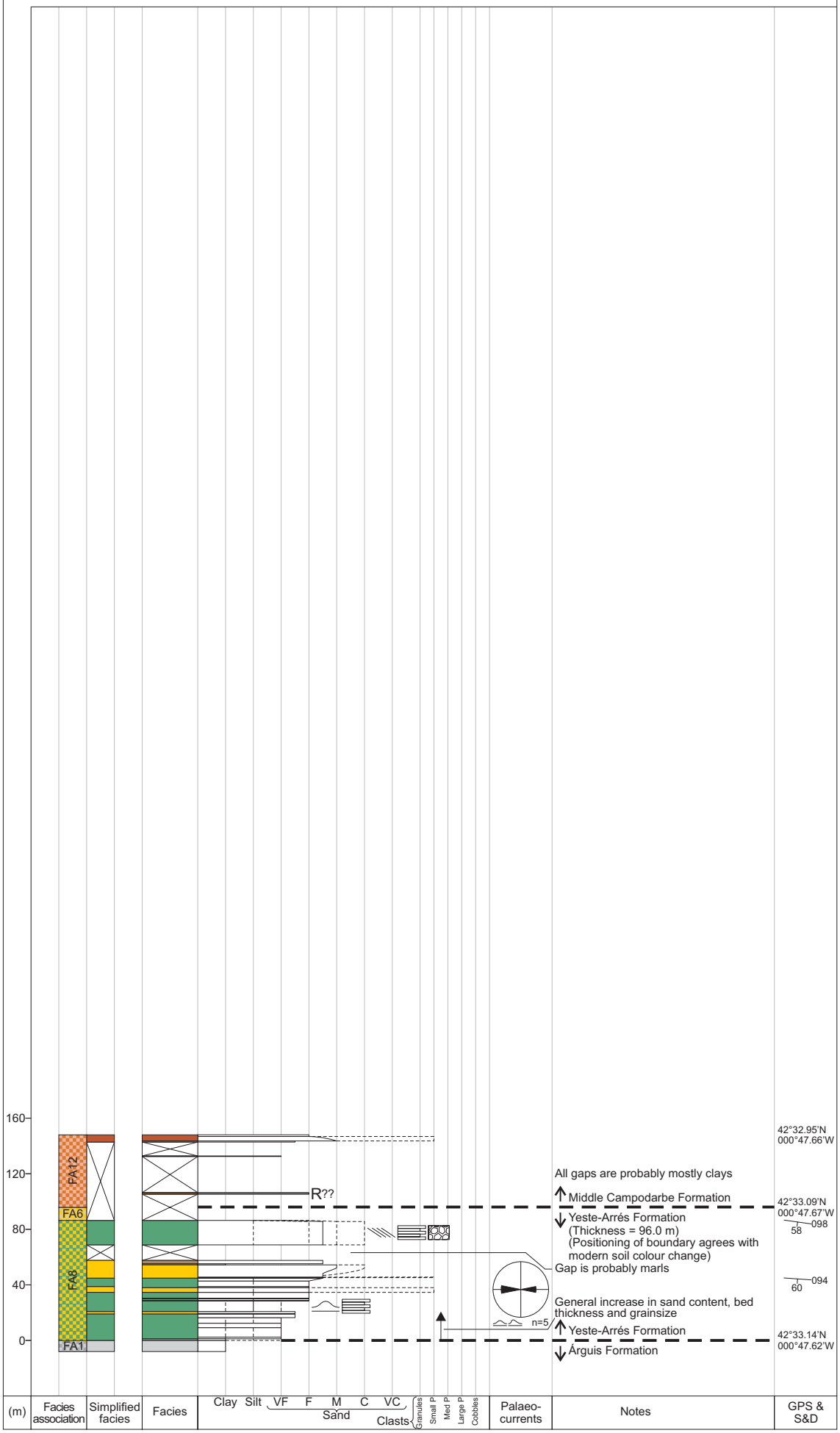
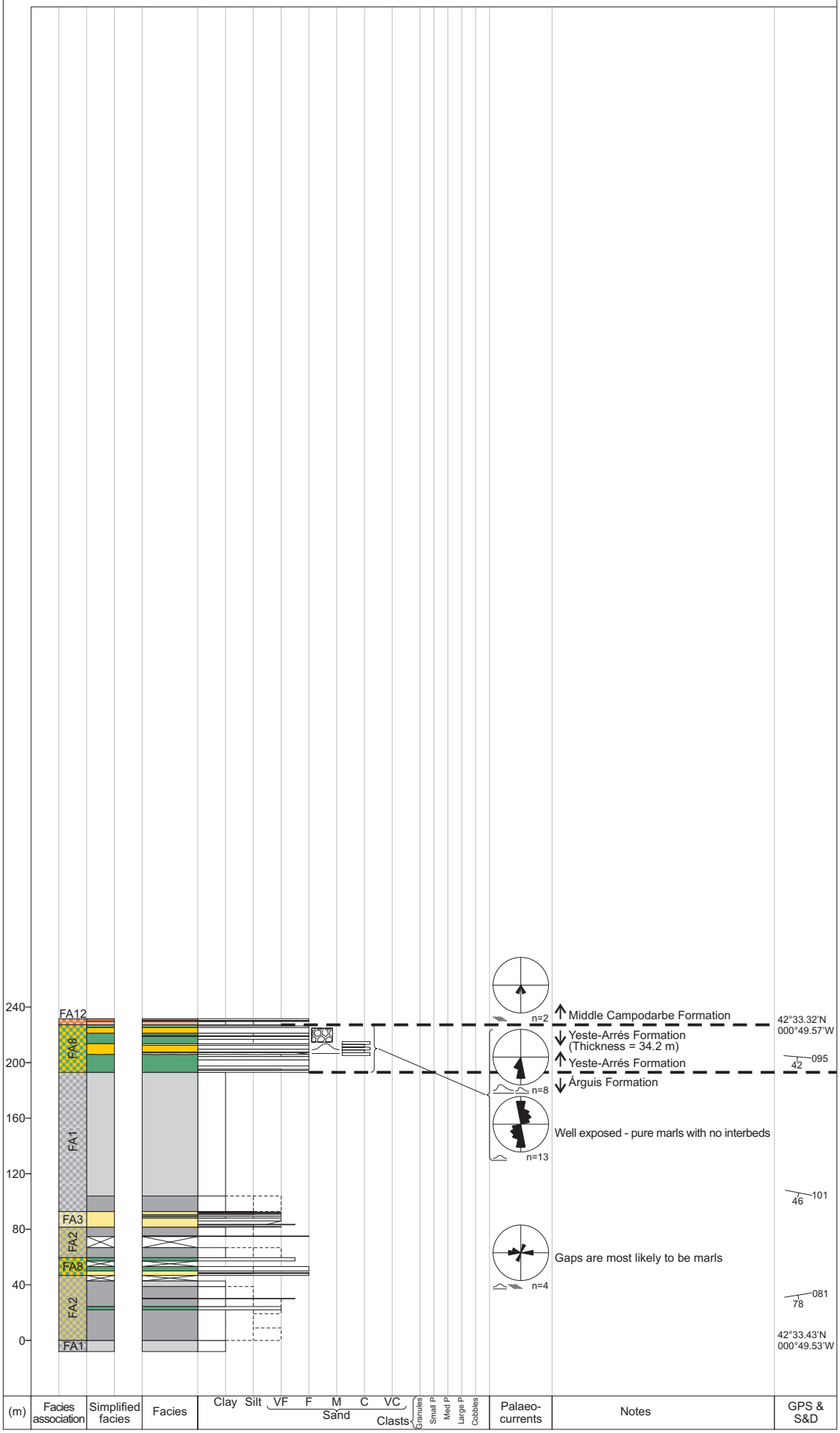


Sector: Western Jaca Basin	**Puente La Reina**	Page: 1 of 1
Dates Logged: 16 & 23/5/03	**Summary Version**	Logged By: Jamie Moss & Stuart Jones



Sector: Western Jaca Basin	**Arrés**	Page: 1 of 1
Date Logged: 16/5/03	**Summary Version**	Logged By: Jamie Moss & Stuart Jones



Sector: Western Jaca Basin	**Martes**	Page: 1 of 1
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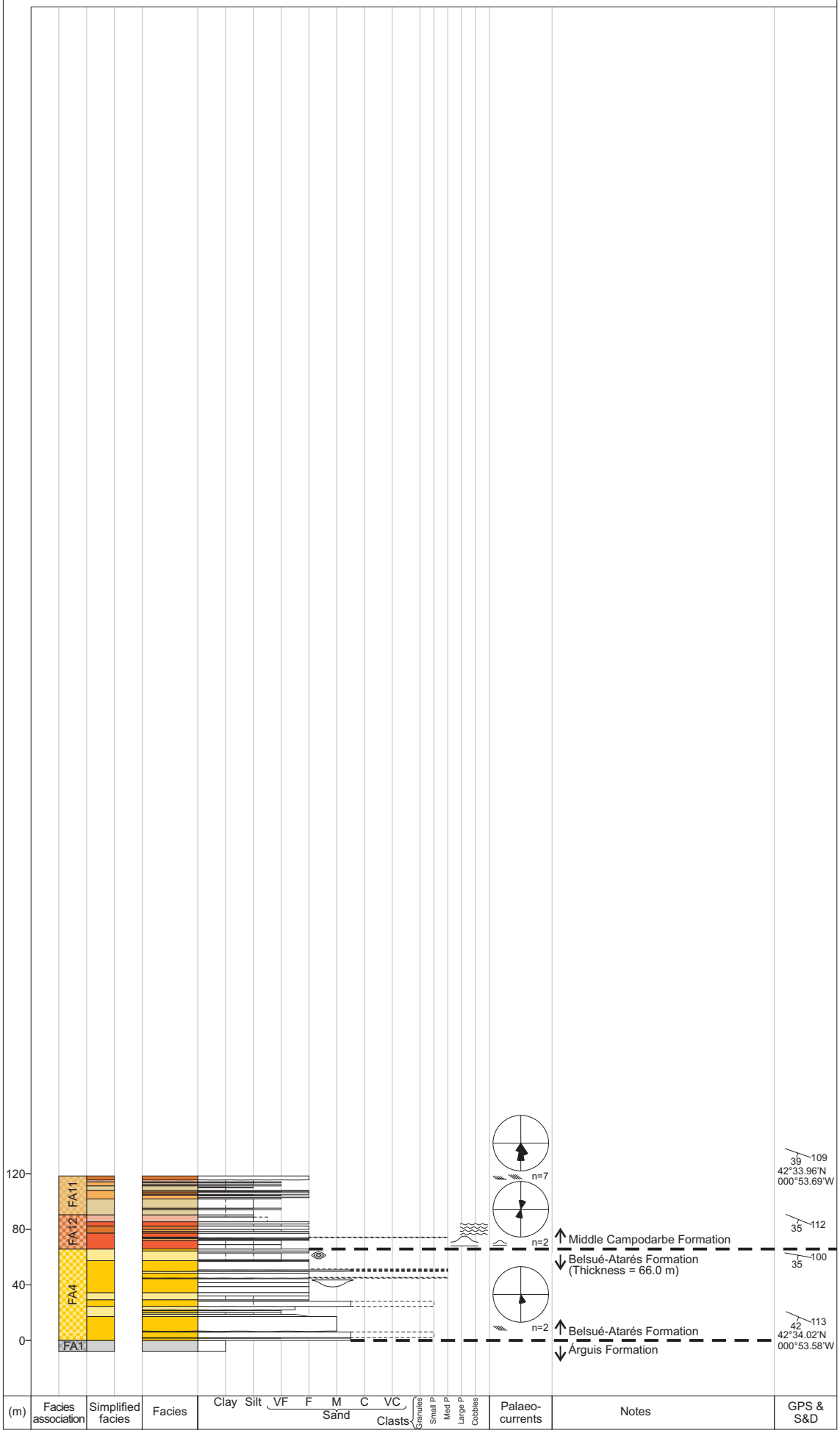

Sector: Western Jaca Basin	**Triste**	Page: 1 of 1
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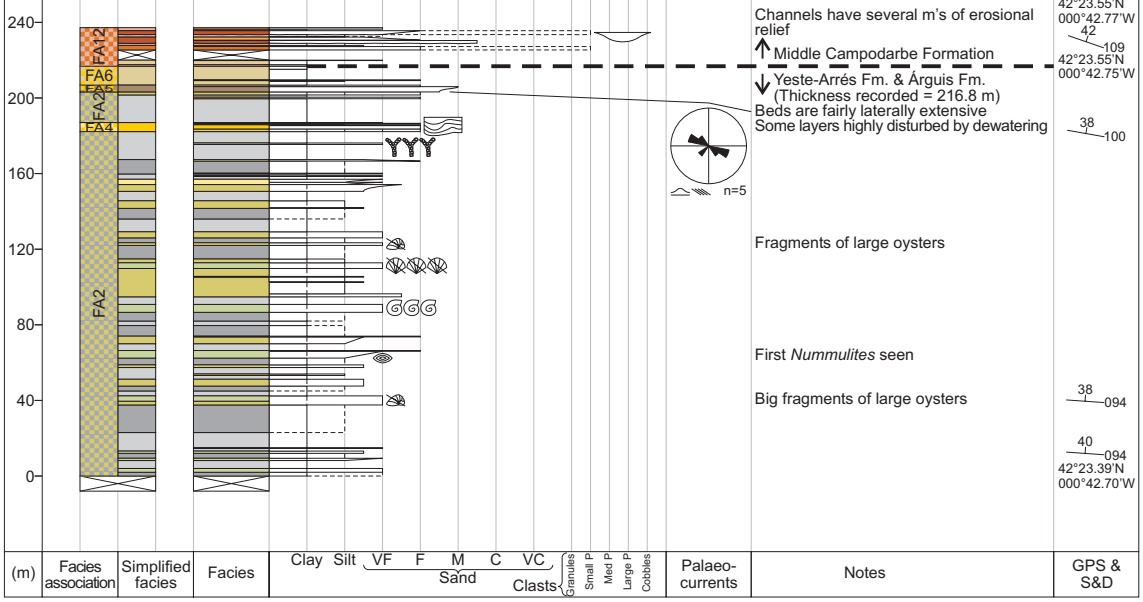
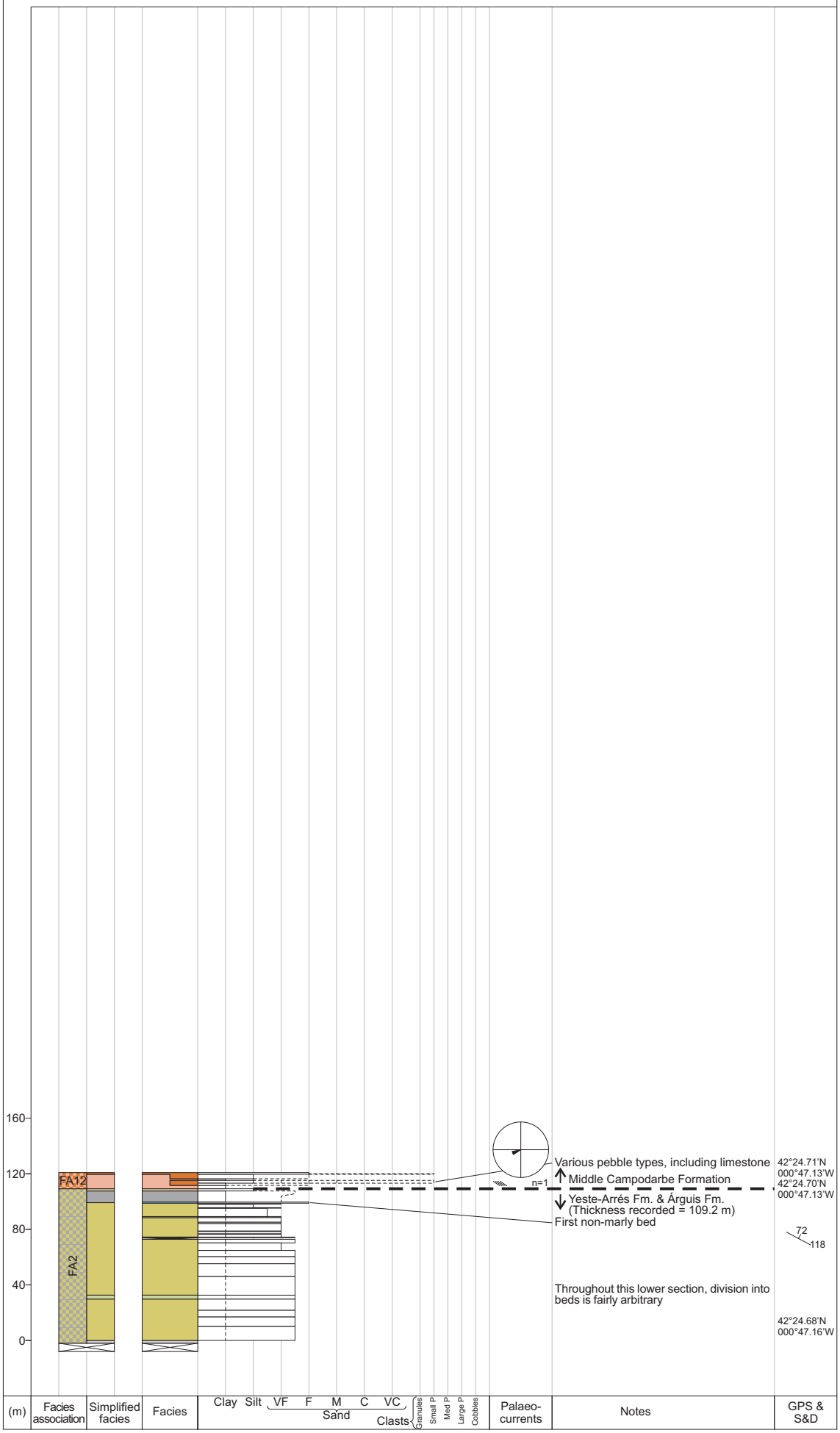


Sector: Western Jaca Basin	**Salinas de Jaca**	Page: 1 of 1
Dates Logged: 2-3/9/03	**Summary Version**	Logged By: Jamie Moss



Sector: Western Jaca Basin	**Villalangua** **Summary Version**	Page: 1 of 1
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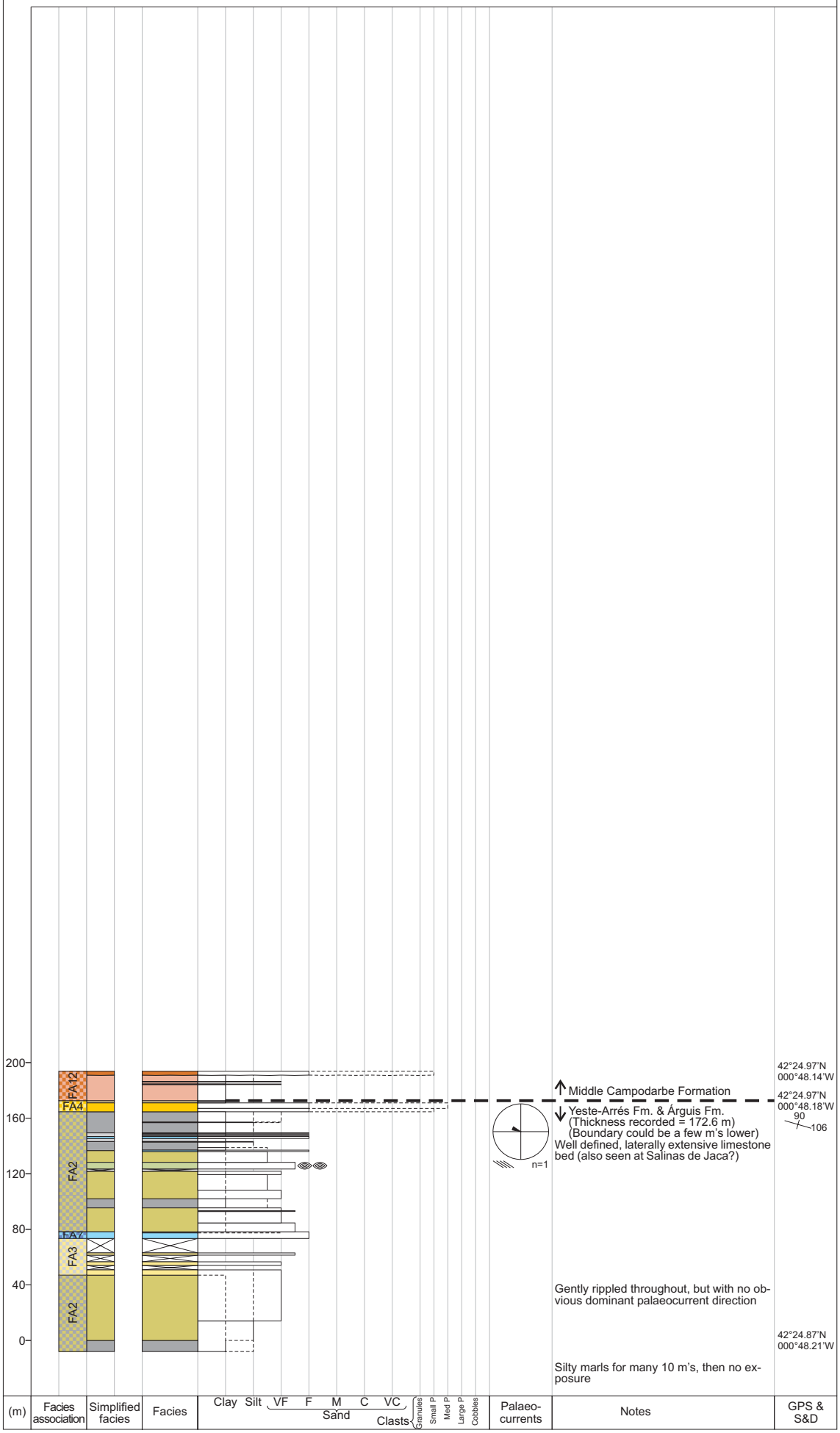
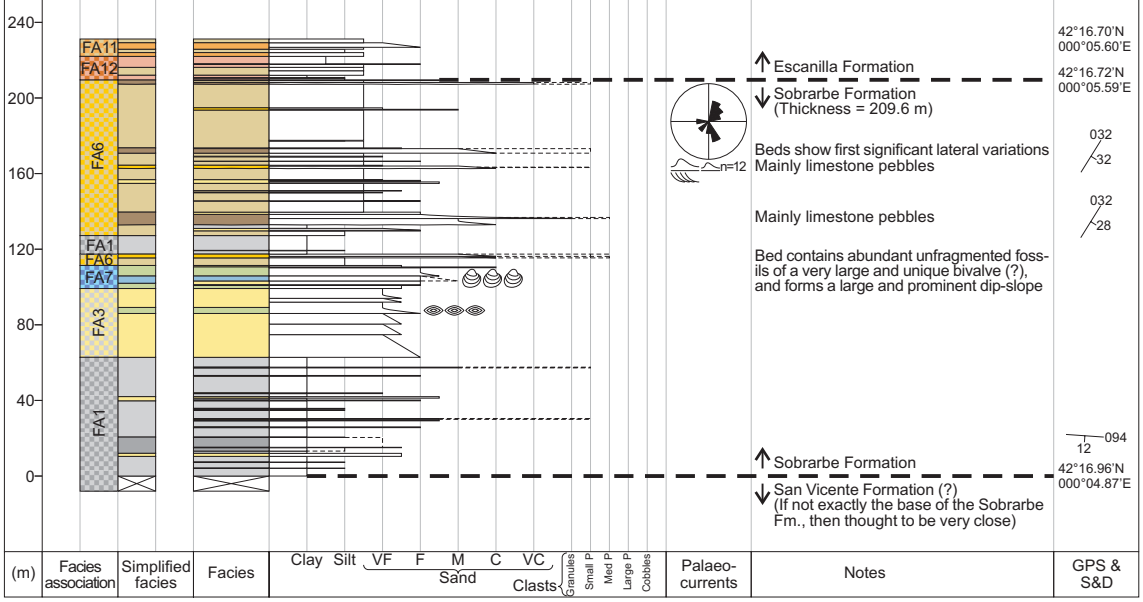


Sector: SE Jaca Basin	**Eripol**	Page: 1 of 1
Date Logged: 9/6/02	**Summary Version**	Logged By: Jamie Moss



Sector: SE Jaca Basin	**Las Almunias (Upper)**	Page: 1 of 1
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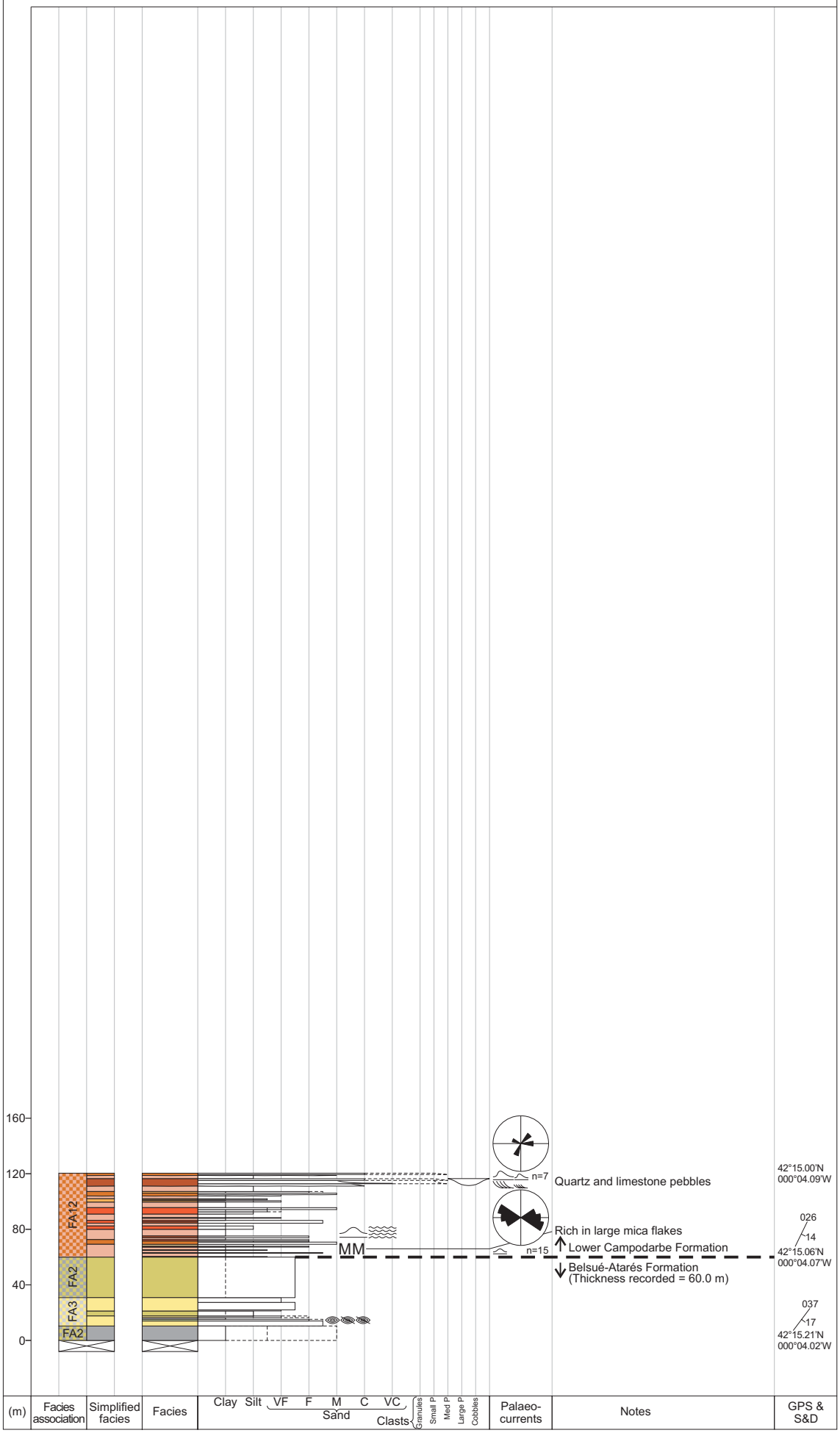

Sector: SE Jaca Basin	**Las Almunias (Lower)**	Page: 1 of 1
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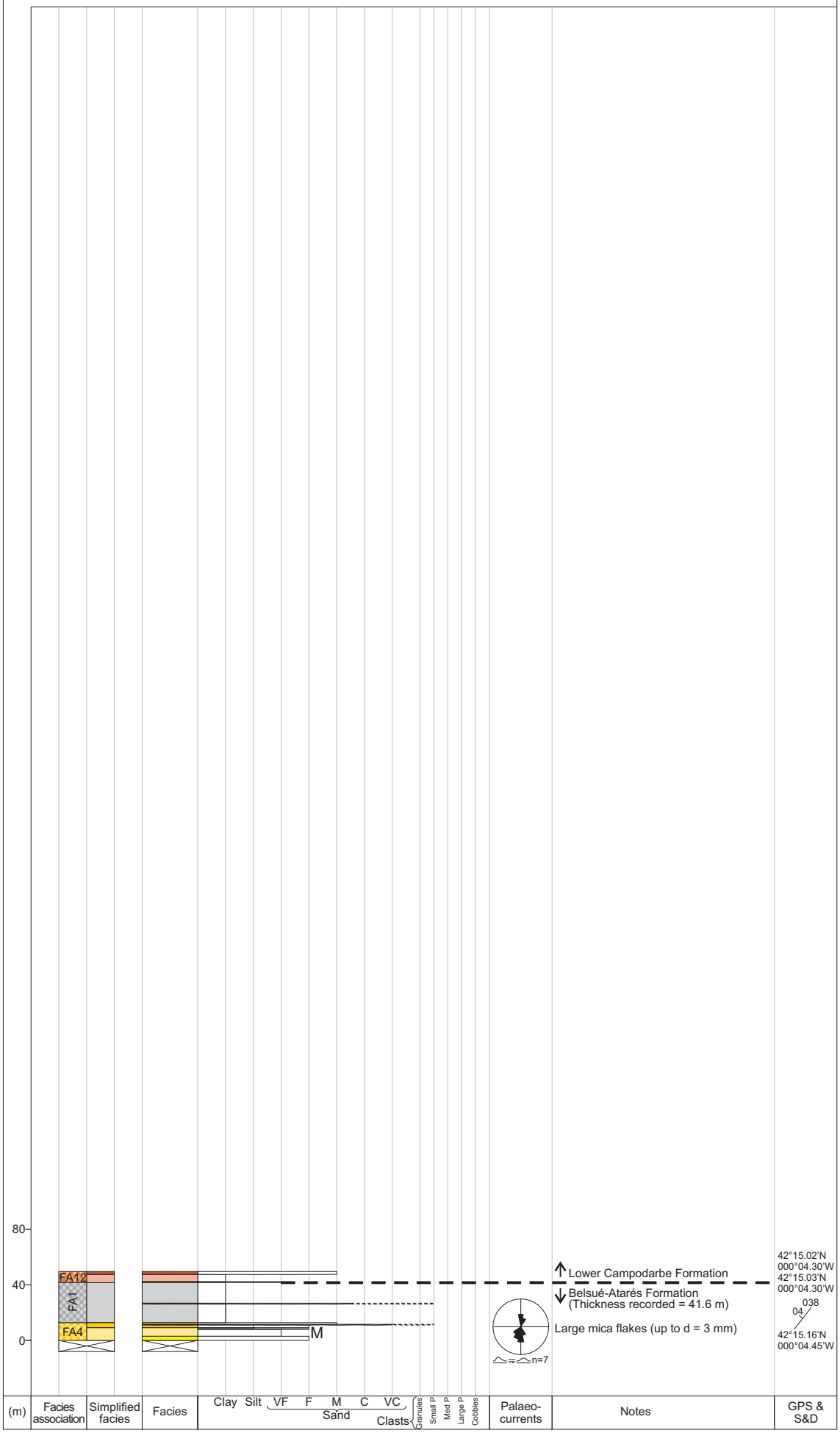
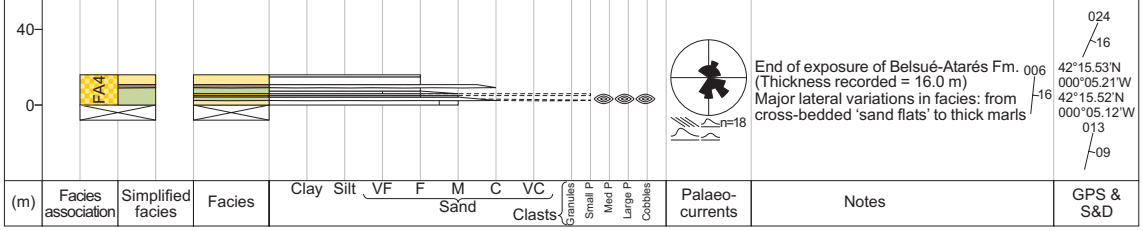
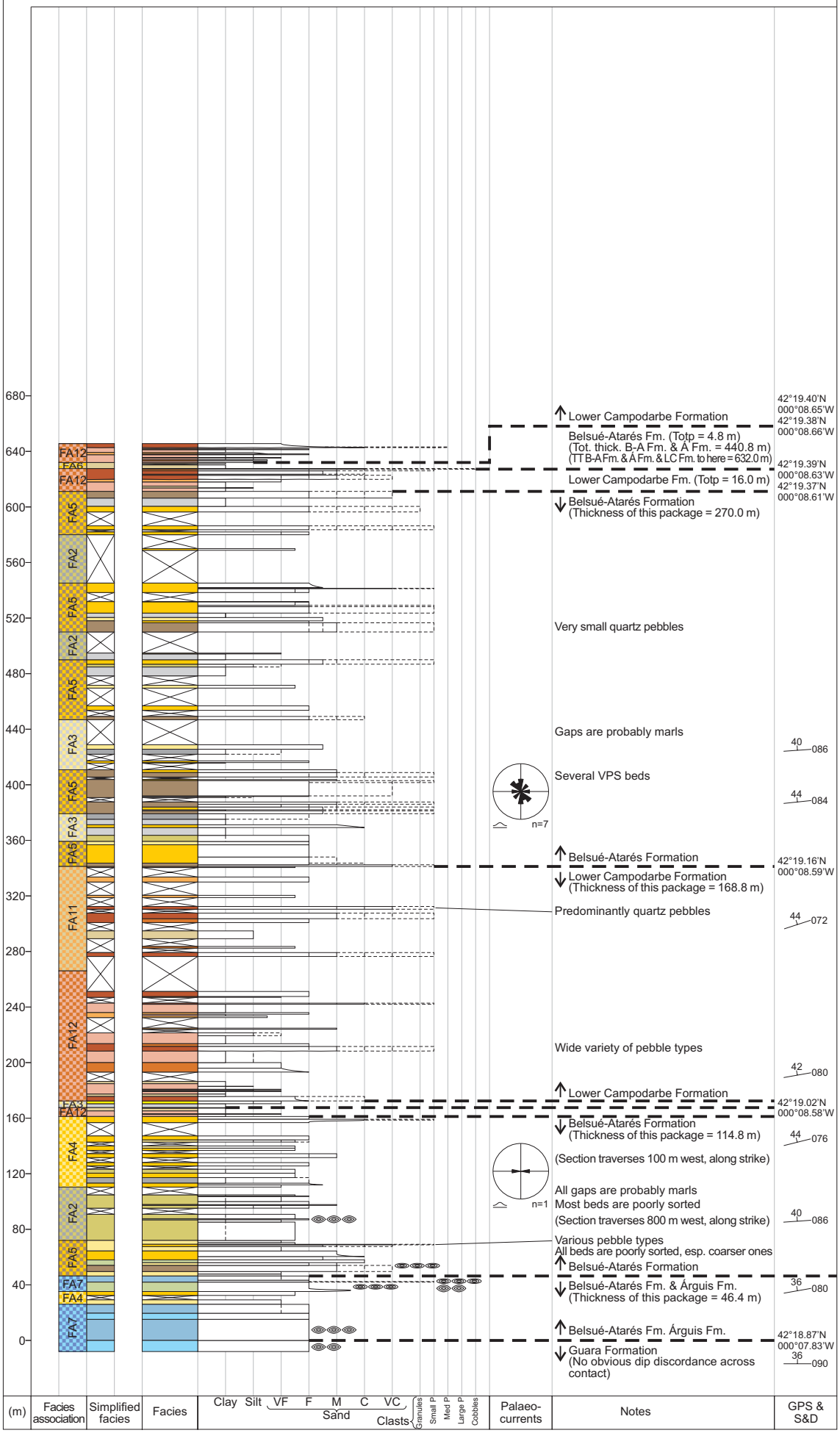


Sector: SE Jaca Basin	**Pedruel**	Page: 1 of 1
Dates Logged: 10/6/02	**Summary Version**	Logged By: Jamie Moss



(m)	Facies association	Simplified facies	Facies	Clay Silt VF F M C VC Sand Clasts Granules Small P Med P Large P Cobbles	Palaeo-currents	Notes	GPS & S&D

Sector: SE Jaca Basin	**Bara**	Page: 1 of 1
Dates Logged: 6-7/9/03	**Summary Version**	Logged By: Jamie Moss



Sector: SE Jaca Basin	**Nocito**	Page: 1 of 2
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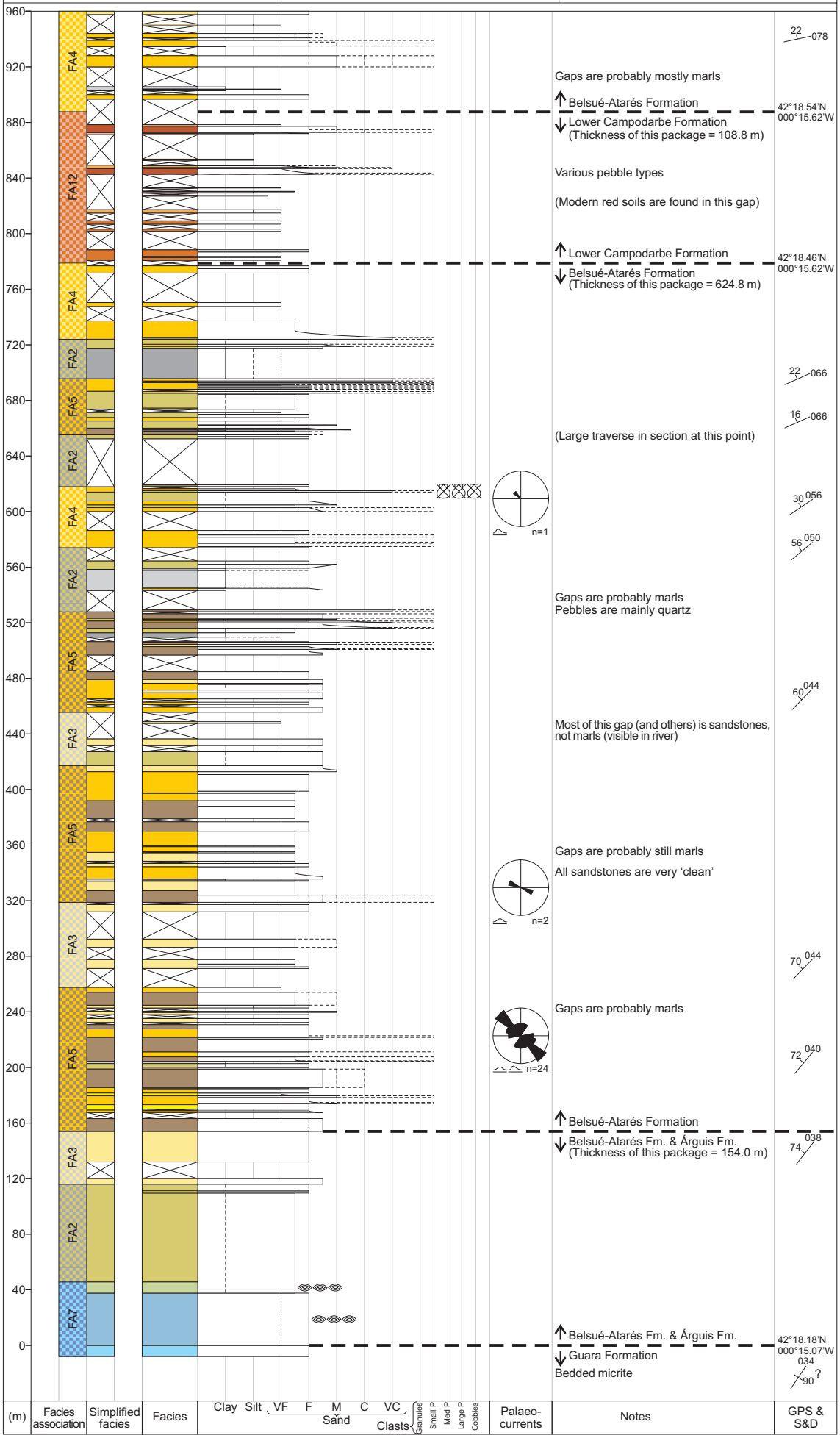
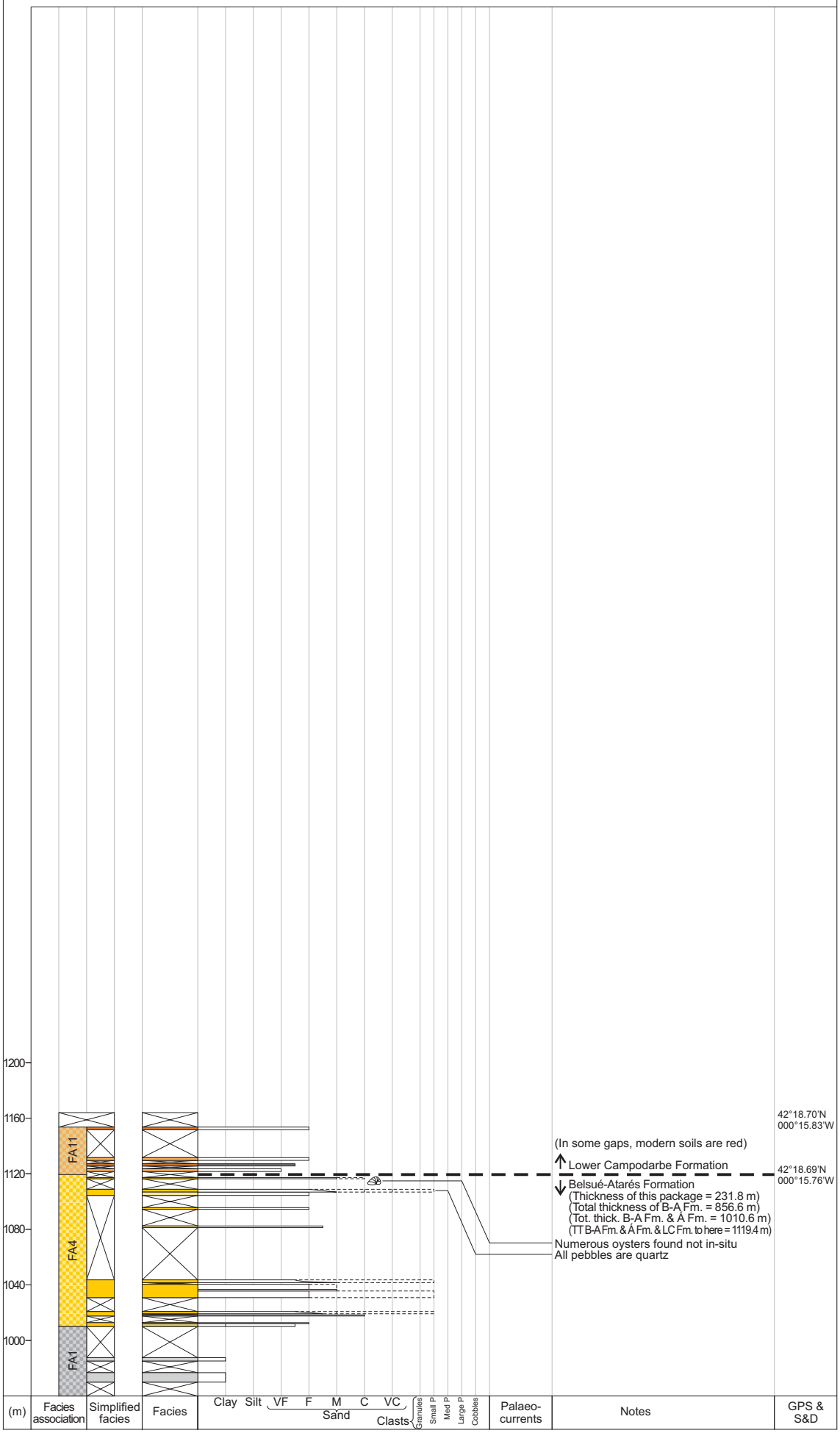
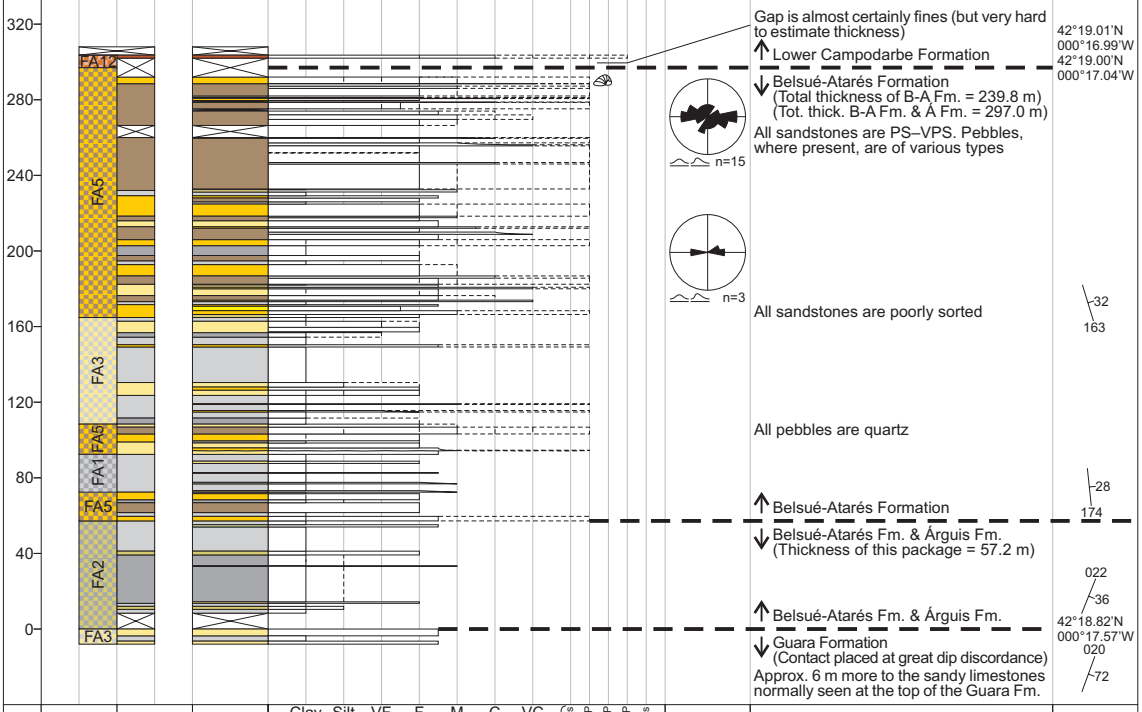


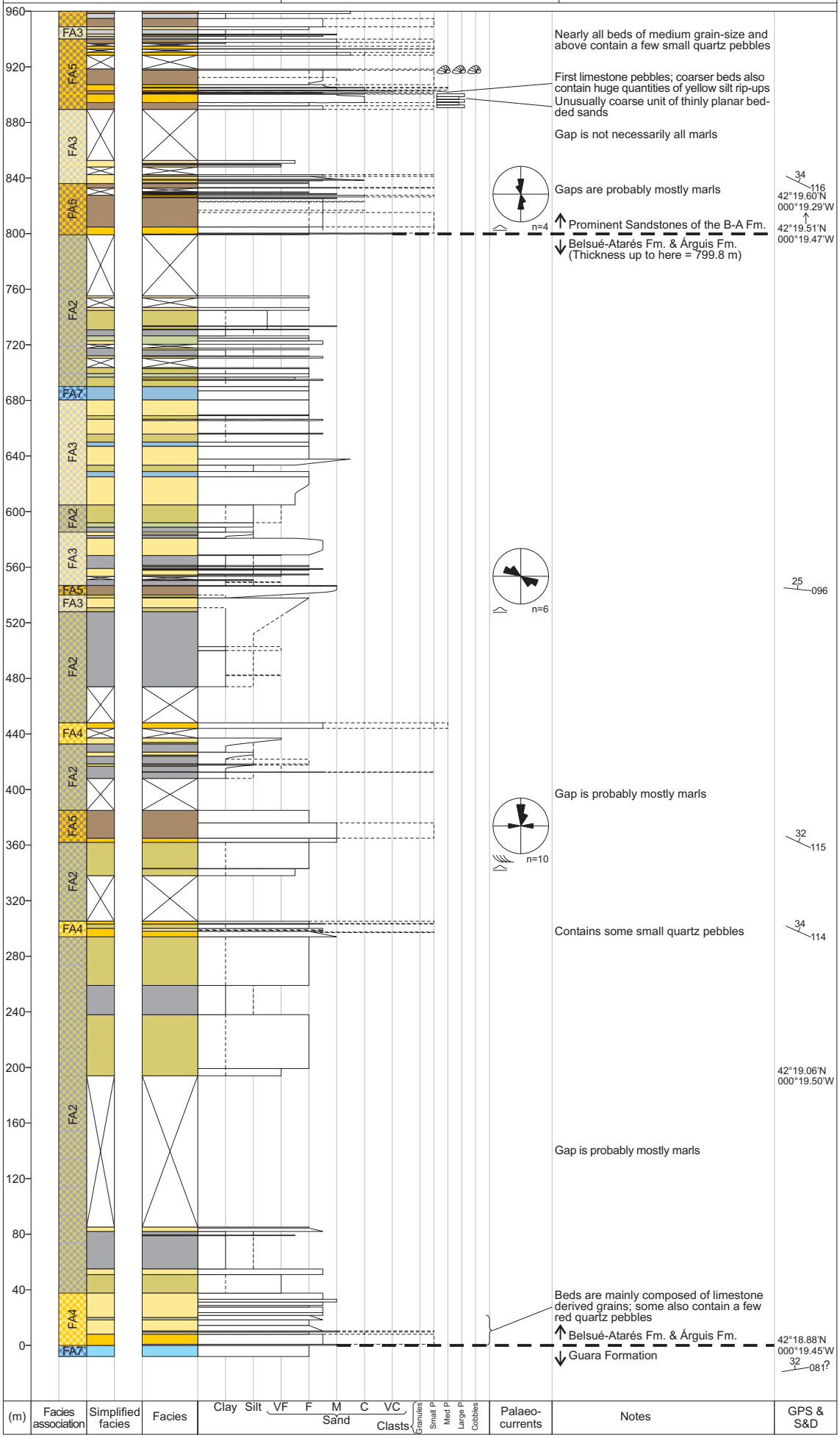
Sector: SE Jaca Basin	**Nocito**	Page: 2 of 2
Dates Logged: 8-10/9/03	**Summary Version**	Logged By: Jamie Moss



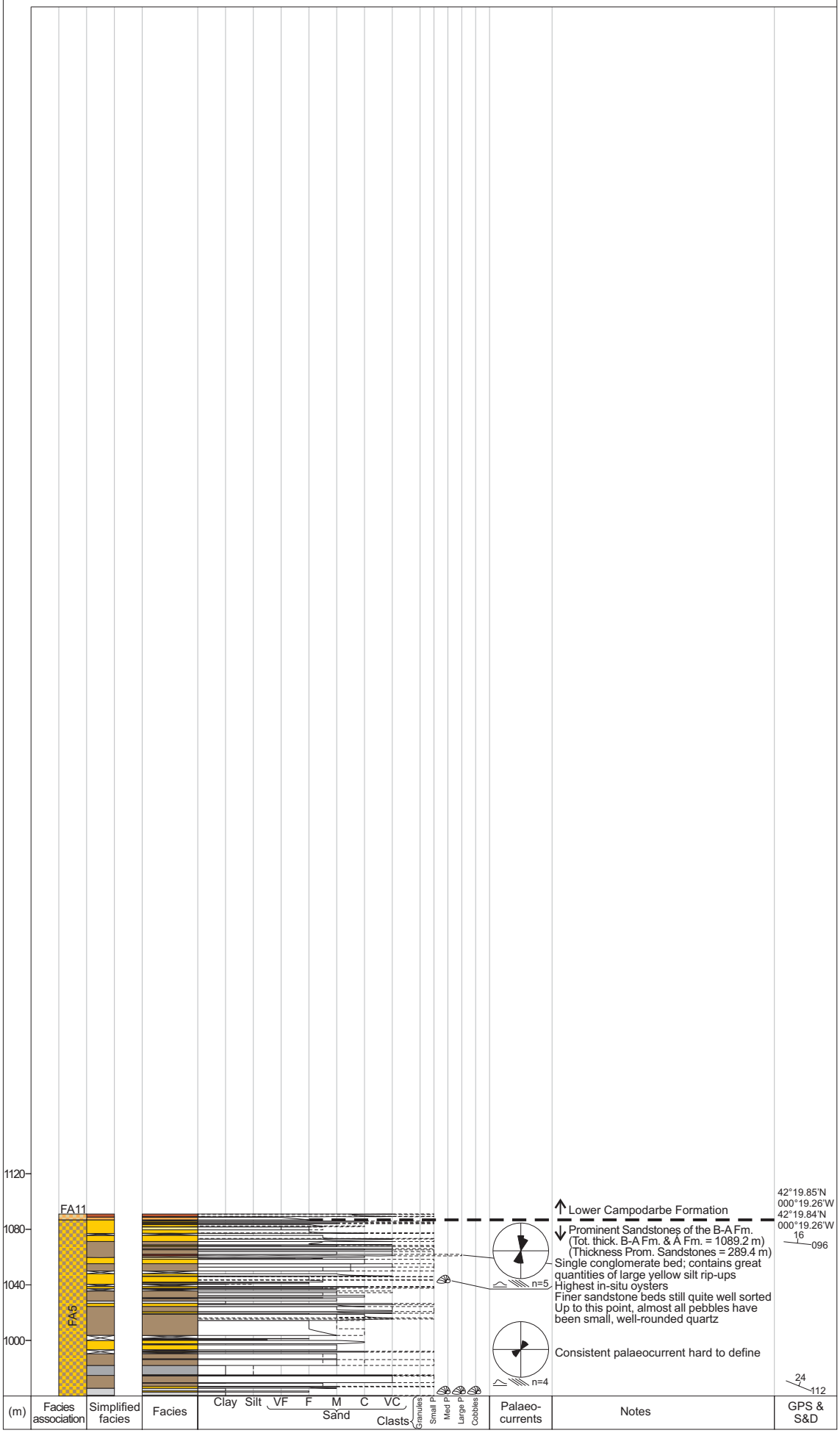
Sector: SE Jaca Basin	**Gabardiella**	Page: 1 of 1
Dates Logged: 4-5/9/02	**Summary Version**	Logged By: Jamie Moss



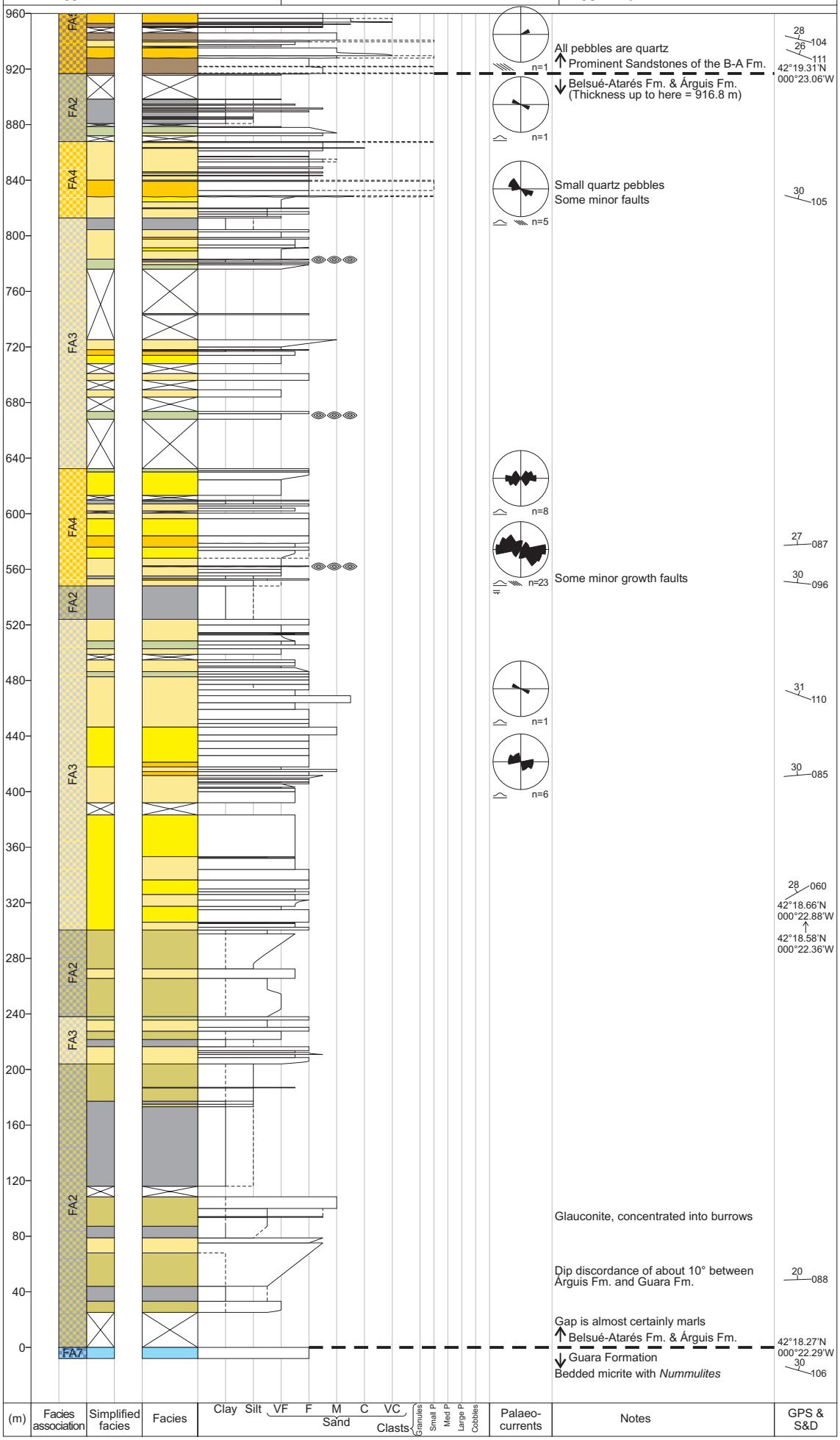
Sector: Southern Jaca Basin	**Lúsera**	Page: 1 of 2
Dates Logged: 3/6/02, 1-2/5/03 & 7-8/6/03	**Summary Version**	Logged By: Jamie Moss



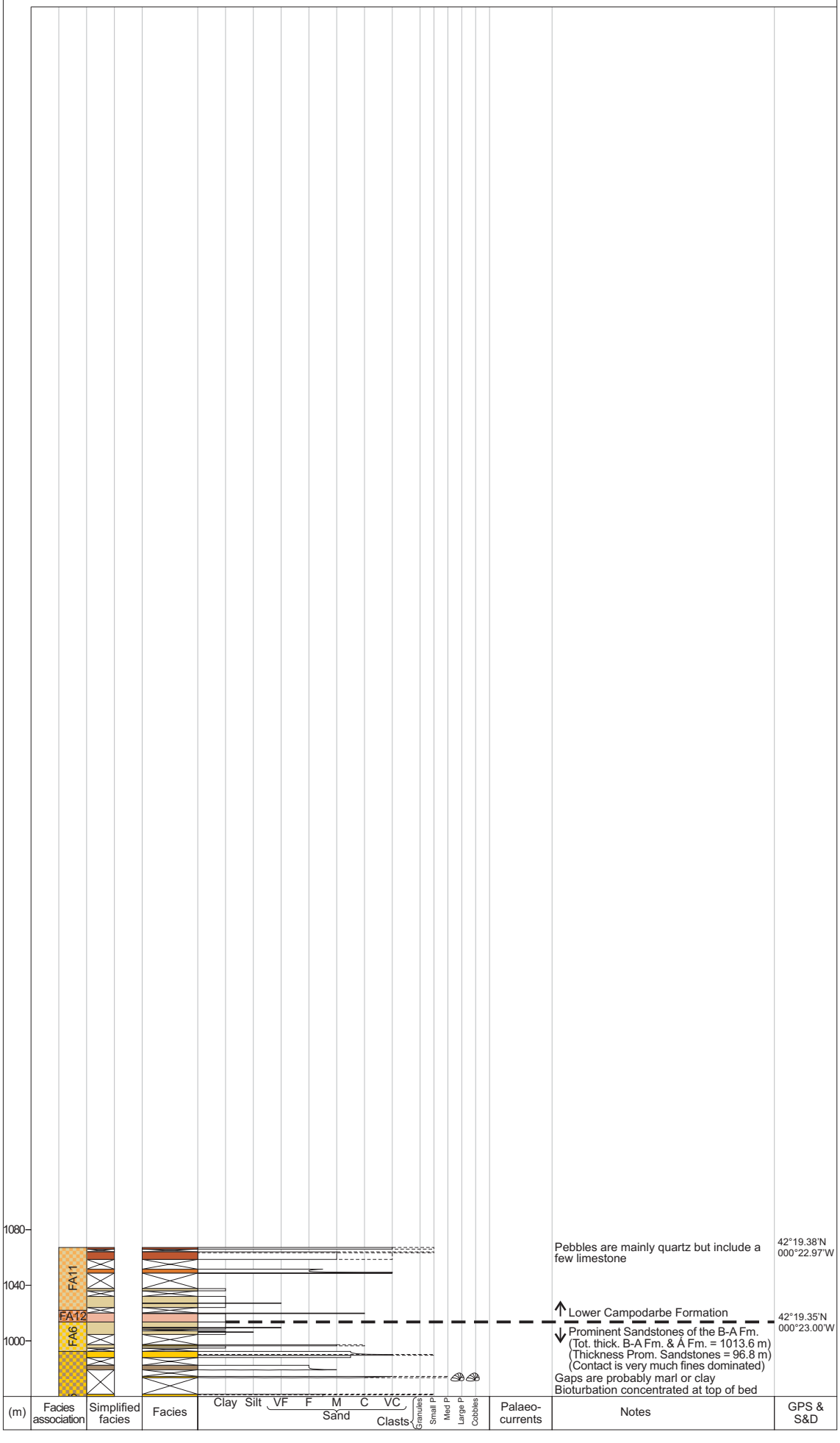
Sector: Southern Jaca Basin	**Lúsera**	Page: 2 of 2
Dates Logged: 3/6/02, 1-2/5/03 & 7-8/6/03	**Summary Version**	Logged By: Jamie Moss



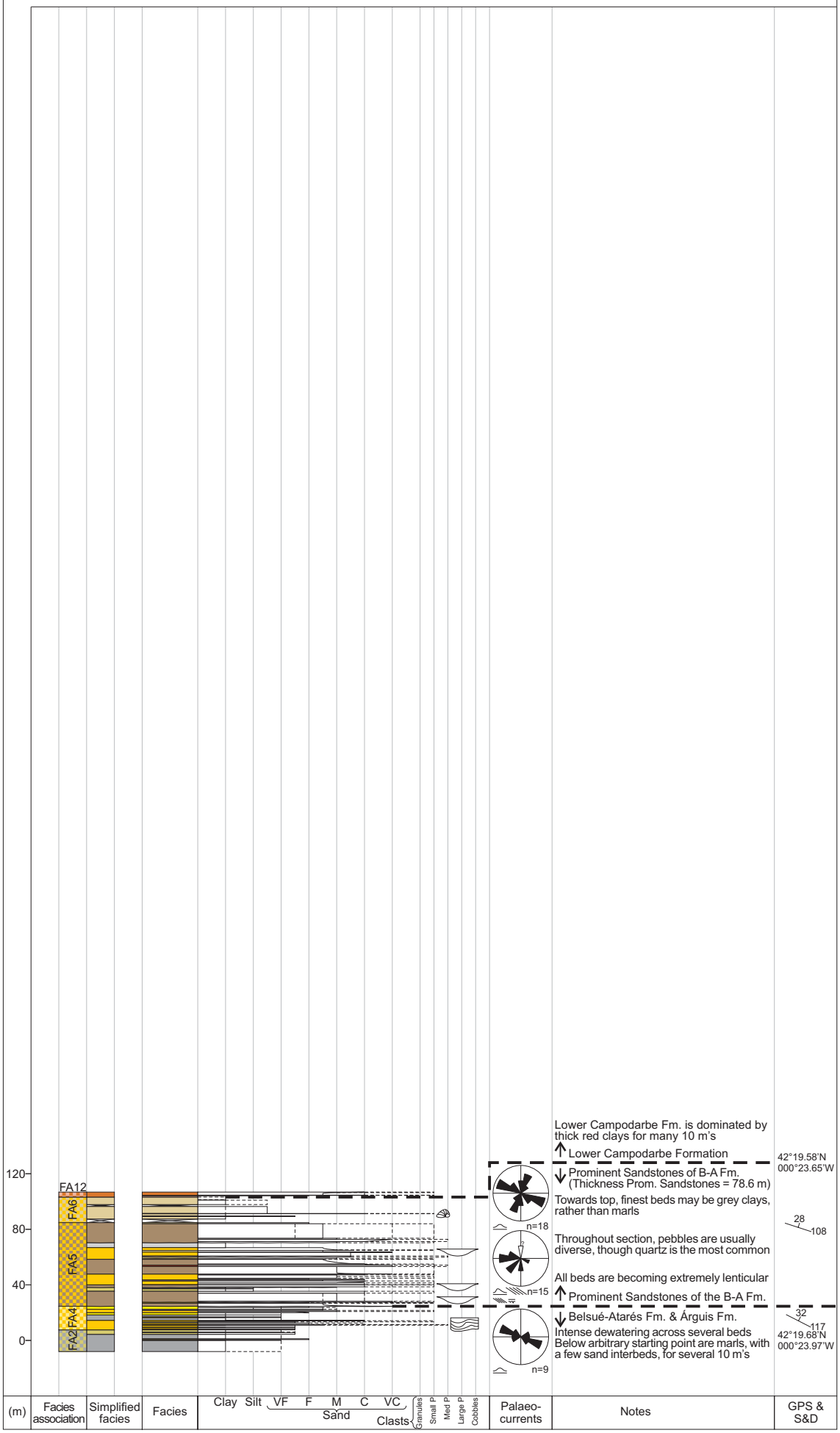
Sector: Southern Jaca Basin	**Belsué**	Page: 1 of 2
Dates Logged: 20-21&25-26/5/02 & 2&9/6/03	**Summary Version**	Logged By: Jamie Moss & Stuart Jones



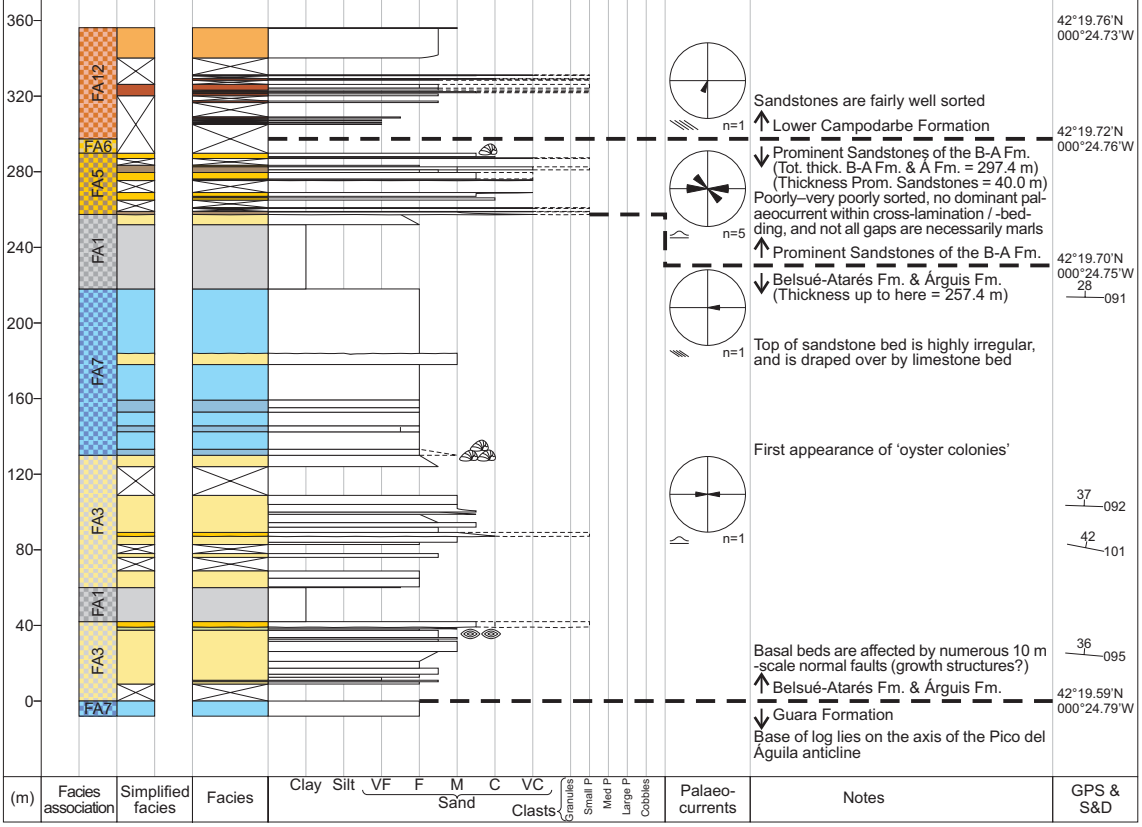
Sector: Southern Jaca Basin	**Belsué**	Page: 2 of 2
Dates Logged: 20-21&25-26/5/02 & 2&9/6/03	**Summary Version**	Logged By: Jamie Moss & Stuart Jones



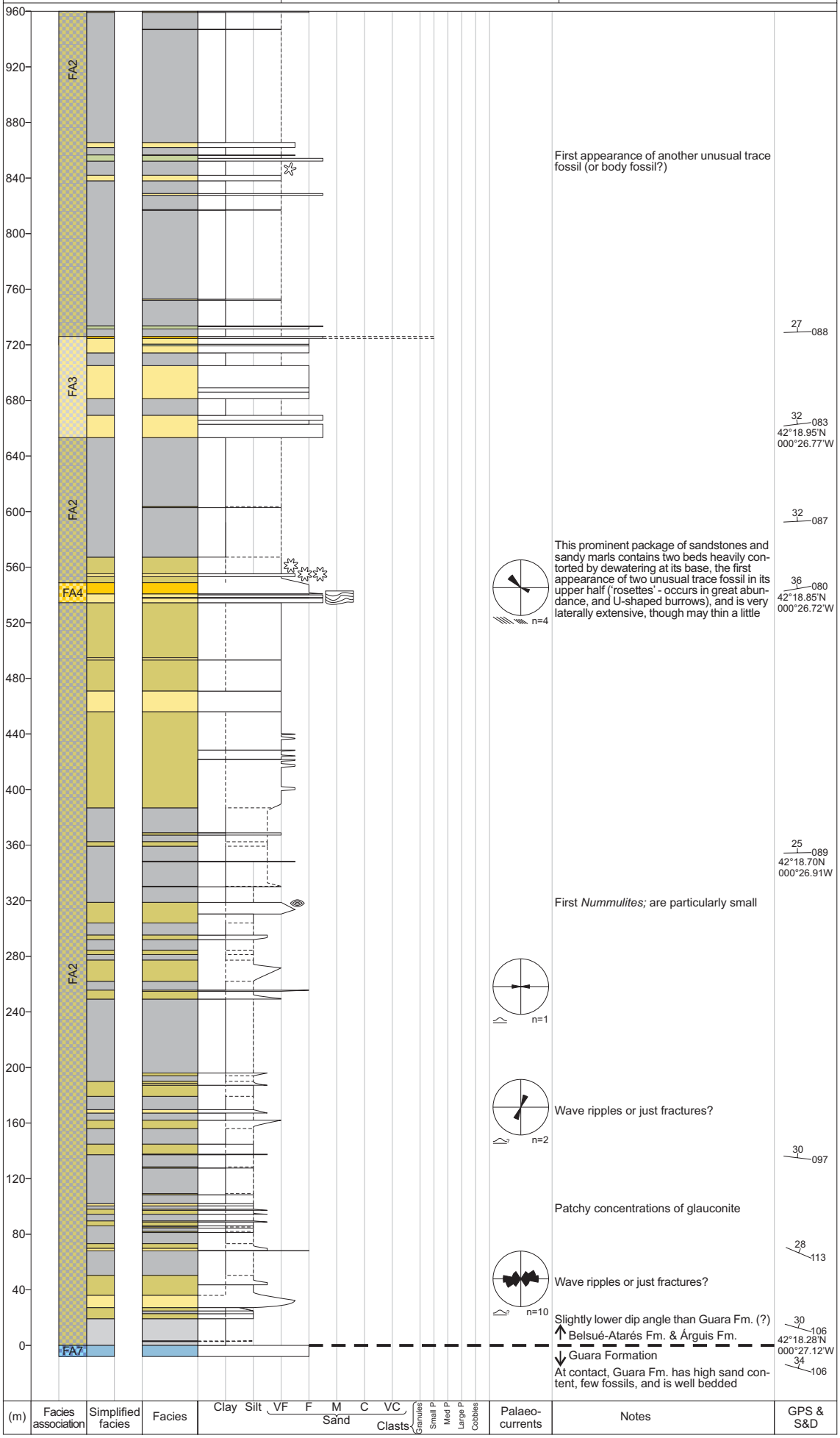
Sector: Southern Jaca Basin	**Monrepos**	Page: 1 of 1
Dates Logged: 6-11/6/03	**Summary Version**	Logged By: Jamie Moss



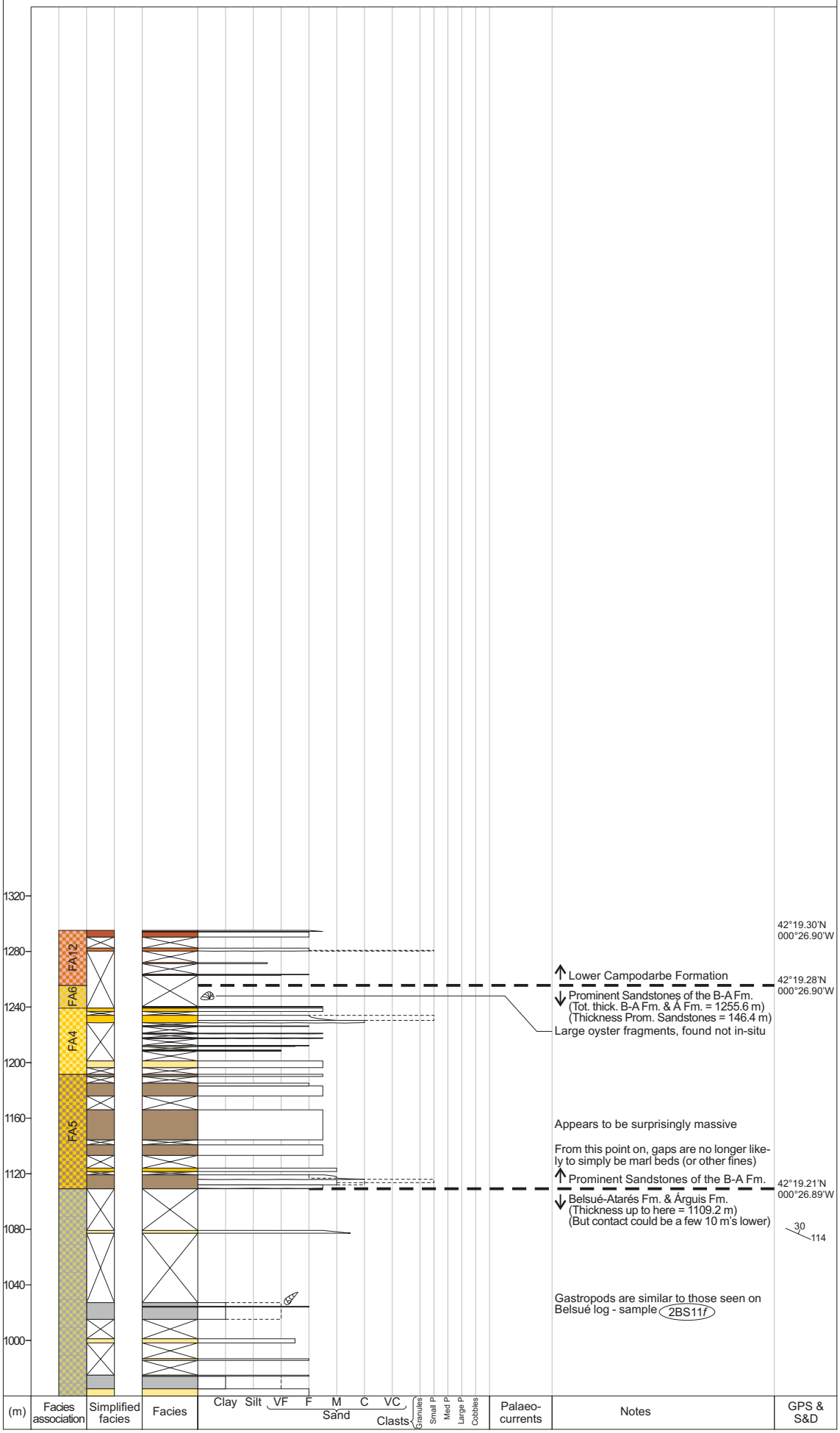
Sector: Southern Jaca Basin	**Pico del Águila**	Page: 1 of 1
Dates Logged: 26-27/5/02 & 6/6/03	**Summary Version**	Logged By: Jamie Moss



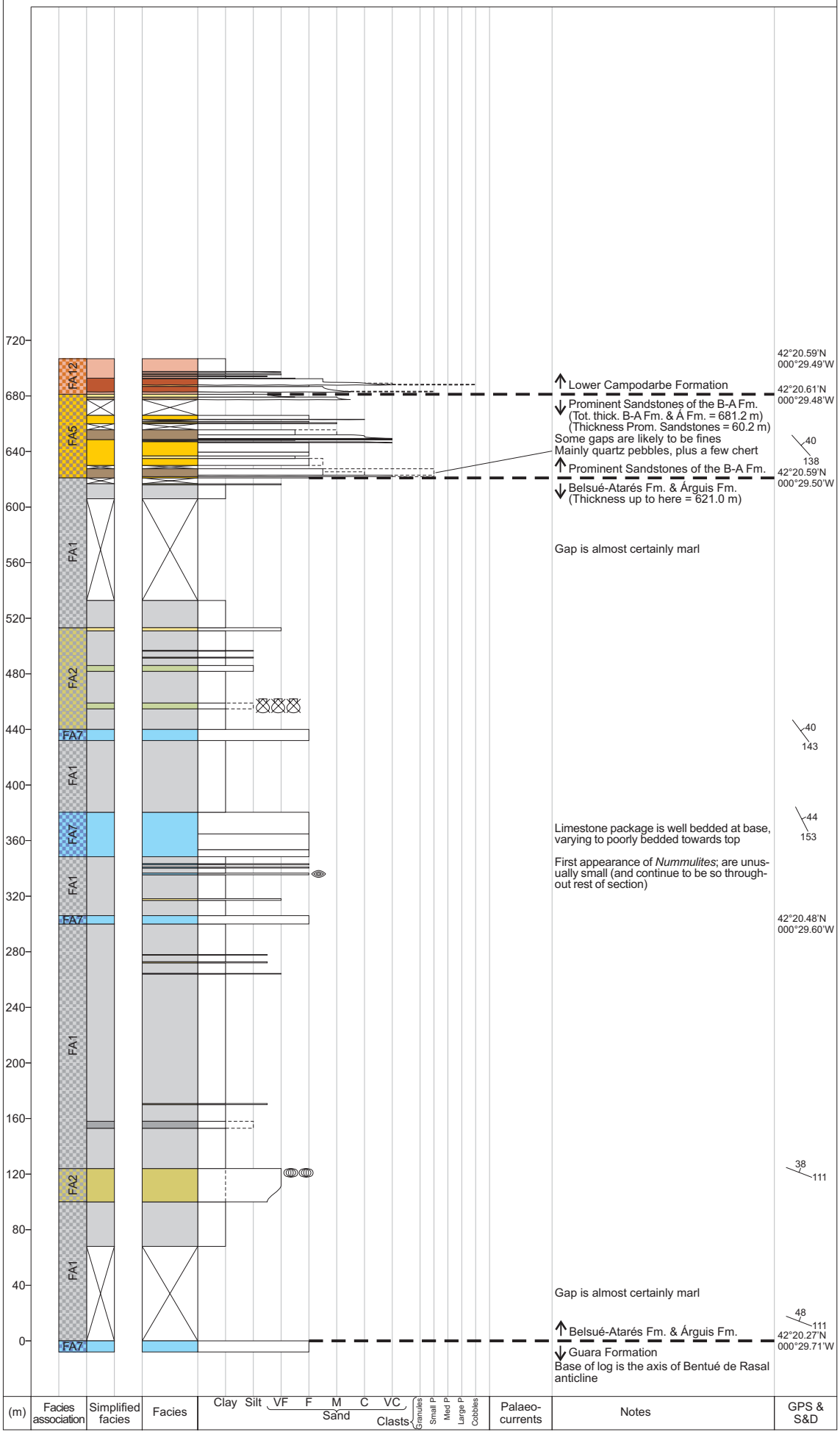
Sector: Southern Jaca Basin	**Árguis** Summary Version	Page: 1 of 2
Dates Logged: 28-29/5/02 & 3-5/6/03		Logged By: Jamie Moss



Sector: Southern Jaca Basin	**Árguis**	Page: 2 of 2
Dates Logged: 28-29/5/02 & 3-5/6/03	**Summary Version**	Logged By: Jamie Moss



Sector: Southern Jaca Basin	**Bentué de Rasal**	Page: 1 of 1
Dates Logged: 30-31/5/02 & 10/6/03	**Summary Version**	Logged By: Jamie Moss



Appendix III:

Graphic Logs

Appendix III: Graphic Logs

These graphic logs have been drawn up directly from the original fieldwork versions, at the same vertical scale of 1 cm = 4 m. For each bed, grainsize and lithology are indicated, and the lithofacies interpreted (Chapter 3). The symbols are an attempt to comprehensively represent the sedimentary structures and fossils found within each bed. The number of a certain type of symbol associated with a particular bed represents the relative abundance of a feature within that bed. For instance, for beds of 4 m thickness or less, 1 symbol means a few examples of a feature were evident on close inspection; 2 symbols means many examples were easily seen; and 3 symbols means a particular feature occurred almost ubiquitously throughout the entire volume of that bed. For beds thicker than 4 m, the abundance of the symbols is proportional to the abundance of the feature. Also, where possible, the positioning of the symbols indicates the most common location of each feature within a bed.

The notes column records important observations than could not be represented by symbols, and the location of any formation boundaries. Rose diagrams depict the directional trends of any palaeocurrents measured from a bed or beds. The symbols on them record the sedimentary structures measured, in decreasing order of the number of readings taken from each. The 'n=' gives the total number of readings taken from all structures (bi-directional measurements count as one reading). In the next column, the locations of photographs of important or unusual features are indicated, as are the beds from which sandstone, clay or fossil sample were taken. The final column contains strike and dip readings and GPS-derived positional information for the most important parts of each log, such as its start and end points and any formation boundaries crossed.

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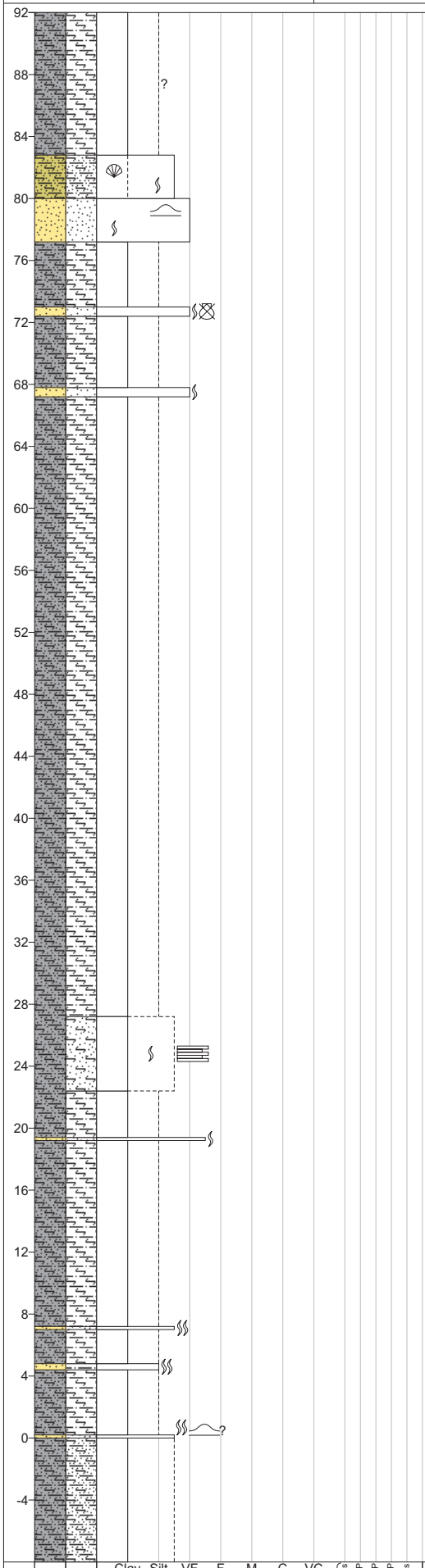
Sector: Far NE Jaca Basin	**Albella**	Page: 1 of 6
Date Logged: 14/6/03		Logged By: Jamie Moss



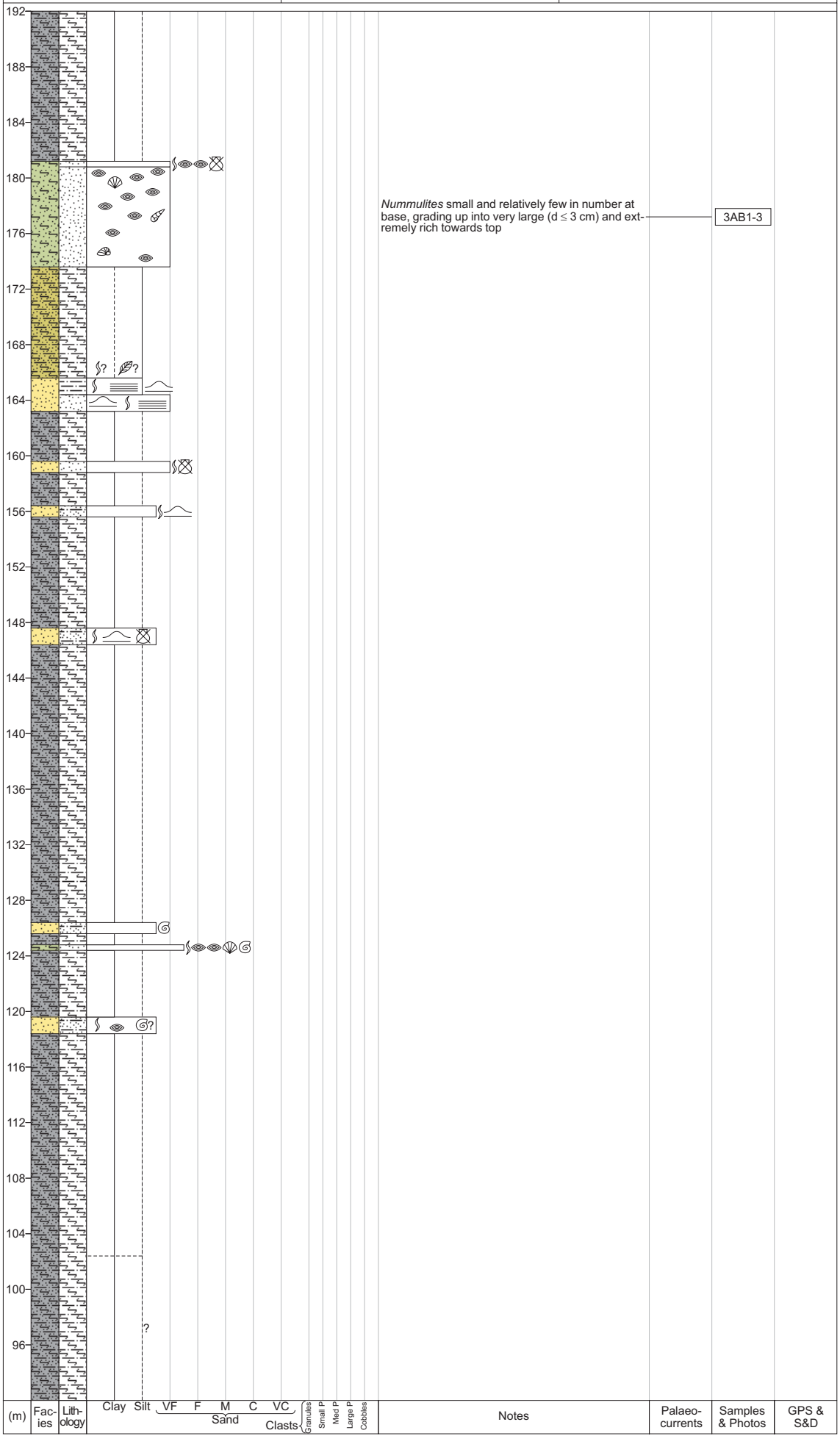
As with most other sandstones, rippling is only very slight, and may not actually be wave rippling

Beneath this point are several hundred metres of silty and sandy marls facies, overlying a package of inaccessible but clearly more competent beds

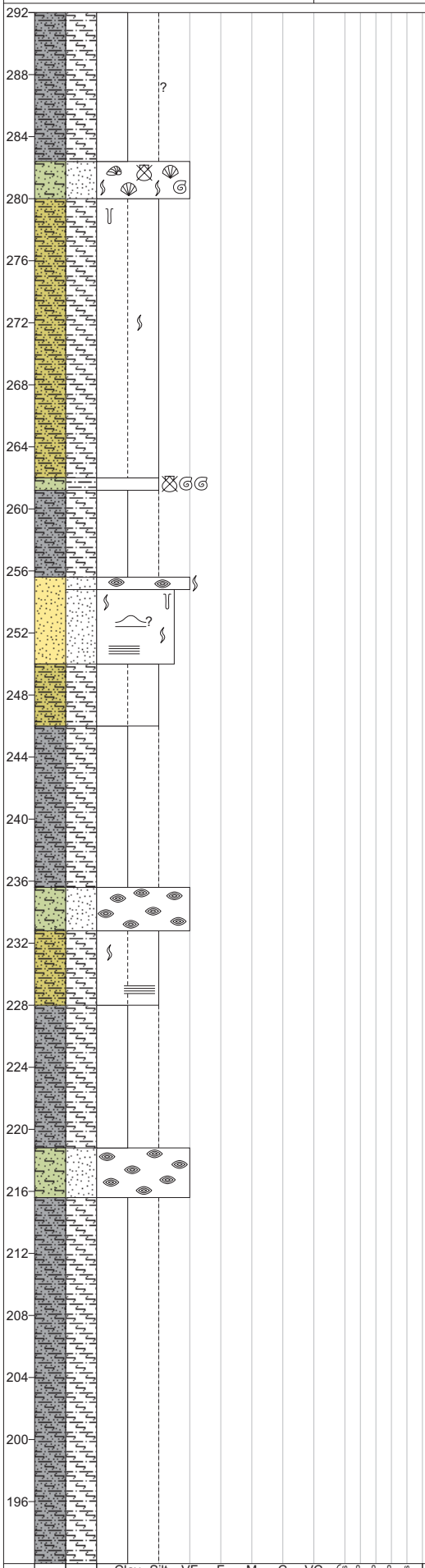
84 120
42°27.97'N
000°03.07'W

(m)	Facies	Lithology	Clay	Silt	VF	F	M	C	VC	Granules	Small P	Med P	Large P	Cobbles	Notes	Palaeo-currents	Samples & Photos	GPS & S&D
					Sand					Clasts								

Sector: Far NE Jaca Basin	**Albella**	Page: 2 of 6
Date Logged: 14/6/03		Logged By: Jamie Moss



Sector: Far NE Jaca Basin	**Albella**	Page: 3 of 6
Date Logged: 14/6/03		Logged By: Jamie Moss

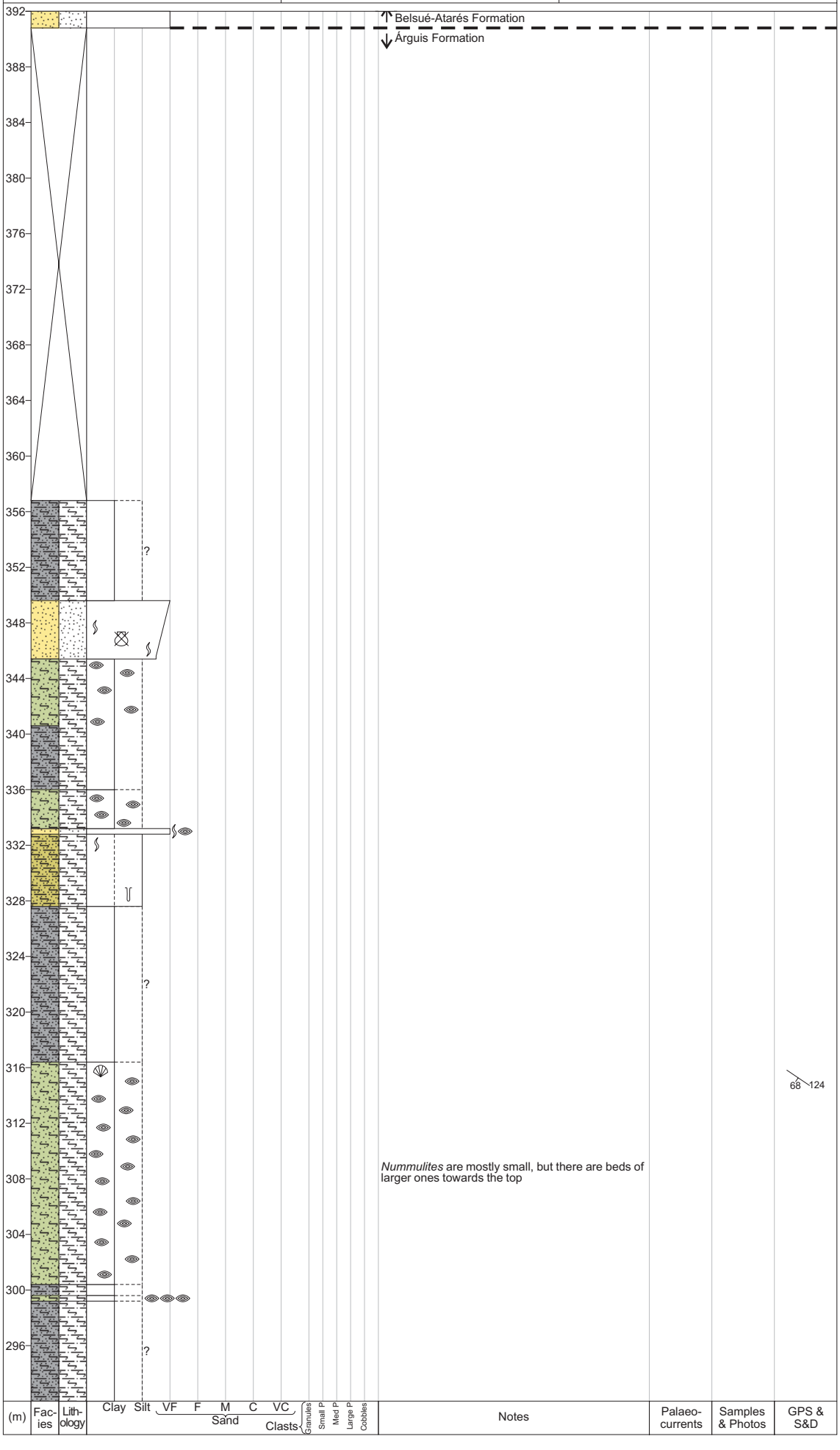


Again, extremely rich in *Nummulites*, from small to very large

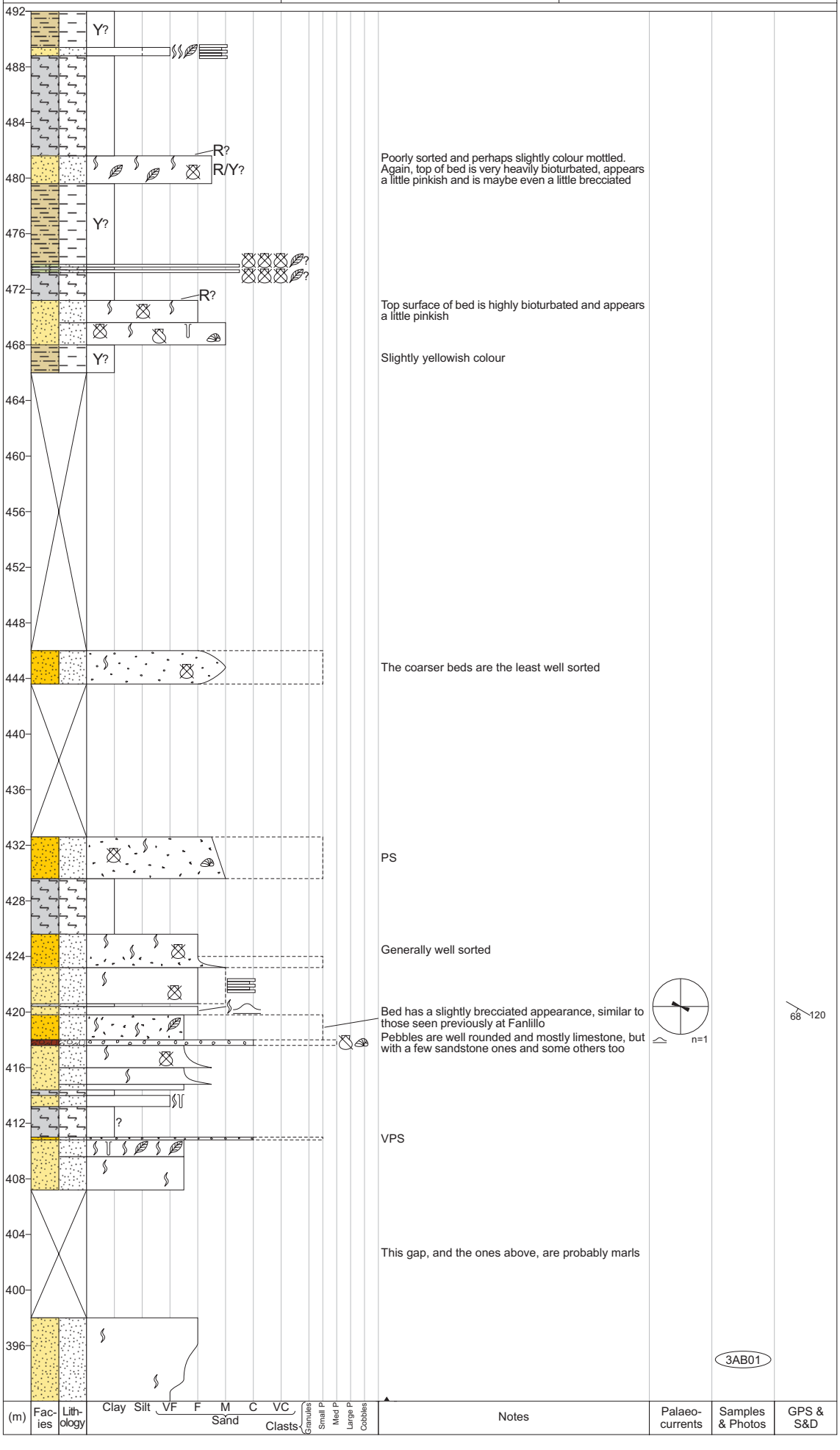
Extremely rich in very large *Nummulites*

Notes	Palaeo-currents	Samples & Photos	GPS & S&D

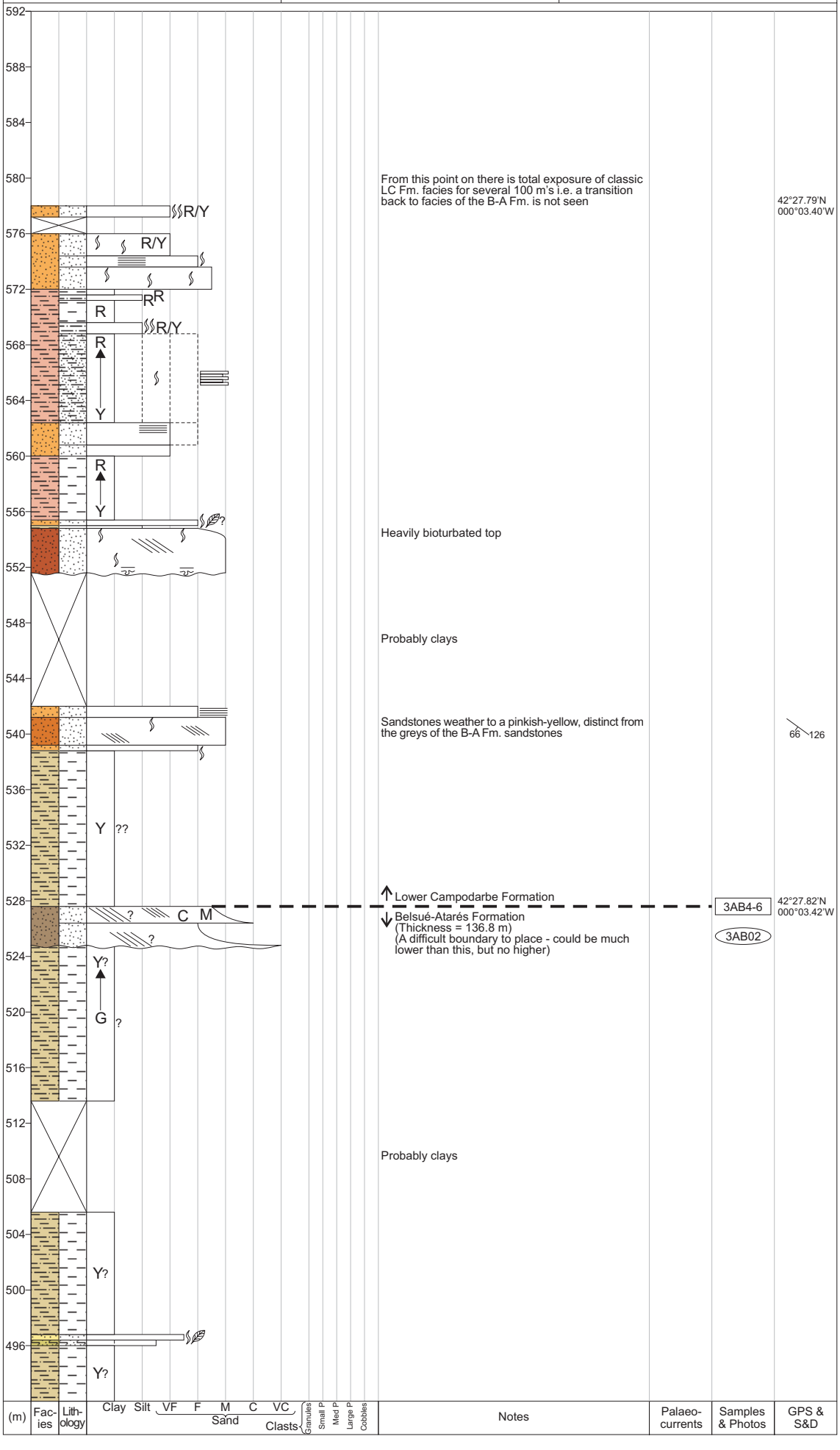
Sector: Far NE Jaca Basin	**Albella**	Page: 4 of 6
Date Logged: 14/6/03		Logged By: Jamie Moss



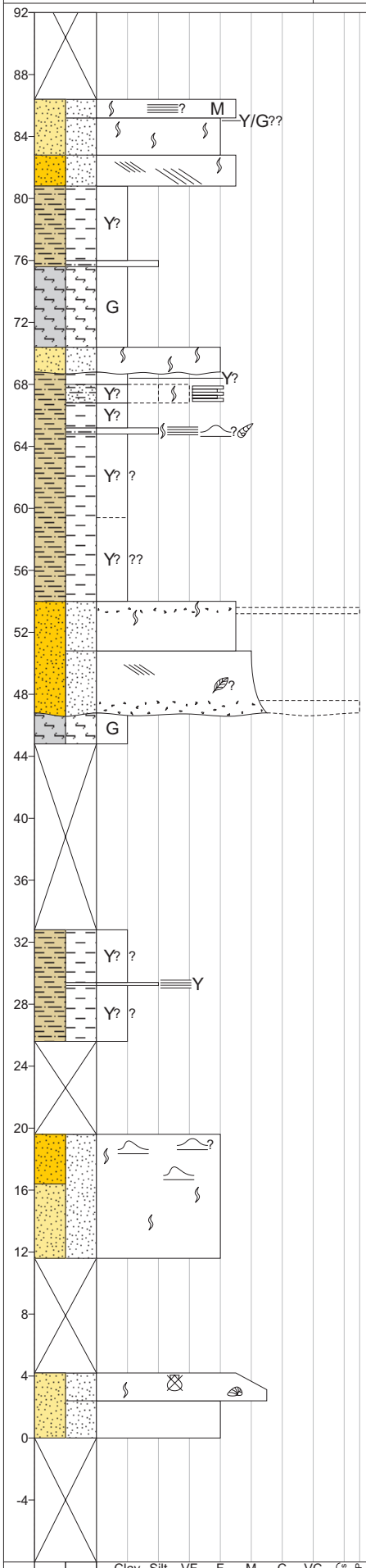
Sector: Far NE Jaca Basin	**Albella**	Page: 5 of 6
Date Logged: 14/6/03		Logged By: Jamie Moss



Sector: Far NE Jaca Basin	**Albella**	Page: 6 of 6
Date Logged: 14/6/03		Logged By: Jamie Moss



Sector: Far NE Jaca Basin	**Ligüerre de Ara**	Page: 1 of 4
Date Logged: 15/6/03		Logged By: Jamie Moss



Possible slight yellow/grey colour mottling at top of bed

Unusual gastropod — 3LG02f

Heavily rippled upper portion. (Photos look to N) — 3LG01, 3LG1-2

n=9

Some sandstone beds are poorly exposed, so internal features and/or grainsize variations may have been overlooked

68 112

All gaps are almost certainly marls (or clays)

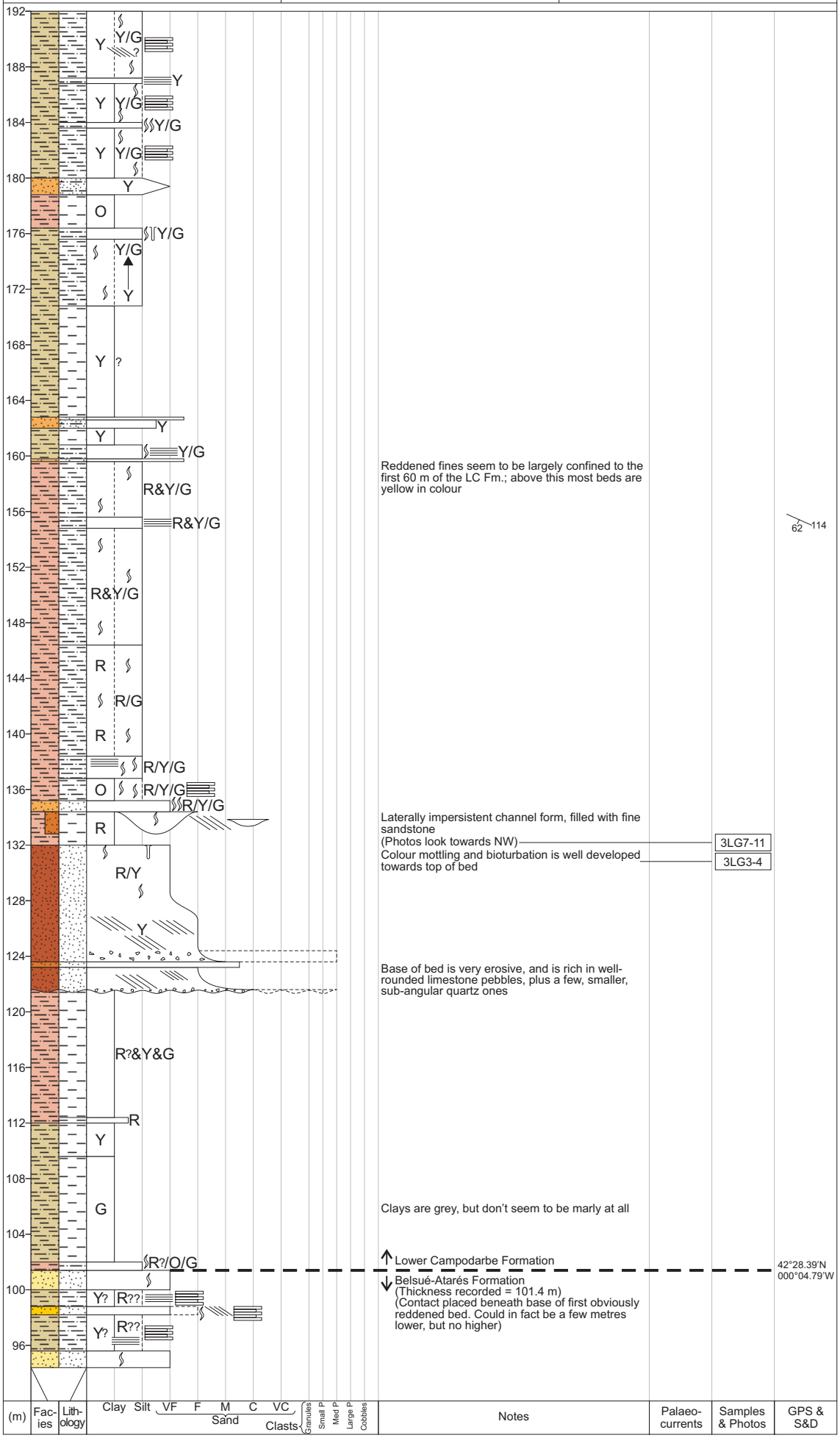
PS

42°28.41'N
000°04.69'W

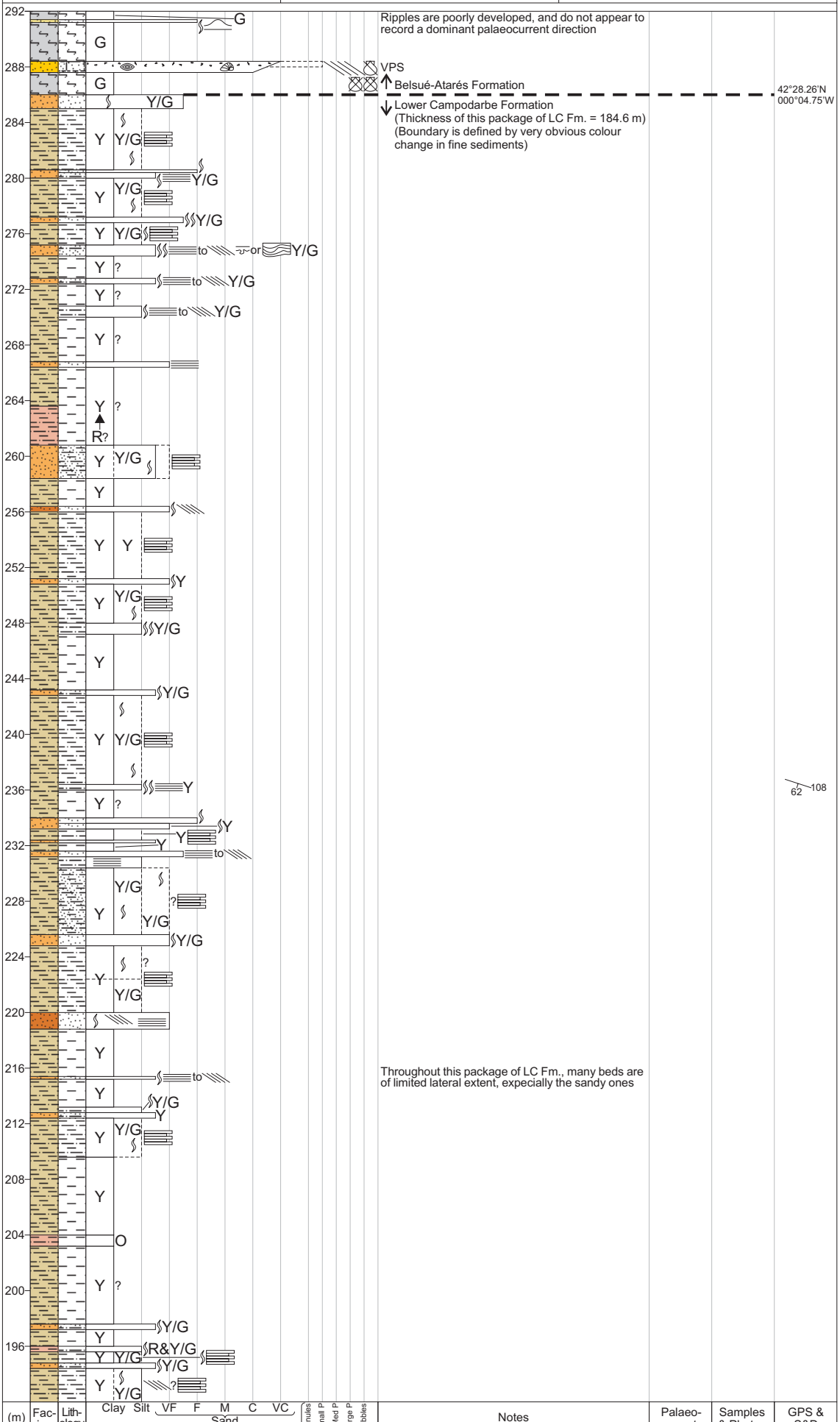
No exposure for a considerable distance

(m)	Facies	Lithology	Clay Silt VF F M C VC Sand Clasts Granules Small P Med P Large P Cobbles	Notes	Palaeo-currents	Samples & Photos	GPS & S&D

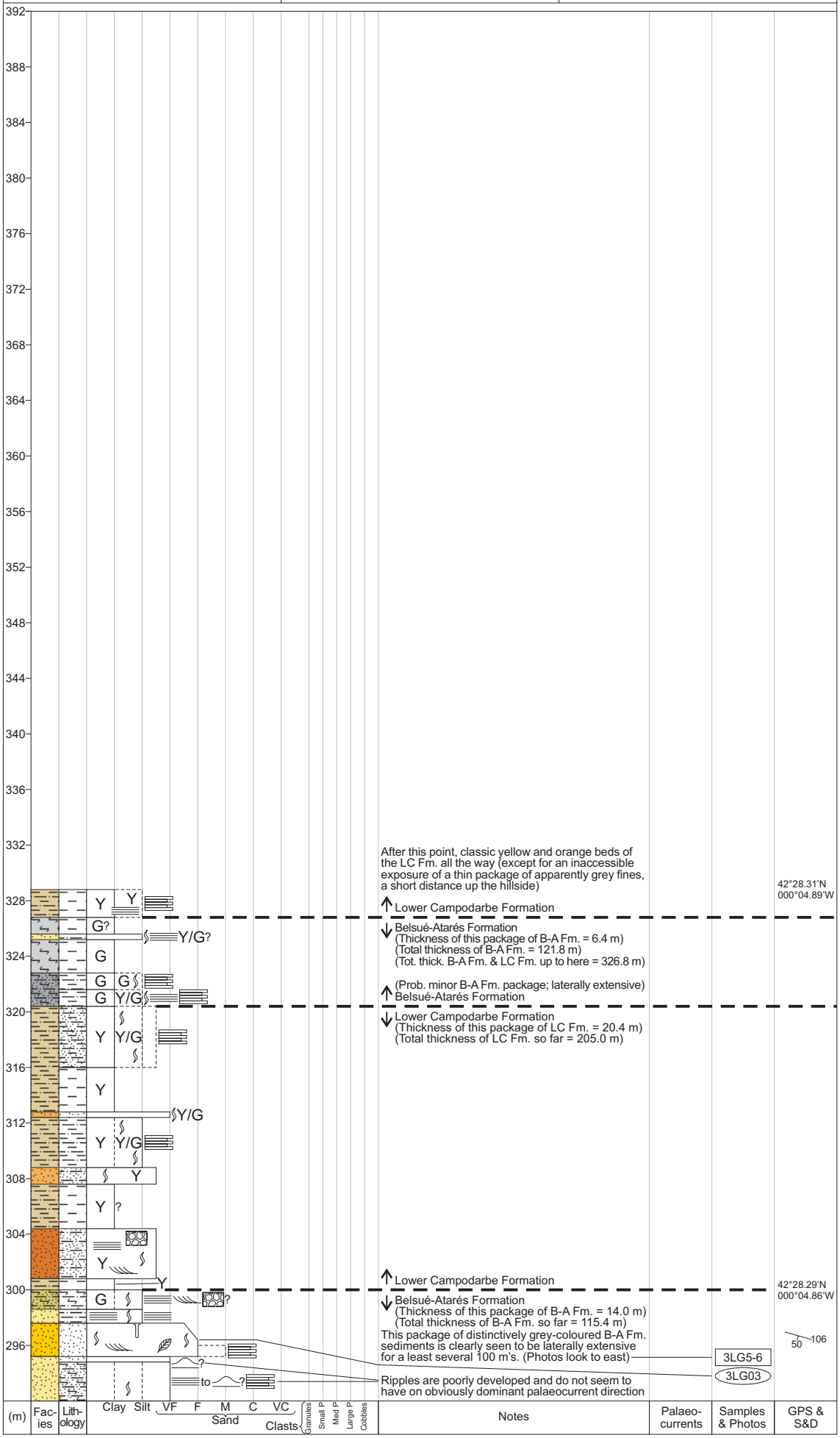
Sector: Far NE Jaca Basin	**Ligüerre de Ara**	Page: 2 of 4
Date Logged: 15/6/03		Logged By: Jamie Moss



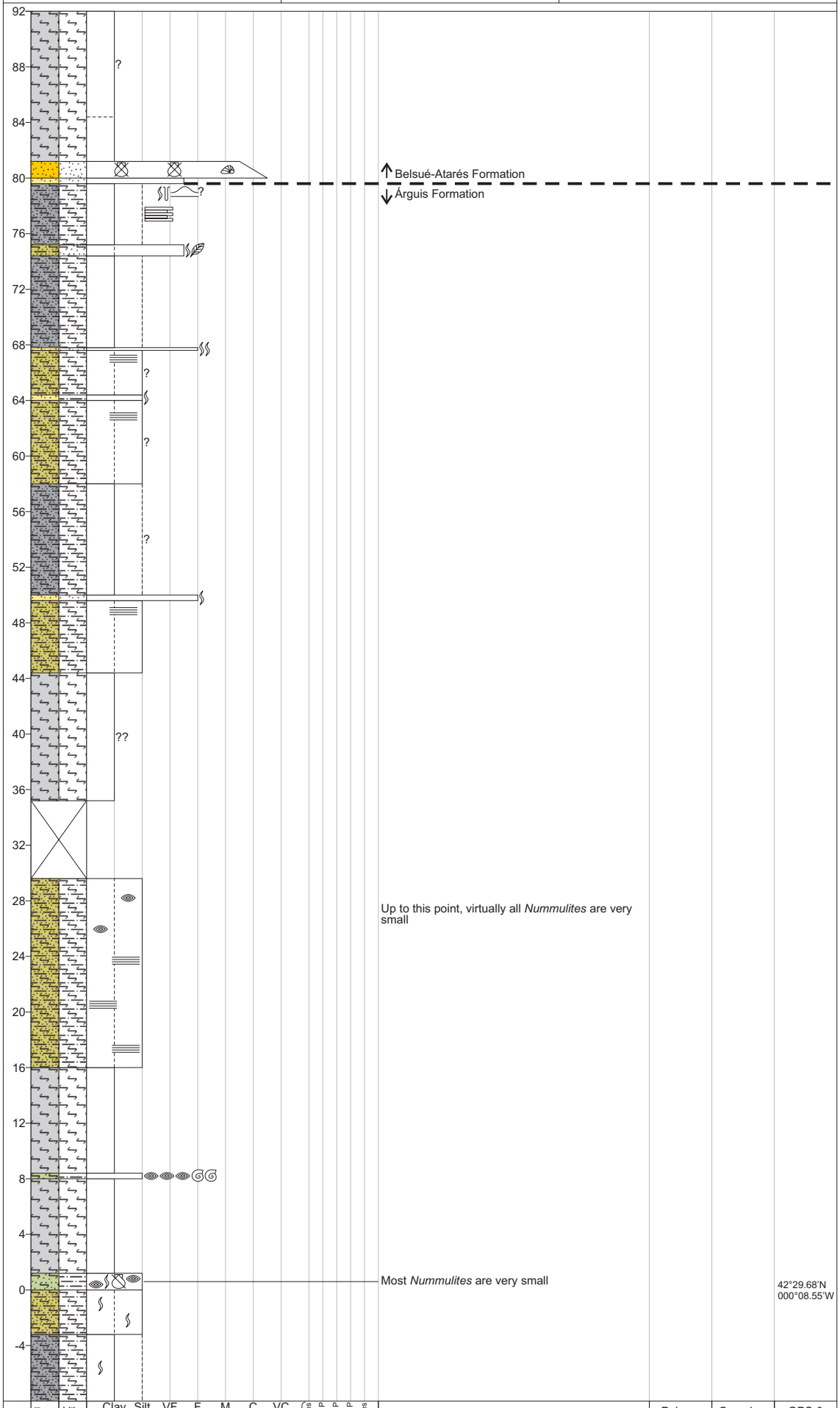
Sector: Far NE Jaca Basin	**Ligüerre de Ara**	Page: 3 of 4
Date Logged: 15/6/03		Logged By: Jamie Moss



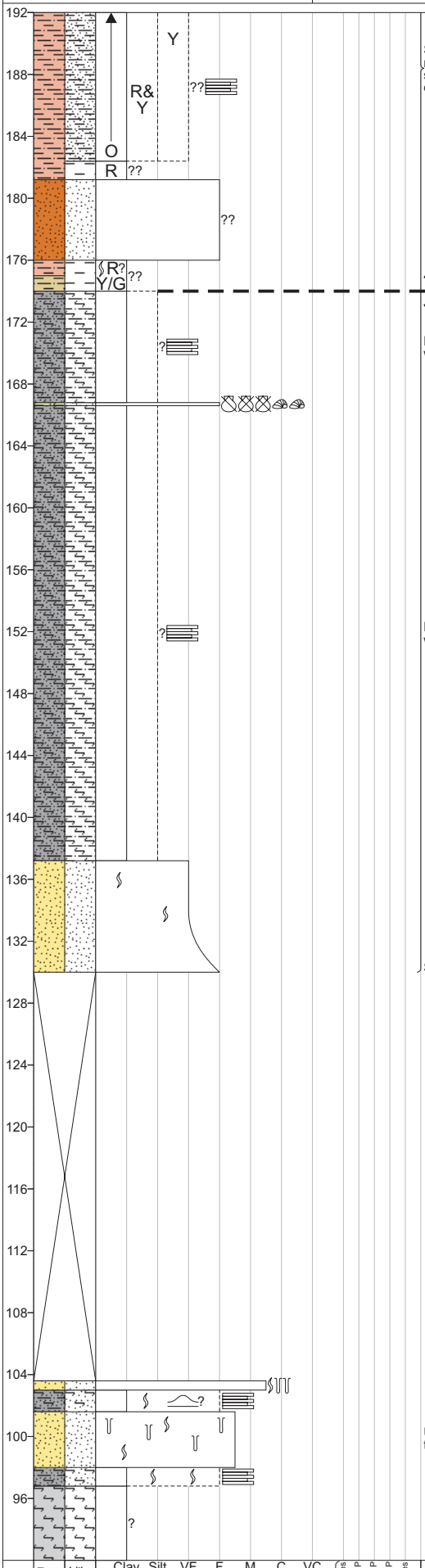
Sector: Far NE Jaca Basin	**Ligüerre de Ara**	Page: 4 of 4
Date Logged: 15/6/03		Logged By: Jamie Moss



Sector: Far NE Jaca Basin	**Lardiés**	Page: 1 of 7
Dates Logged: 16-17/6/03		Logged By: Jamie Moss



Sector: Far NE Jaca Basin	**Lardiés**	Page: 2 of 7
Dates Logged: 16-17/6/03		Logged By: Jamie Moss



Section of (largely) inaccessible exposure. All thicknesses have been estimated, and most bed grain-sizes and features have been interpreted from a distance

↑ Lower Campodarbe Formation

↓ Belsué-Atarés Formation (Thickness of this package of B-A Fm. = 94.4 m)

Marls are silty, and contain very thin silt intebeds as well

Marls are silty, and contain very thin silt intebeds as well

Start of section of (largely) inaccessible exposure

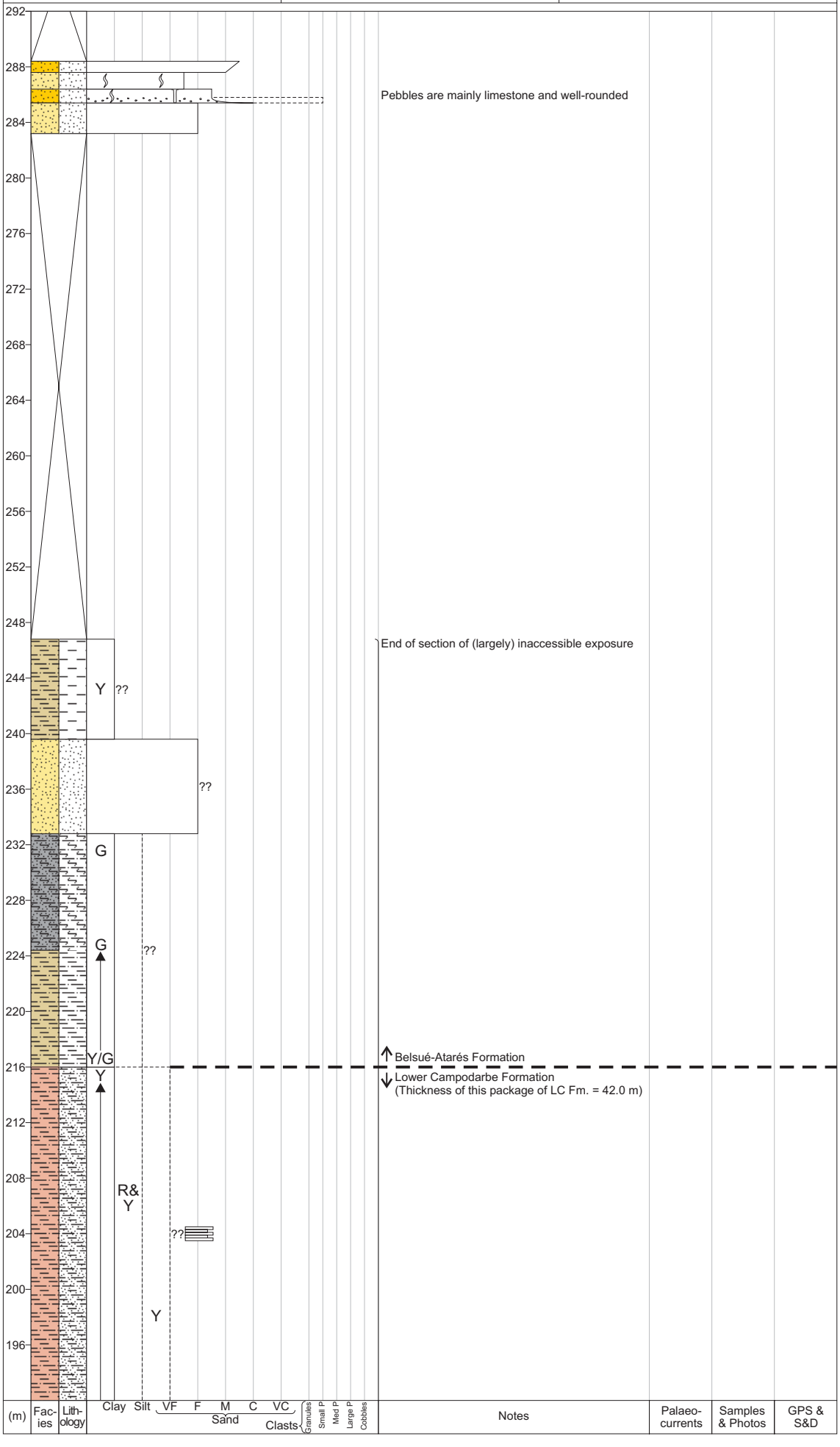
Unusually intense burrowing, especially towards top of bed

3LR01

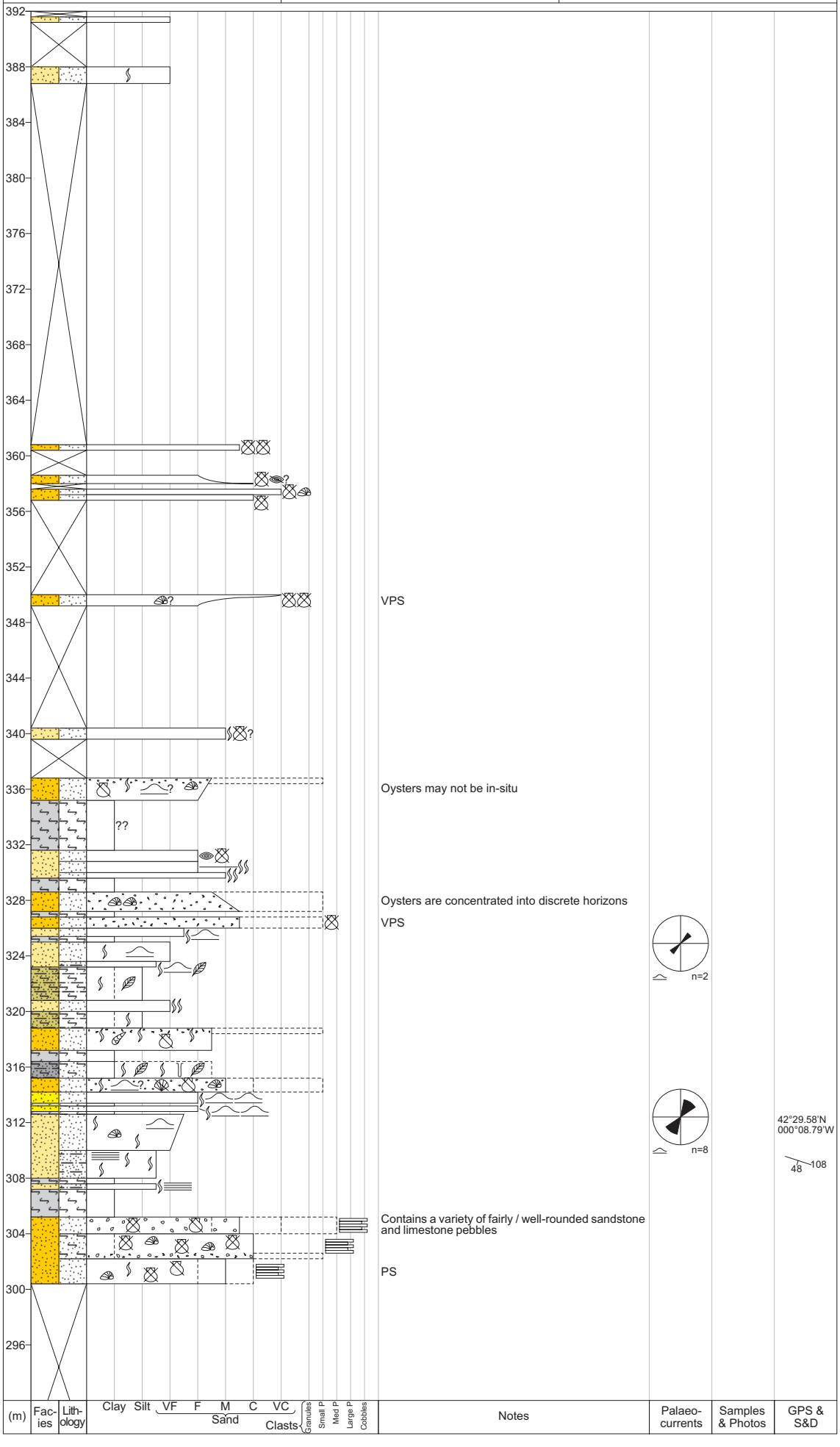
58 112

(m)	Facies	Lithology	Notes	Palaeo-currents	Samples & Photos	GPS & S&D

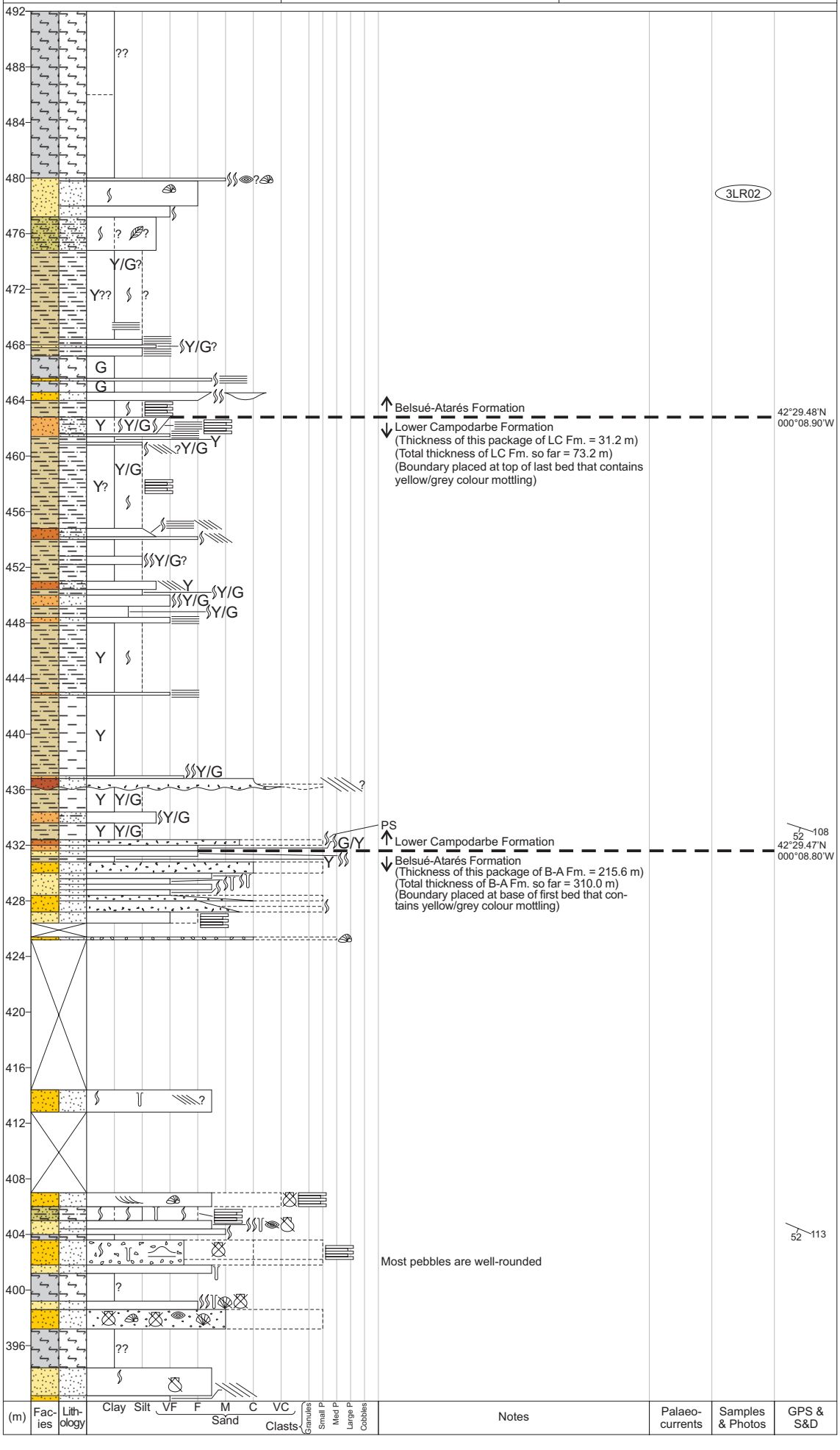
Sector: Far NE Jaca Basin	**Lardiés**	Page: 3 of 7
Dates Logged: 16-17/6/03		Logged By: Jamie Moss



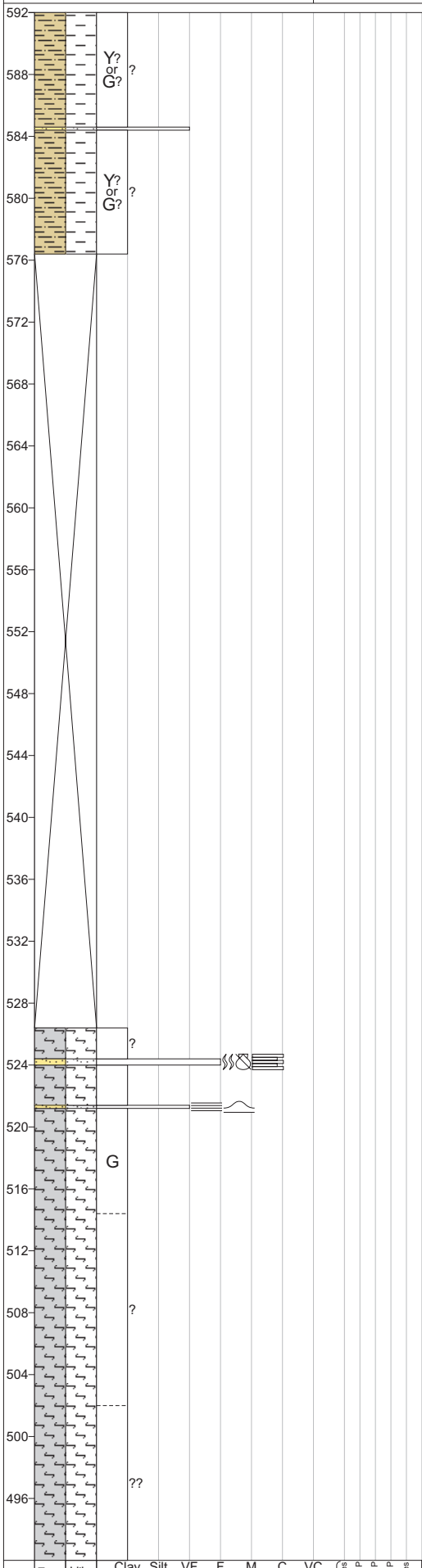
Sector: Far NE Jaca Basin	**Lardiés**	Page: 4 of 7
Dates Logged: 16-17/6/03		Logged By: Jamie Moss



Sector: Far NE Jaca Basin	**Lardiés**	Page: 5 of 7
Dates Logged: 16-17/6/03		Logged By: Jamie Moss



Sector: Far NE Jaca Basin	**Lardiés**	Page: 6 of 7
Dates Logged: 16-17/6/03		Logged By: Jamie Moss



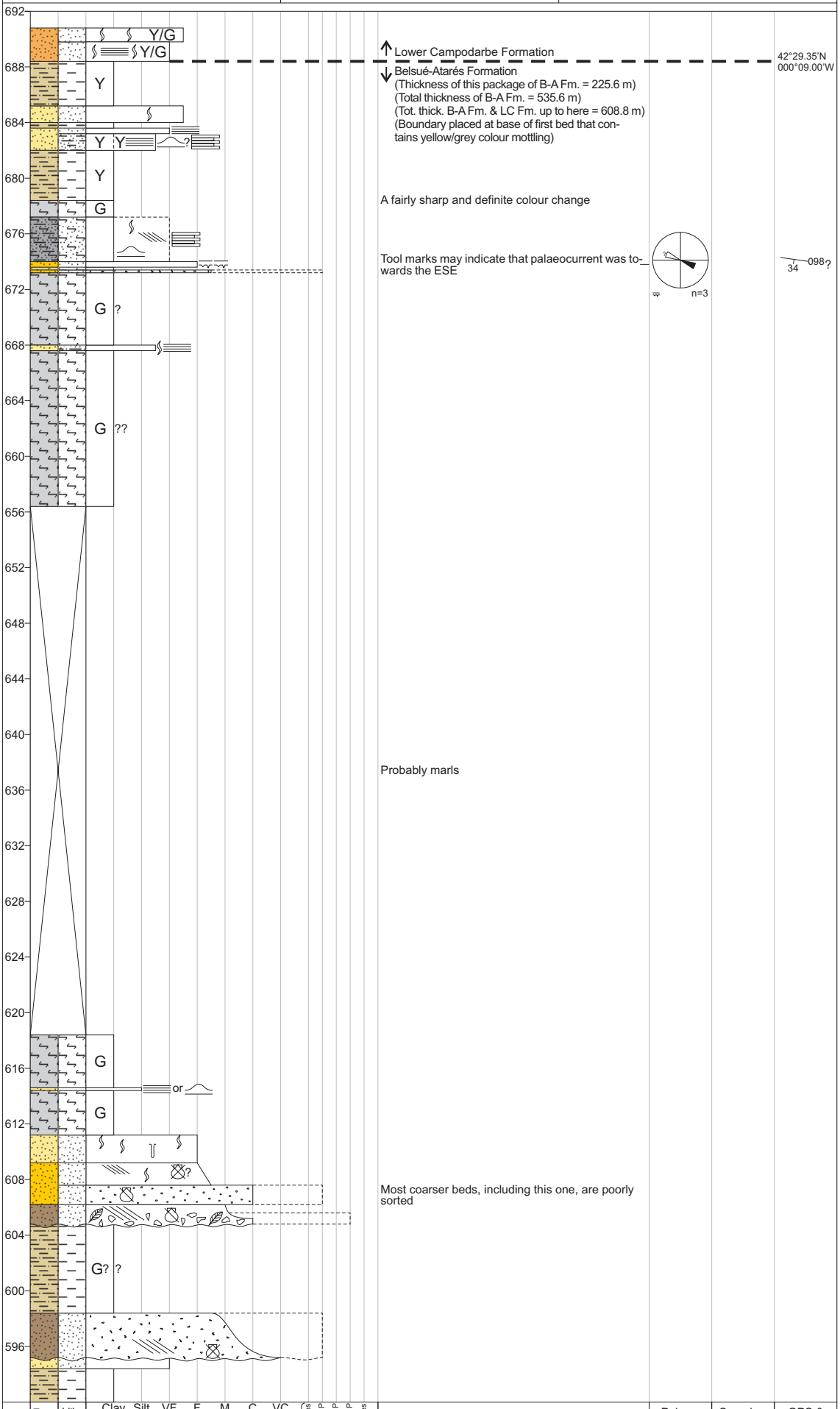
Again, difficult to decide colour of bed

Difficult to decide colour of bed

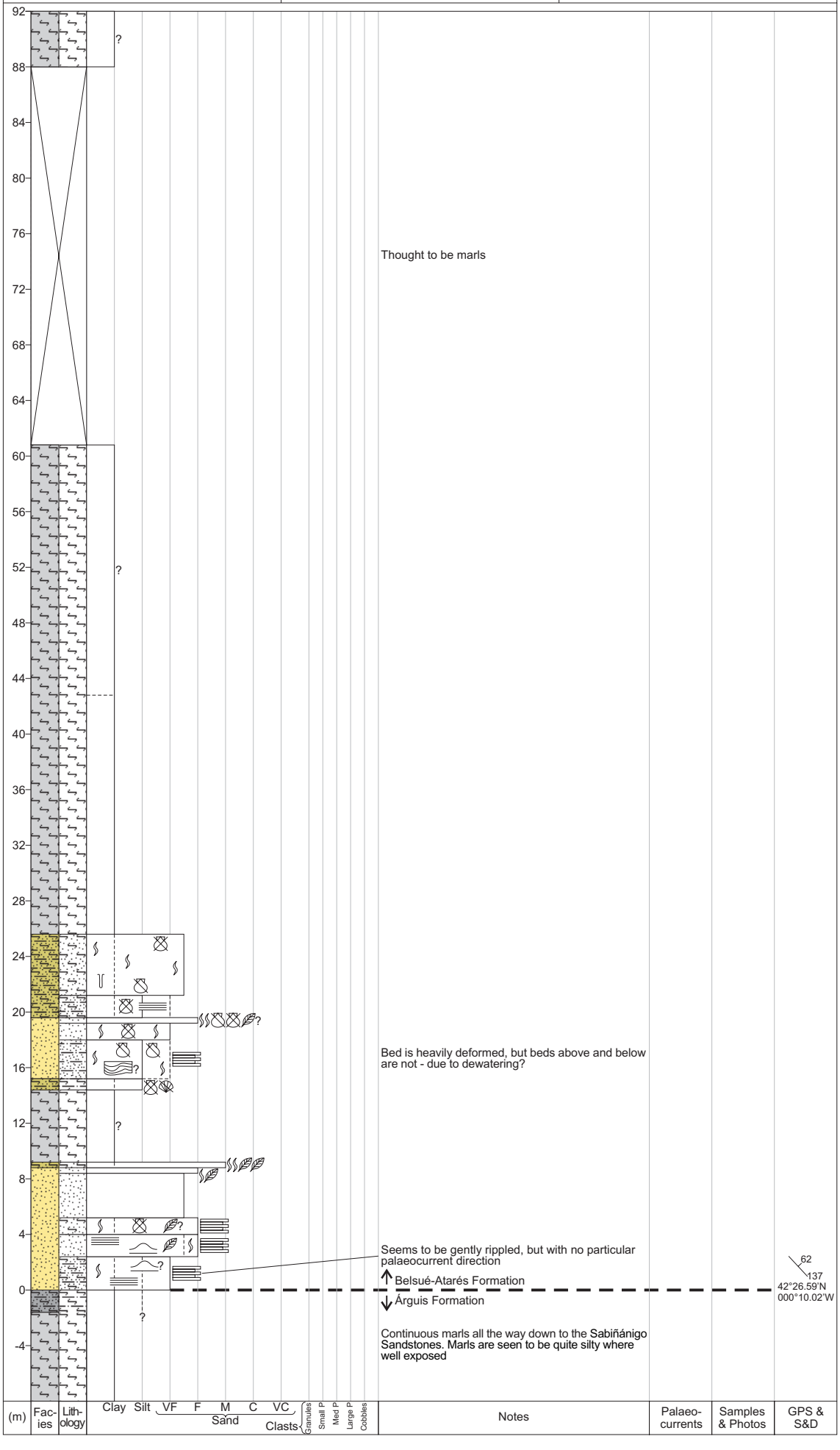
Not necessarily all marls or clays

Notes	Palaeo-currents	Samples & Photos	GPS & S&D

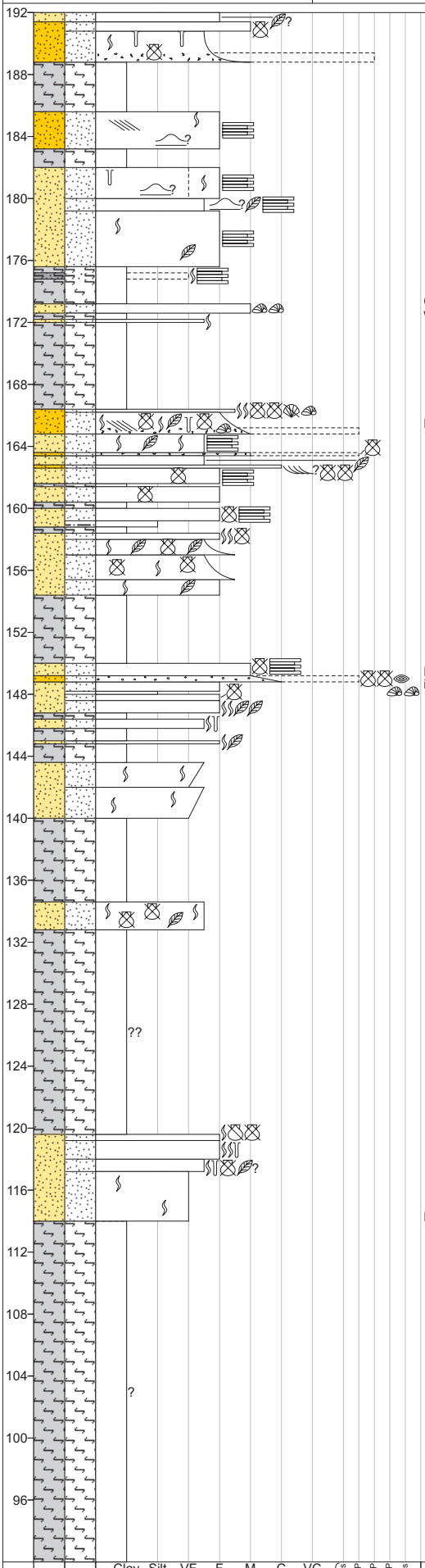
Sector: Far NE Jaca Basin	**Lardiés**	Page: 7 of 7
Dates Logged: 16-17/6/03		Logged By: Jamie Moss



Sector: NE Jaca Basin	**Fablo**	Page: 1 of 5
Dates Logged: 12-13/6/03		Logged By: Jamie Moss



Sector: NE Jaca Basin	**Fablo**	Page: 2 of 5
Dates Logged: 12-13/6/03		Logged By: Jamie Moss



Oyster shells are concentrated into horizons and well fragmented

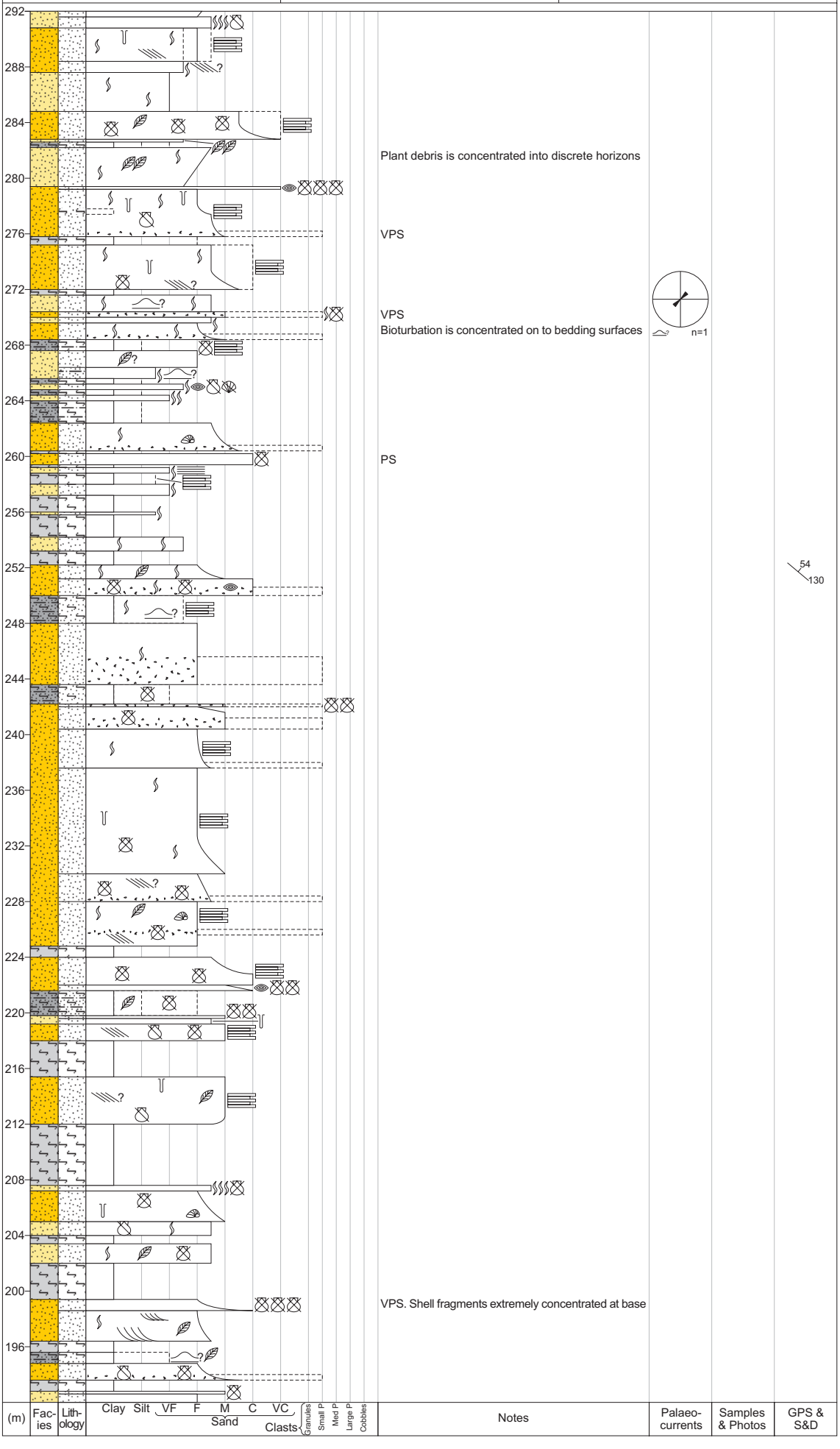
Plant debris is concentrated into thin horizons

Poorly sorted. Contains various types of pebbles, including limestone; all are well rounded

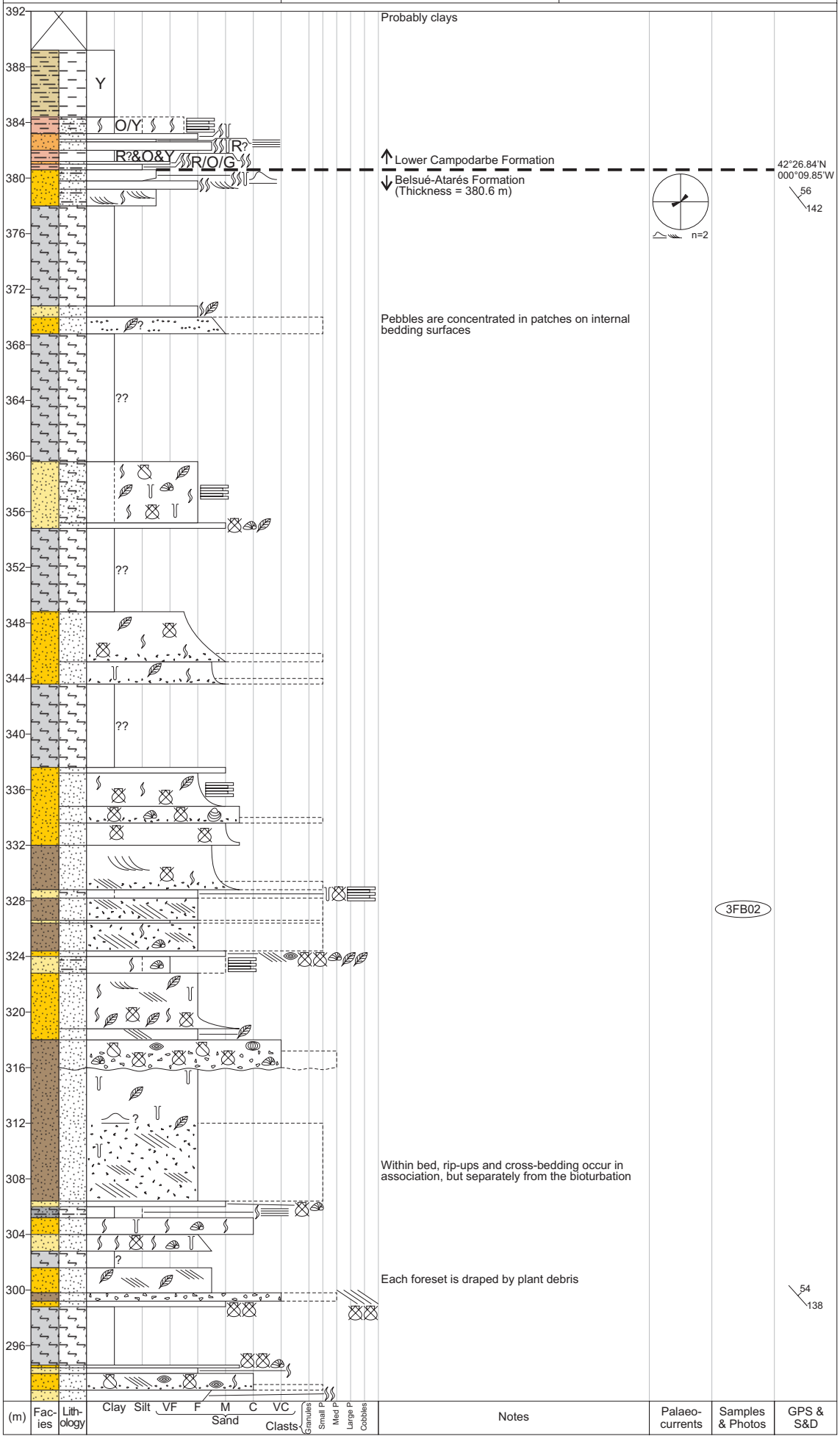
Possible alternative base to B-A Fm.

(m)	Facies	Lithology	Clay Silt VF F M C VC Sand Clasts Granules Small P Med P Large P Cobbles	Notes	Palaeo-currents	Samples & Photos	GPS & S&D
						3FB01	58/146; 66/146; 54/154 42°26.65'N 000°10.01'W

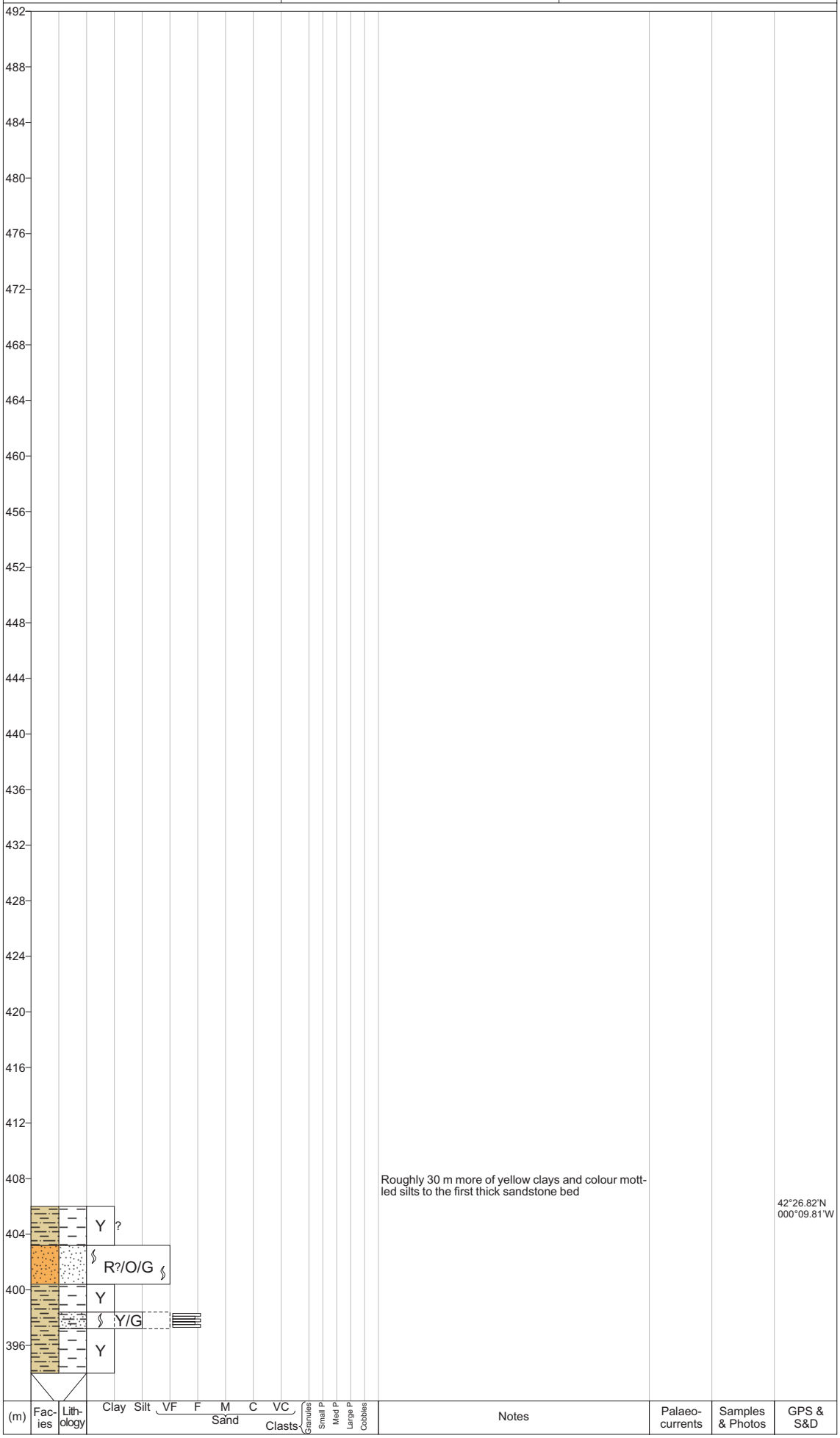
Sector: NE Jaca Basin	**Fablo**	Page: 3 of 5
Dates Logged: 12-13/6/03		Logged By: Jamie Moss



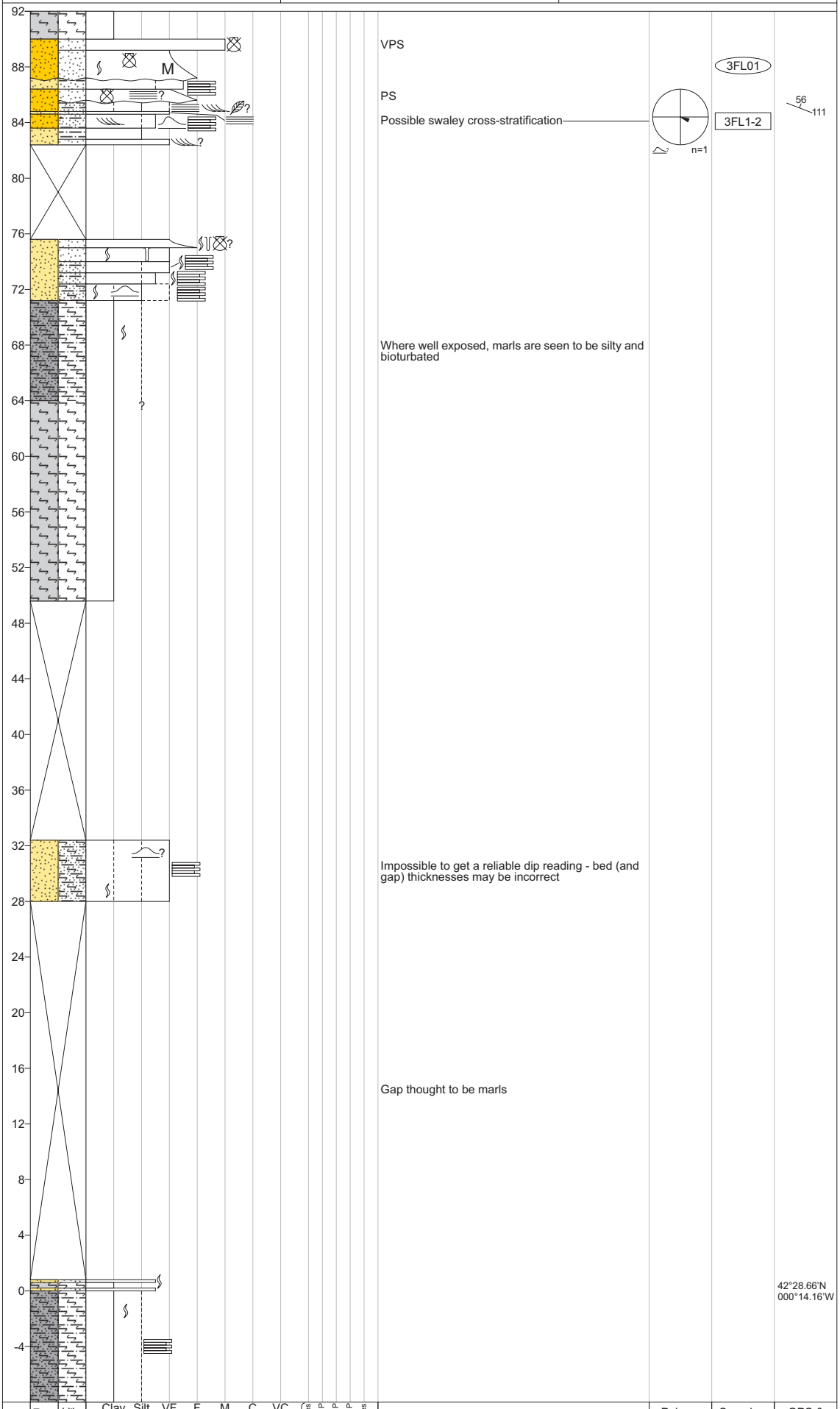
Sector: NE Jaca Basin	**Fablo**	Page: 4 of 5
Dates Logged: 12-13/6/03		Logged By: Jamie Moss



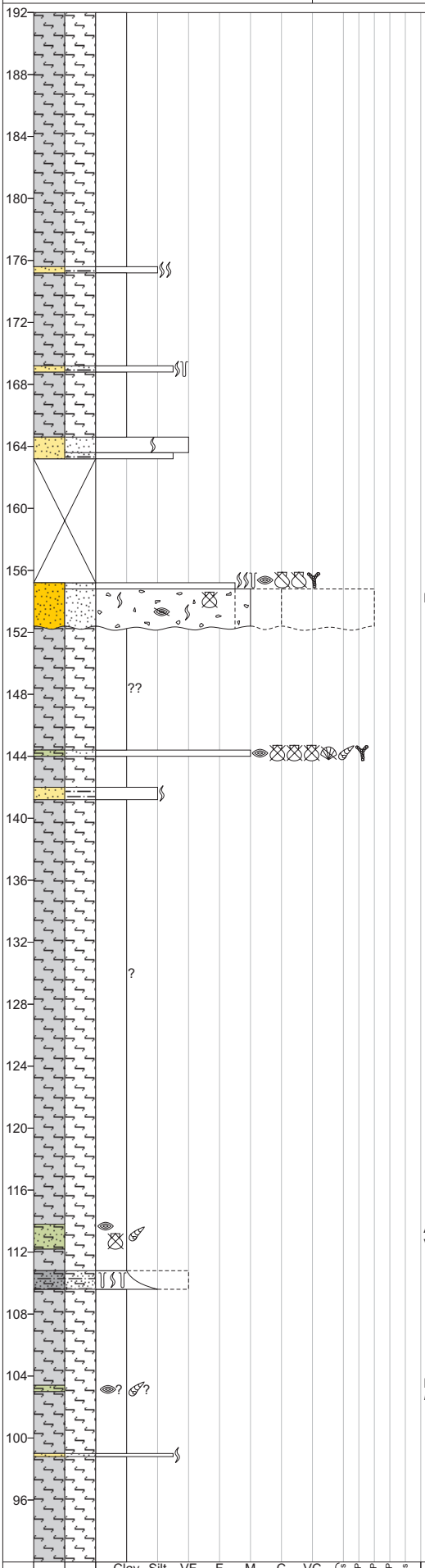
Sector: NE Jaca Basin	**Fablo**	Page: 5 of 5
Dates Logged: 12-13/6/03		Logged By: Jamie Moss



Sector: NE Jaca Basin	**Fanlillo**	Page: 1 of 5
Dates Logged: 14 & 20-21/5/03		Logged By: Jamie Moss

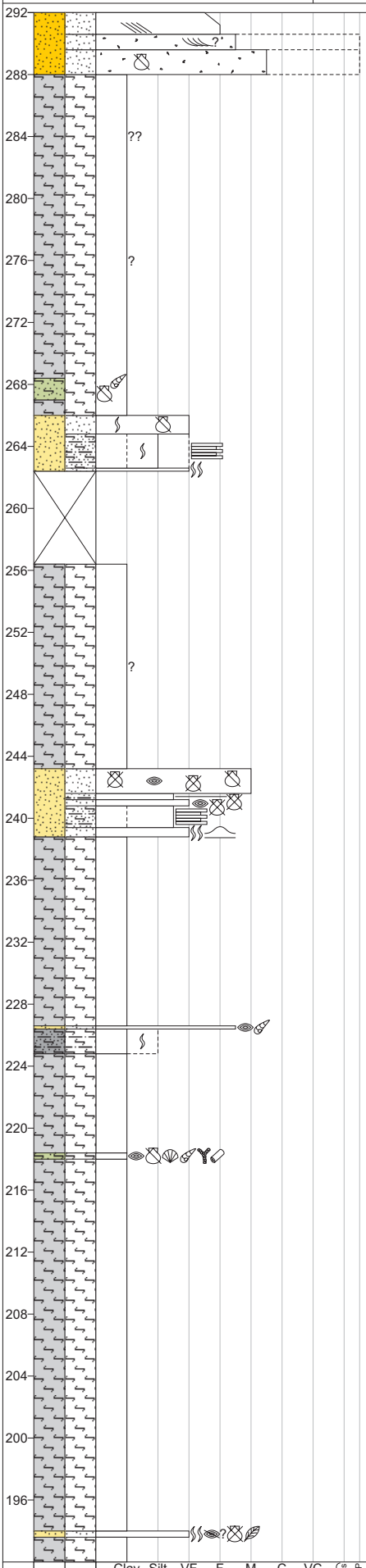


Sector: NE Jaca Basin	**Fanlillo**	Page: 2 of 5
Dates Logged: 14 & 20-21/5/03		Logged By: Jamie Moss



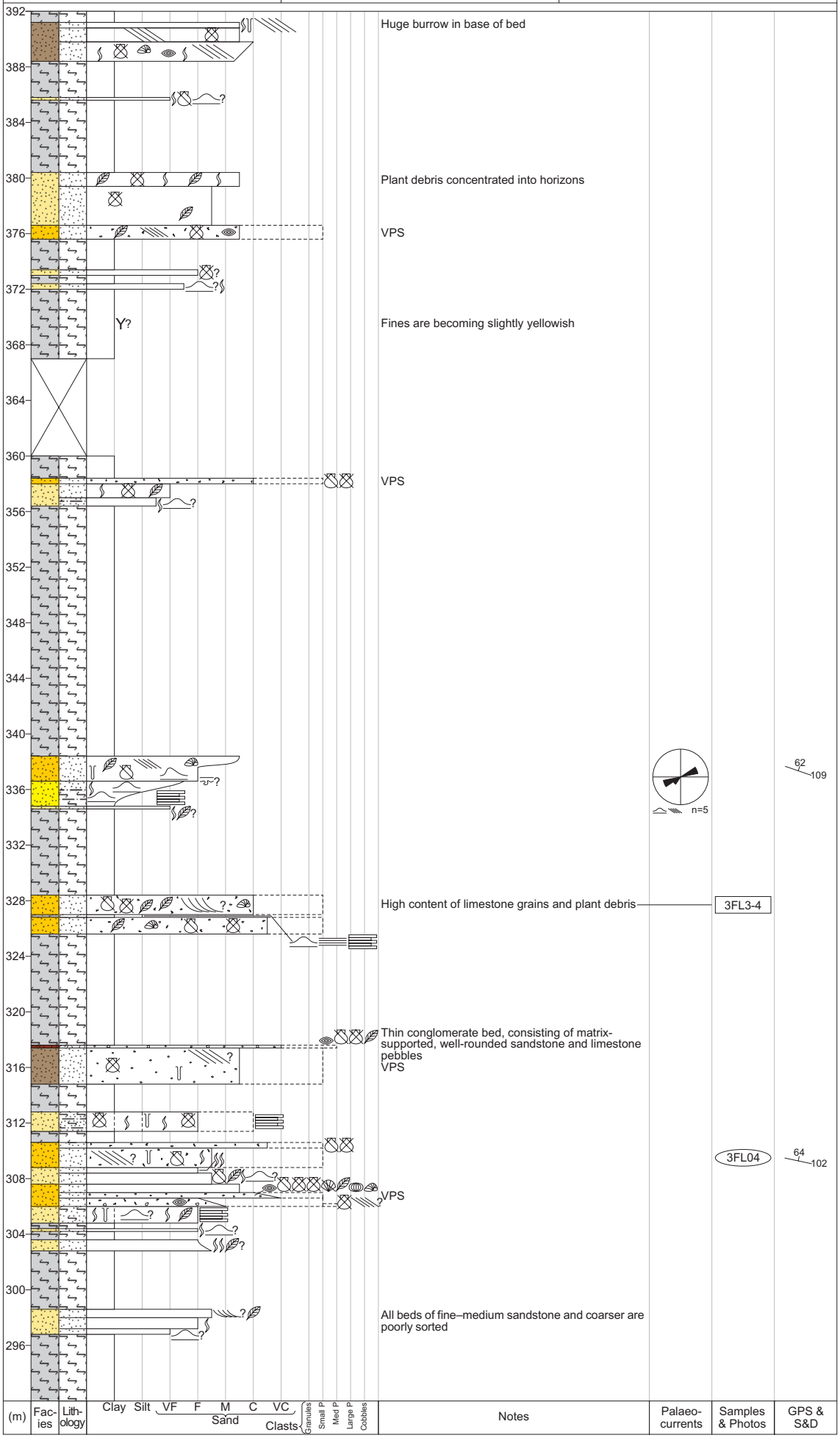
(m)	Facies	Lithology	Clay Silt VF F M C VC Sand Clasts (Granules, Small P, Med P, Large P, Cobbles)	Notes	Palaeo-currents	Samples & Photos	GPS & S&D
				PS		3FL02	
				Again fossils not found in-situ. Also Includes some very large *Nummulites*			
				Fossils not found in-situ. Includes some very large *Nummulites*			

Sector: NE Jaca Basin	**Fanlillo**	Page: 3 of 5
Dates Logged: 14 & 20-21/5/03		Logged By: Jamie Moss

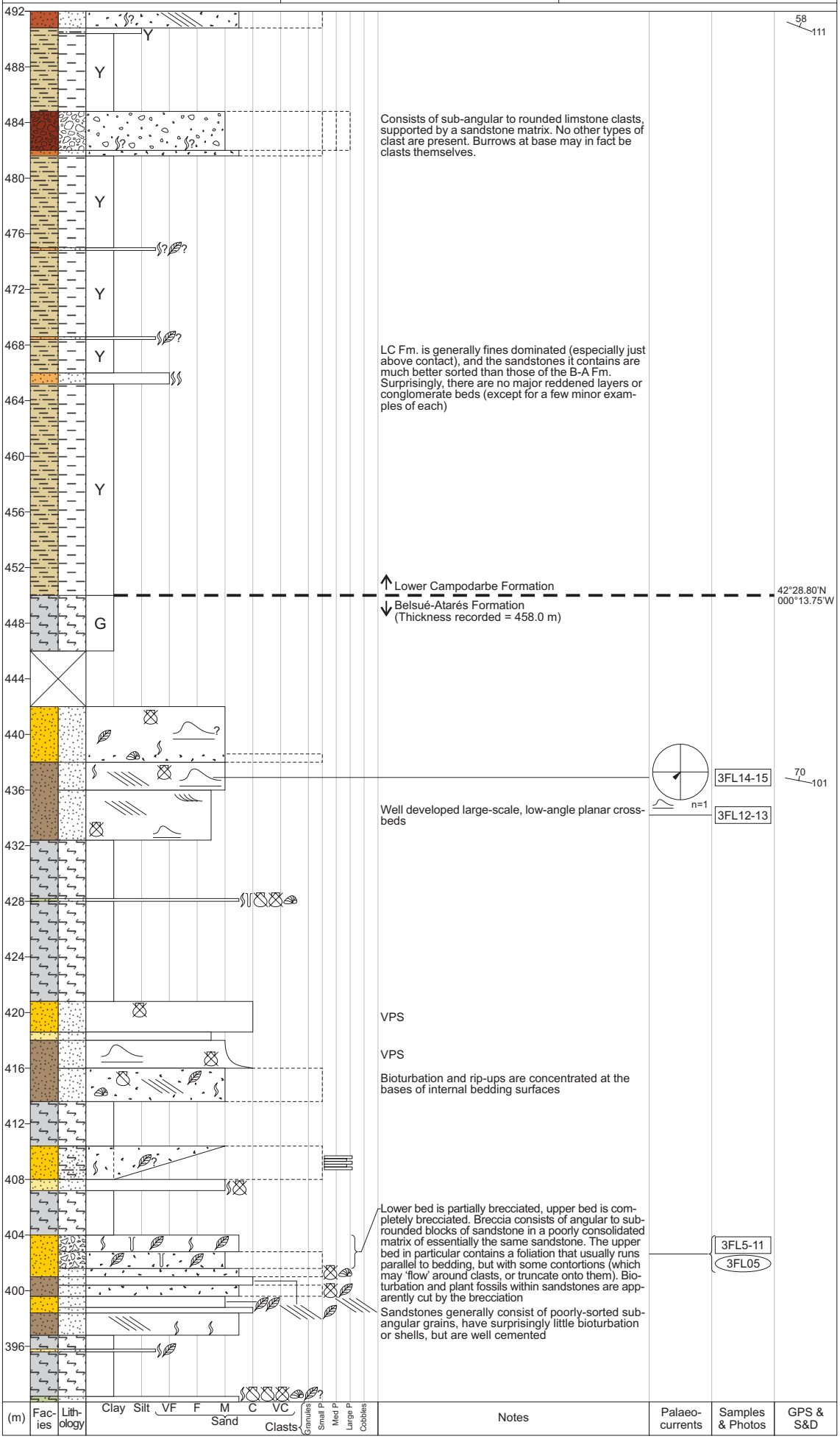


(m)	Facies	Lithology	Clay Silt VF F M C VC (Sand) Clasts (Granules, Small P, Med P, Large P, Cobbles)	Notes	Palaeo-currents	Samples & Photos	GPS & S&D
				PS			58 / 114
				VPS			
				More fossilised shells within marls			
				Very rich in 'calcite plates'			
				Unusual fossil bed actually within marls. Contains many different types of small fossil shells, including at least 10 different types of gastropod, plus numerous 'worm tubes' (white, non-calcitic tubes)		3FL03*f*	

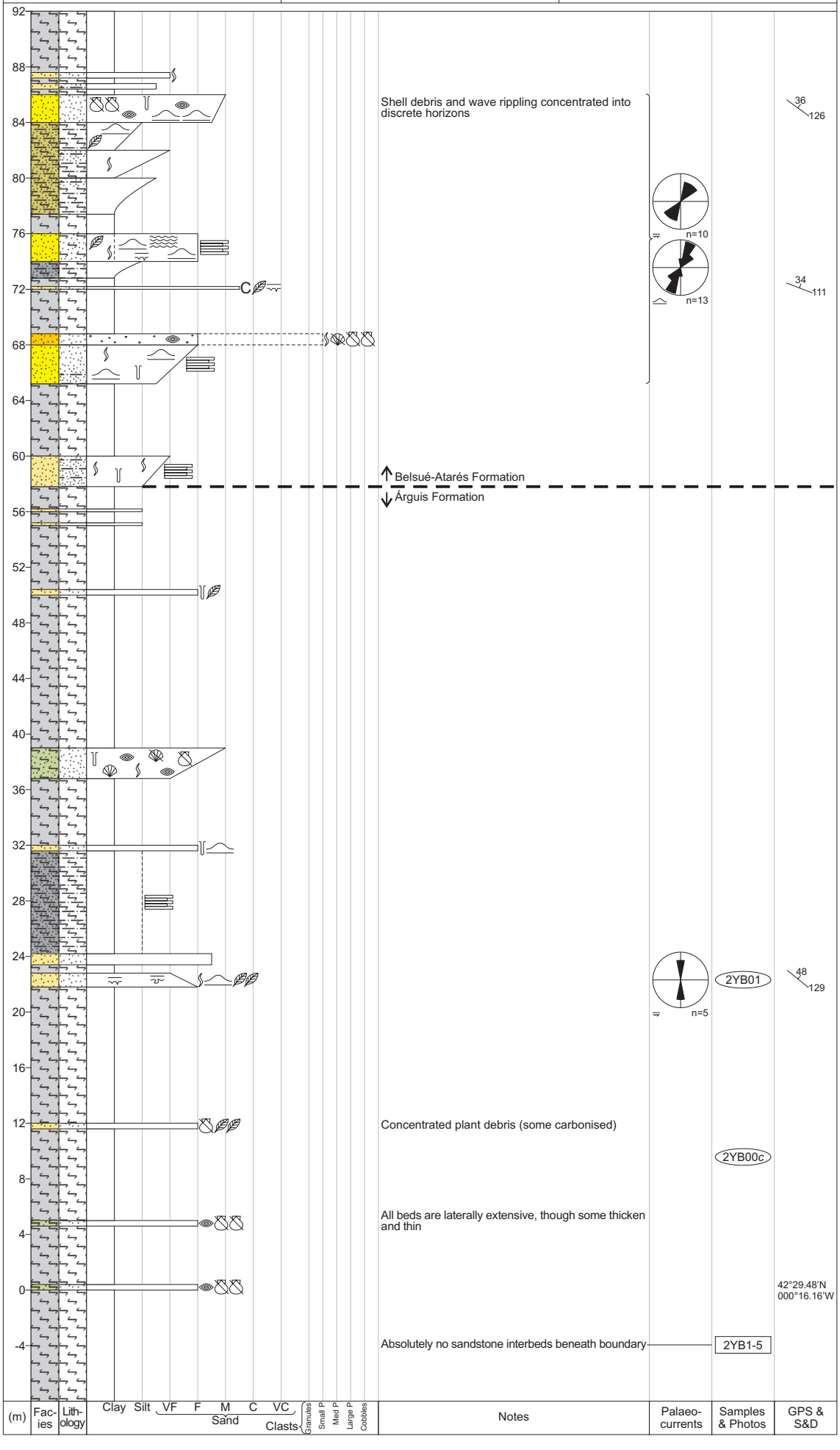
Sector: NE Jaca Basin	**Fanlillo**	Page: 4 of 5
Dates Logged: 14 & 20-21/5/03		Logged By: Jamie Moss



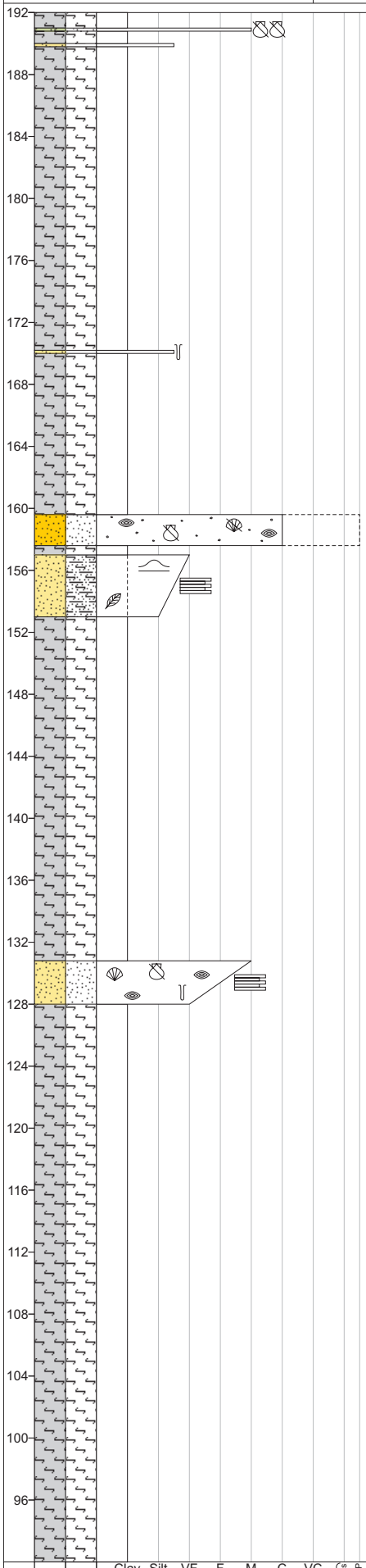
Sector: NE Jaca Basin	**Fanlillo**	Page: 5 of 5
Dates Logged: 14 & 20-21/5/03		Logged By: Jamie Moss



Sector: NE Jaca Basin	**Yebra de Basa**	Page: 1 of 7
Dates Logged: 23-24/5/02		Logged By: Jamie Moss

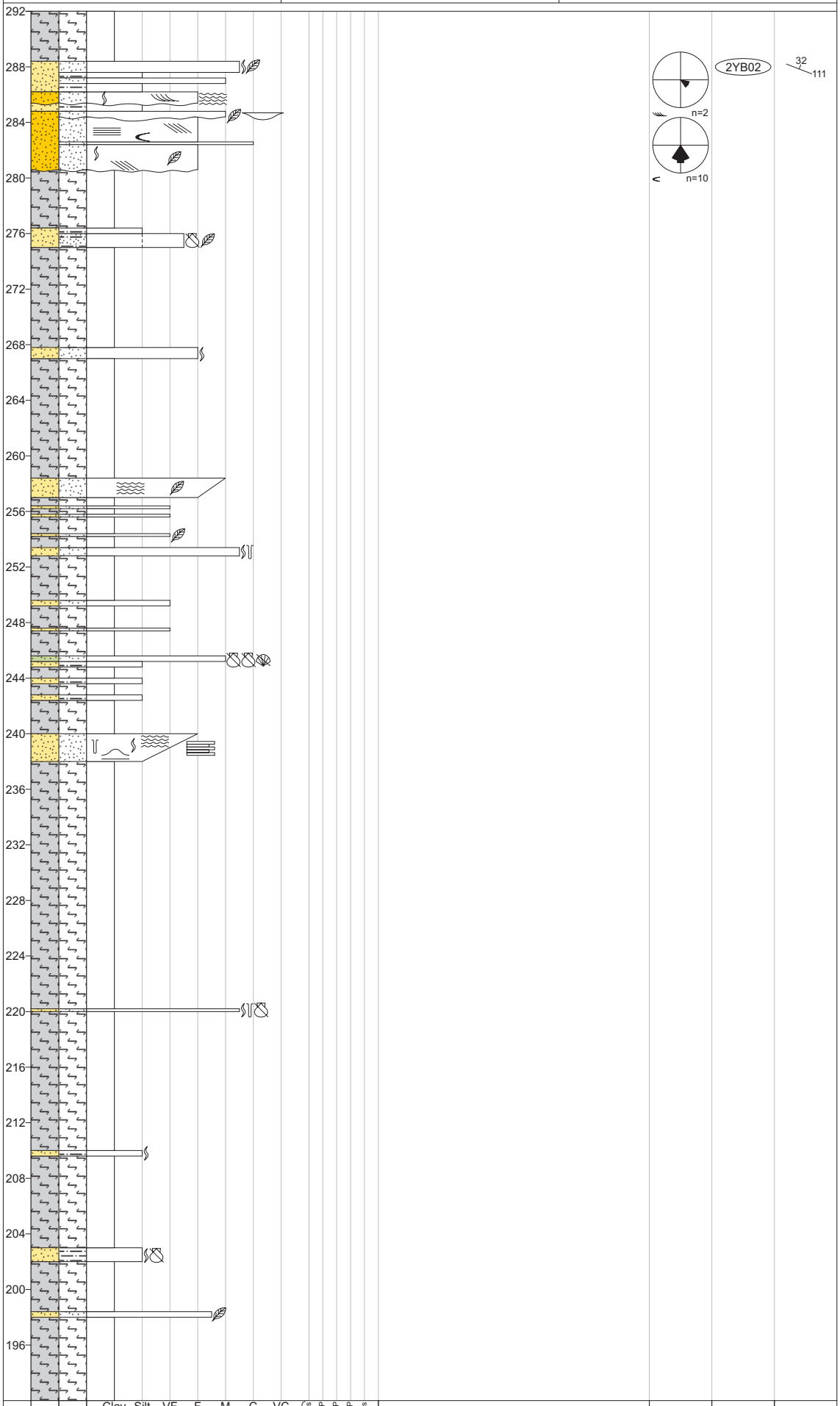


Sector: NE Jaca Basin	**Yebra de Basa**	Page: 2 of 7
Dates Logged: 23-24/5/02		Logged By: Jamie Moss

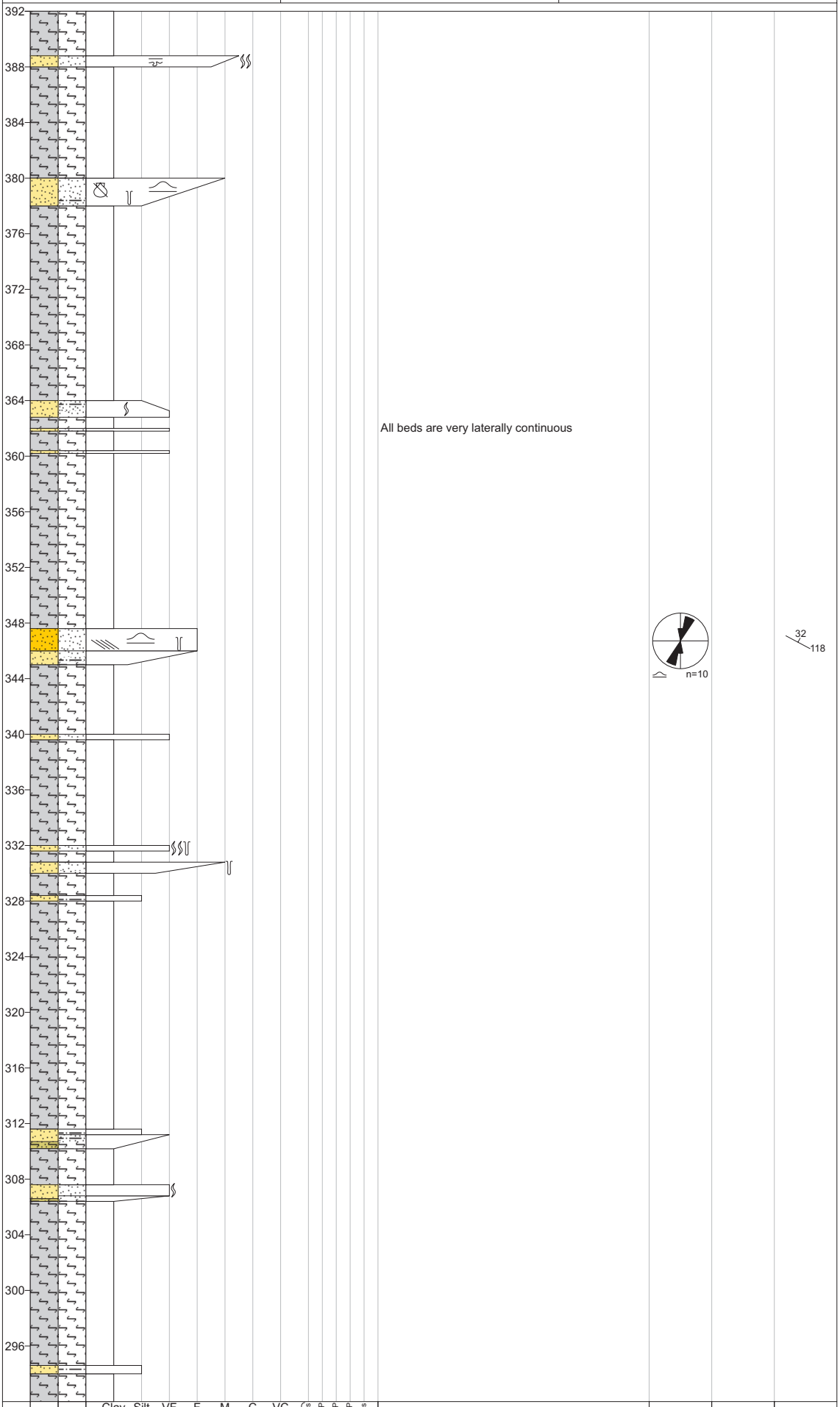


(m)	Facies	Lithology	Clay	Silt	VF	F	M	C	VC	Granules	Small P	Med P	Large P	Cobbles	Notes	Palaeo-currents	Samples & Photos	GPS & S&D
					Sand					Clasts								

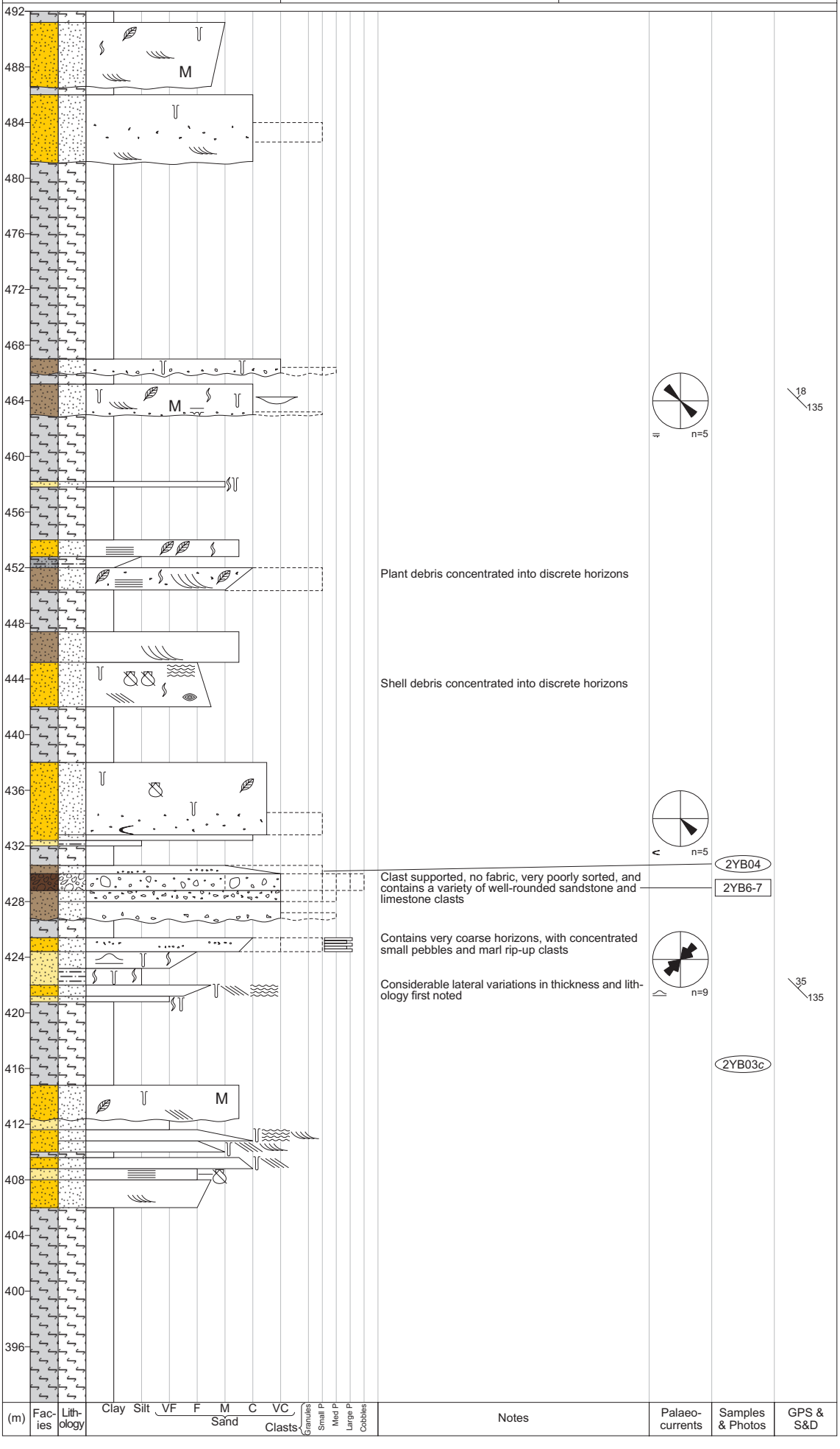
Sector: NE Jaca Basin	**Yebra de Basa**	Page: 3 of 7
Dates Logged: 23-24/5/02		Logged By: Jamie Moss



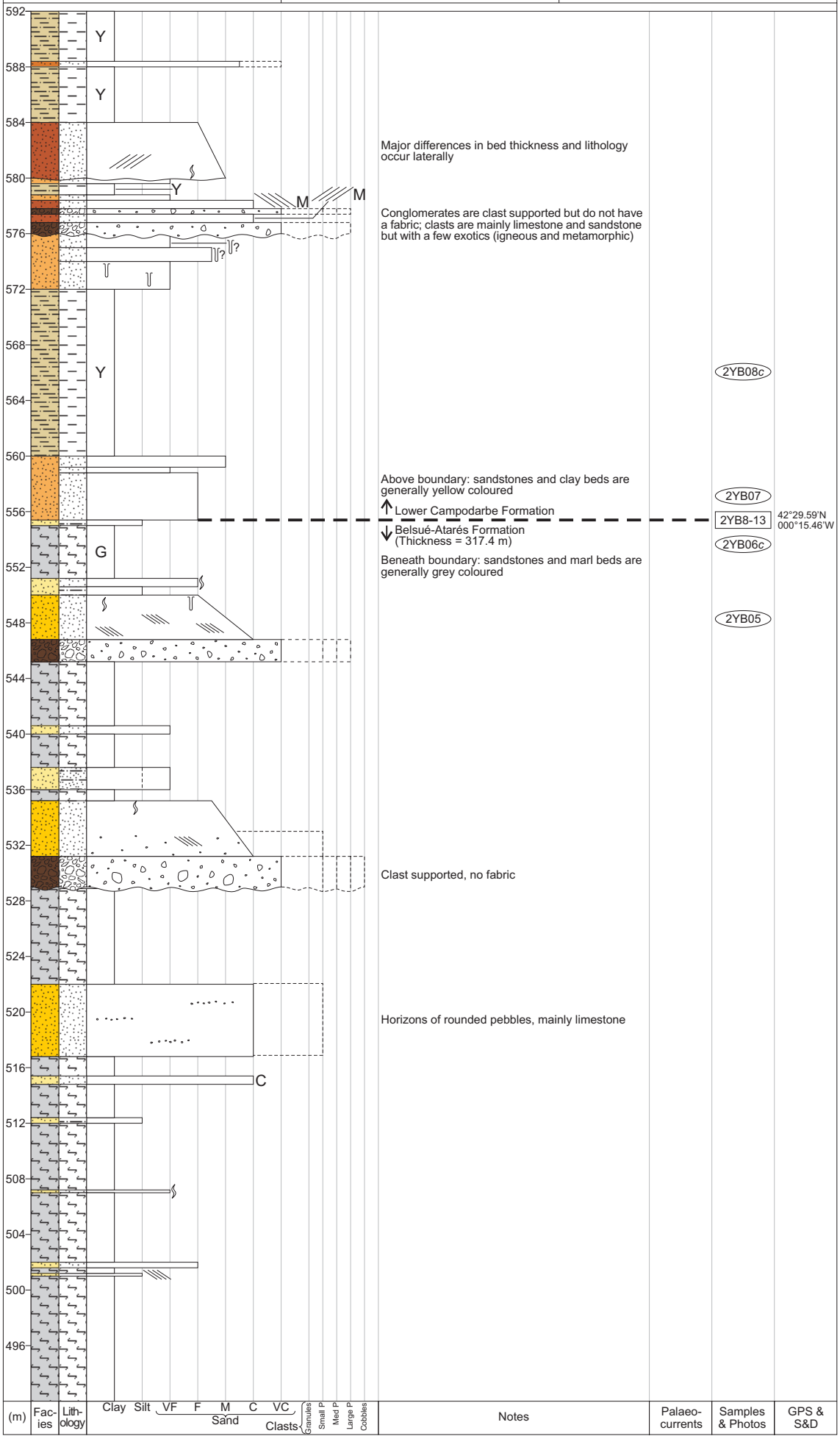
Sector: NE Jaca Basin	**Yebra de Basa**	Page: 4 of 7
Dates Logged: 23-24/5/02		Logged By: Jamie Moss



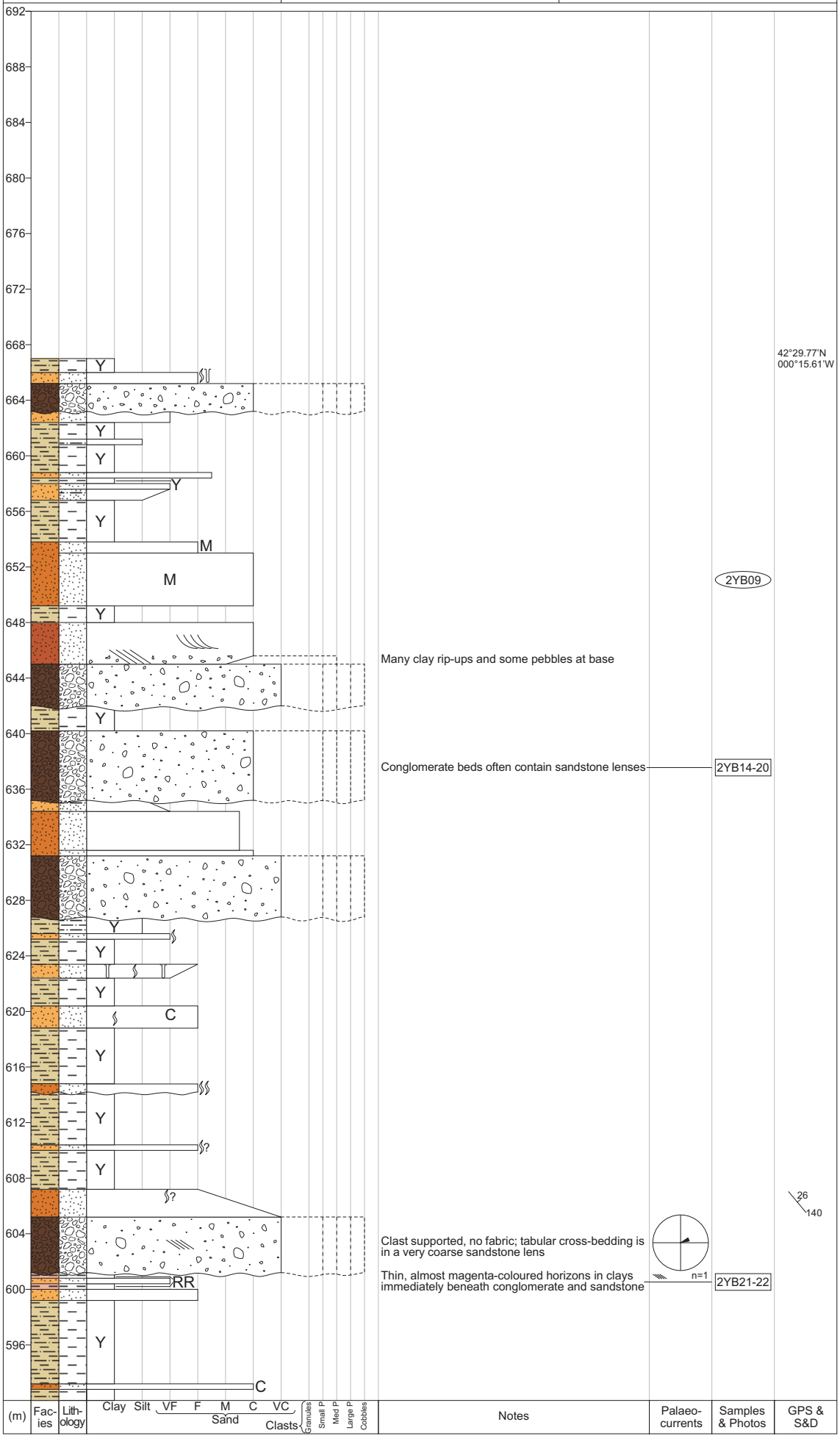
Sector: NE Jaca Basin	**Yebra de Basa**	Page: 5 of 7
Dates Logged: 23-24/5/02		Logged By: Jamie Moss



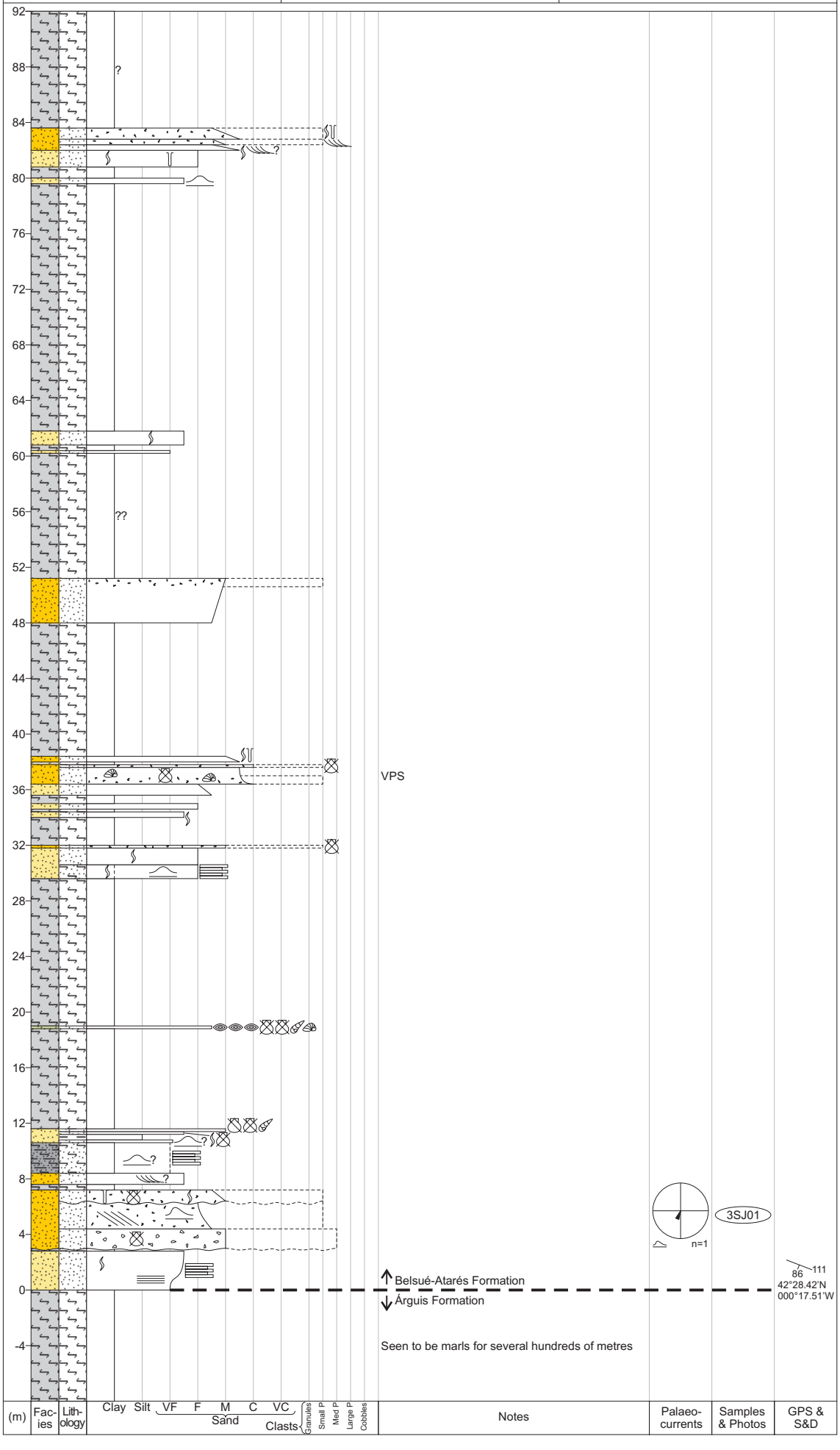
Sector: NE Jaca Basin	**Yebra de Basa**	Page: 6 of 7
Dates Logged: 23-24/5/02		Logged By: Jamie Moss



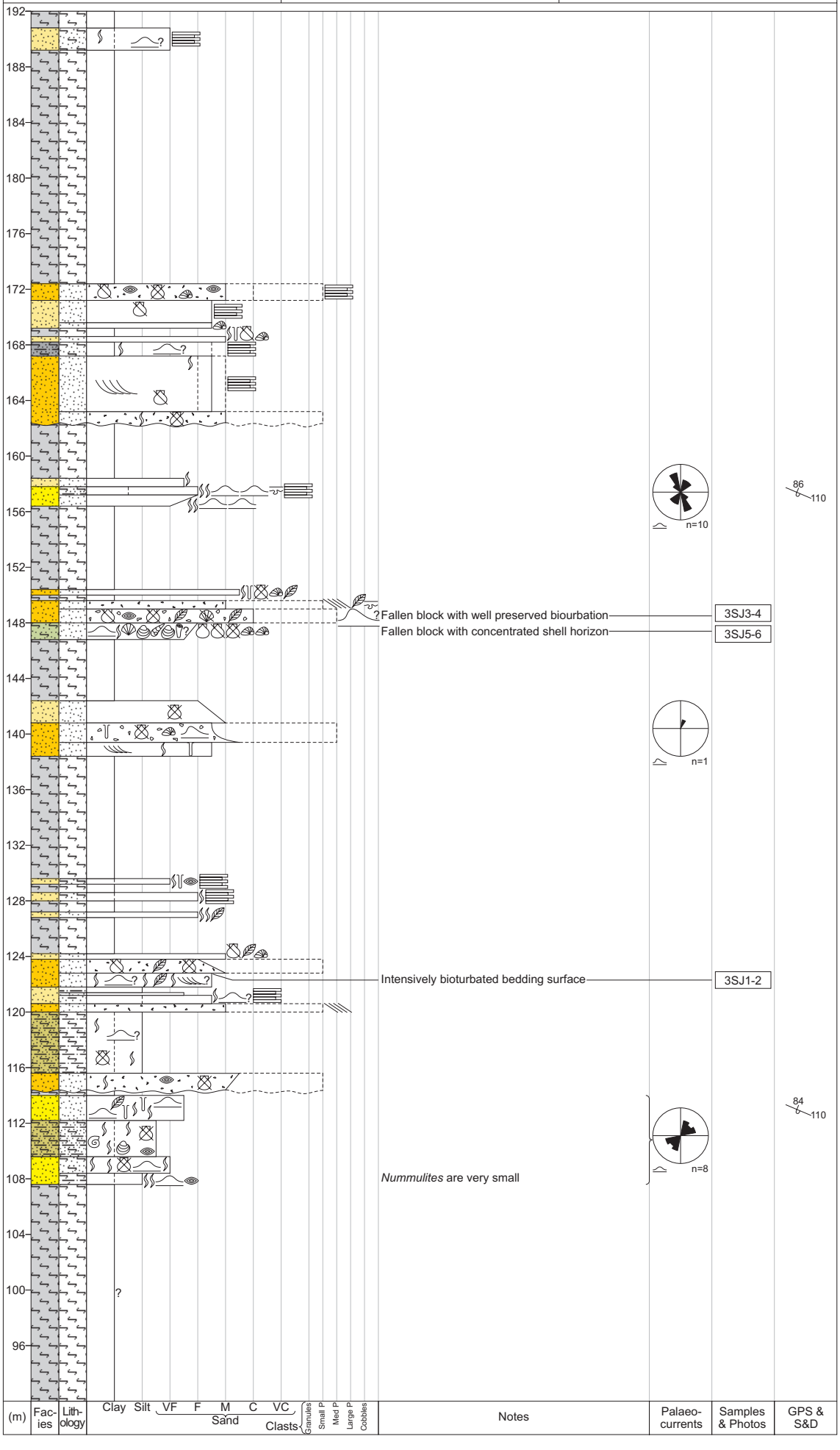
Sector: NE Jaca Basin	**Yebra de Basa**	Page: 7 of 7
Dates Logged: 23-24/5/02		Logged By: Jamie Moss



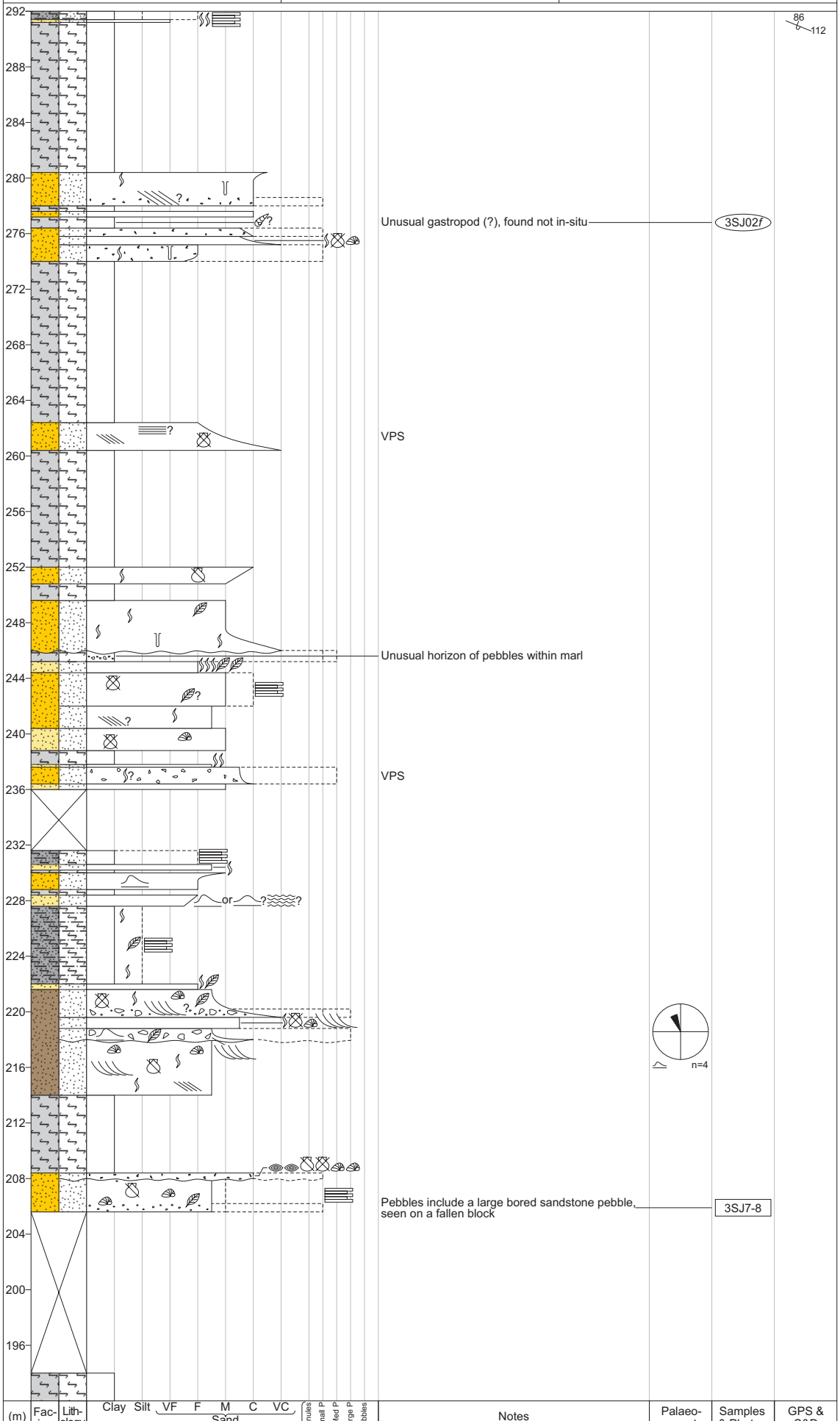
Sector: NE Jaca Basin	San Julián de Basa	Page: 1 of 7
Dates Logged: 29-31/5/03		Logged By: Jamie Moss



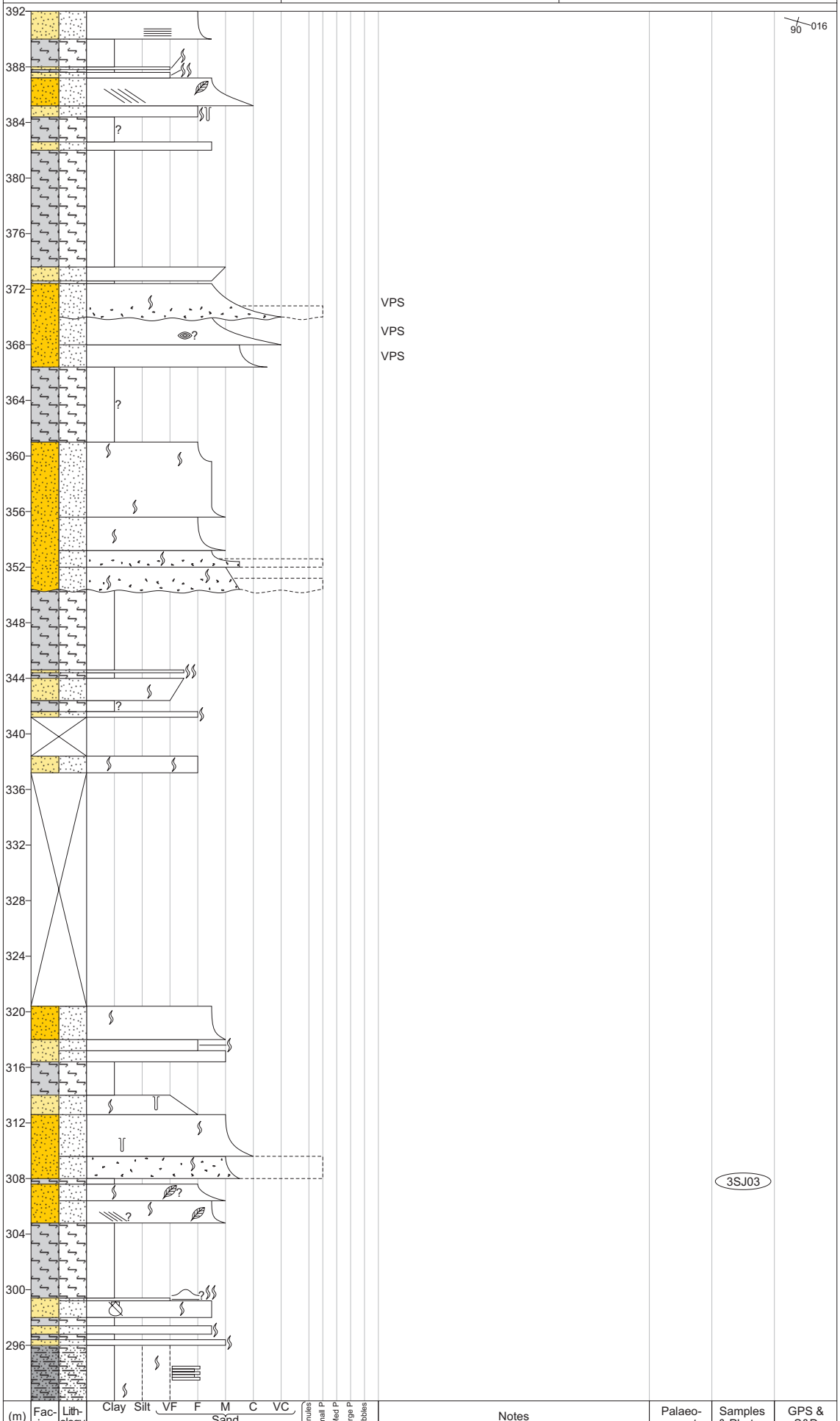
Sector: NE Jaca Basin	San Julián de Basa	Page: 2 of 7
Dates Logged: 29-31/5/03		Logged By: Jamie Moss



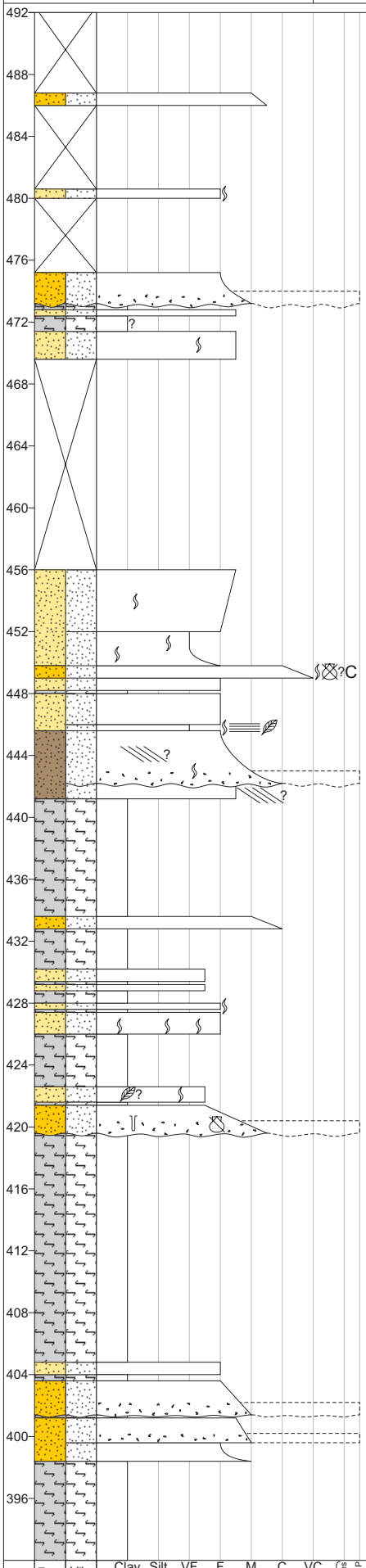
Sector: NE Jaca Basin	San Julián de Basa	Page: 3 of 7
Dates Logged: 29-31/5/03		Logged By: Jamie Moss



Sector: NE Jaca Basin	San Julián de Basa	Page: 4 of 7
Dates Logged: 29-31/5/03		Logged By: Jamie Moss

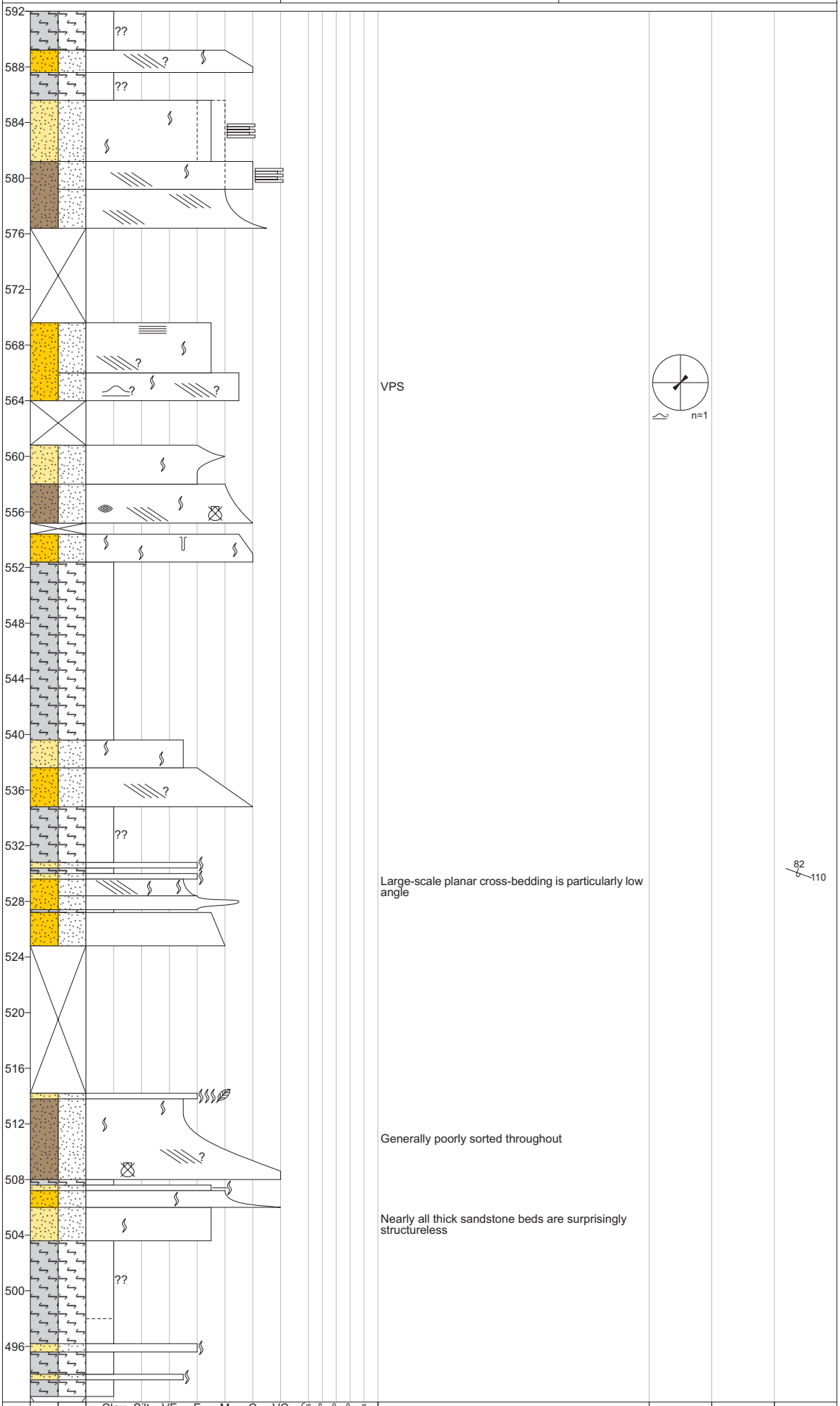


Sector: NE Jaca Basin	San Julián de Basa	Page: 5 of 7
Dates Logged: 29-31/5/03		Logged By: Jamie Moss

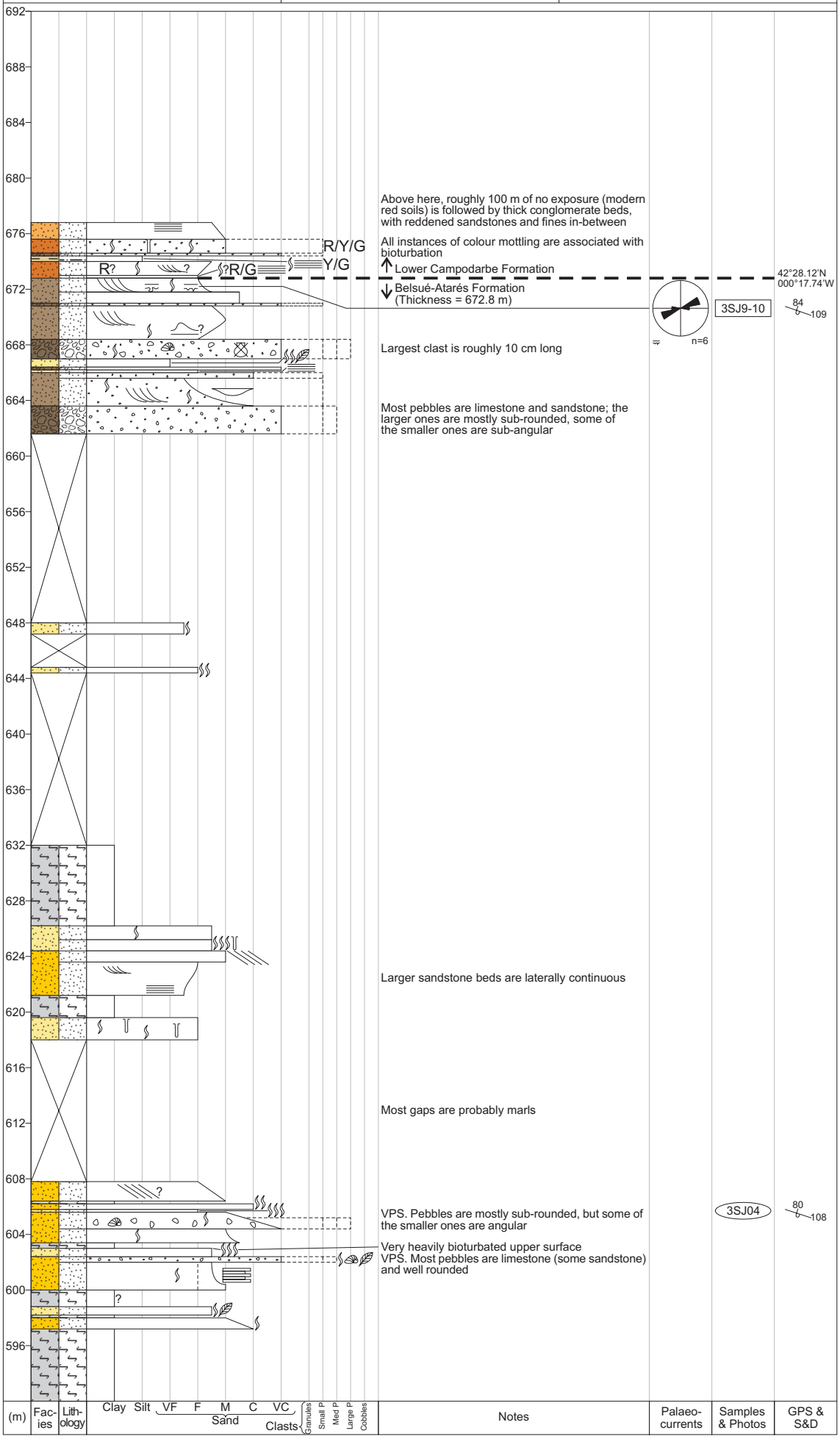


(m)	Facies	Lithology	Clay Silt VF F M C VC Sand Clasts Granules Small P Med P Large P Cobbles	Notes	Palaeo-currents	Samples & Photos	GPS & S&D
				Other than grading, sandstones are surprisingly massive			

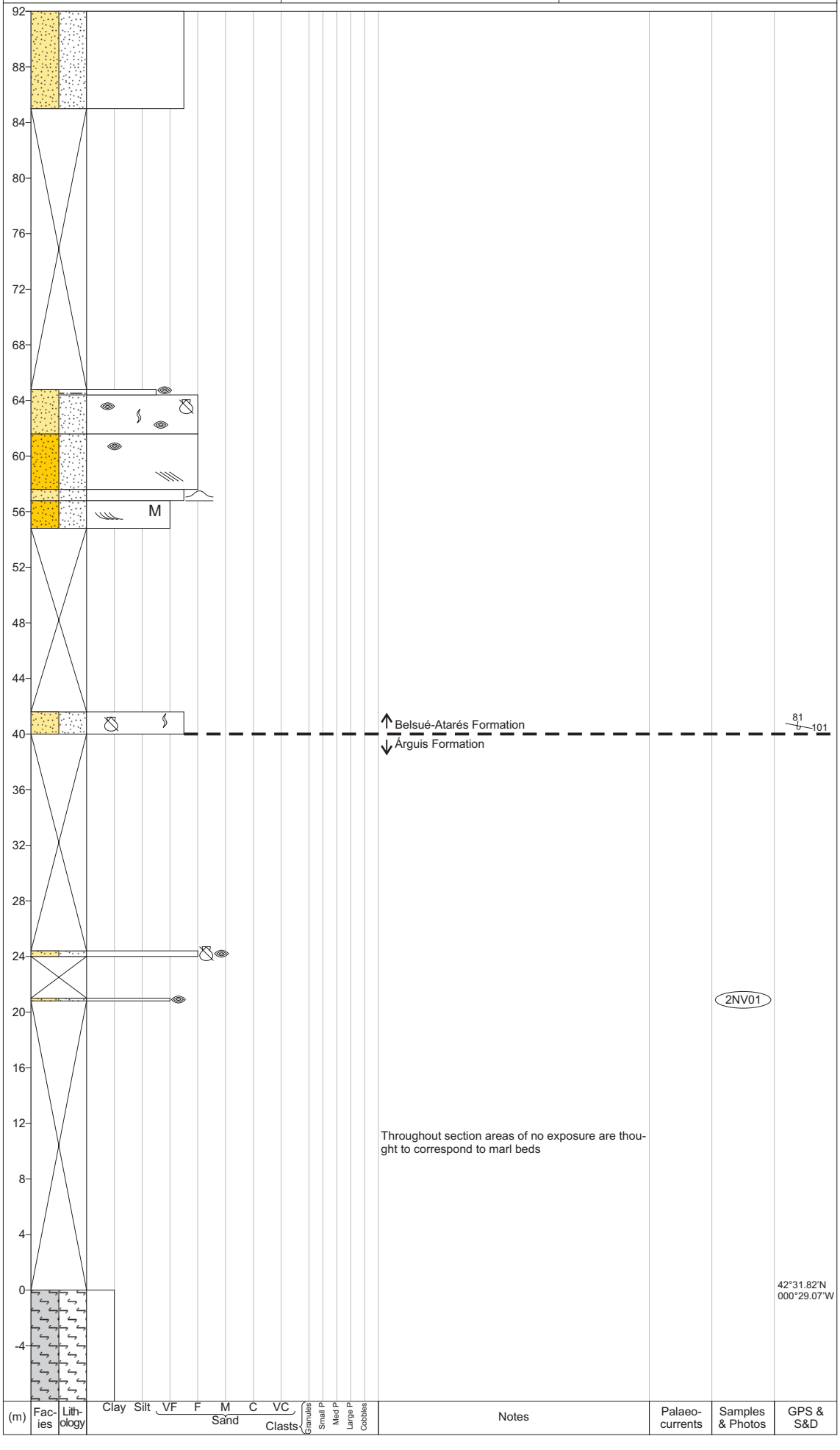
Sector: NE Jaca Basin	San Julián de Basa	Page: 6 of 7
Dates Logged: 29-31/5/03		Logged By: Jamie Moss



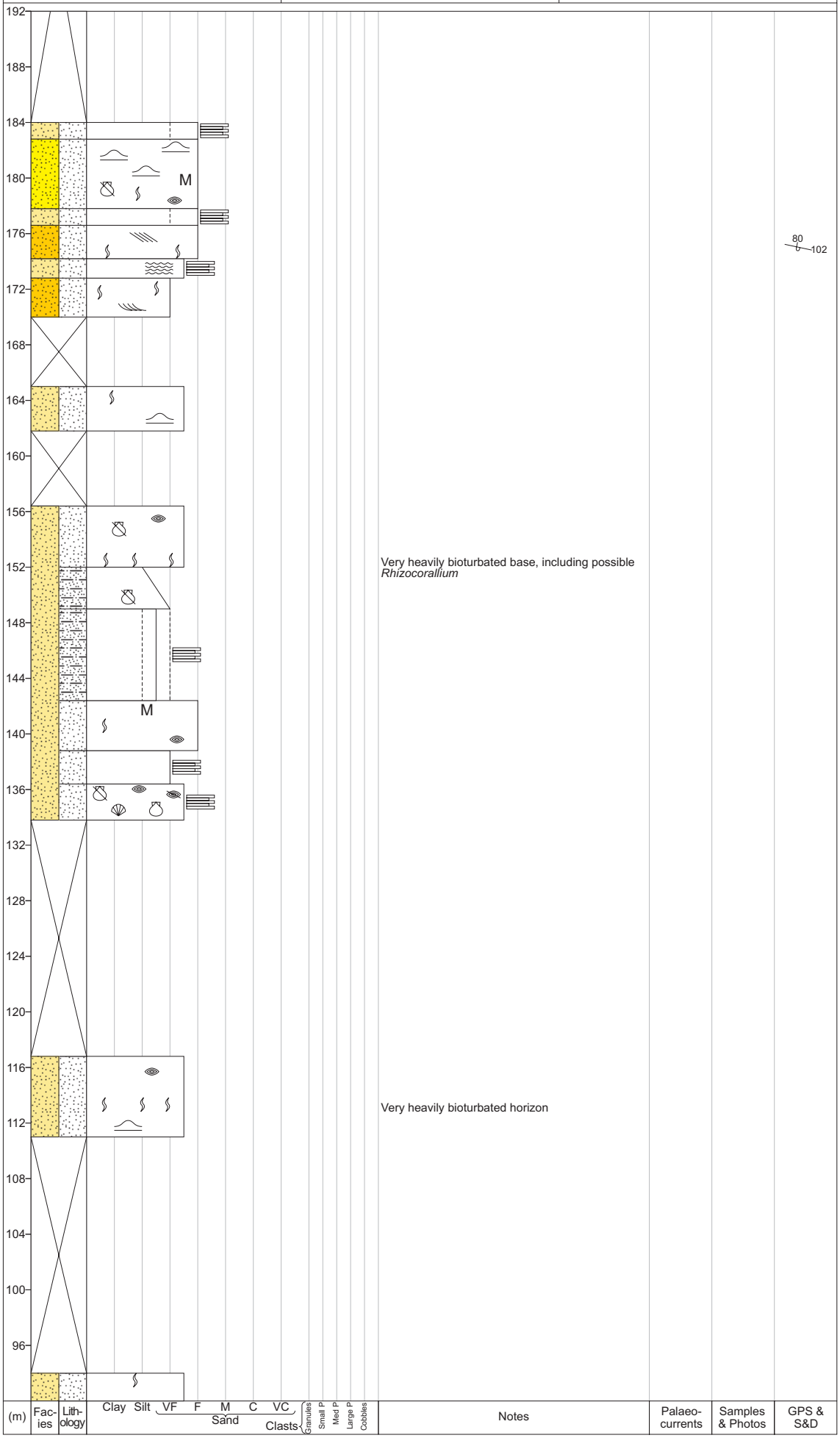
Sector: NE Jaca Basin	San Julián de Basa	Page: 7 of 7
Dates Logged: 29-31/5/03		Logged By: Jamie Moss



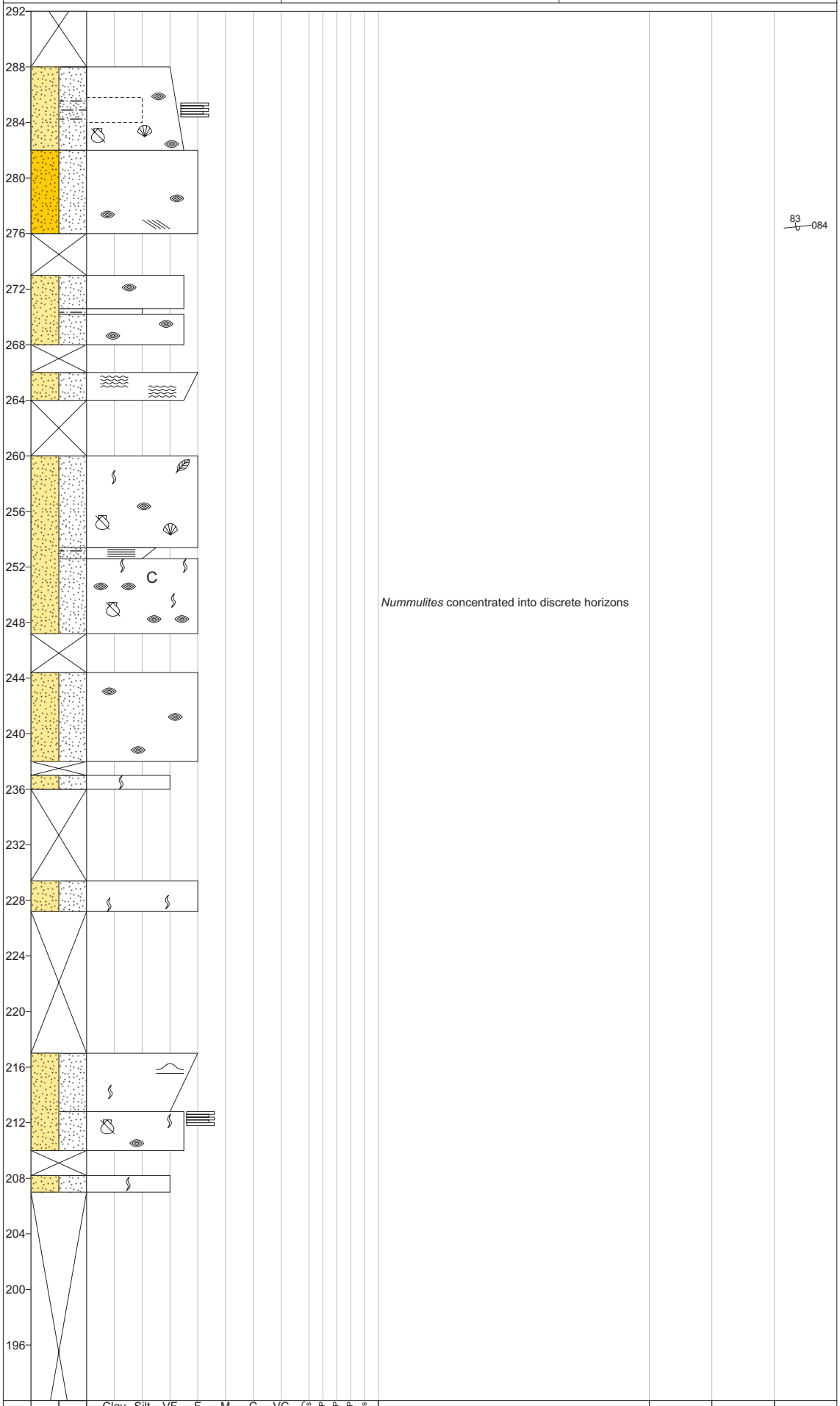
Sector: Northern Jaca Basin	**Navasa**	Page: 1 of 7
Dates Logged: 19/5/02 & 6/5/03		Logged By: Jamie Moss & Stuart Jones



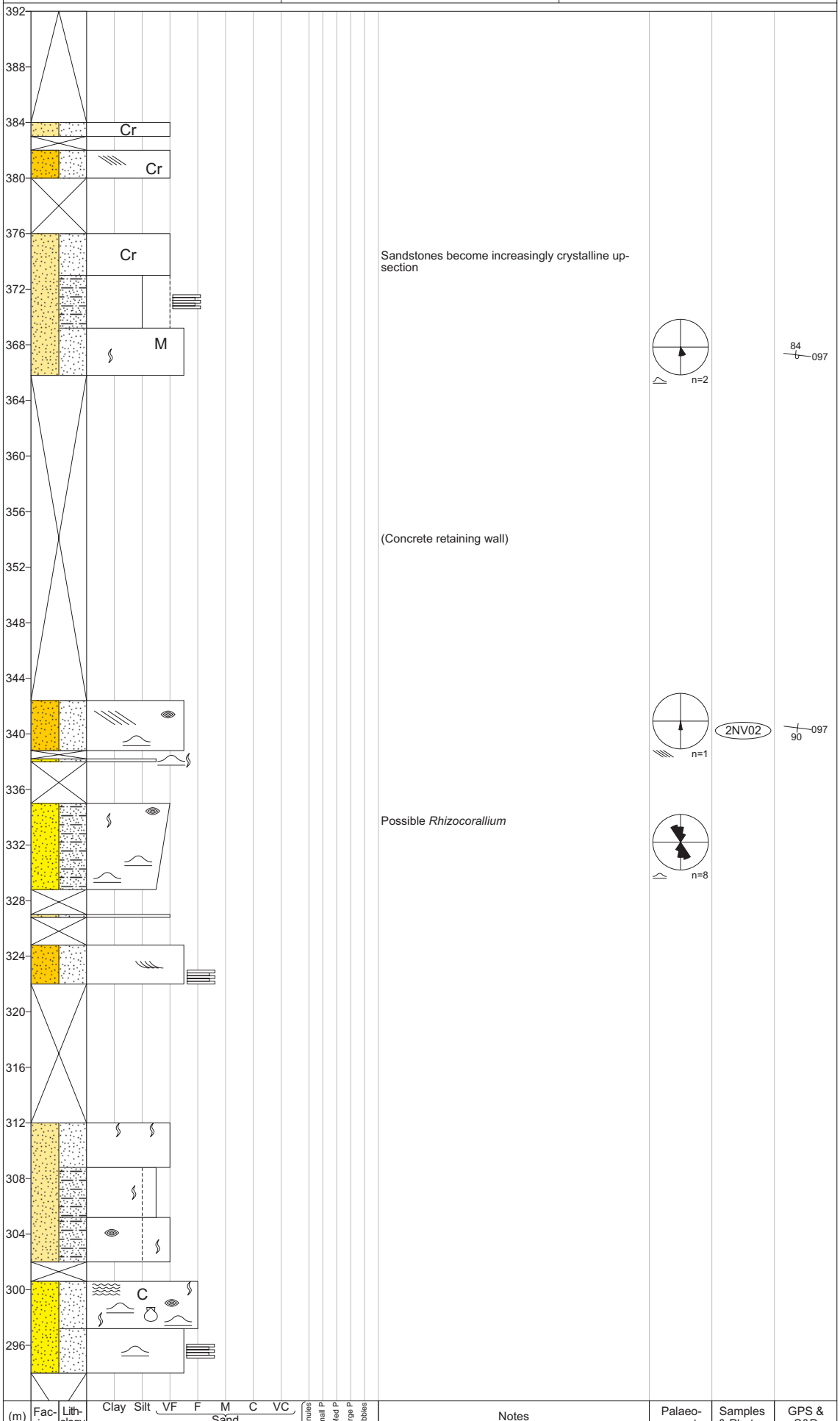
Sector: Northern Jaca Basin	**Navasa**	Page: 2 of 7
Dates Logged: 19/5/02 & 6/5/03		Logged By: Jamie Moss & Stuart Jones



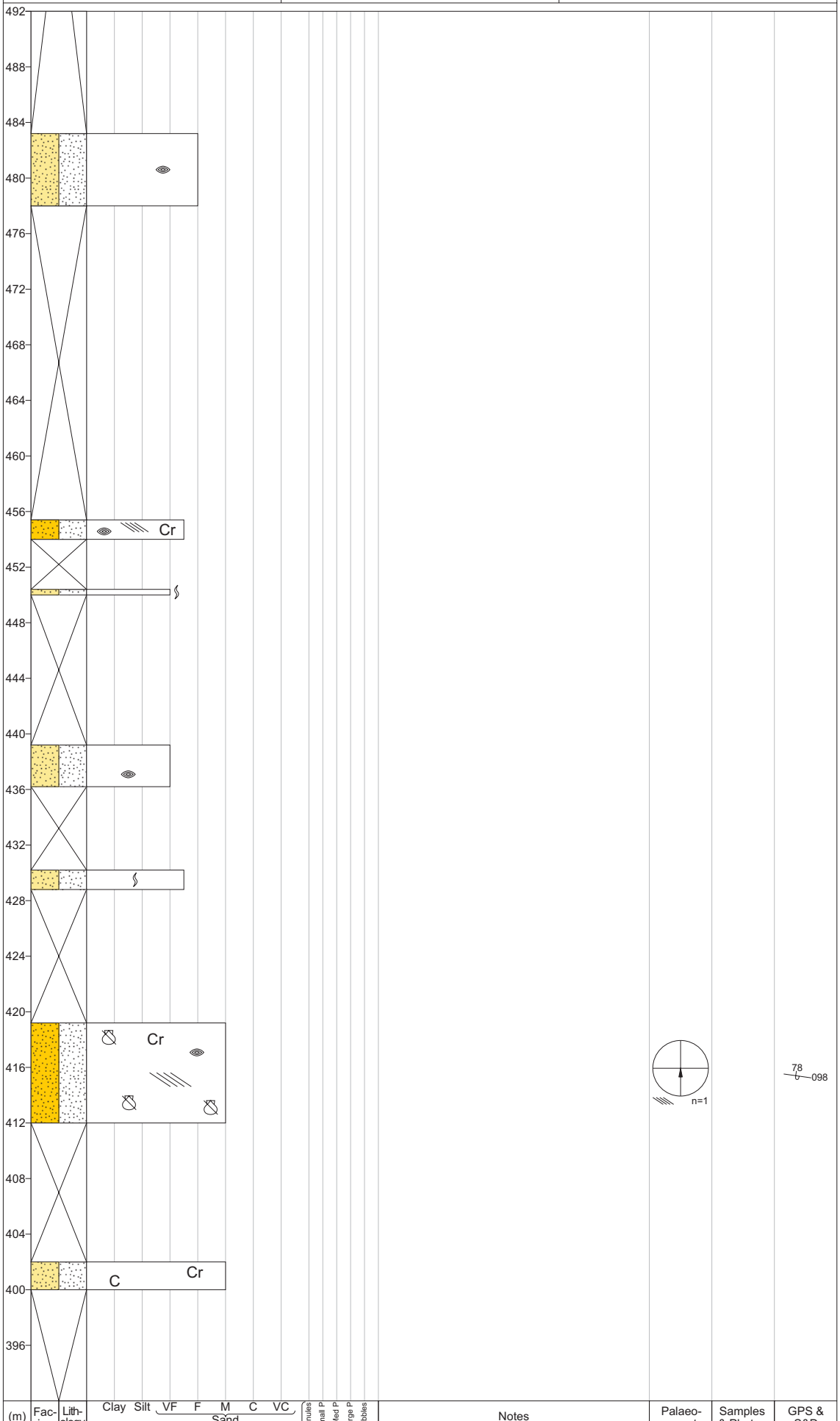
Sector: Northern Jaca Basin	**Navasa**	Page: 3 of 7
Dates Logged: 19/5/02 & 6/5/03		Logged By: Jamie Moss & Stuart Jones



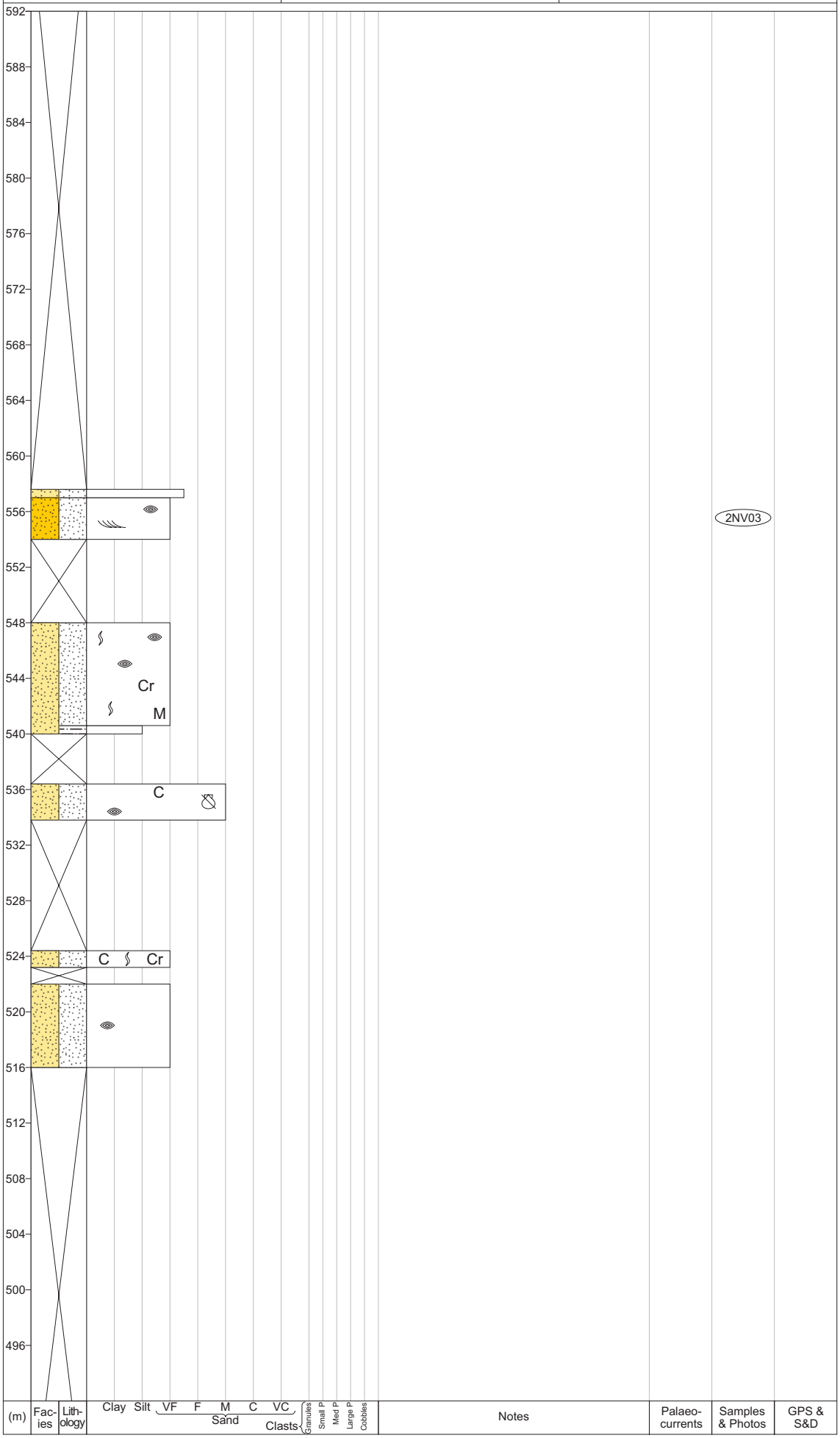
Sector: Northern Jaca Basin	**Navasa**	Page: 4 of 7
Dates Logged: 19/5/02 & 6/5/03		Logged By: Jamie Moss & Stuart Jones



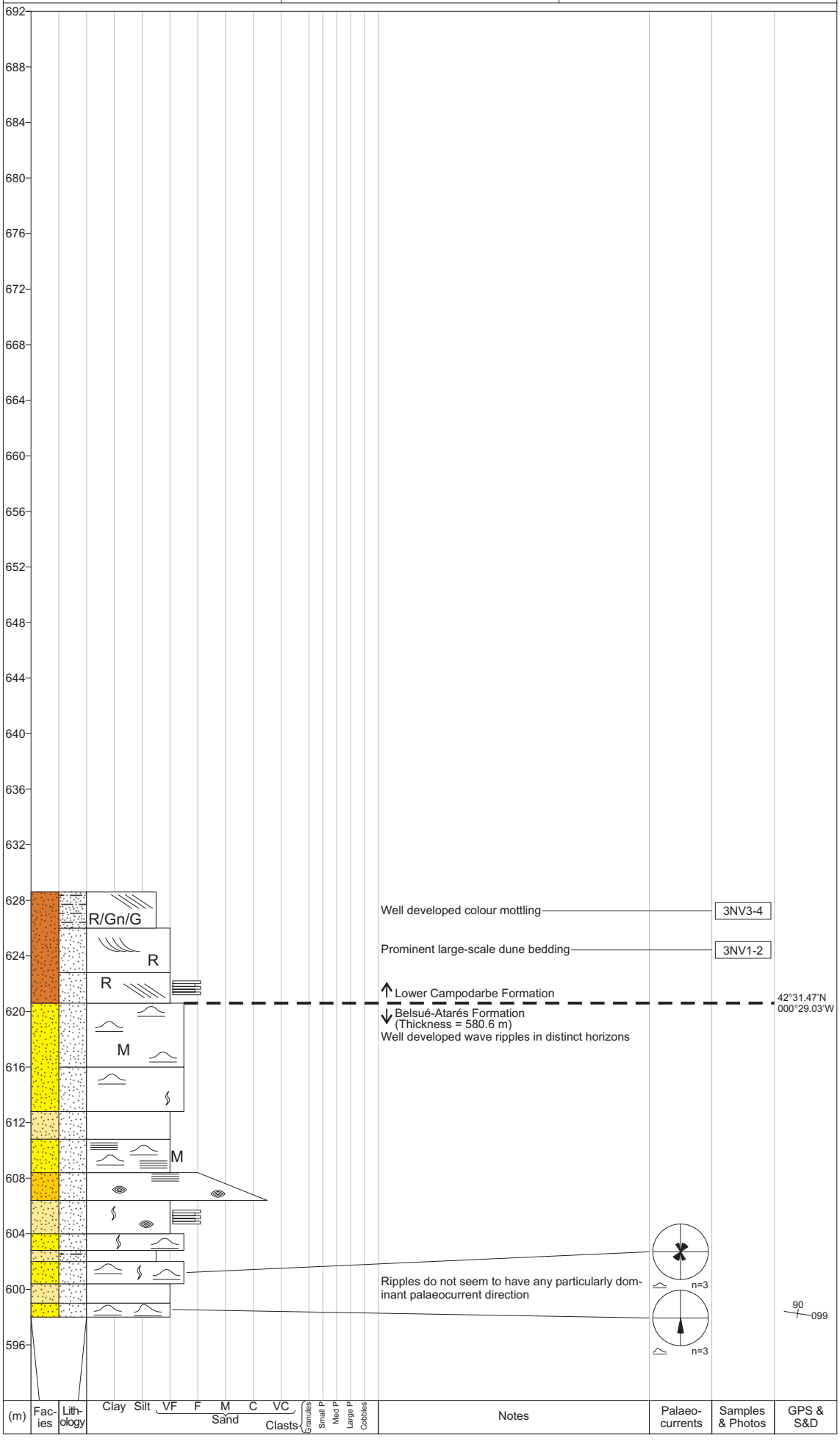
Sector: Northern Jaca Basin	**Navasa**	Page: 5 of 7
Dates Logged: 19/5/02 & 6/5/03		Logged By: Jamie Moss & Stuart Jones



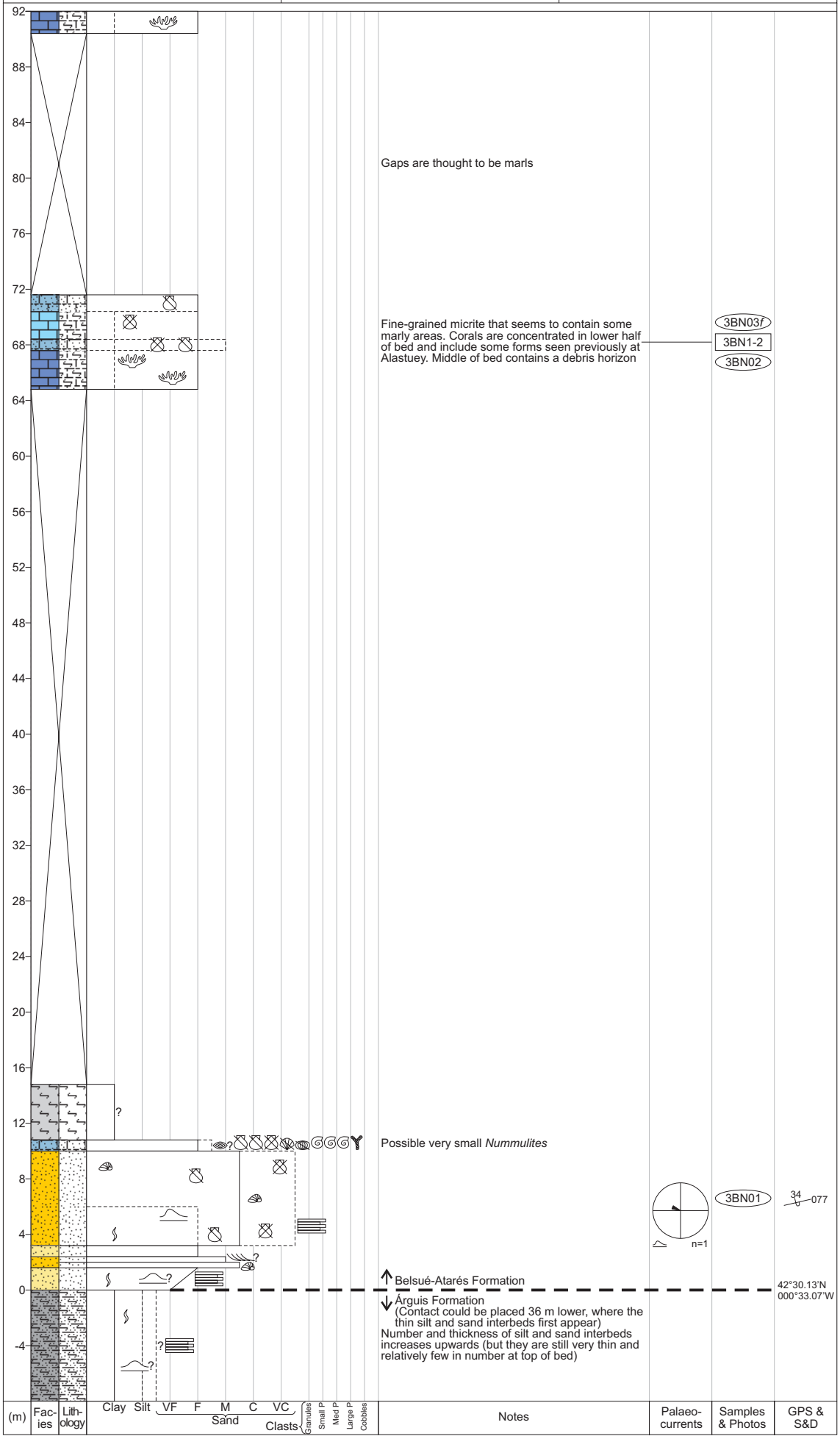
Sector: Northern Jaca Basin	**Navasa**	Page: 6 of 7
Dates Logged: 19/5/02 & 6/5/03		Logged By: Jamie Moss & Stuart Jones



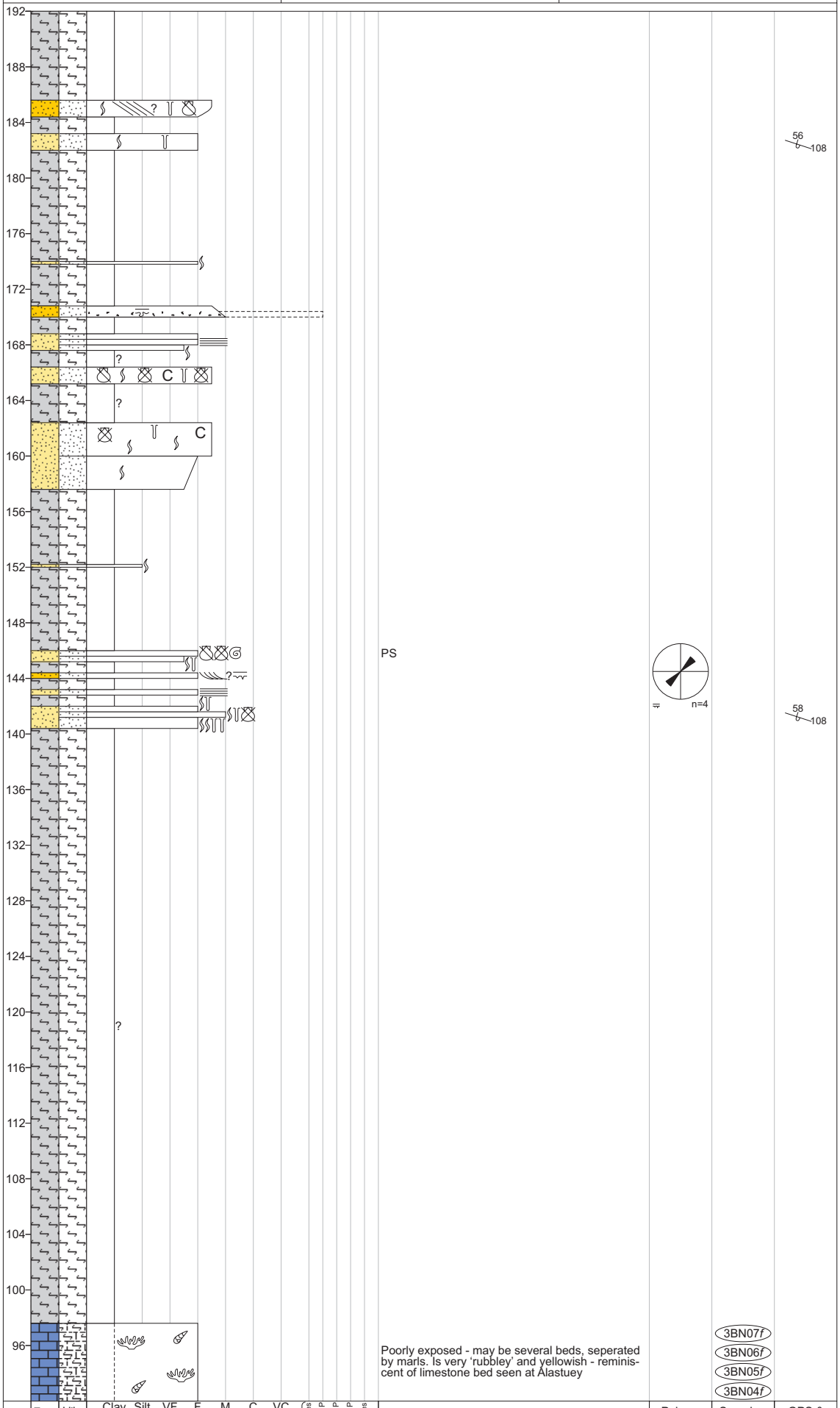
Sector: Northern Jaca Basin	**Navasa**	Page: 7 of 7
Dates Logged: 19/5/02 & 6/5/03		Logged By: Jamie Moss & Stuart Jones



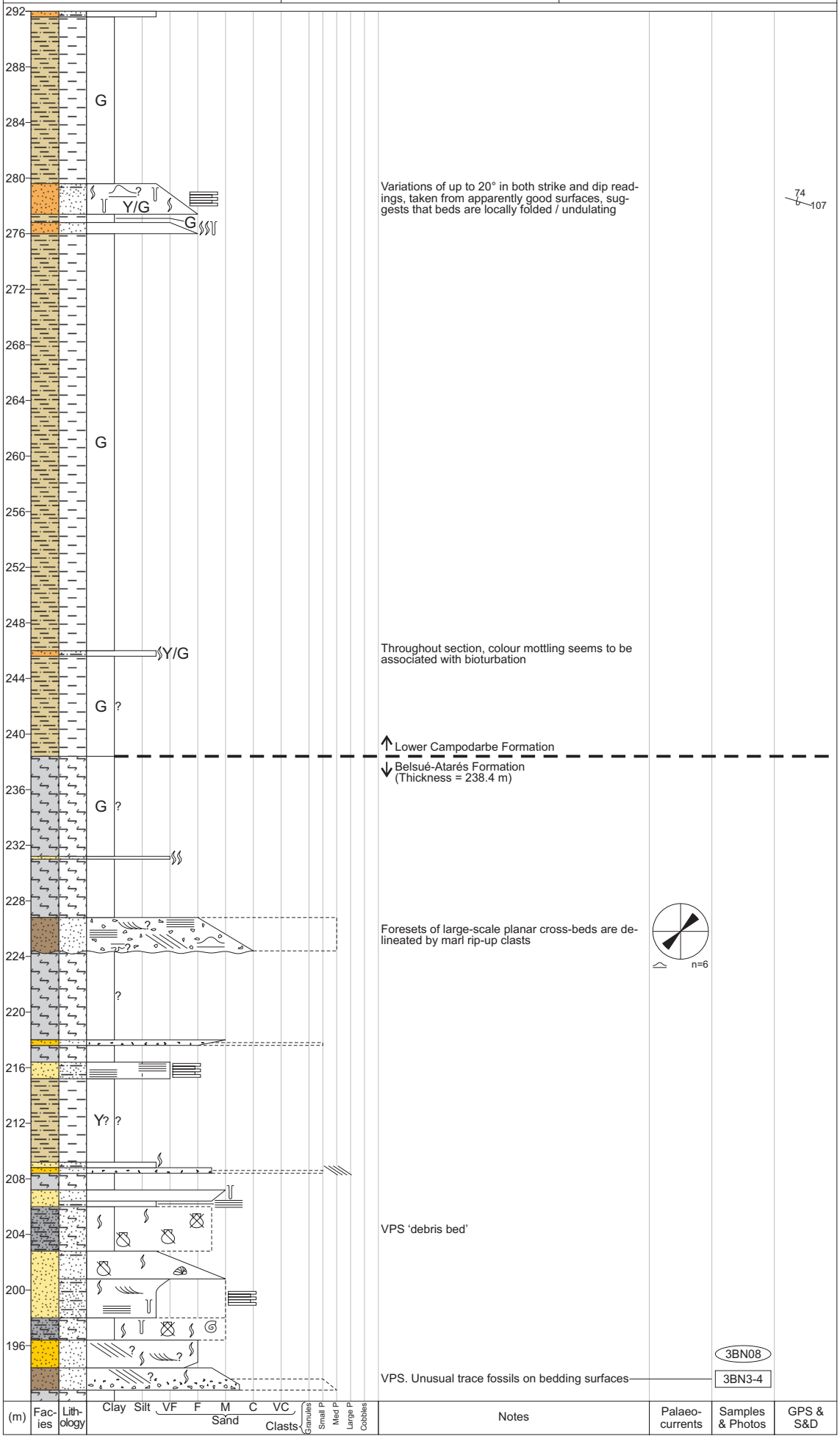
Sector: Northern Jaca Basin	**Bernués**	Page: 1 of 5
Dates Logged: 10-11/5/03		Logged By: Jamie Moss



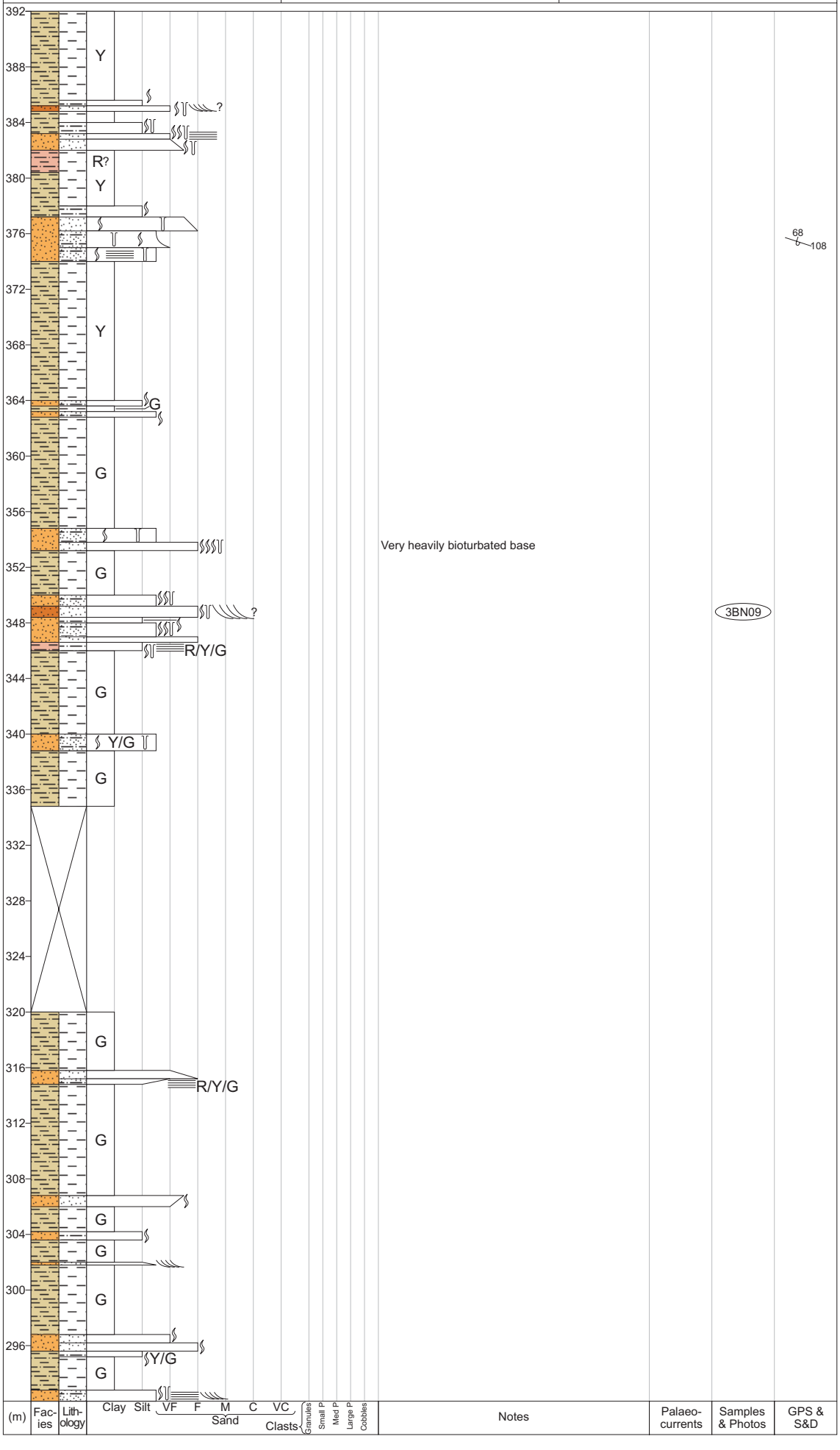
Sector: Northern Jaca Basin	**Bernués**	Page: 2 of 5
Dates Logged: 10-11/5/03		Logged By: Jamie Moss



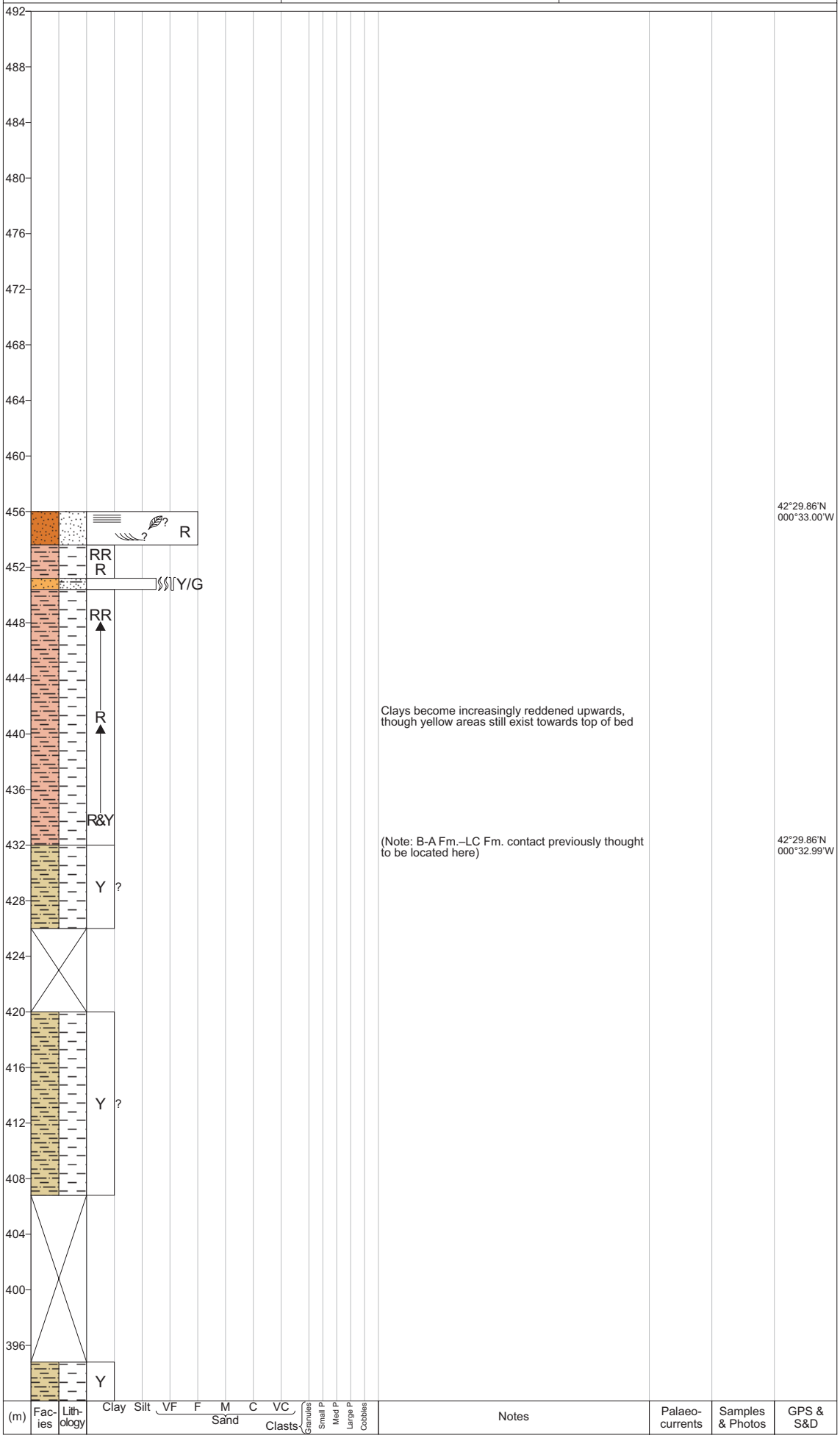
Sector: Northern Jaca Basin	**Bernués**	Page: 3 of 5
Dates Logged: 10-11/5/03		Logged By: Jamie Moss



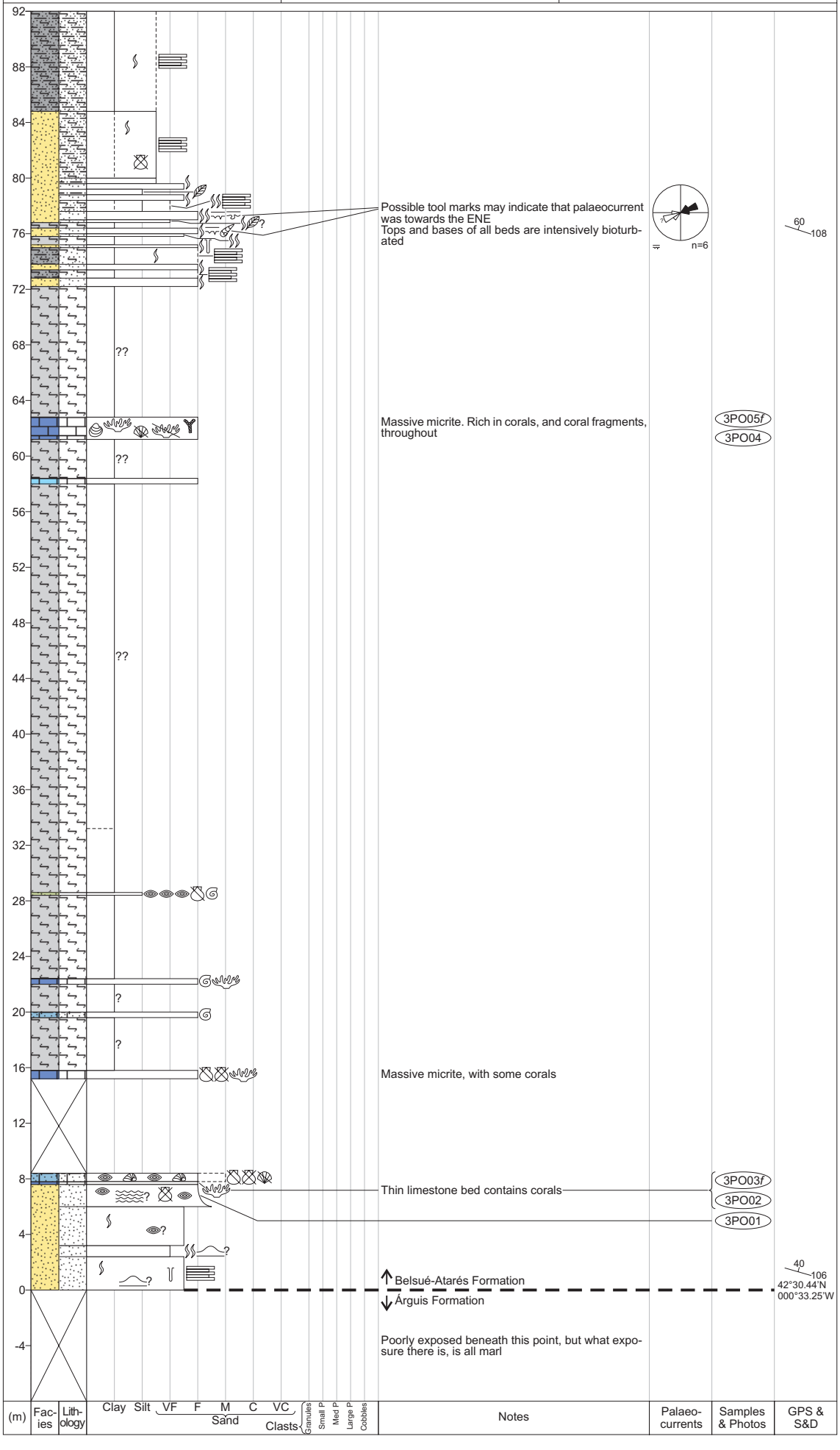
Sector: Northern Jaca Basin	**Bernués**	Page: 4 of 5
Dates Logged: 10-11/5/03		Logged By: Jamie Moss



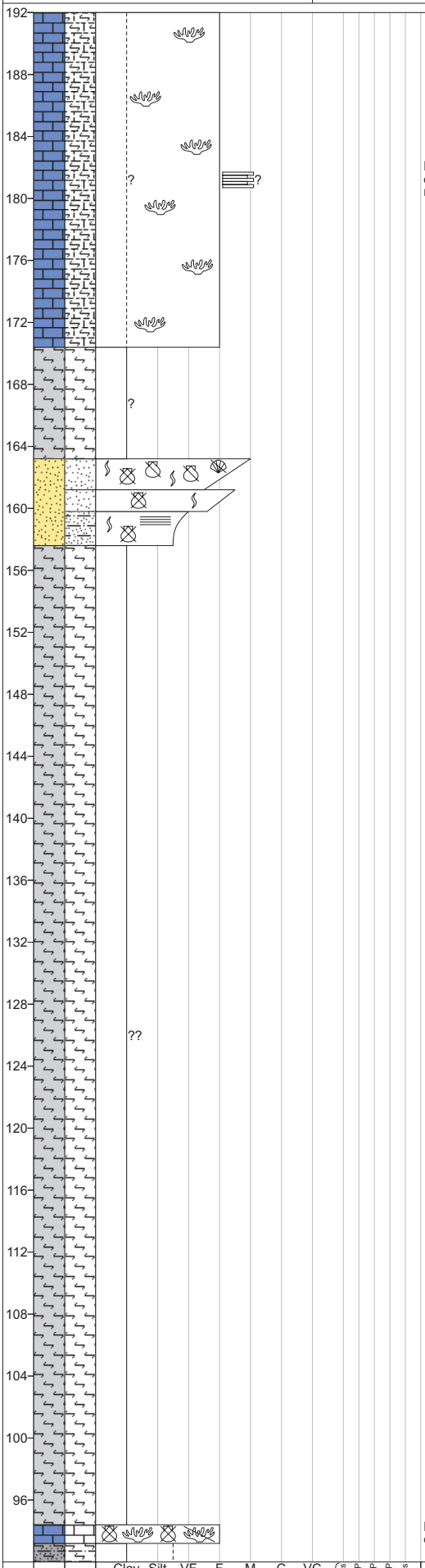
Sector: Northern Jaca Basin	**Bernués**	Page: 5 of 5
Dates Logged: 10-11/5/03		Logged By: Jamie Moss



Sector: Northern Jaca Basin	**Peña Oroel**	Page: 1 of 5
Dates Logged: 26-28/5/03		Logged By: Jamie Moss



Sector: Northern Jaca Basin	**Peña Oroel**	Page: 2 of 5
Dates Logged: 26-28/5/03		Logged By: Jamie Moss



Micritic and roughly bedded. Rich in a diverse range of corals thoroughout. May be interbedded with marls, but severe weathering makes it difficult to tell

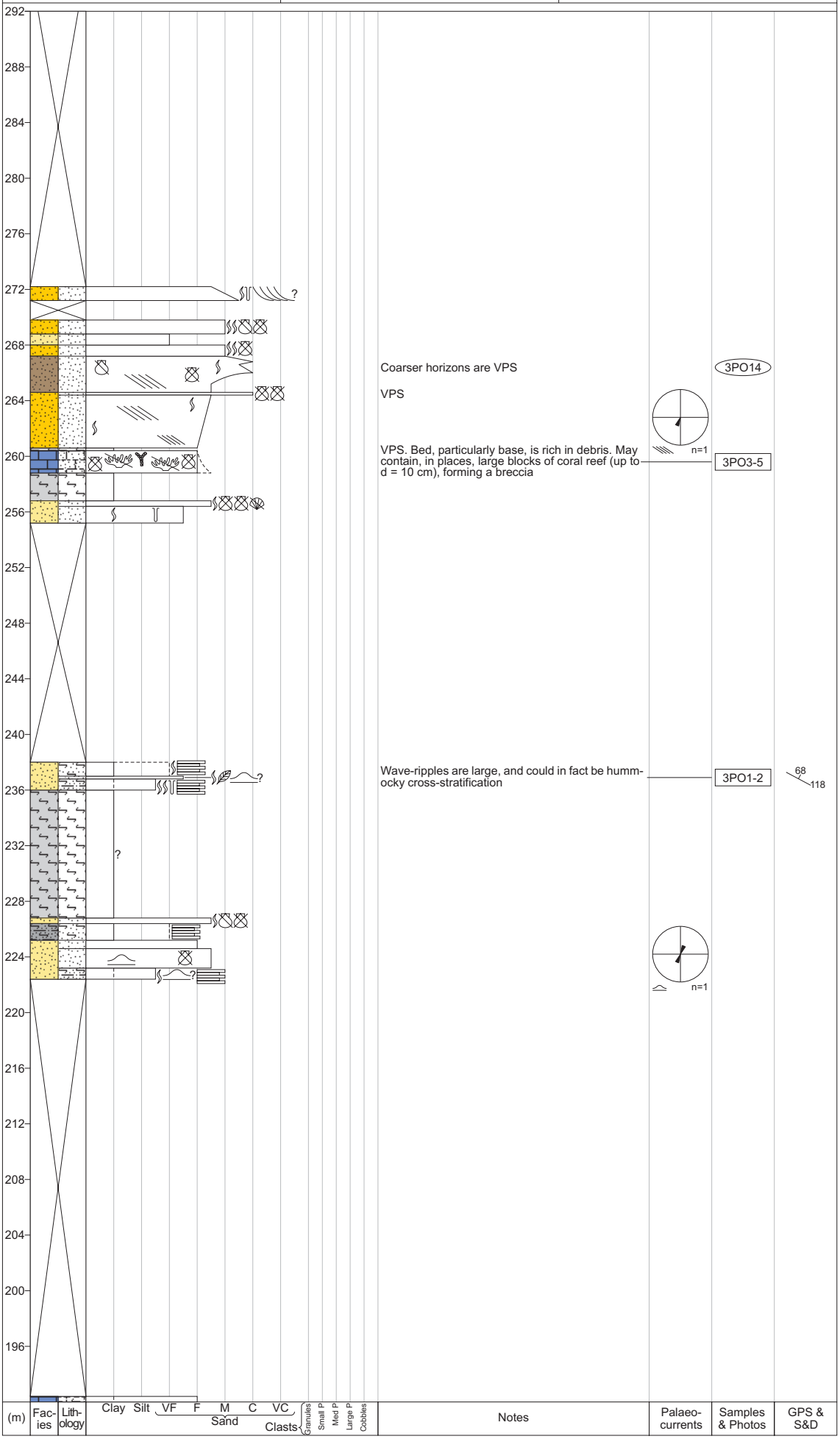
3PO13f
3PO12f
3PO11f
3PO10f
3PO09f
3PO08f
3PO07f
3PO06f

66
116

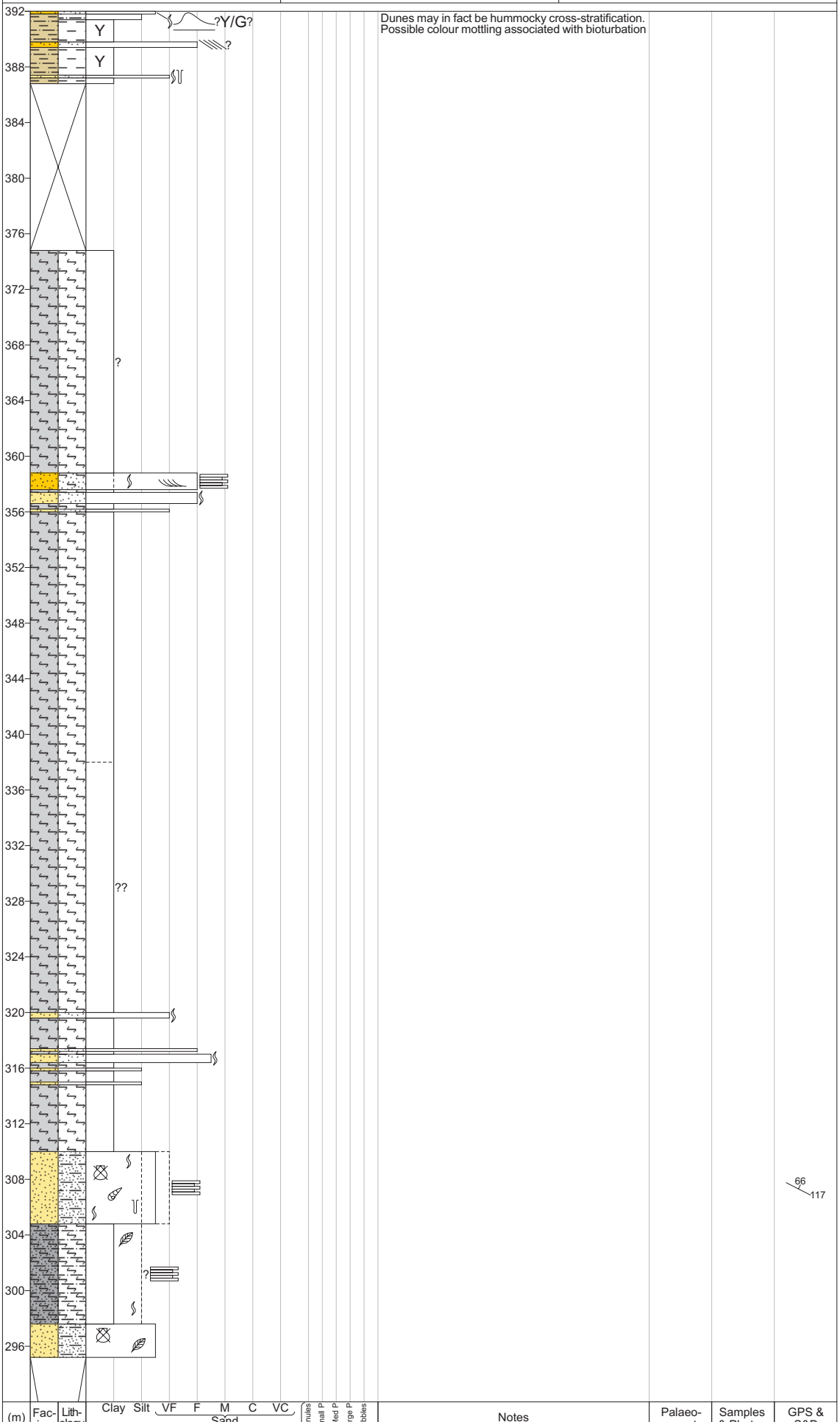
Micrite with corals. Rich in fragments of shells and corals. Roughly bedded

(m)	Facies	Lithology	Notes	Palaeo-currents	Samples & Photos	GPS & S&D

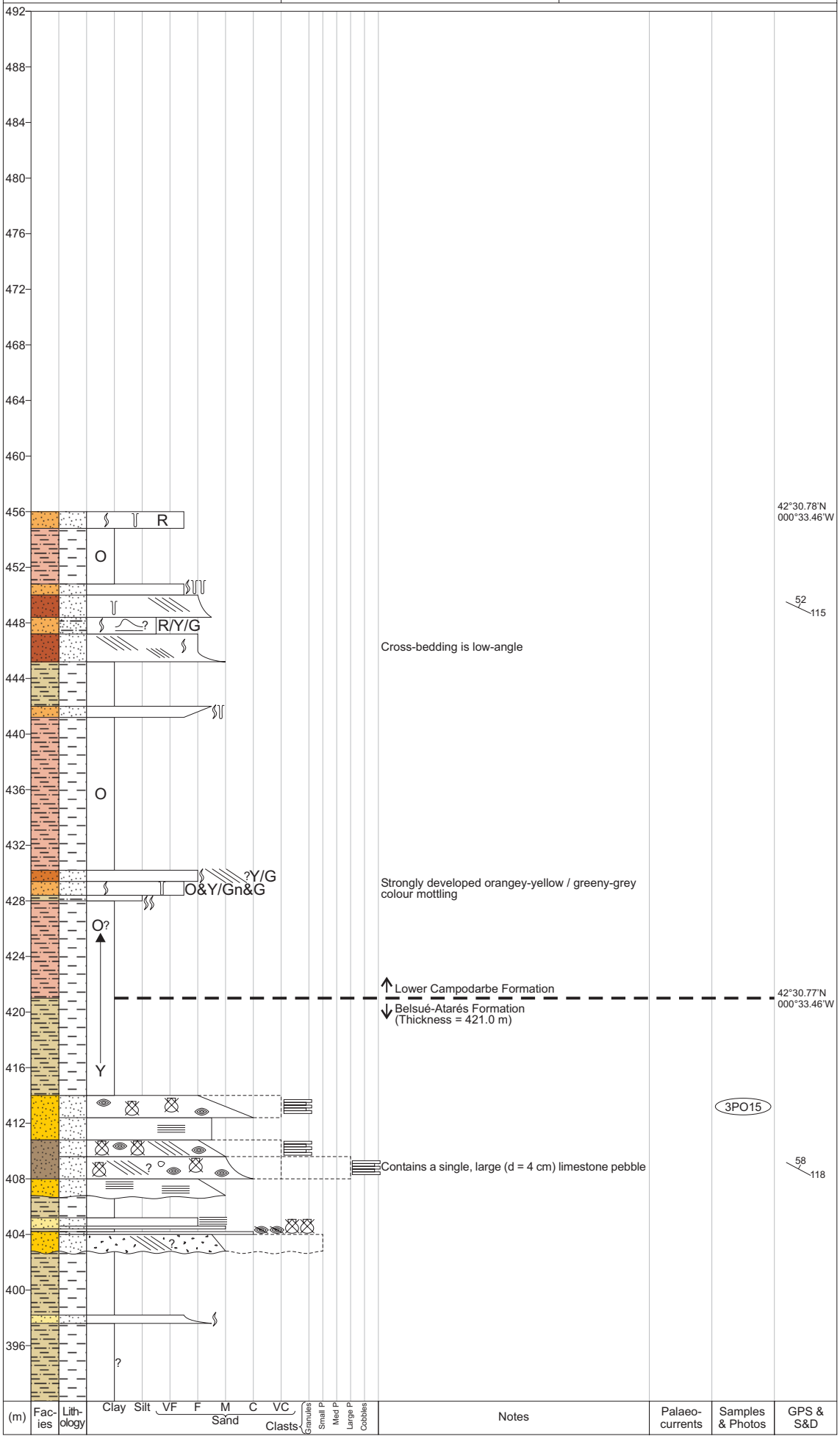
Sector: Northern Jaca Basin	**Peña Oroel**	Page: 3 of 5
Dates Logged: 26-28/5/03		Logged By: Jamie Moss



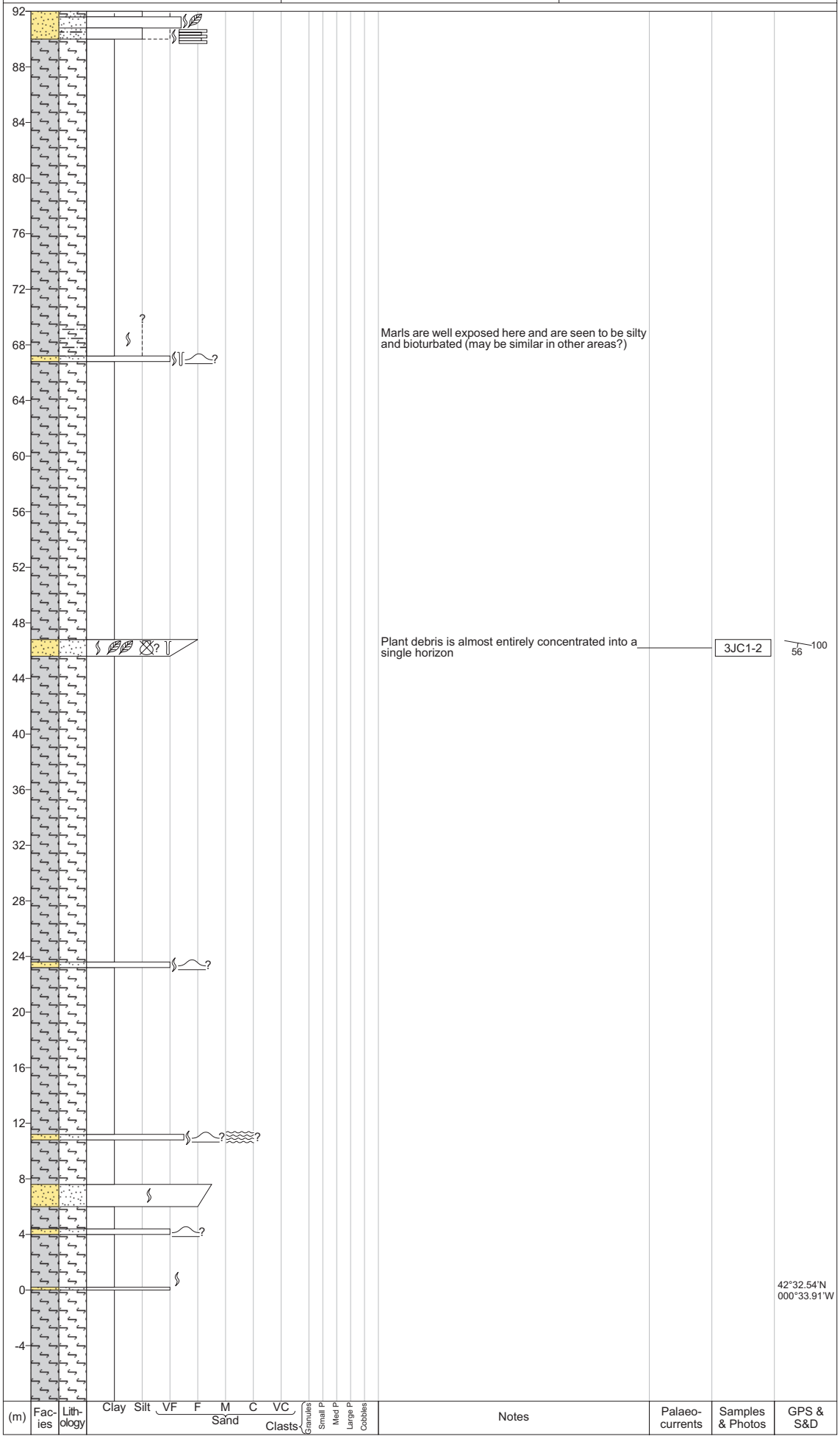
Sector: Northern Jaca Basin	**Peña Oroel**	Page: 4 of 5
Dates Logged: 26-28/5/03		Logged By: Jamie Moss



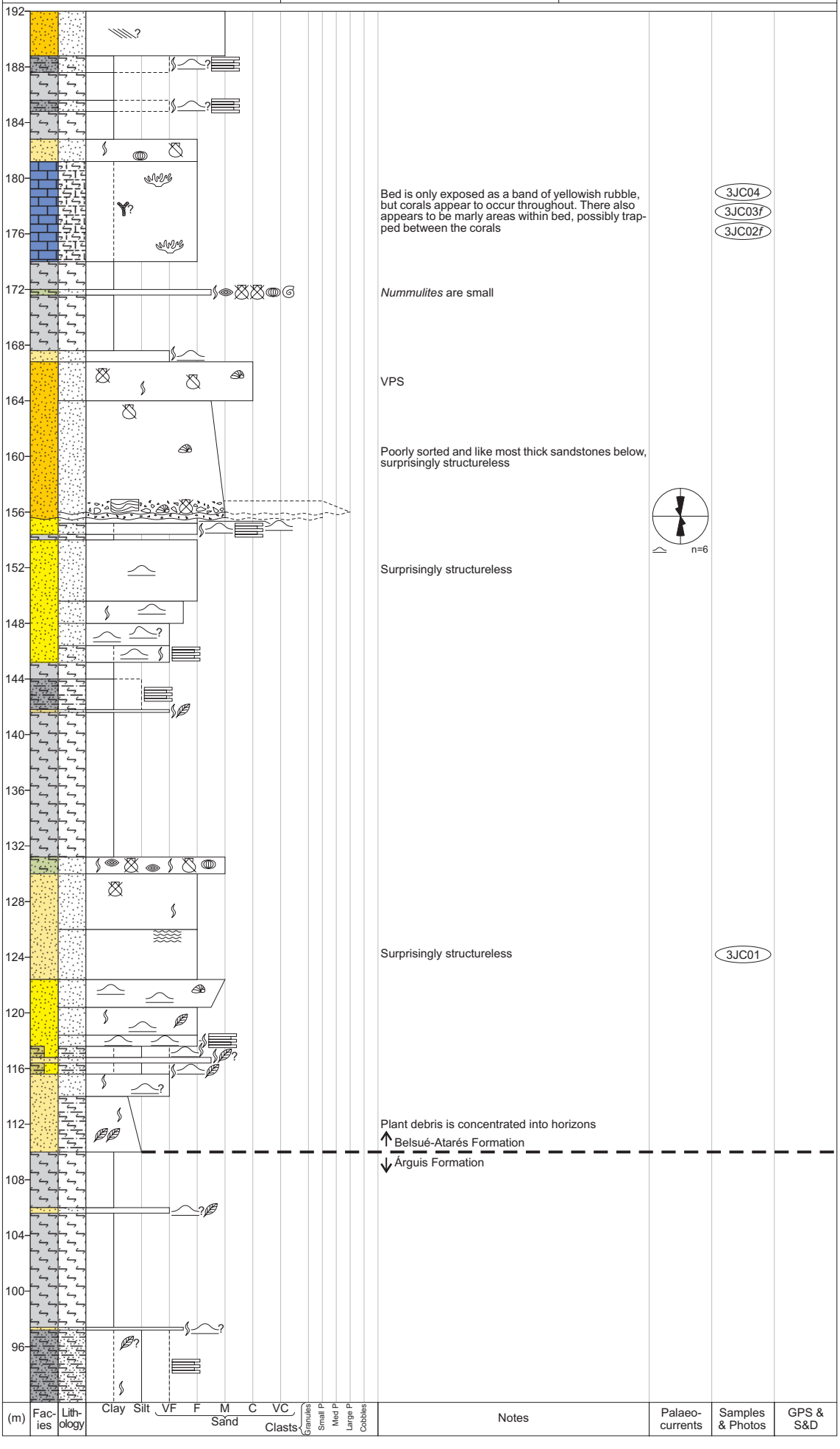
Sector: Northern Jaca Basin	**Peña Oroel**	Page: 5 of 5
Dates Logged: 26-28/5/03		Logged By: Jamie Moss



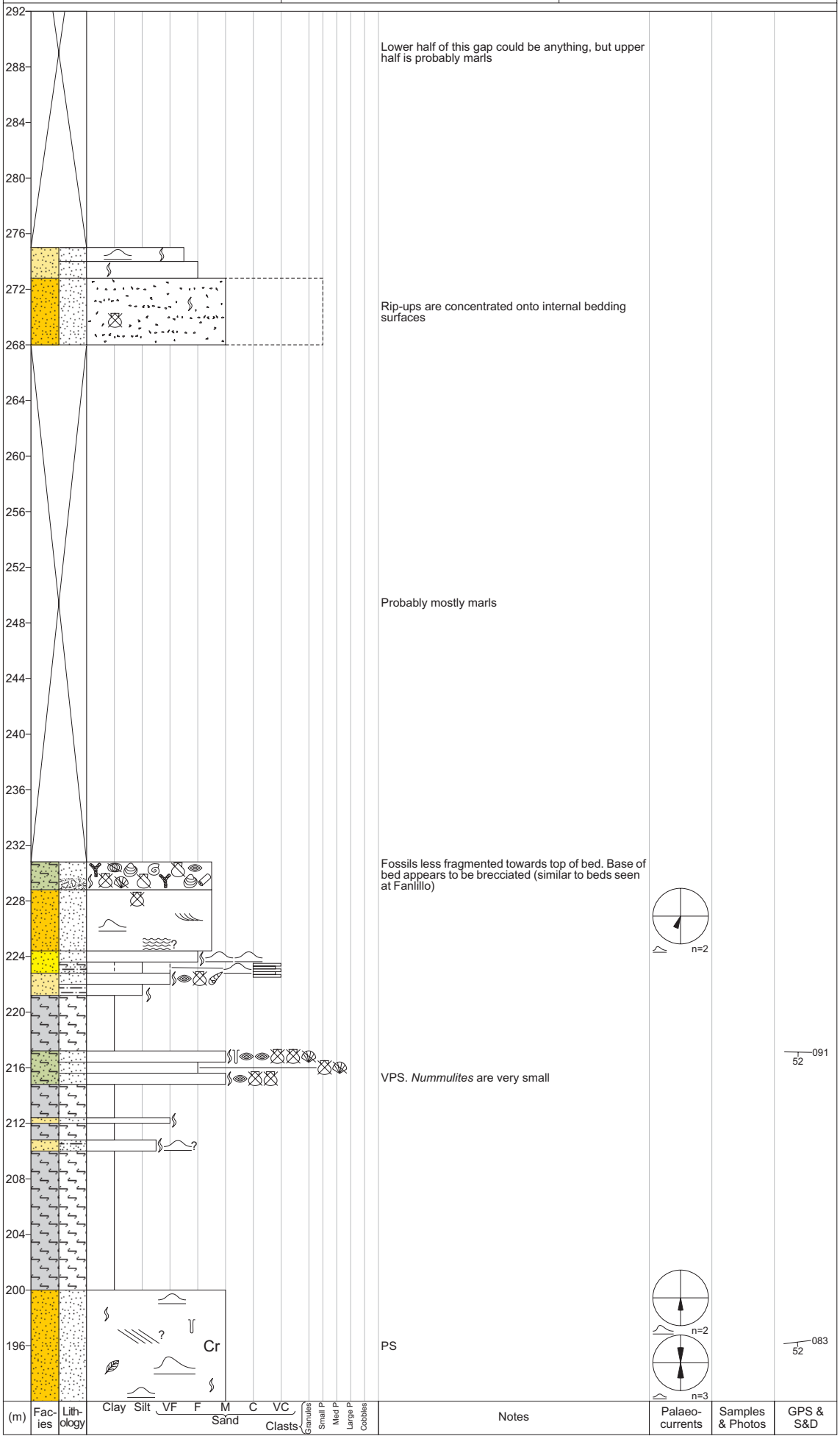
Sector: Northern Jaca Basin	**Jaca**	Page: 1 of 9
Dates Logged: 22-25/5/03		Logged By: Jamie Moss



Sector: Northern Jaca Basin	**Jaca**	Page: 2 of 9
Dates Logged: 22-25/5/03		Logged By: Jamie Moss



Sector: Northern Jaca Basin	**Jaca**	Page: 3 of 9
Dates Logged: 22-25/5/03		Logged By: Jamie Moss



Lower half of this gap could be anything, but upper half is probably marls

Rip-ups are concentrated onto internal bedding surfaces

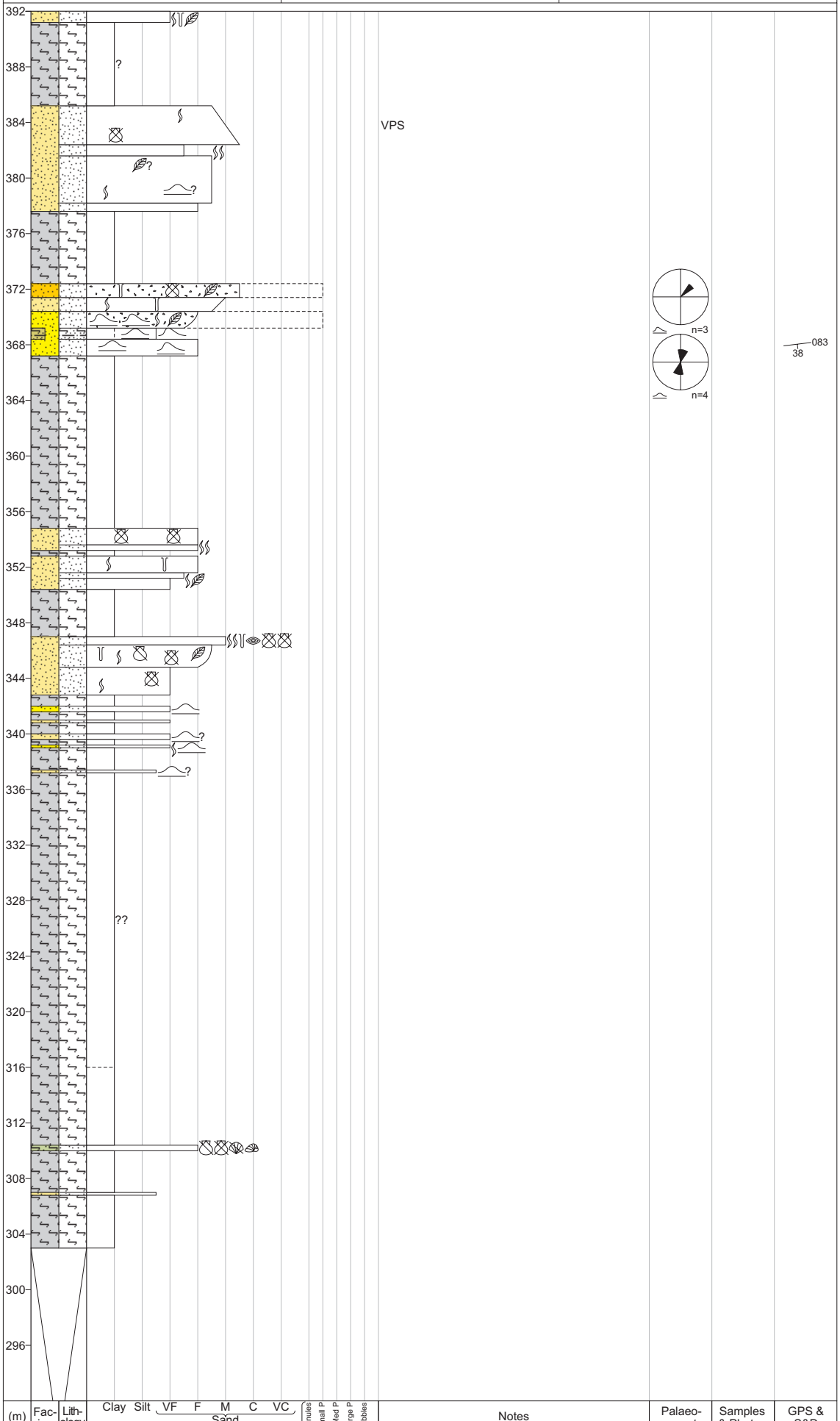
Probably mostly marls

Fossils less fragmented towards top of bed. Base of bed appears to be brecciated (similar to beds seen at Fanlillo)

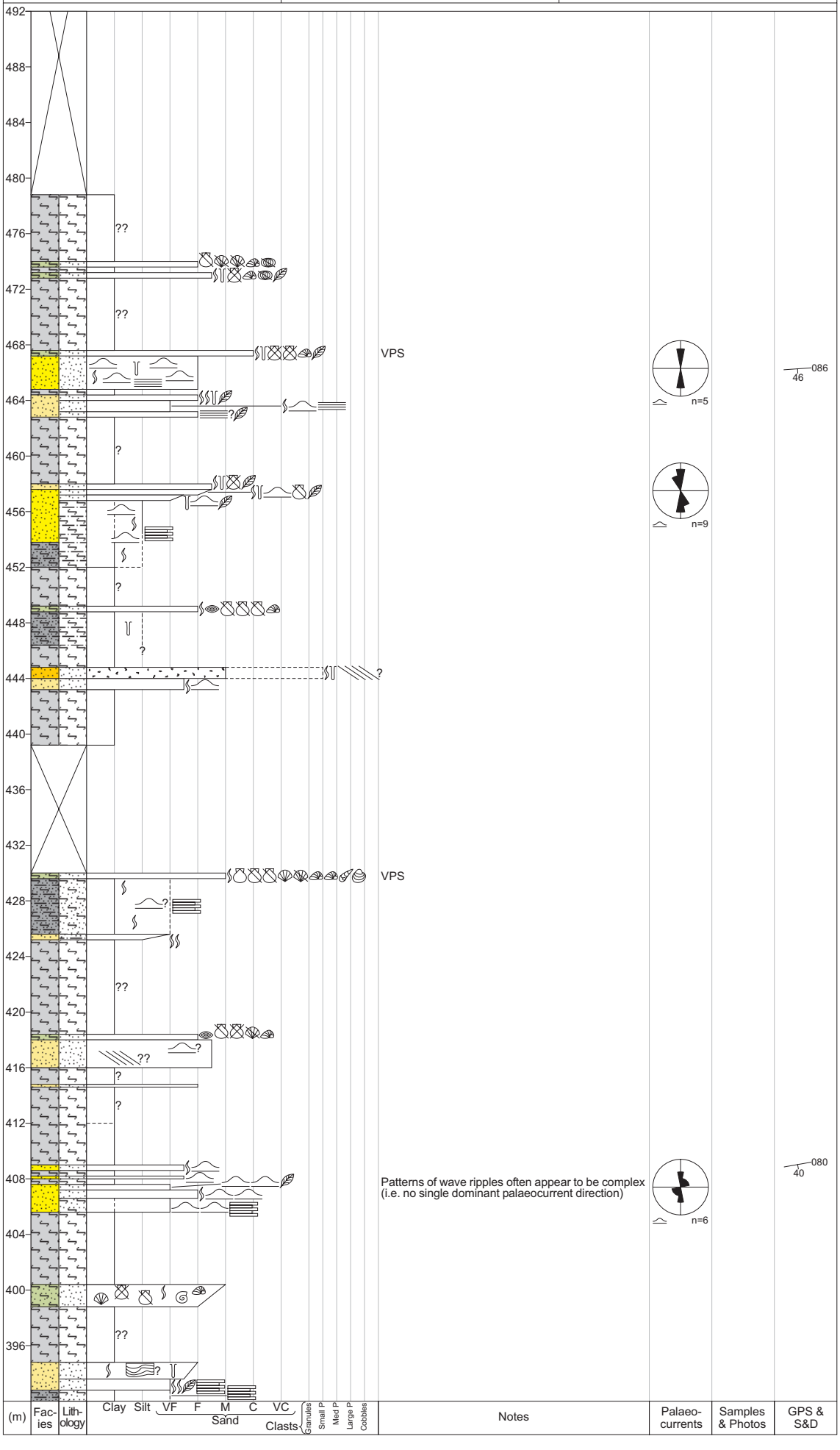
VPS. *Nummulites* are very small

PS

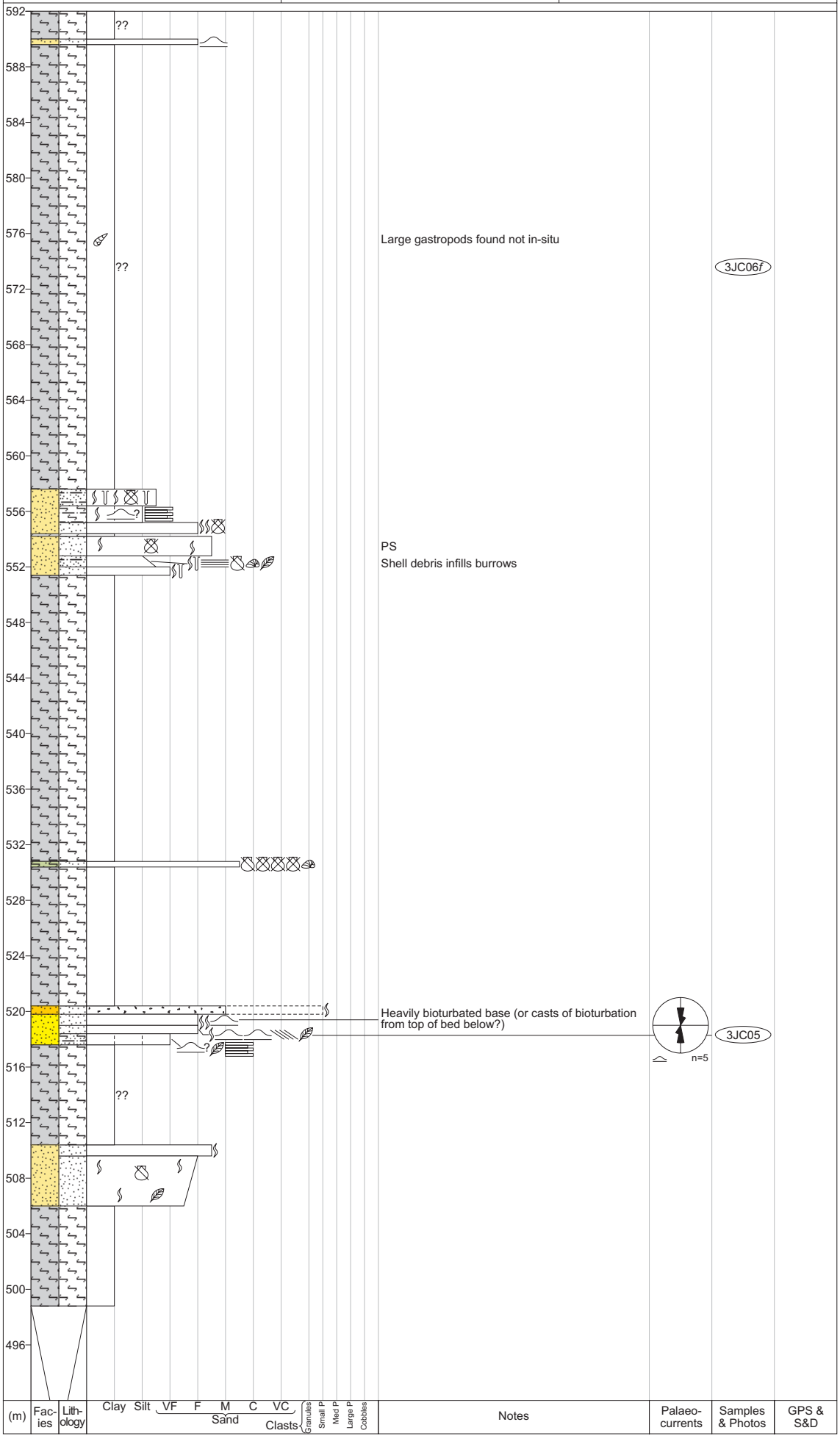
Sector: Northern Jaca Basin	**Jaca**	Page: 4 of 9
Dates Logged: 22-25/5/03		Logged By: Jamie Moss



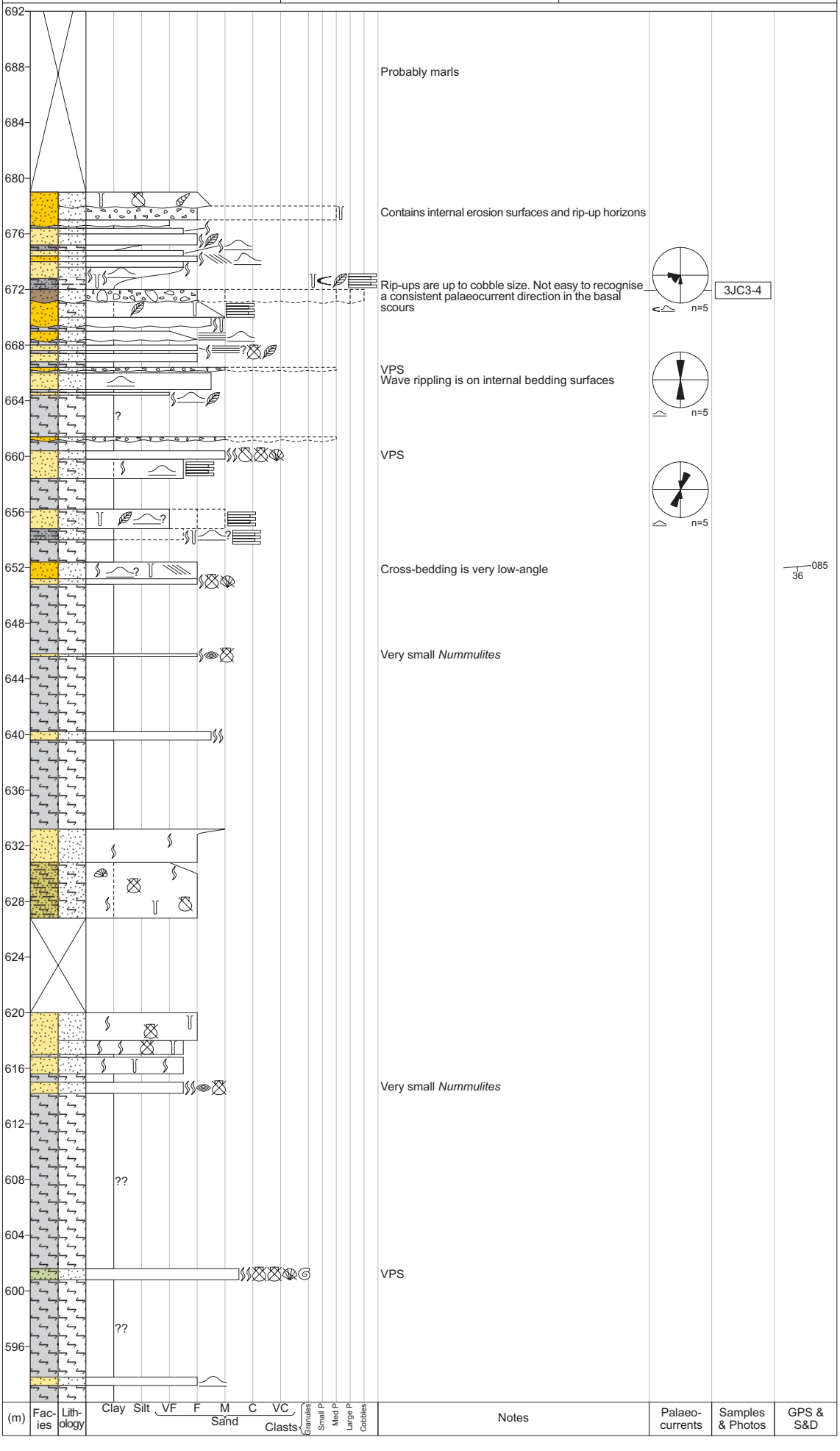
Sector: Northern Jaca Basin	**Jaca**	Page: 5 of 9
Dates Logged: 22-25/5/03		Logged By: Jamie Moss



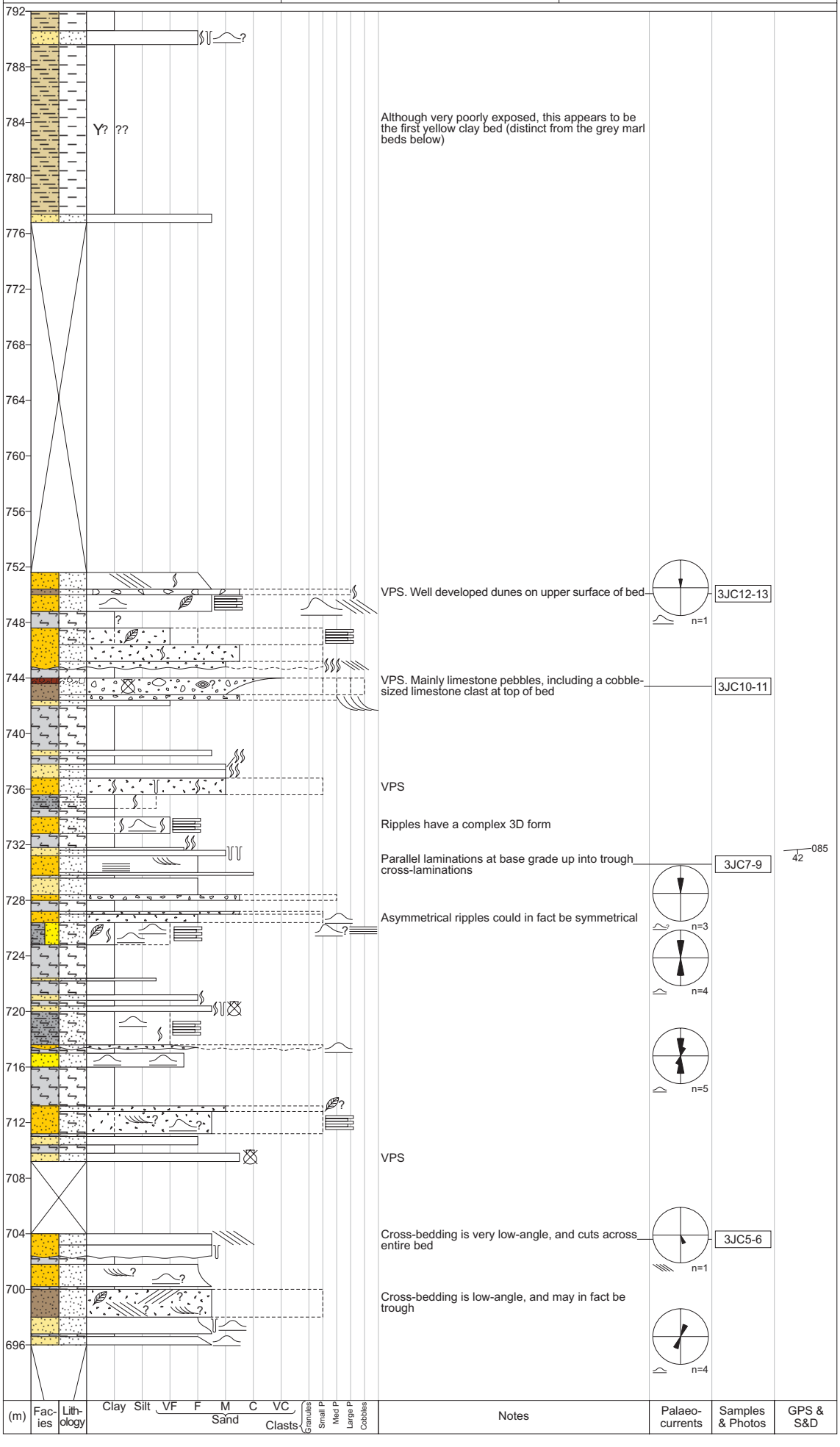
Sector: Northern Jaca Basin	**Jaca**	Page: 6 of 9
Dates Logged: 22-25/5/03		Logged By: Jamie Moss



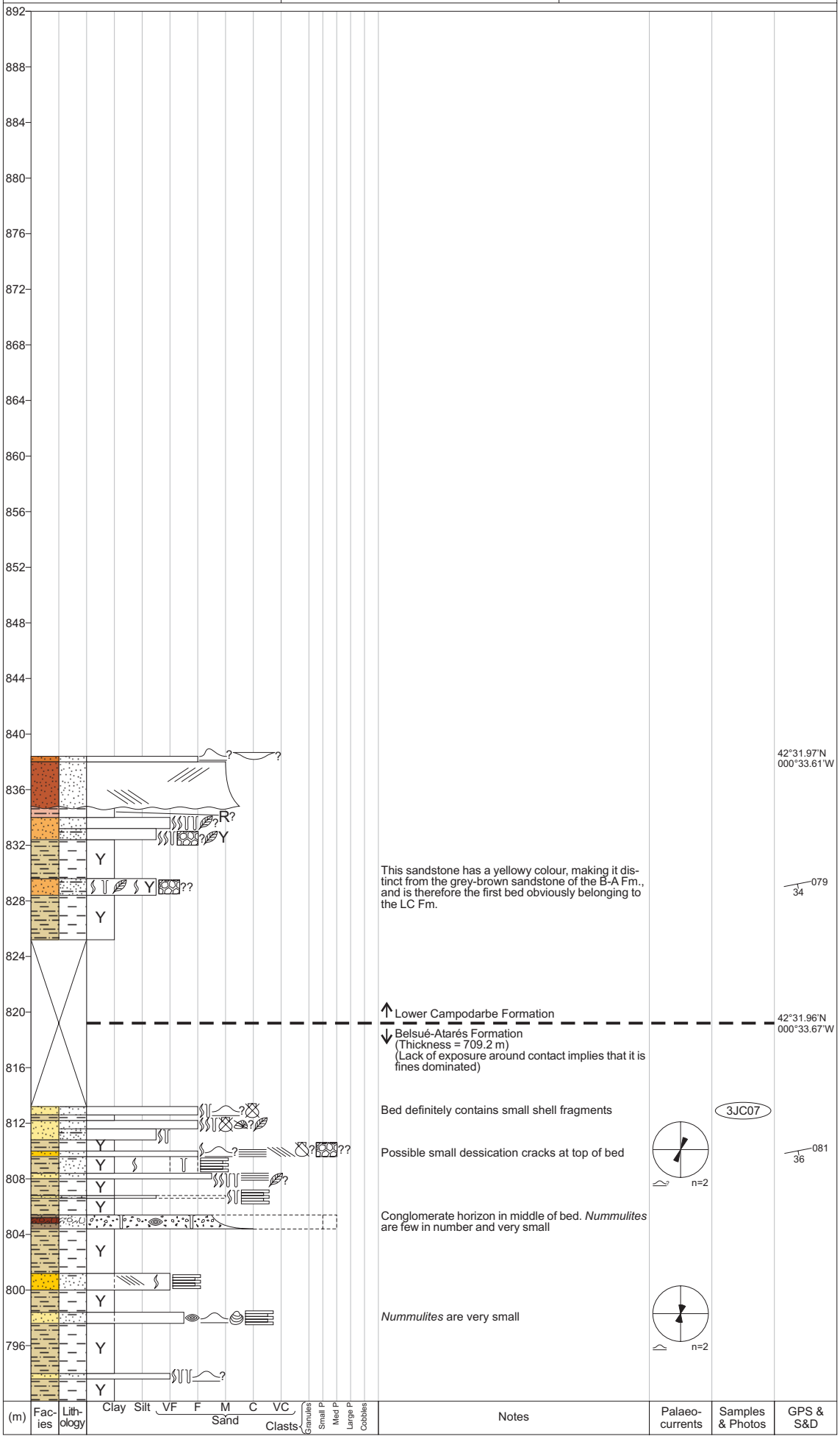
Sector: Northern Jaca Basin	**Jaca**	Page: 7 of 9
Dates Logged: 22-25/5/03		Logged By: Jamie Moss



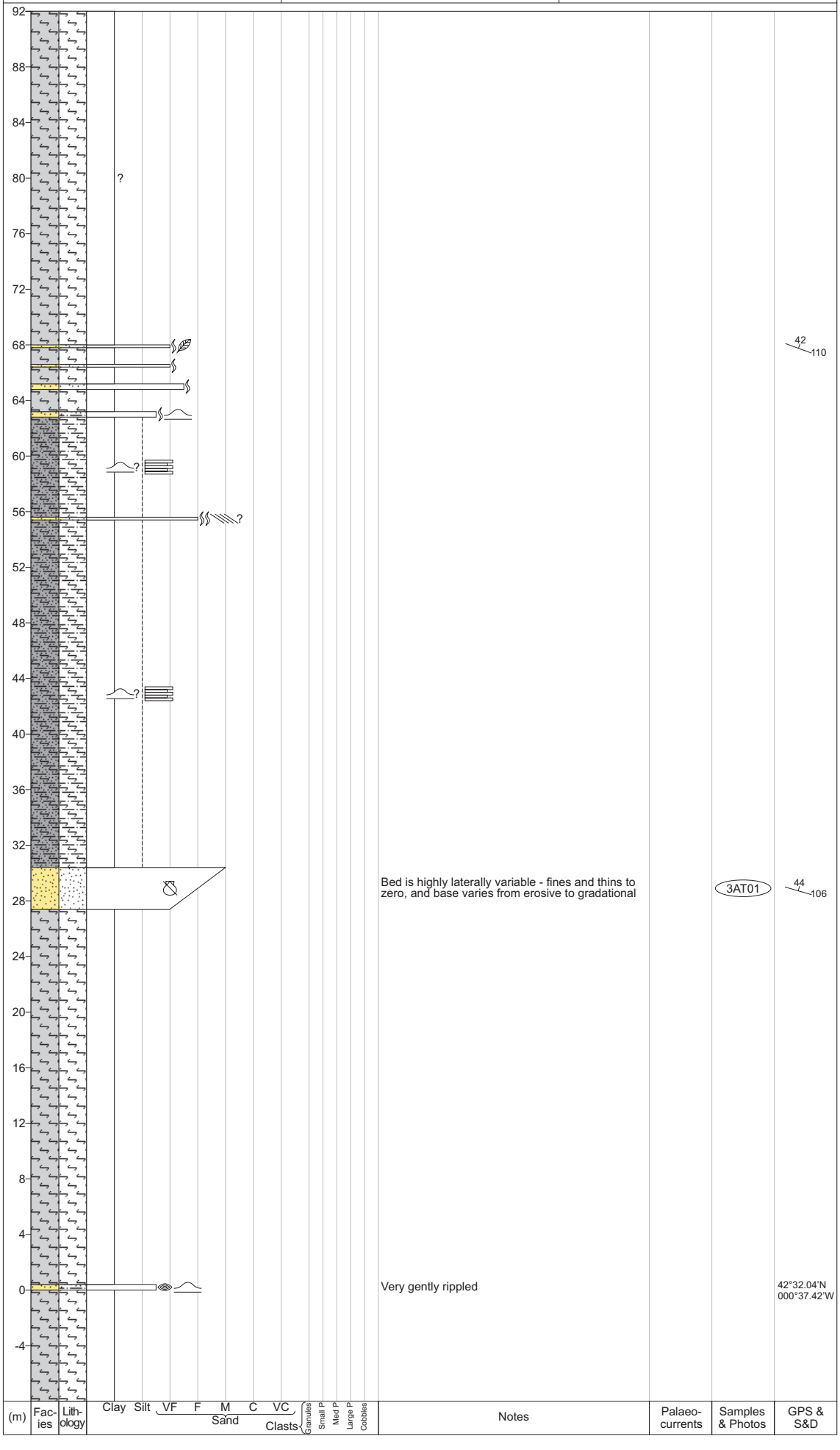
Sector: Northern Jaca Basin	**Jaca**	Page: 8 of 9
Dates Logged: 22-25/5/03		Logged By: Jamie Moss



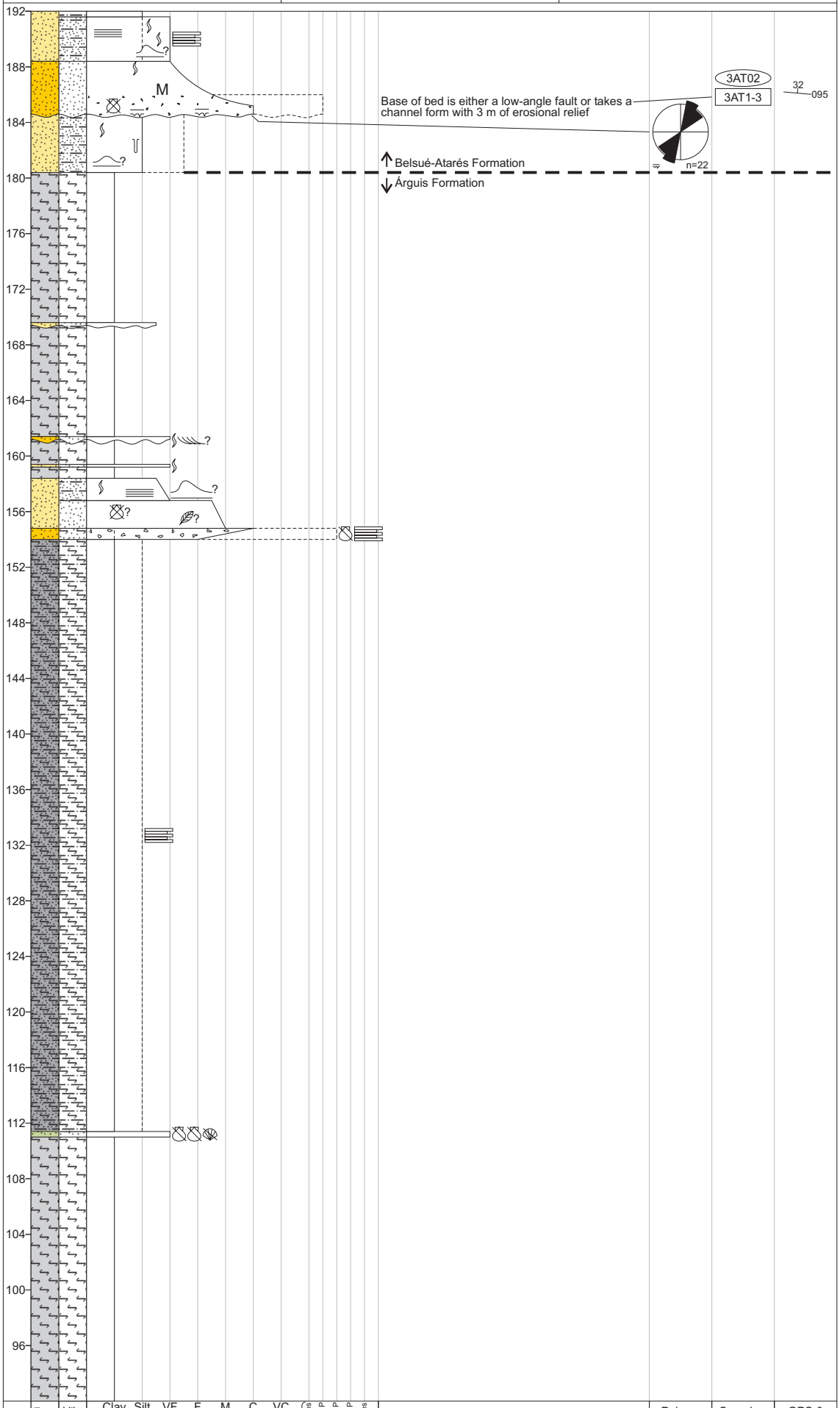
Sector: Northern Jaca Basin	**Jaca**	Page: 9 of 9
Dates Logged: 22-25/5/03		Logged By: Jamie Moss



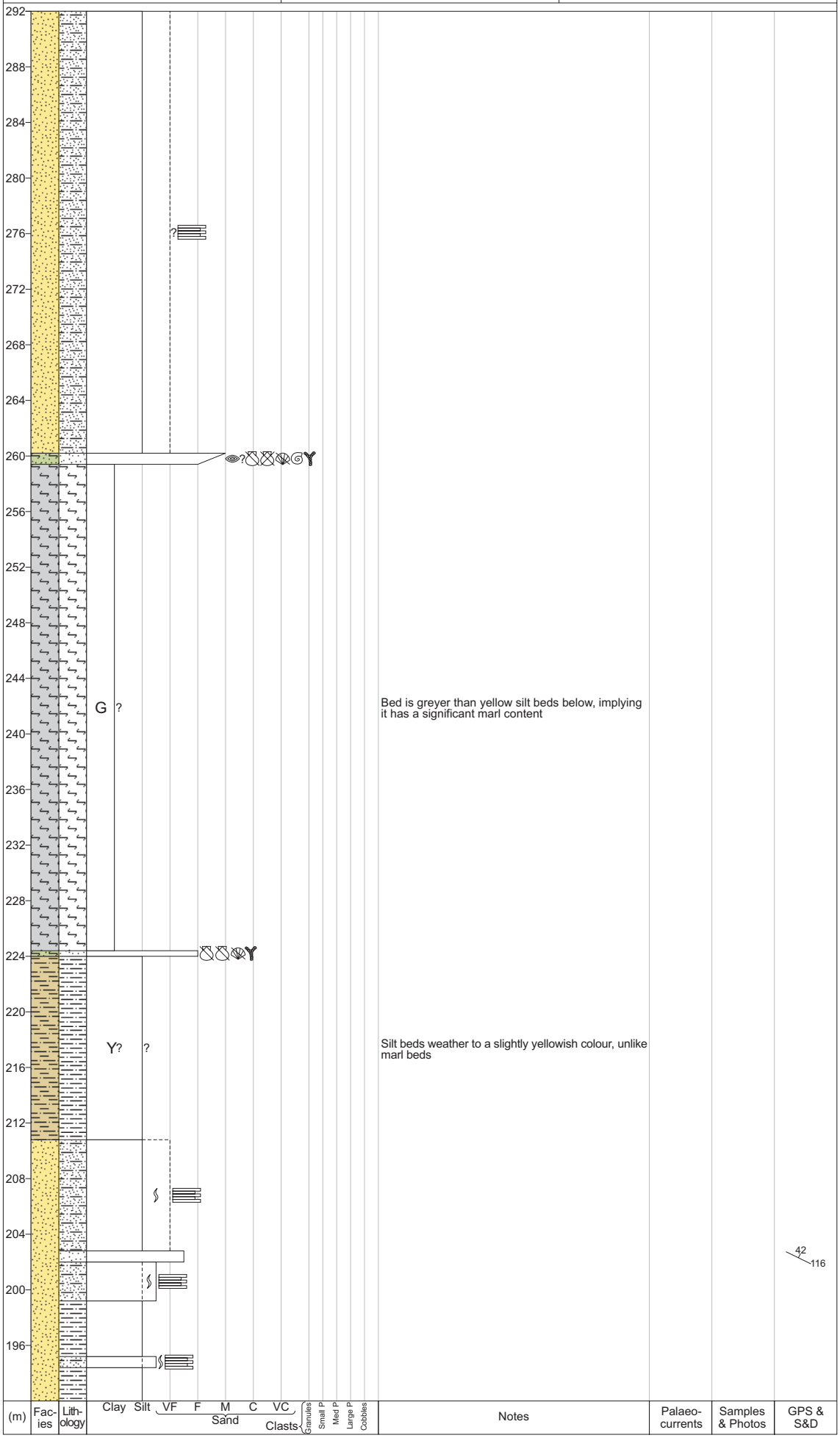
Sector: Northern Jaca Basin	**Atarés**	Page: 1 of 7
Dates Logged: 4-7/5/03		Logged By: Jamie Moss



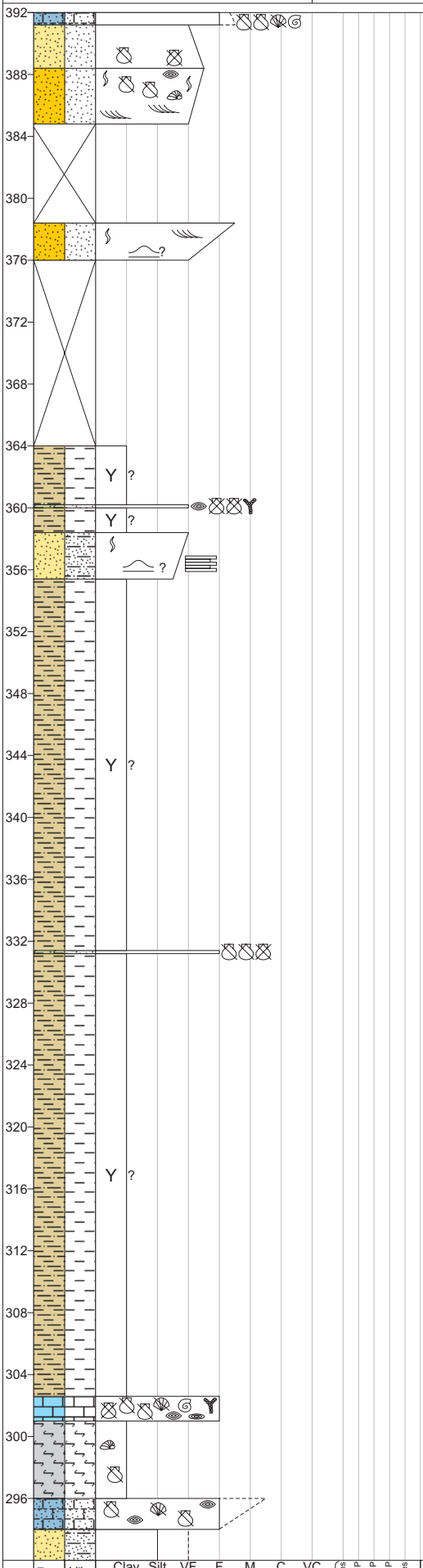
Sector: Northern Jaca Basin	**Atarés**	Page: 2 of 7
Dates Logged: 4-7/5/03		Logged By: Jamie Moss



Sector: Northern Jaca Basin	**Atarés**	Page: 3 of 7
Dates Logged: 4-7/5/03		Logged By: Jamie Moss

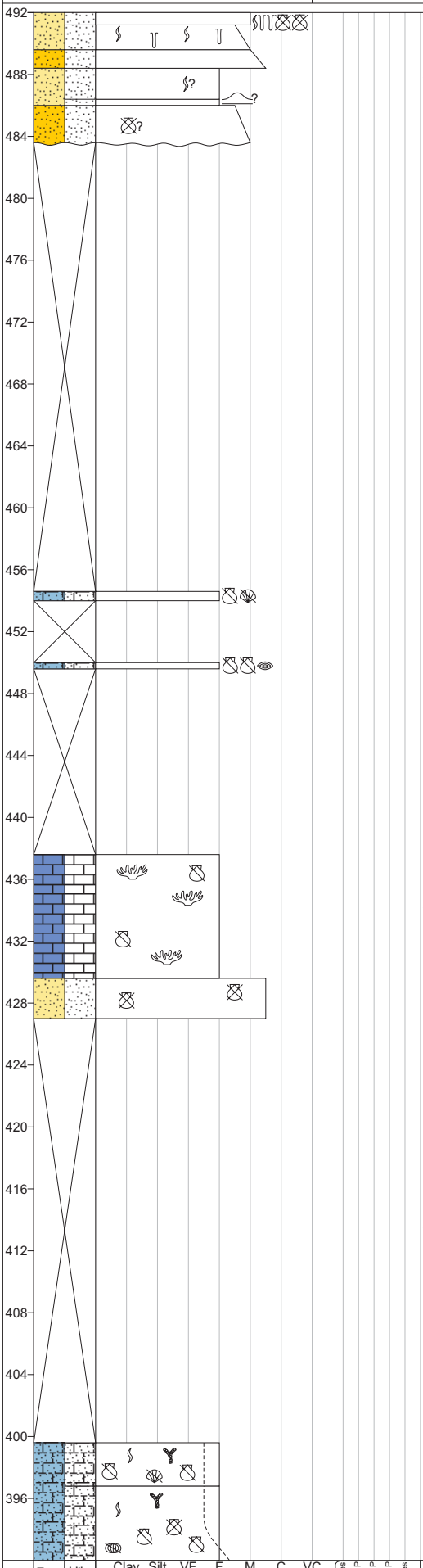


Sector: Northern Jaca Basin	**Atarés**	Page: 4 of 7
Dates Logged: 4-7/5/03		Logged By: Jamie Moss



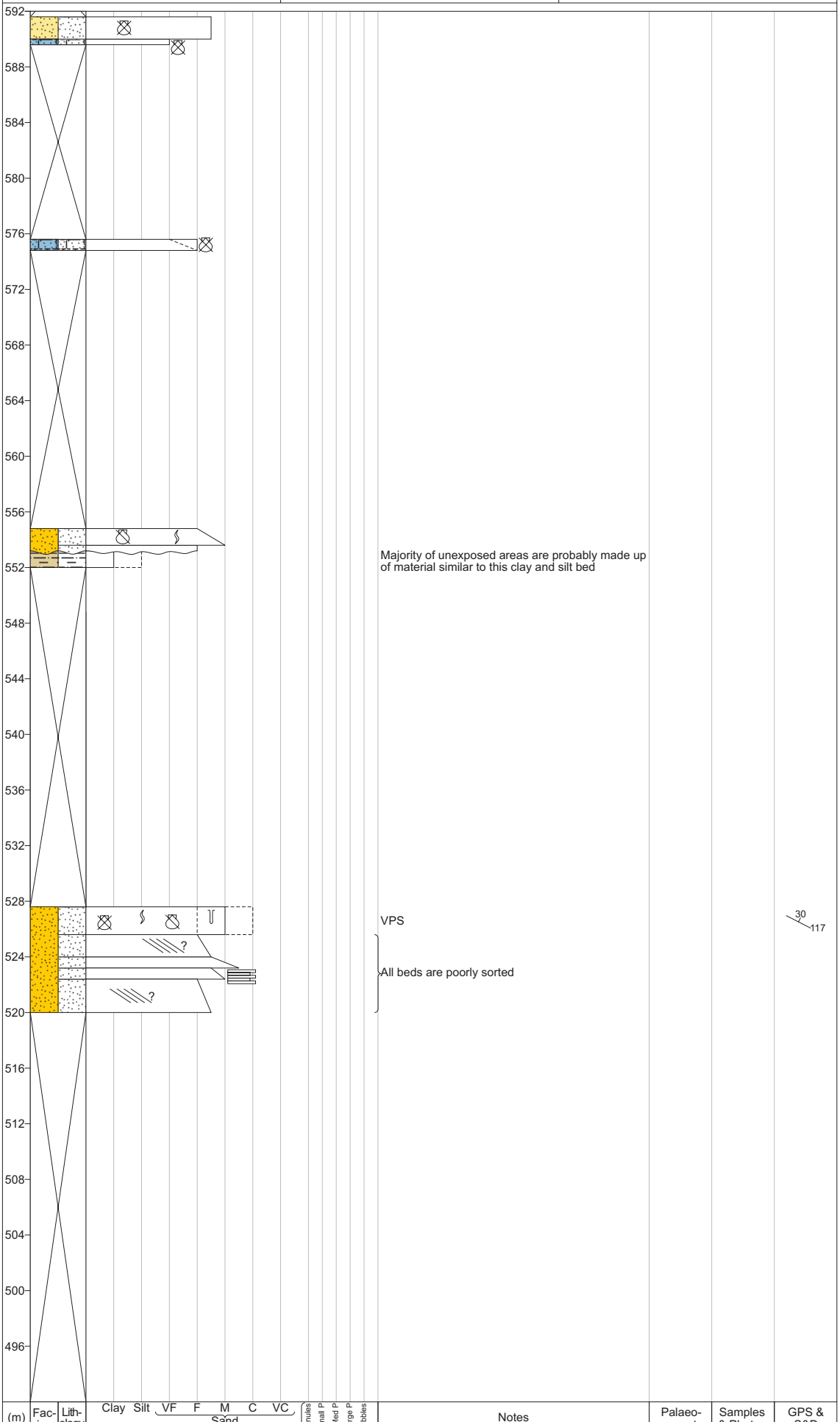
(m)	Facies	Lithology	Clay Silt VF F M C VC (Sand) Clasts (Granules, Small P, Med P, Large P, Cobbles)	Notes	Palaeo-currents	Samples & Photos	GPS & S&D
				Complex rippling, mainly concentrated at base of bed		3AT05	
							36 / 118
				Again, *Nummulites* are very small			
				Huge fossil oyster (d = 30 cm) found not in-situ		3AT04*f*	
				Nummulites are very small		3AT03	

Sector: Northern Jaca Basin	**Atarés**	Page: 5 of 7
Dates Logged: 4-7/5/03		Logged By: Jamie Moss

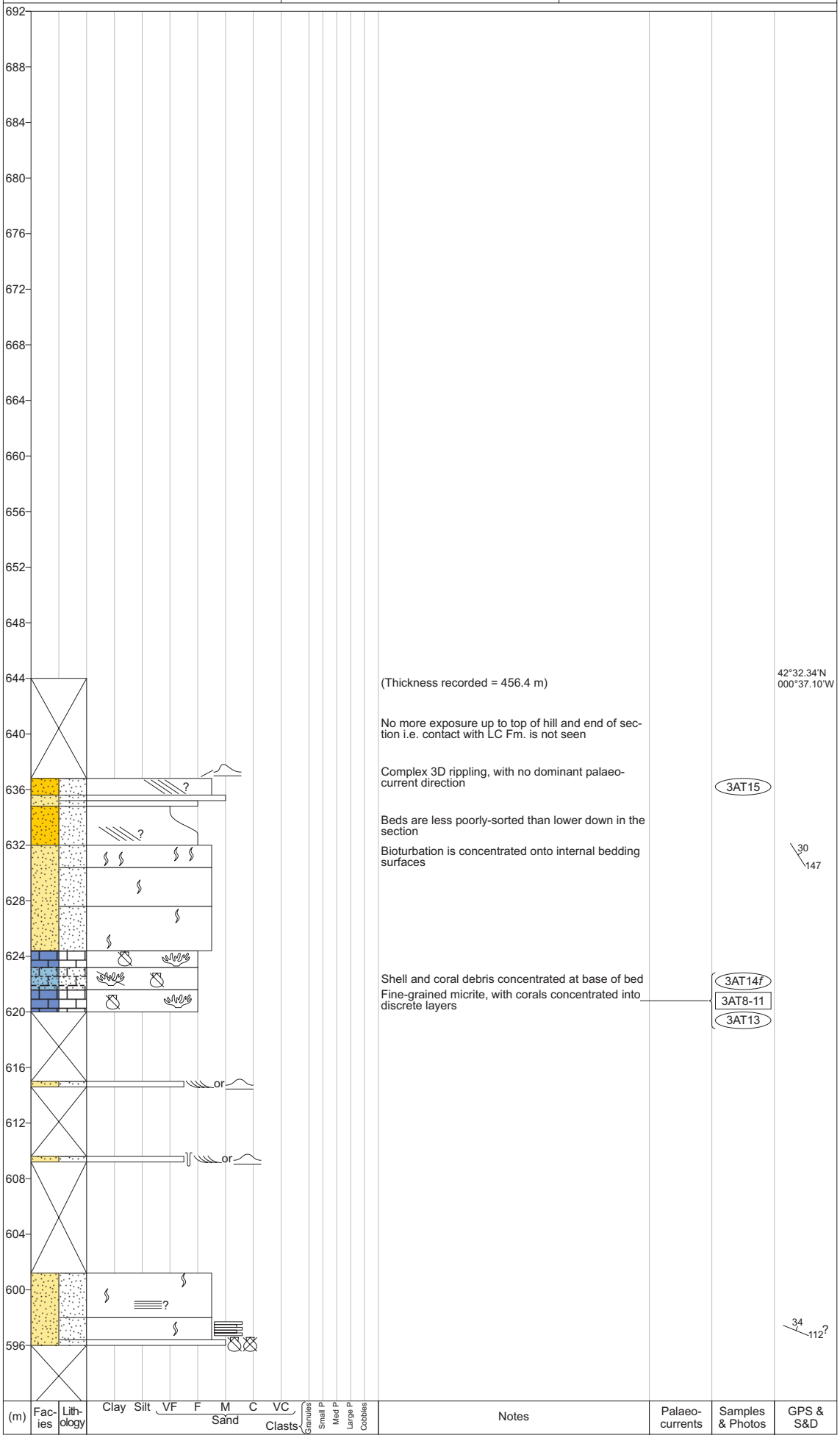


(m)	Facies	Lithology	Notes	Palaeo-currents	Samples & Photos	GPS & S&D
			All beds are poorly sorted and without depositional structures		3AT12	
			A planar and laterally continuous bed, composed of fine-grained micrite and corals. Some layers are more coral-rich than others, and there seems to be a general increase in coral content towards top of bed		3AT11*f* 3AT10*f* 3AT09*f* 3AT4-7 3AT08*f* 3AT07*f* 3AT06	
			All gaps are thought to be made up of marls, silts and clays			
			Both beds are poorly sorted and have their shell content concentrated towards their bases			

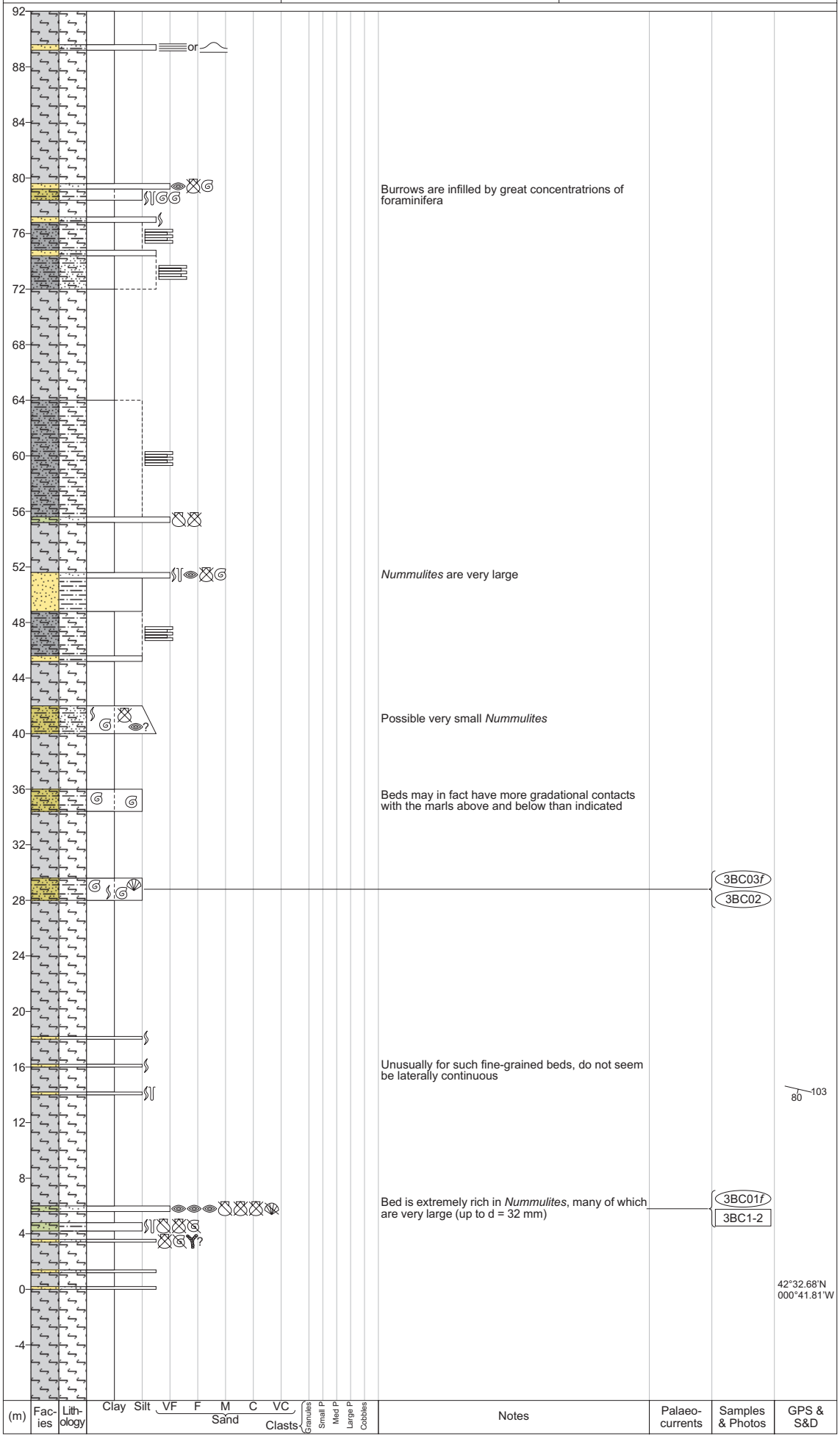
Sector: Northern Jaca Basin	**Atarés**	Page: 6 of 7
Dates Logged: 4-7/5/03		Logged By: Jamie Moss



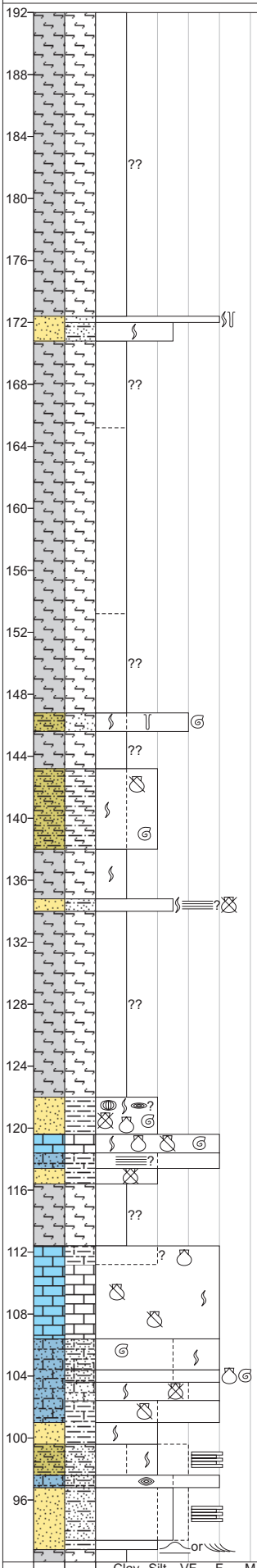
Sector: Northern Jaca Basin	**Atarés**	Page: 7 of 7
Dates Logged: 4-7/5/03		Logged By: Jamie Moss



Sector: Western Jaca Basin	**Binacua**	Page: 1 of 4
Date Logged: 12/5/03		Logged By: Jamie Moss

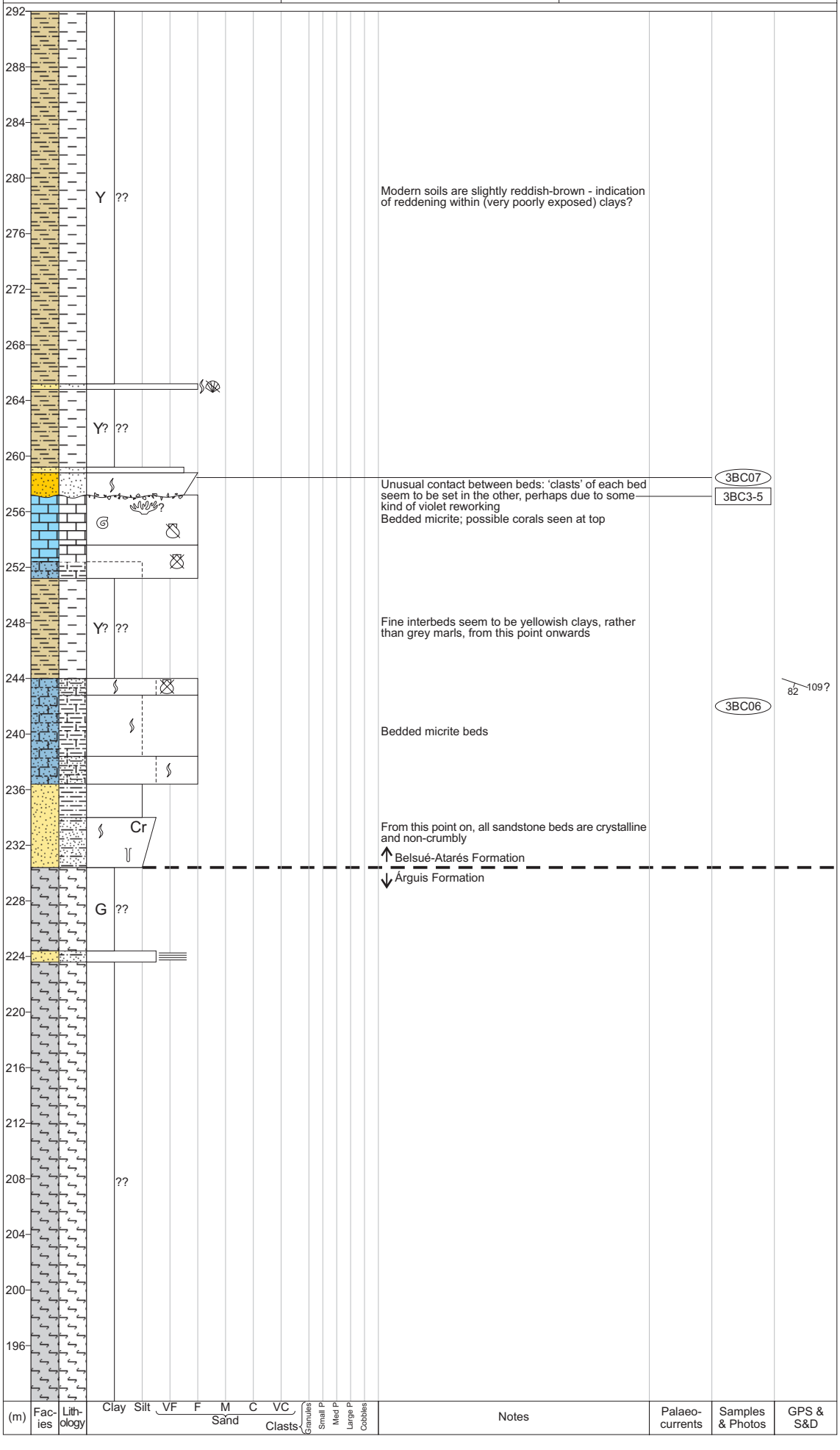


Sector: Western Jaca Basin	**Binacua**	Page: 2 of 4
Date Logged: 12/5/03		Logged By: Jamie Moss

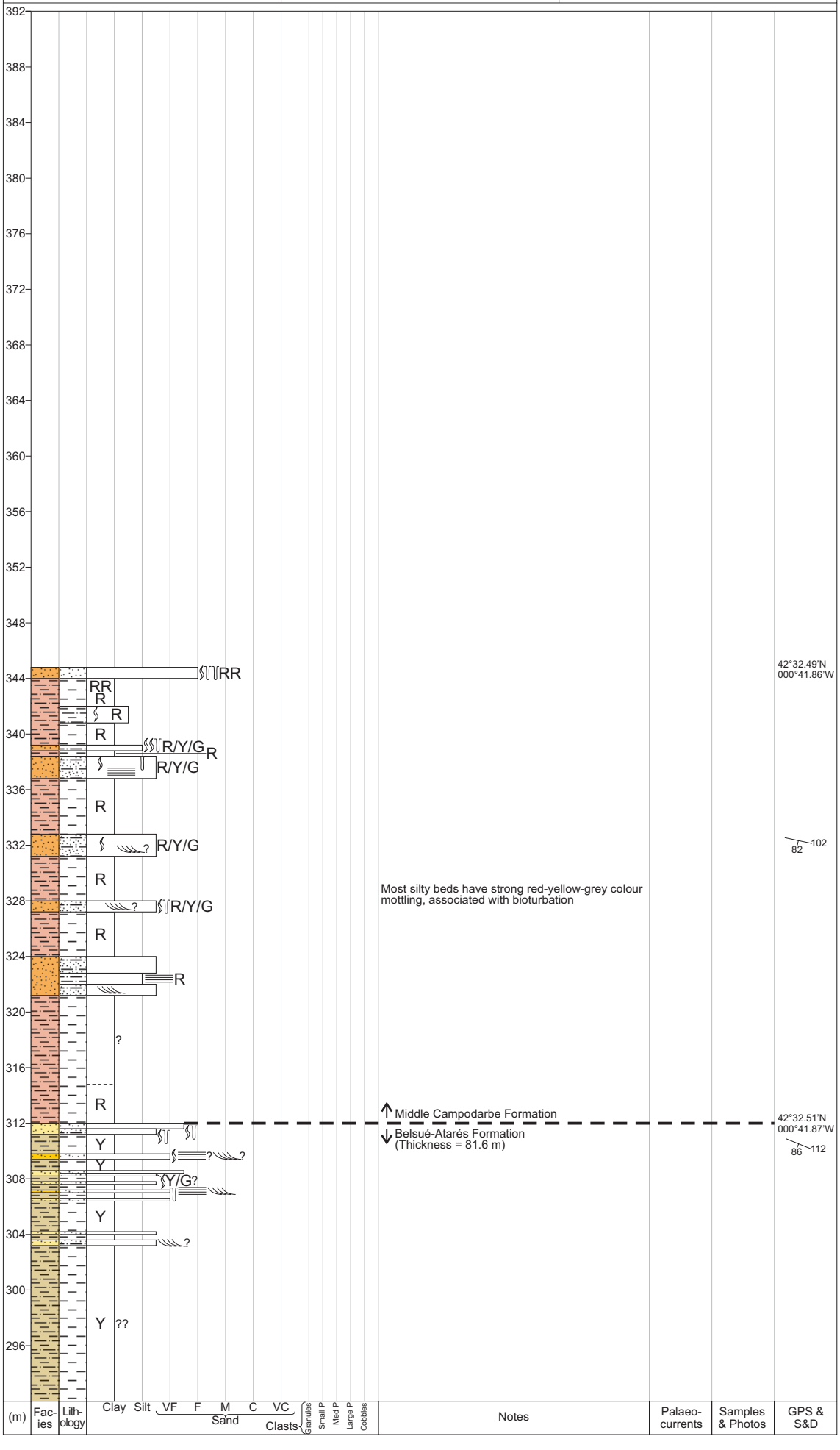


(m)	Facies	Lithology	Clay Silt VF F M C VC Sand Clasts (Granules, Small P, Med P, Large P, Cobbles)	Notes	Palaeo-currents	Samples & Photos	GPS & S&D
				Bedded micrite, no corals		3BC05f	
				Bedded micrite, no corals. Most of bed is light grey, though seems to get browner and siltier towards top. Shells are slightly concentrated into horizons		3BC04	
				All calcareous beds are at least roughly bedded			74 109

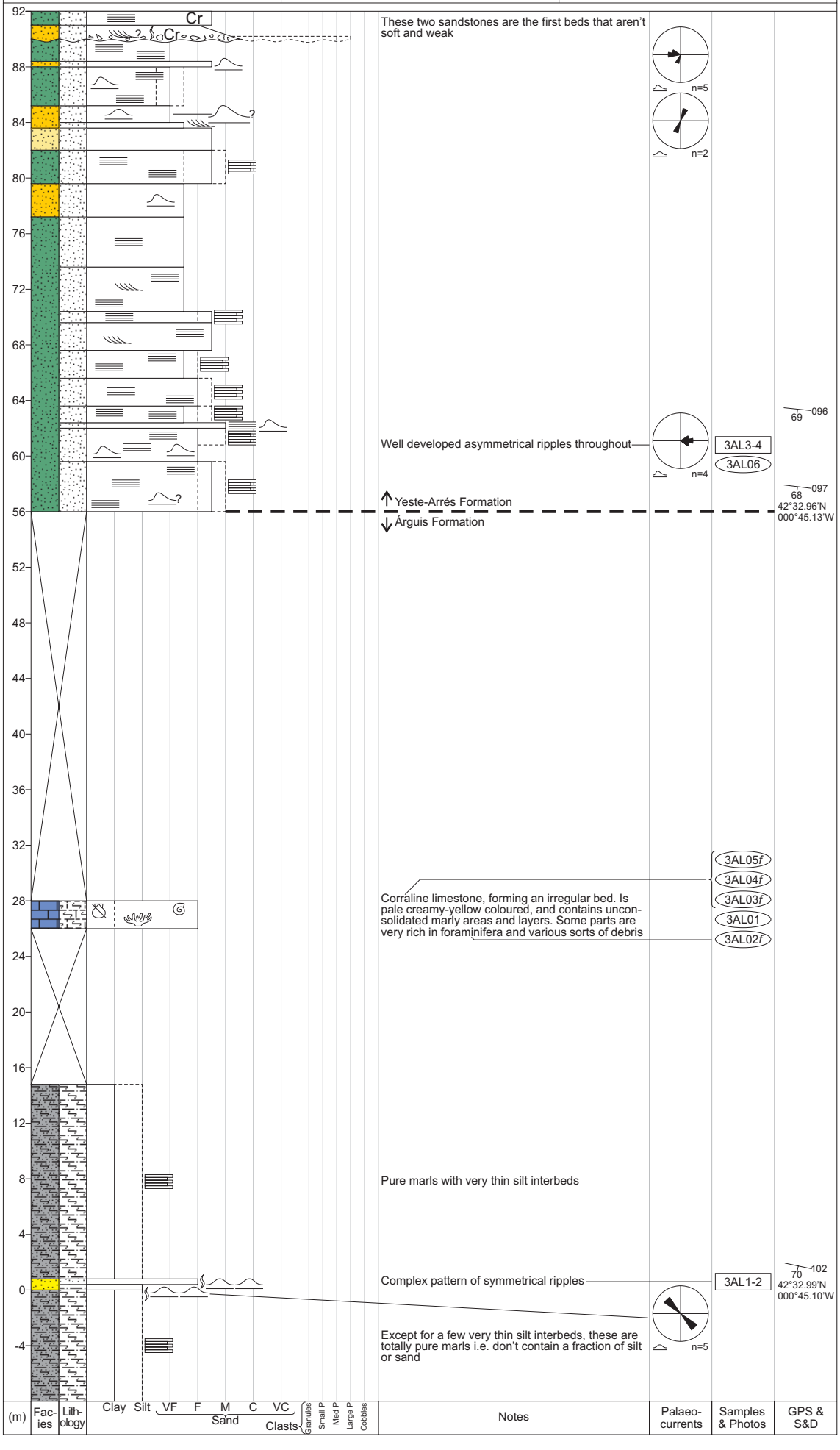
Sector: Western Jaca Basin	**Binacua**	Page: 3 of 4
Date Logged: 12/5/03		Logged By: Jamie Moss



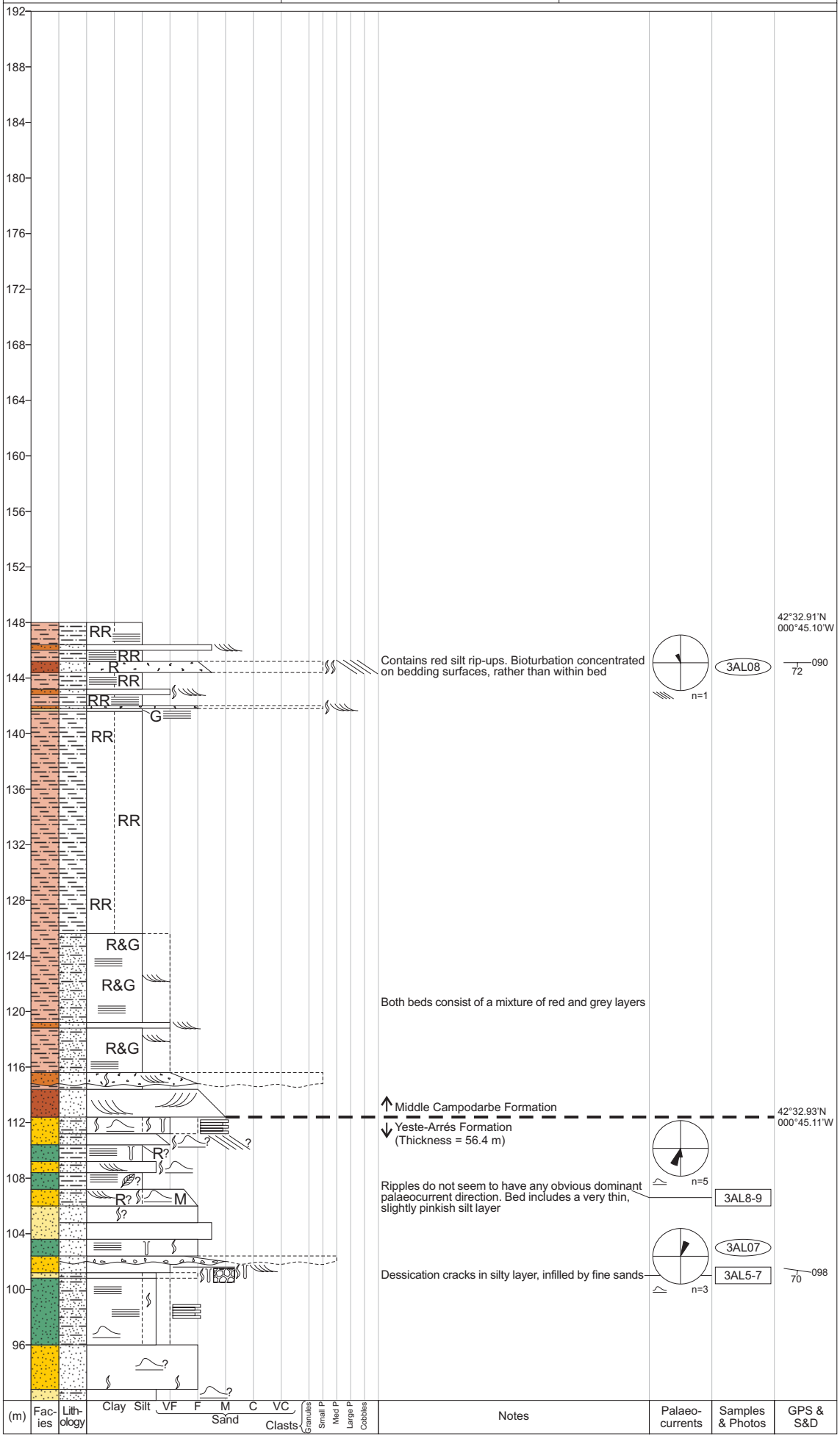
Sector: Western Jaca Basin	**Binacua**	Page: 4 of 4
Date Logged: 12/5/03		Logged By: Jamie Moss



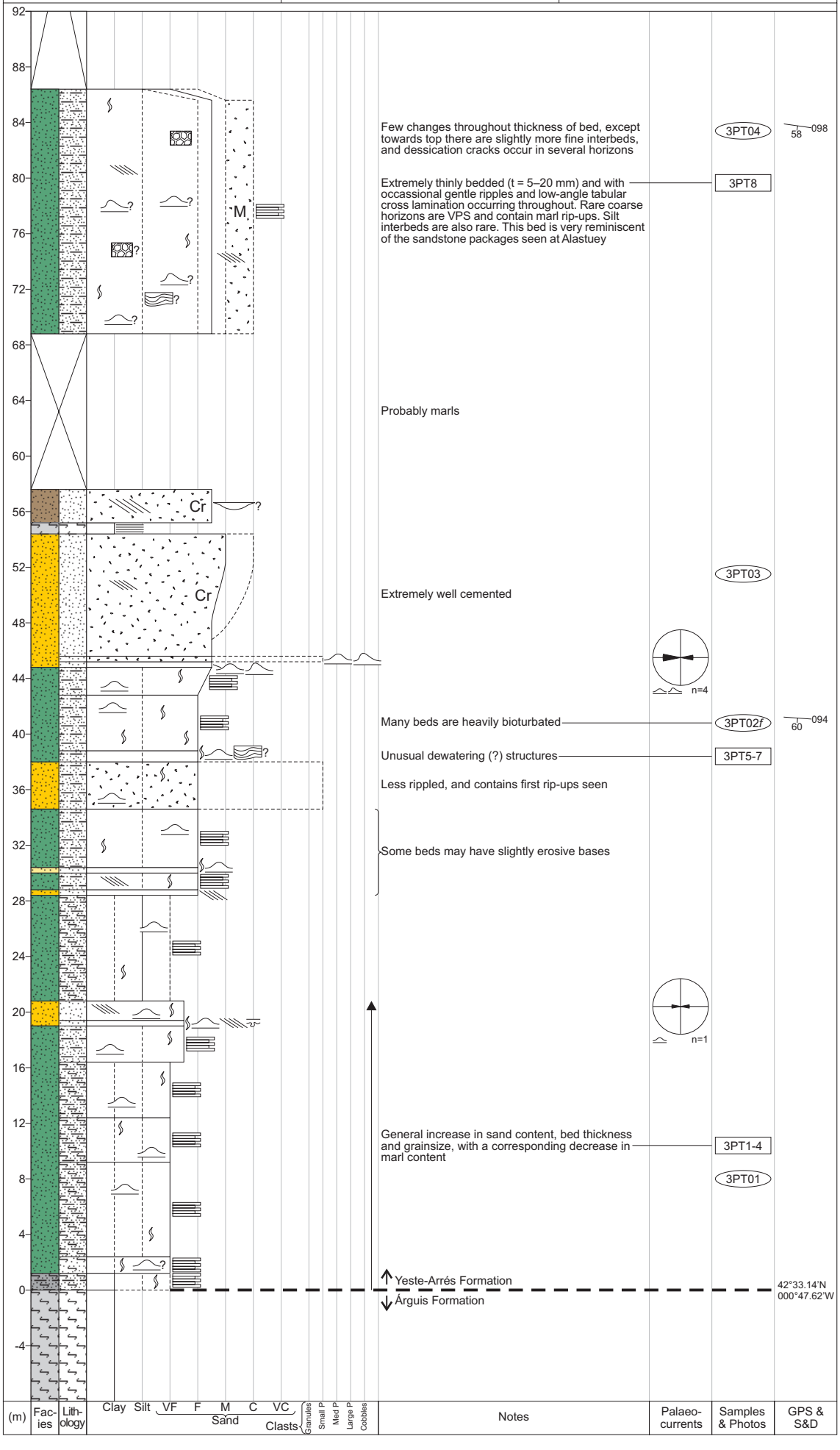
Sector: Western Jaca Basin	**Alastuey**	Page: 1 of 2
Date Logged: 8/5/03		Logged By: Jamie Moss



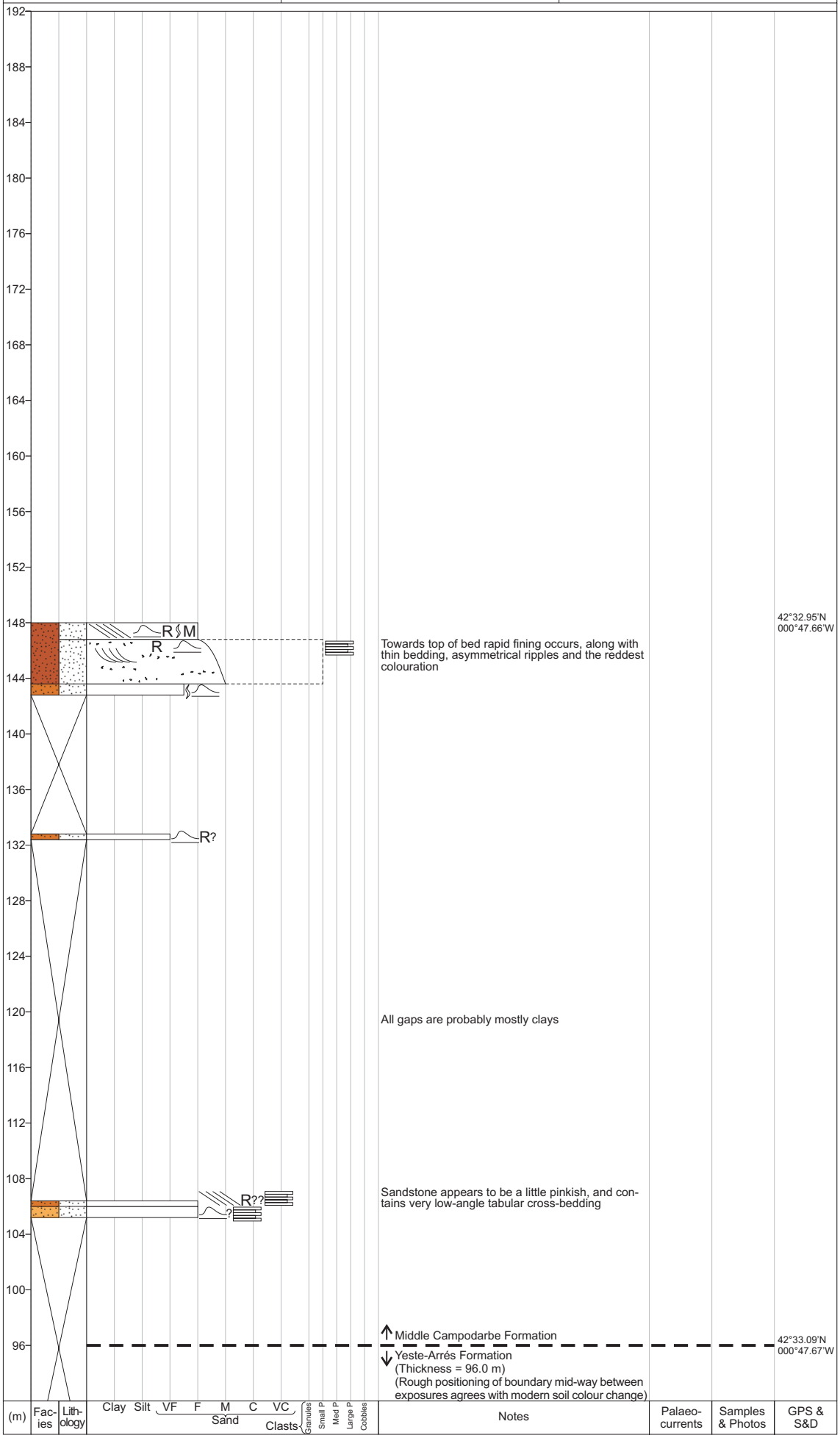
Sector: Western Jaca Basin	**Alastuey**	Page: 2 of 2
Date Logged: 8/5/03		Logged By: Jamie Moss



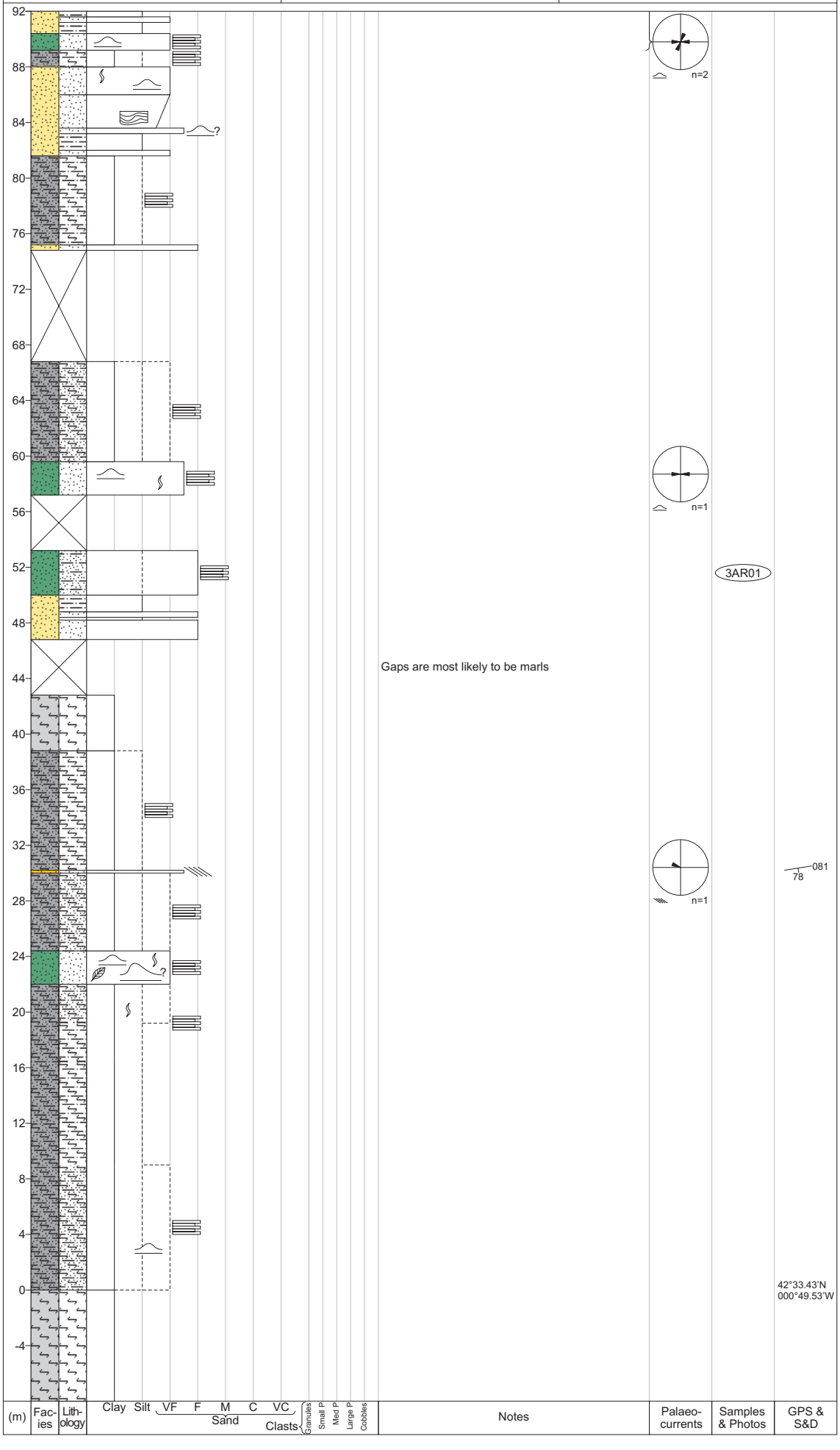
Sector: Western Jaca Basin	**Puente La Reina**	Page: 1 of 2
Dates Logged: 16 & 23/5/03		Logged By: Jamie Moss & Stuart Jones



Sector: Western Jaca Basin	**Puente La Reina**	Page: 2 of 2
Dates Logged: 16 & 23/5/03		Logged By: Jamie Moss & Stuart Jones

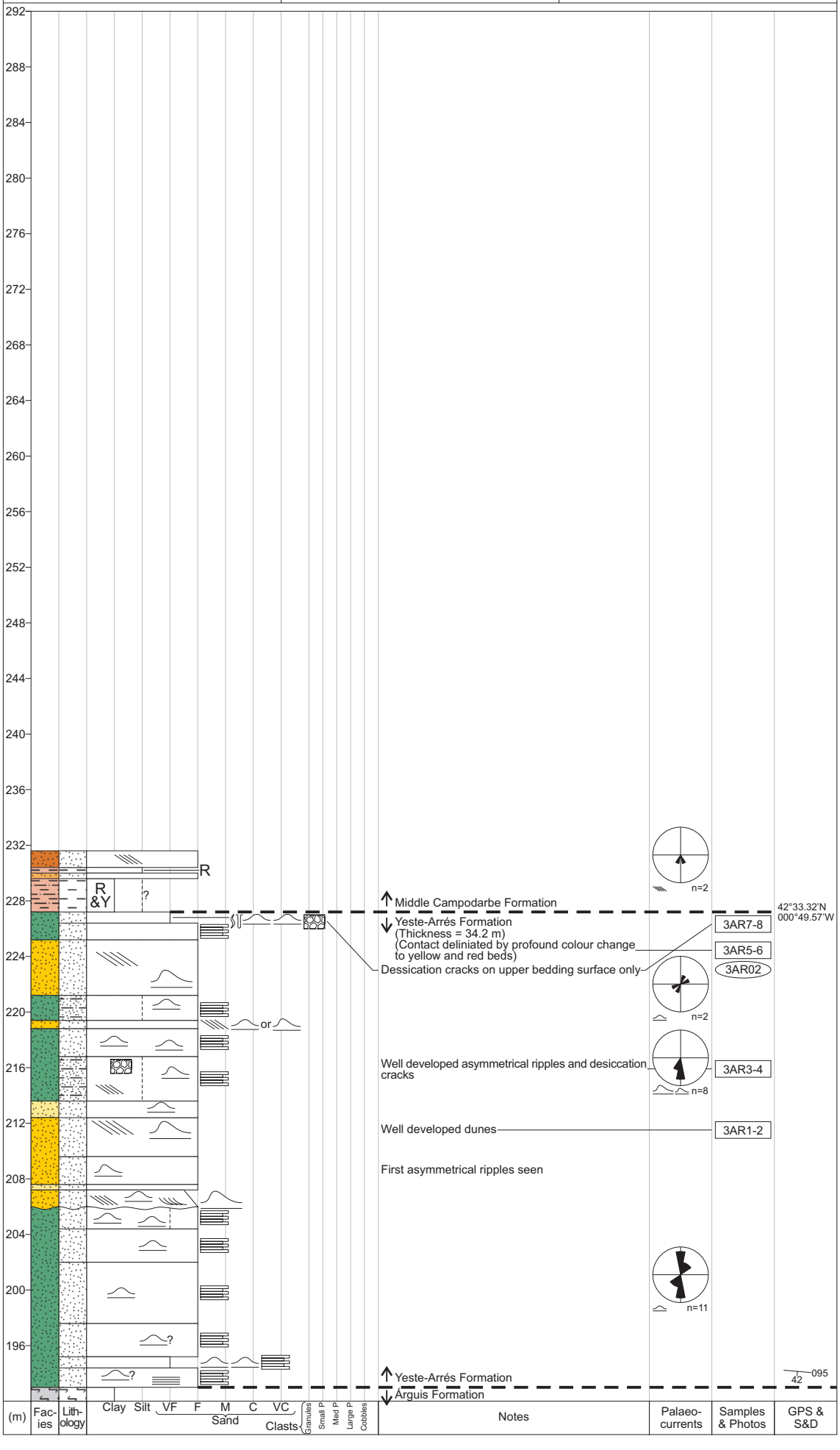


Sector: Western Jaca Basin	**Arrés**	Page: 1 of 3
Date Logged: 16/5/03		Logged By: Jamie Moss & Stuart Jones

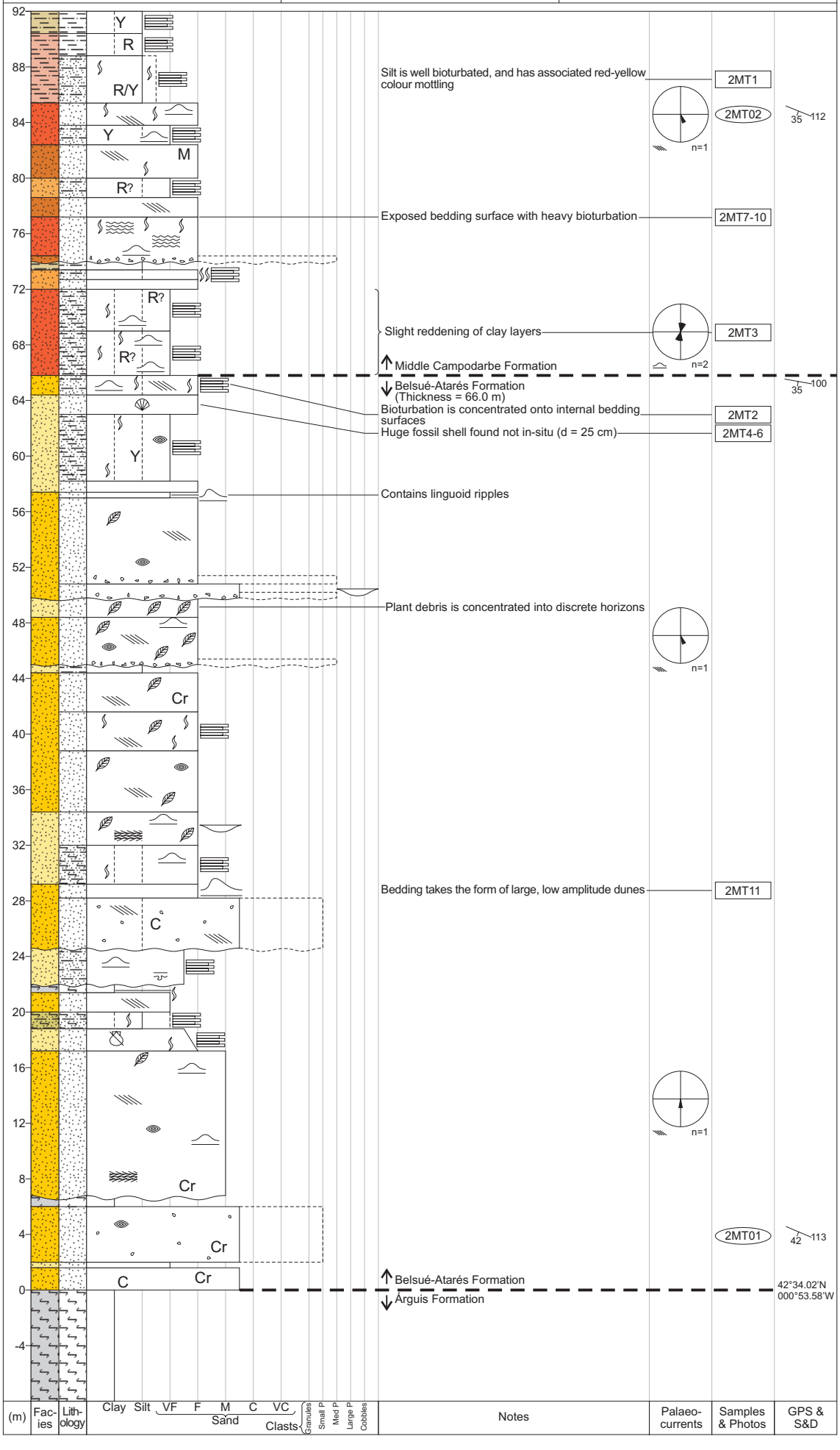


Sector: Western Jaca Basin	**Arrés**	Page: 2 of 3
Date Logged: 16/5/03		Logged By: Jamie Moss & Stuart Jones

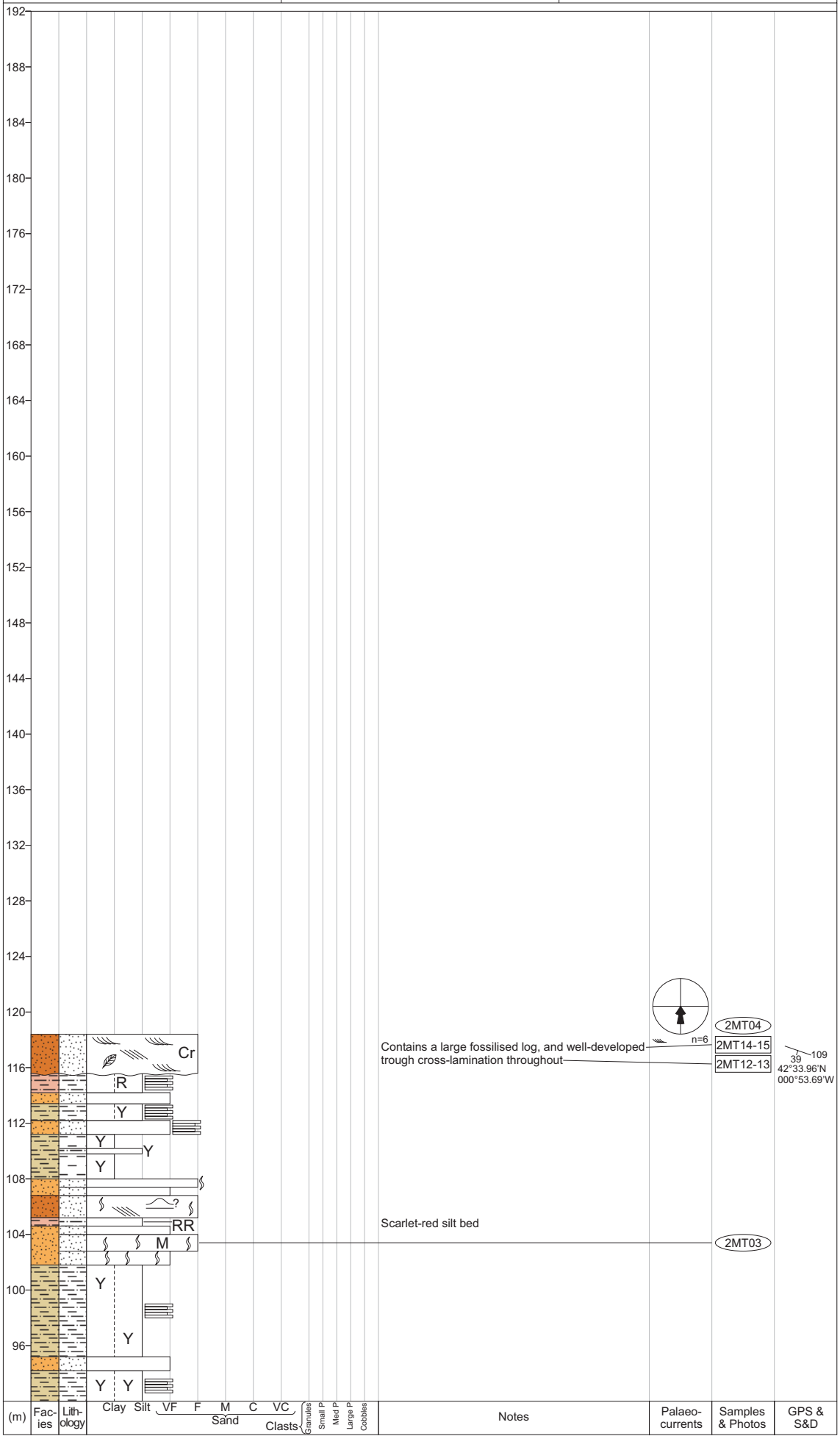
Sector: Western Jaca Basin	**Arrés**	Page: 3 of 3
Date Logged: 16/5/03		Logged By: Jamie Moss & Stuart Jones



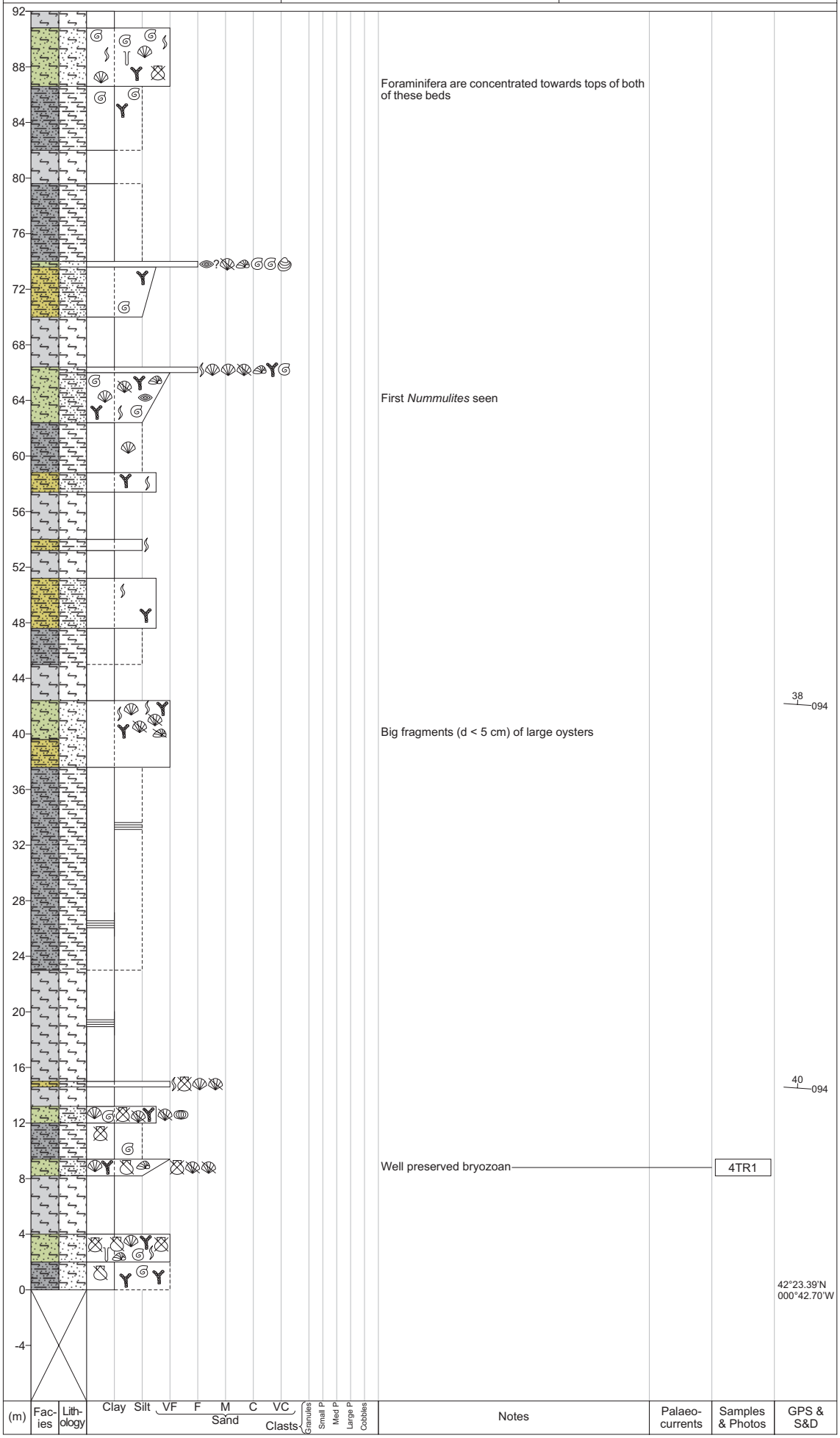
Sector: Western Jaca Basin	**Martes**	Page: 1 of 2
Date Logged: 19/5/02		Logged By: Jamie Moss & Stuart Jones



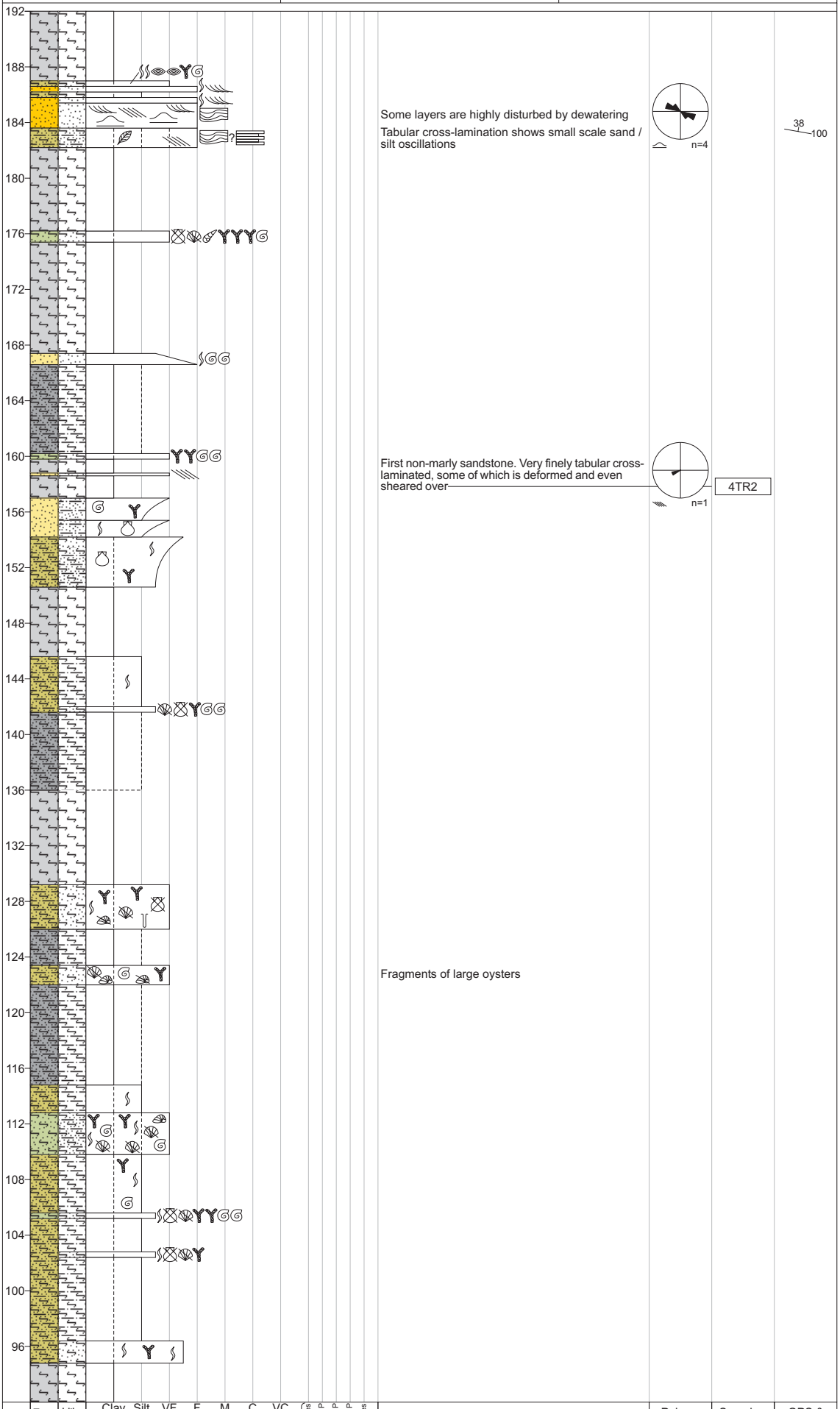
Sector: Western Jaca Basin	**Martes**	Page: 2 of 2
Date Logged: 19/5/02		Logged By: Jamie Moss & Stuart Jones



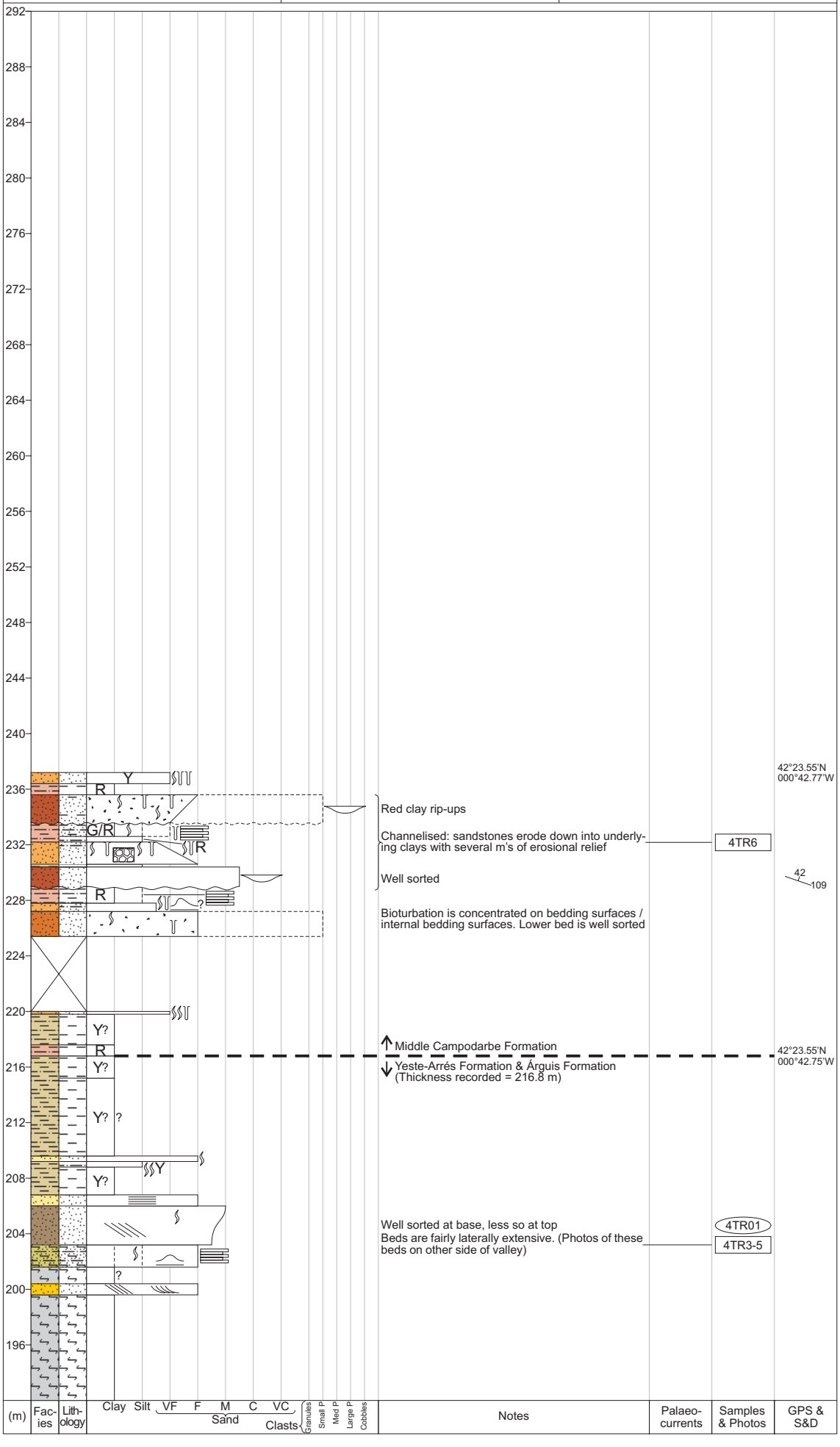
Sector: Western Jaca Basin	**Triste**	Page: 1 of 3
Date Logged: 2/9/03		Logged By: Jamie Moss



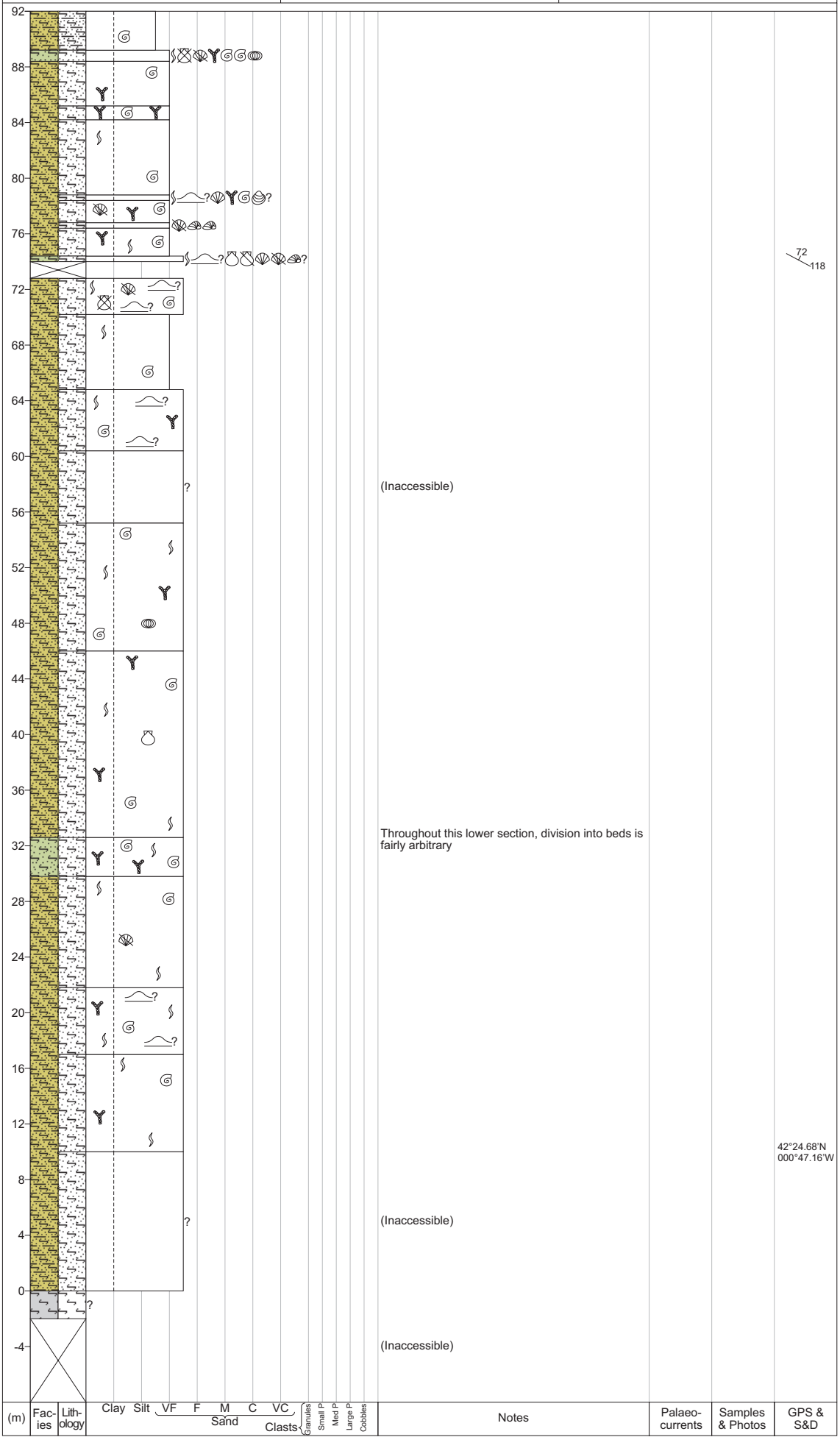
Sector: Western Jaca Basin	**Triste**	Page: 2 of 3
Date Logged: 2/9/03		Logged By: Jamie Moss



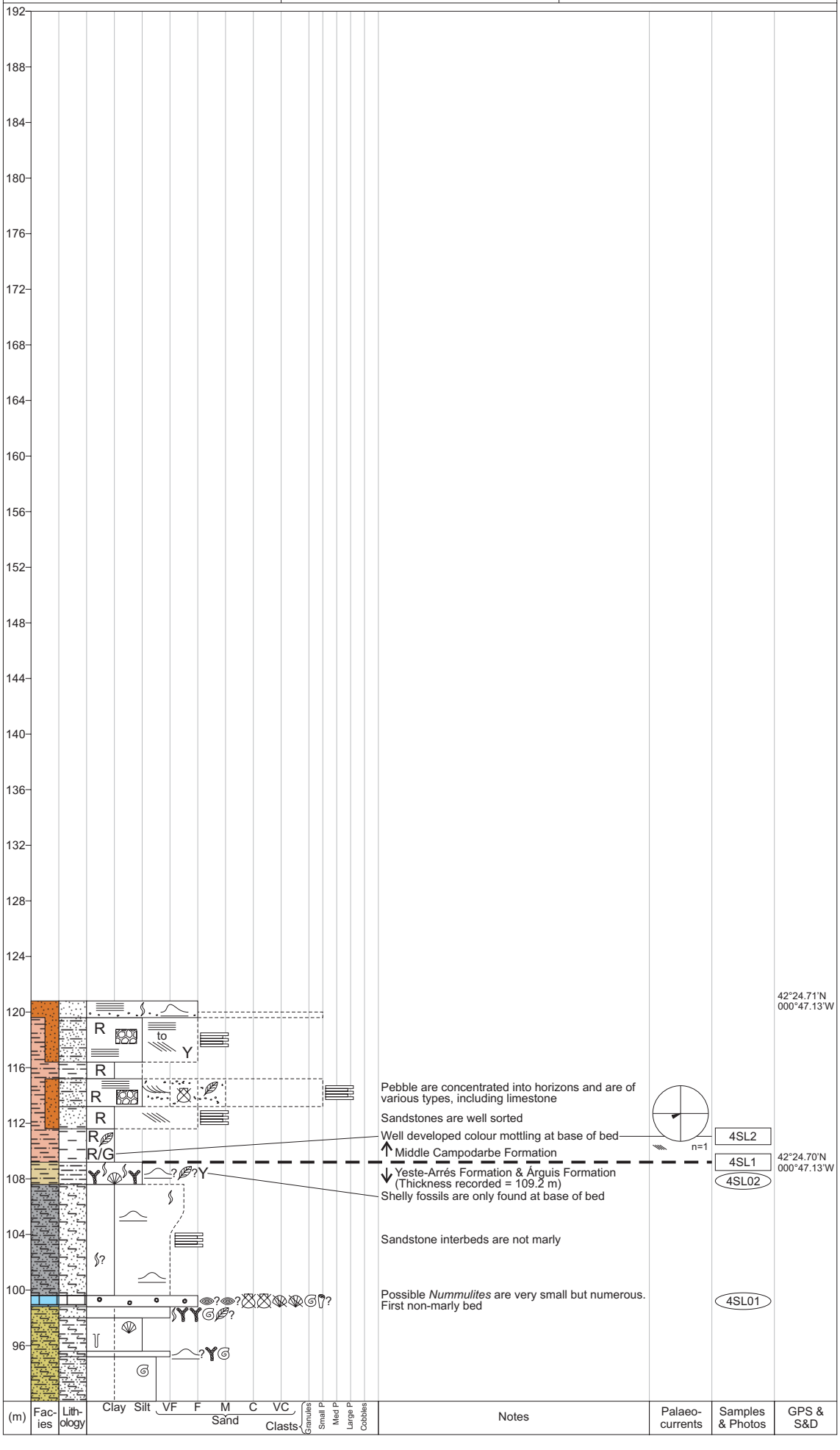
Sector: Western Jaca Basin	**Triste**	Page: 3 of 3
Date Logged: 2/9/03		Logged By: Jamie Moss



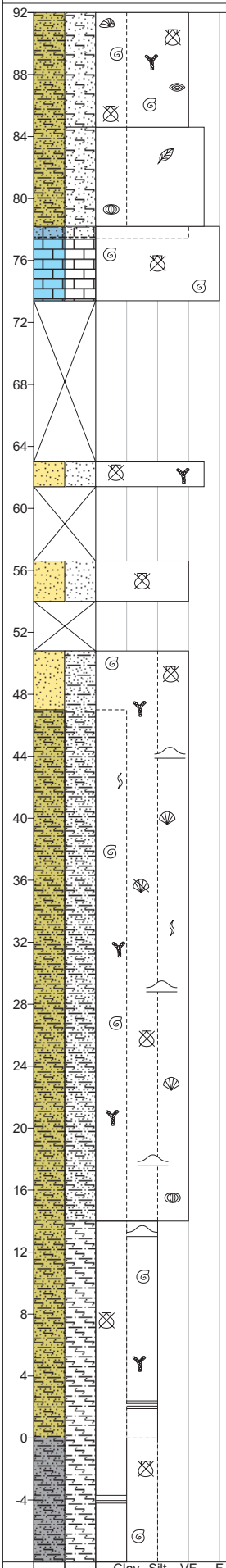
Sector: Western Jaca Basin	**Salinas de Jaca**	Page: 1 of 2
Dates Logged: 2-3/9/03		Logged By: Jamie Moss



Sector: Western Jaca Basin	**Salinas de Jaca**	Page: 2 of 2
Dates Logged: 2-3/9/03		Logged By: Jamie Moss



Sector: Western Jaca Basin	**Villalangua**	Page: 1 of 3
Date Logged: 3/9/03		Logged By: Jamie Moss



Well bedded

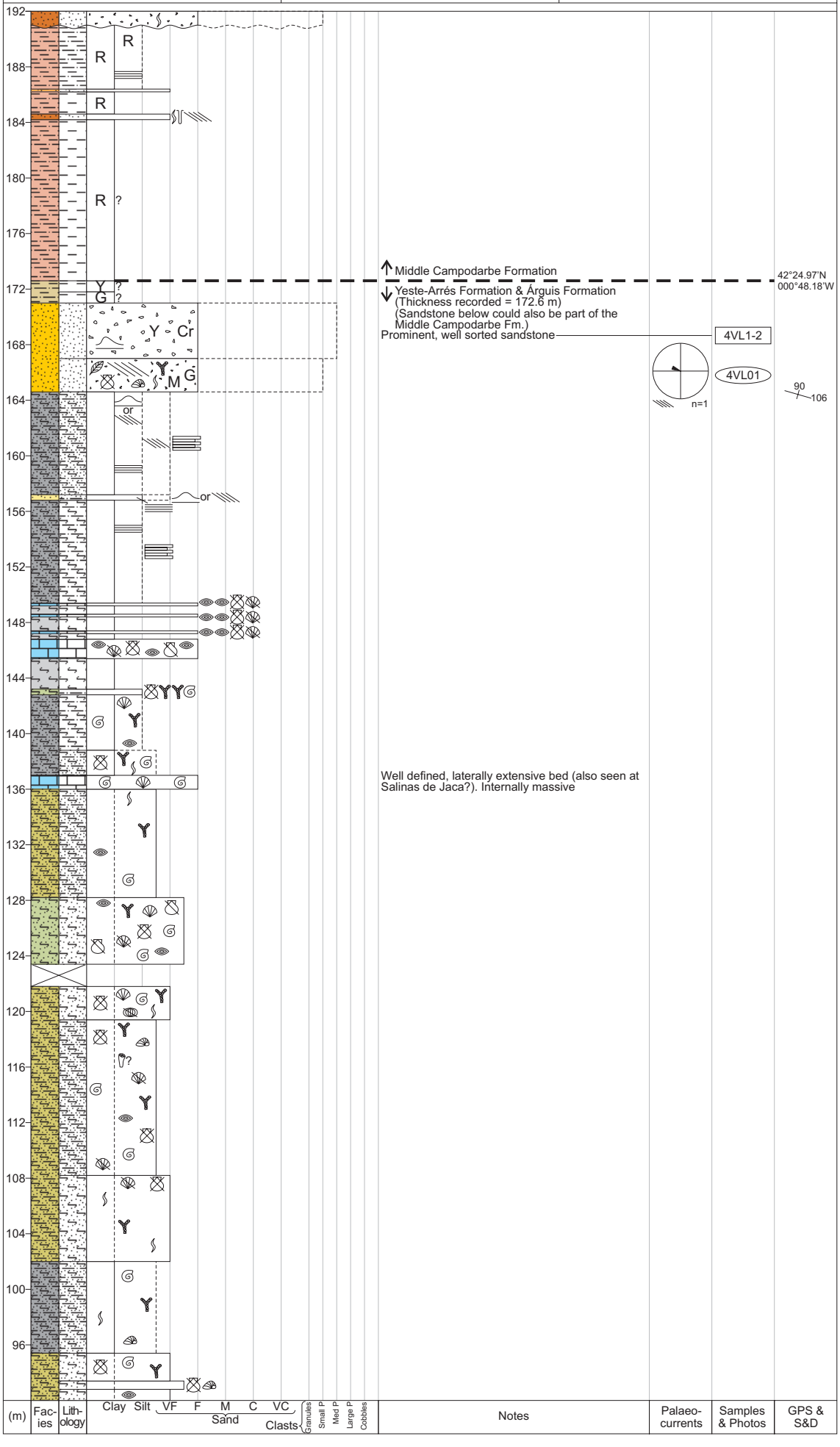
Gently rippled throughout, but with no obvious dominant palaeocurrent direction

Silty marls for many 10 m's, then no exposure

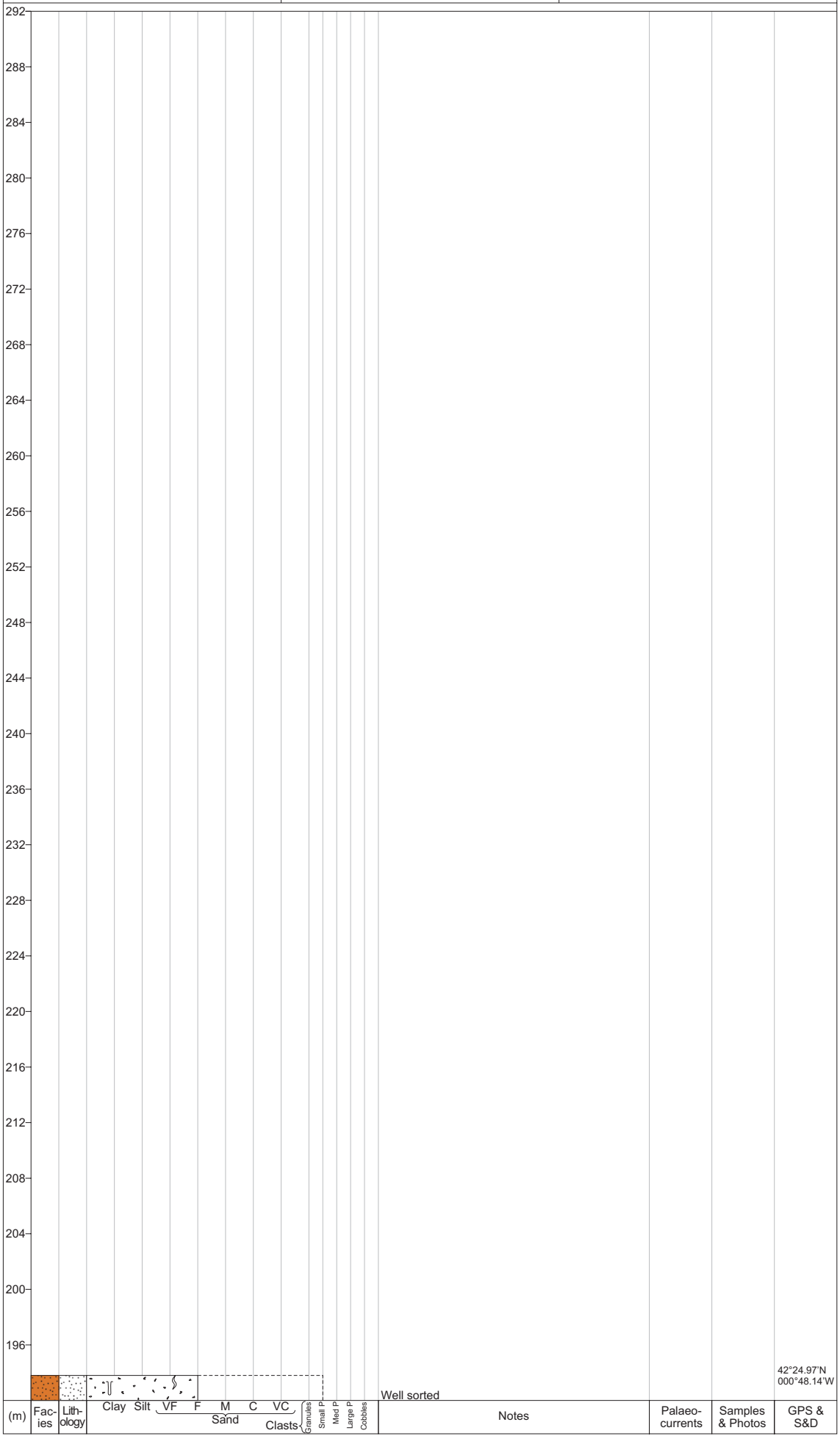
42°24.87'N
000°48.21'W

(m)	Facies	Lithology	Clay Silt VF F M C VC Sand Clasts Granules Small P Med P Large P Cobbles	Notes	Palaeocurrents	Samples & Photos	GPS & S&D

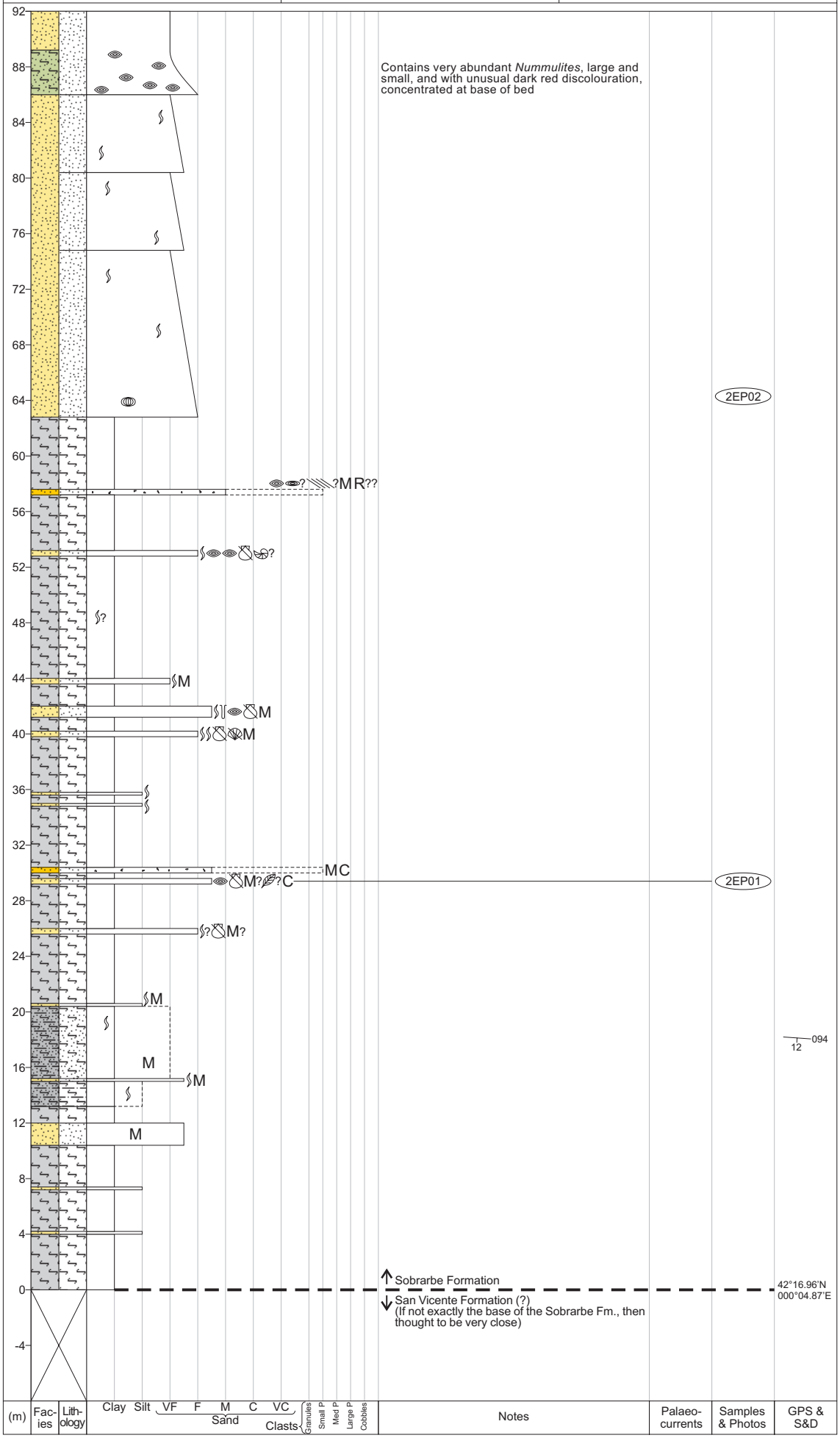
Sector: Western Jaca Basin	**Villalangua**	Page: 2 of 3
Date Logged: 3/9/03		Logged By: Jamie Moss



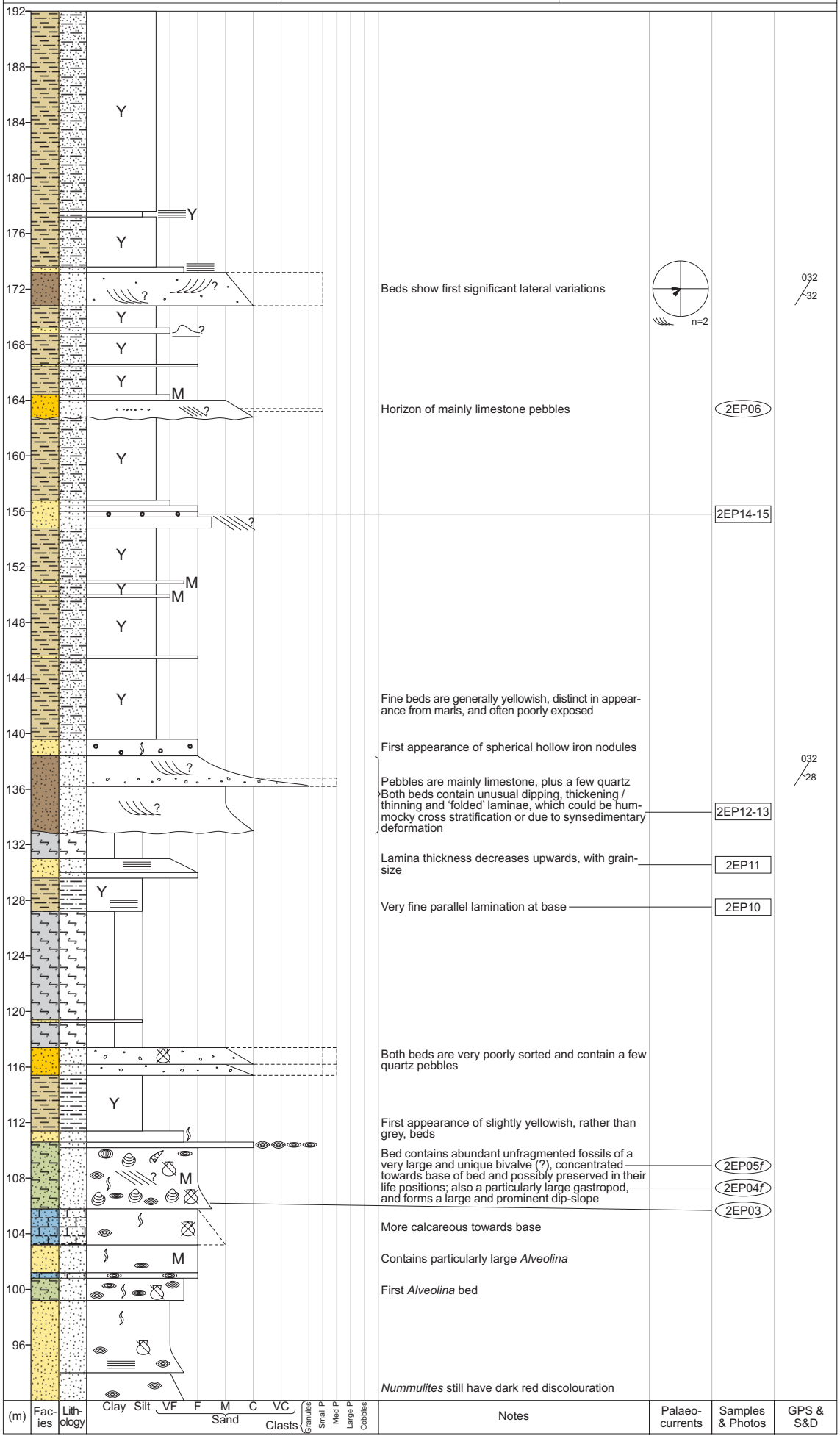
Sector: Western Jaca Basin	**Villalangua**	Page: 3 of 3
Date Logged: 3/9/03		Logged By: Jamie Moss



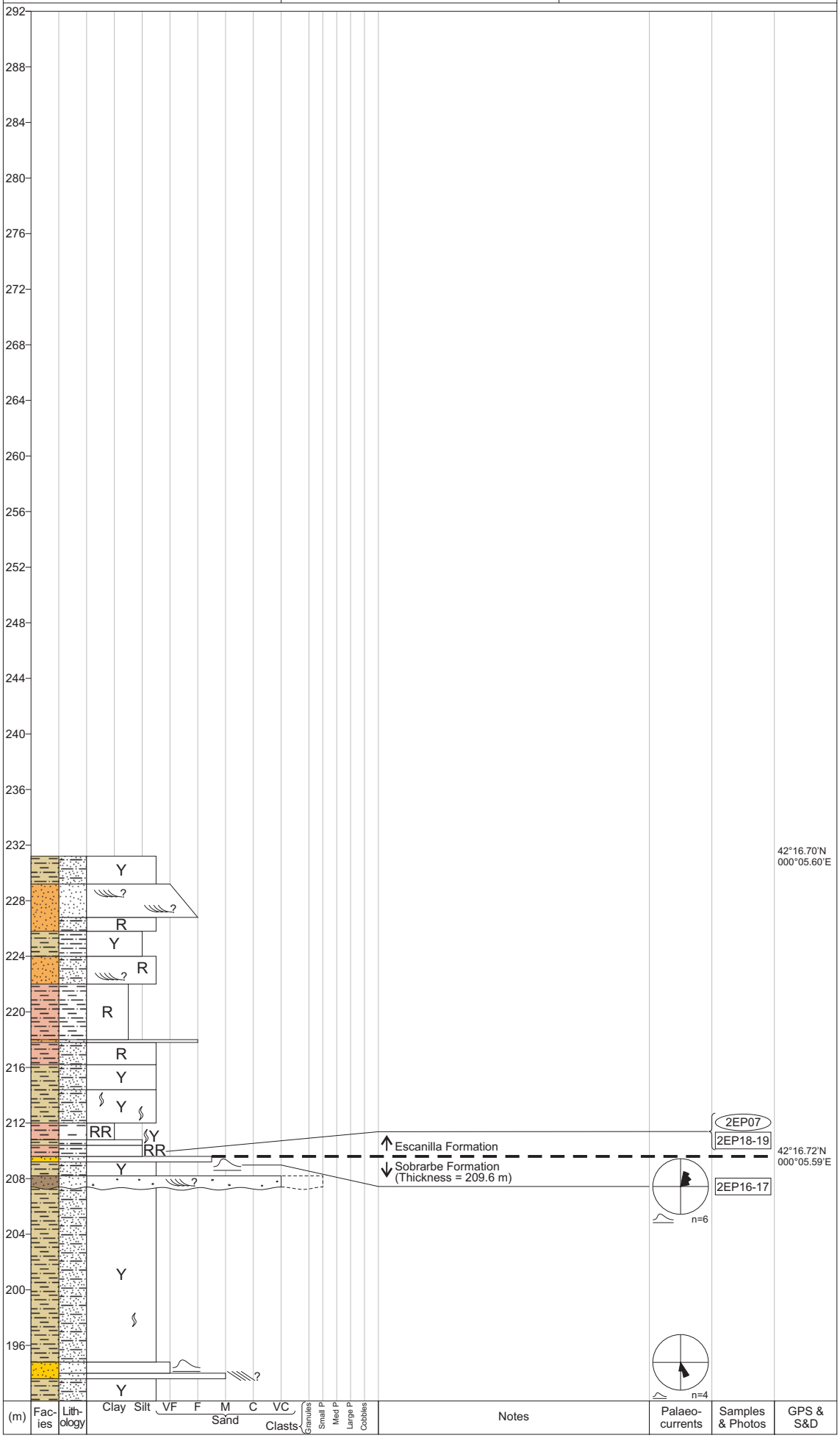
Sector: SE Jaca Basin	**Eripol**	Page: 1 of 3
Date Logged: 9/6/02		Logged By: Jamie Moss



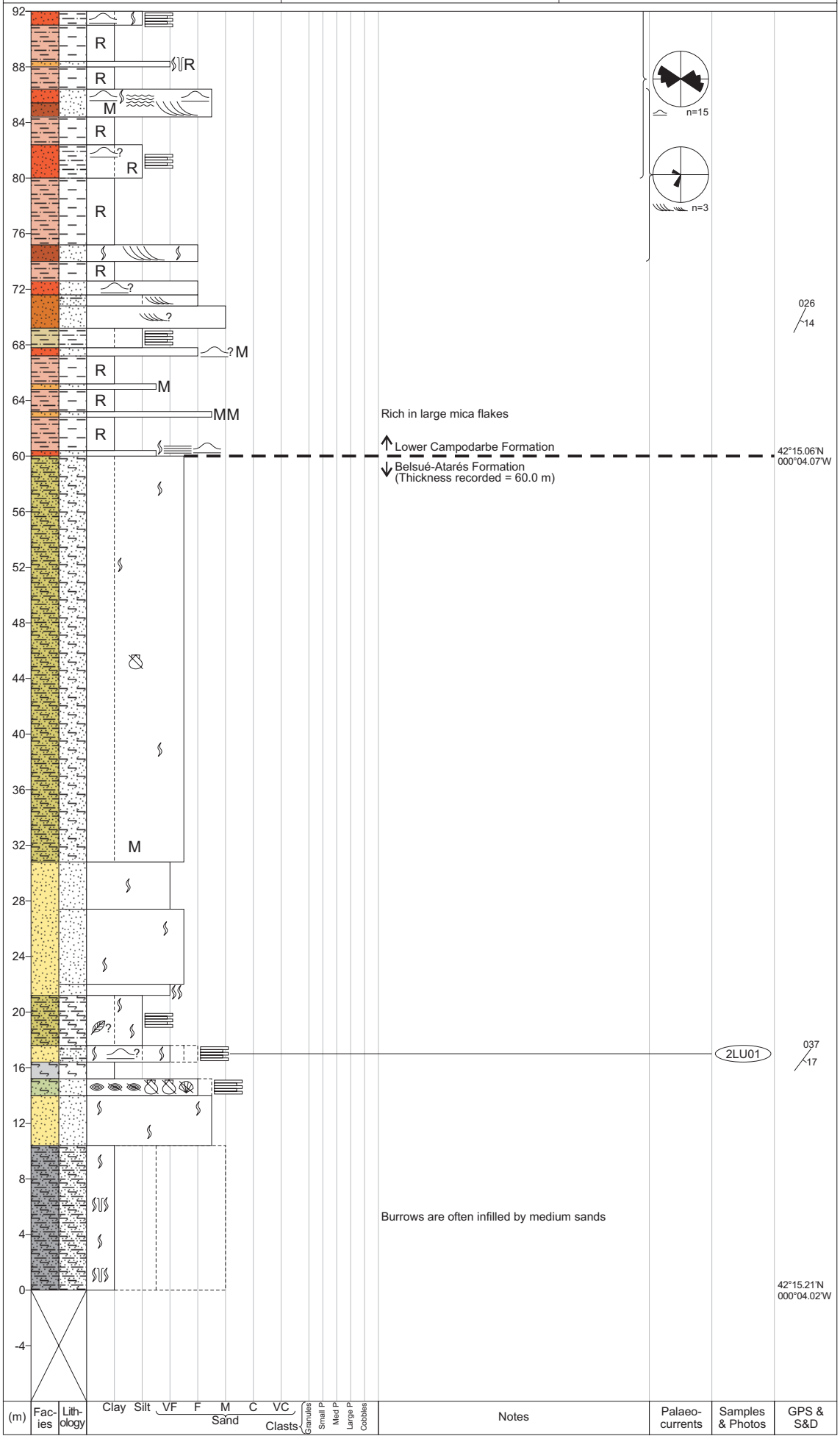
Sector: SE Jaca Basin	**Eripol**	Page: 2 of 3
Date Logged: 9/6/02		Logged By: Jamie Moss



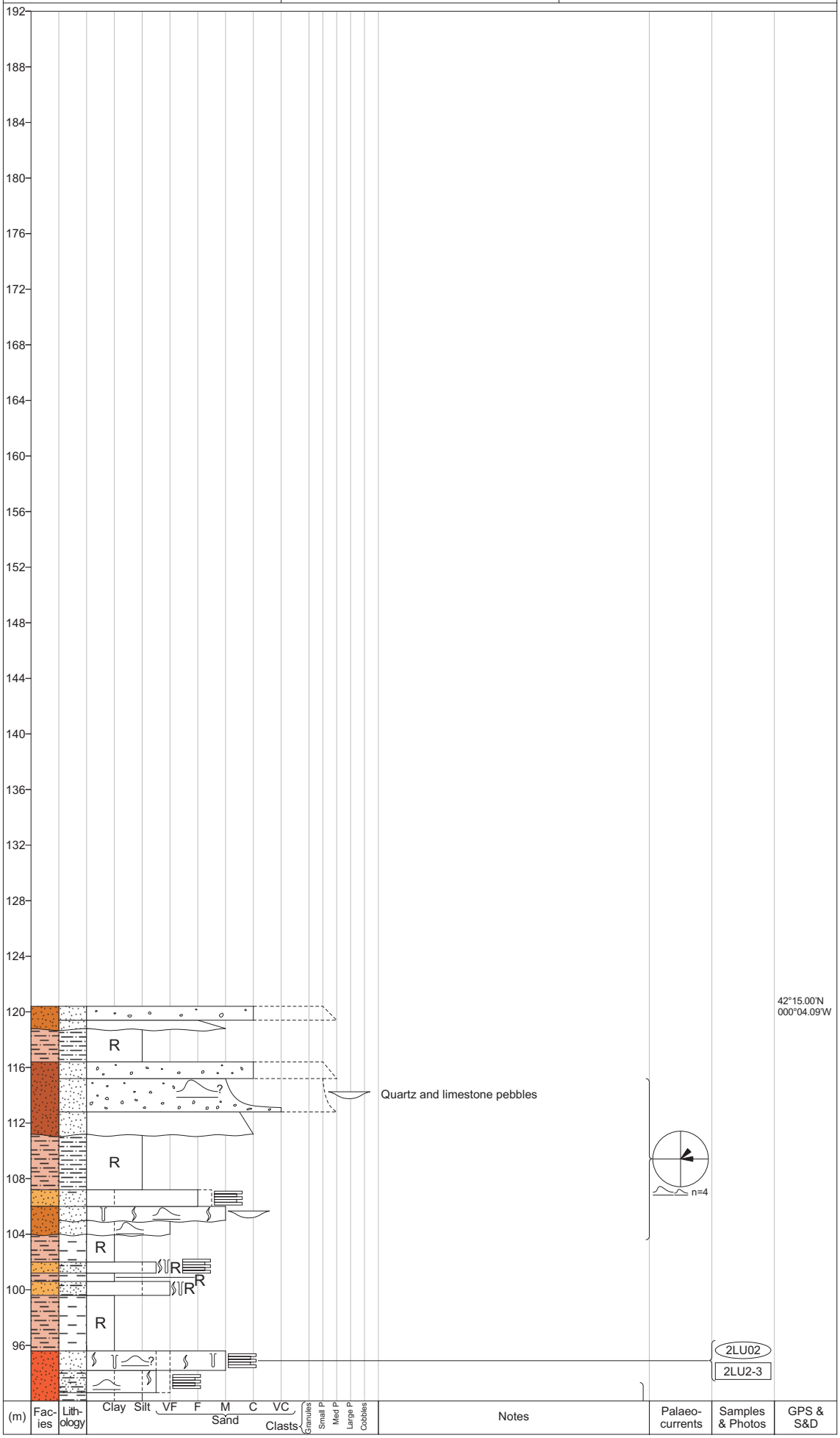
Sector: SE Jaca Basin	**Eripol**	Page: 3 of 3
Date Logged: 9/6/02		Logged By: Jamie Moss



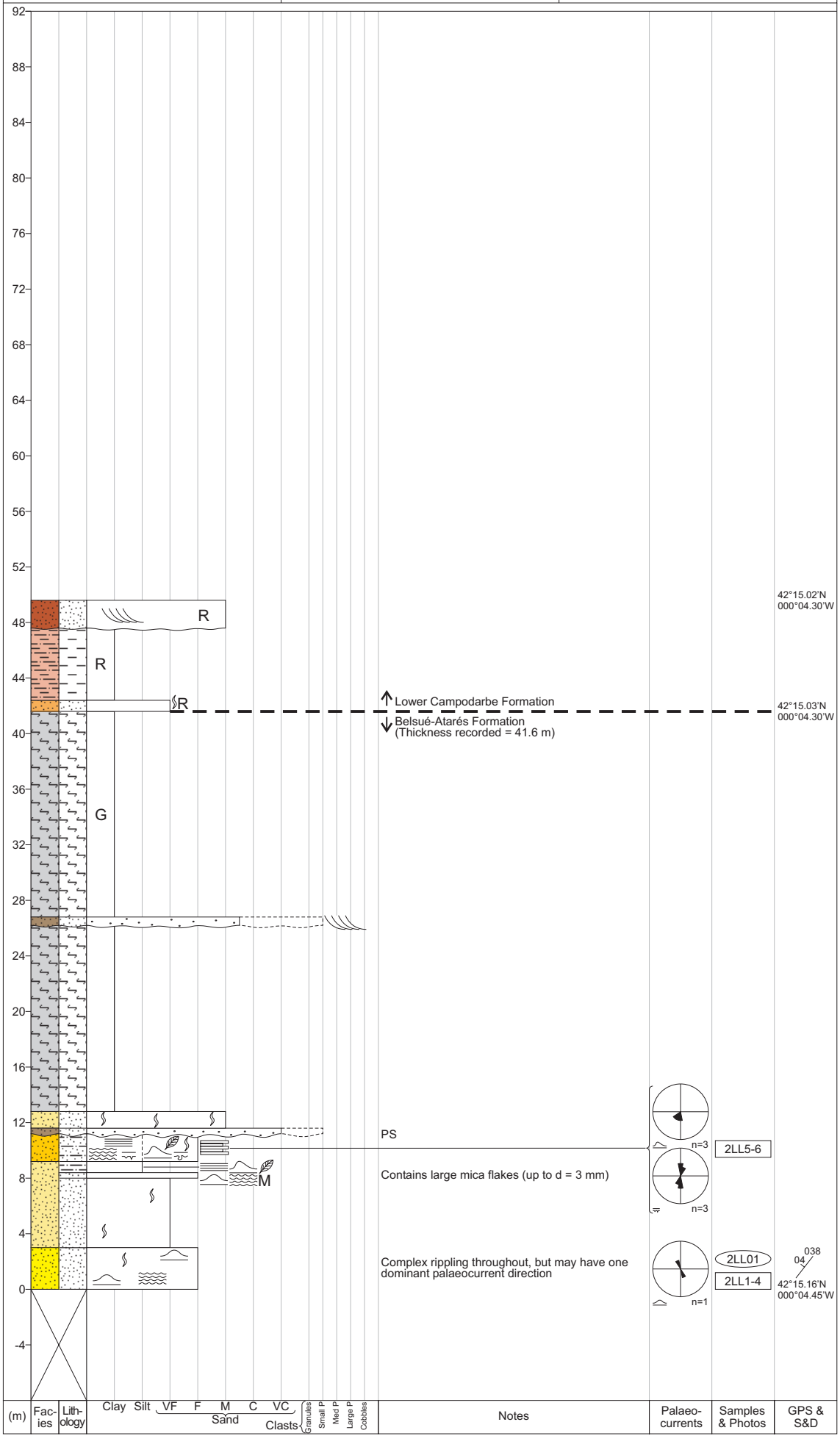
Sector: SE Jaca Basin	**Las Almunias (Upper)**	Page: 1 of 2
Date Logged: 6/6/02		Logged By: Jamie Moss



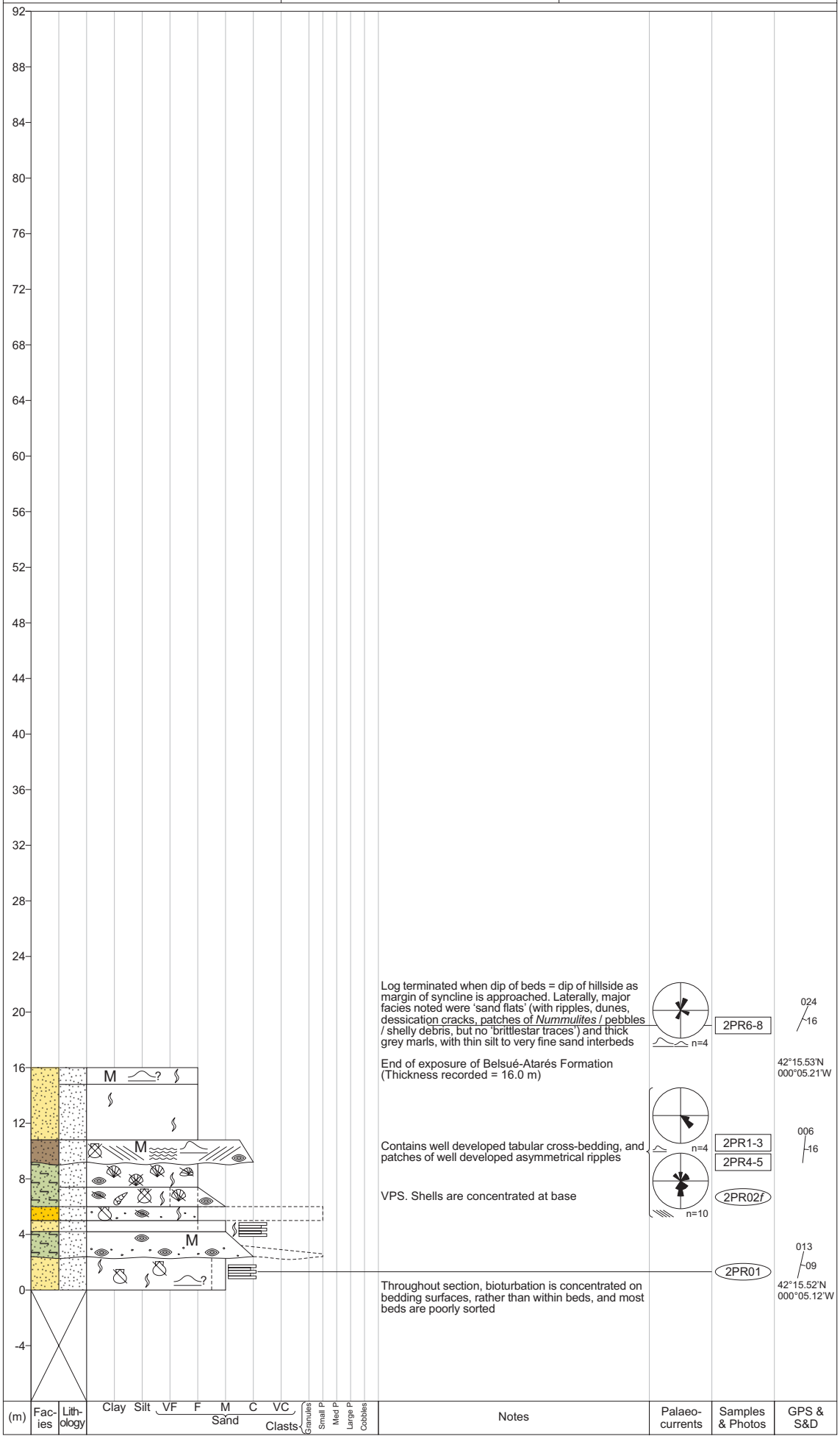
Sector: SE Jaca Basin	**Las Aluminas (Upper)**	Page: 2 of 2
Date Logged: 6/6/02		Logged By: Jamie Moss



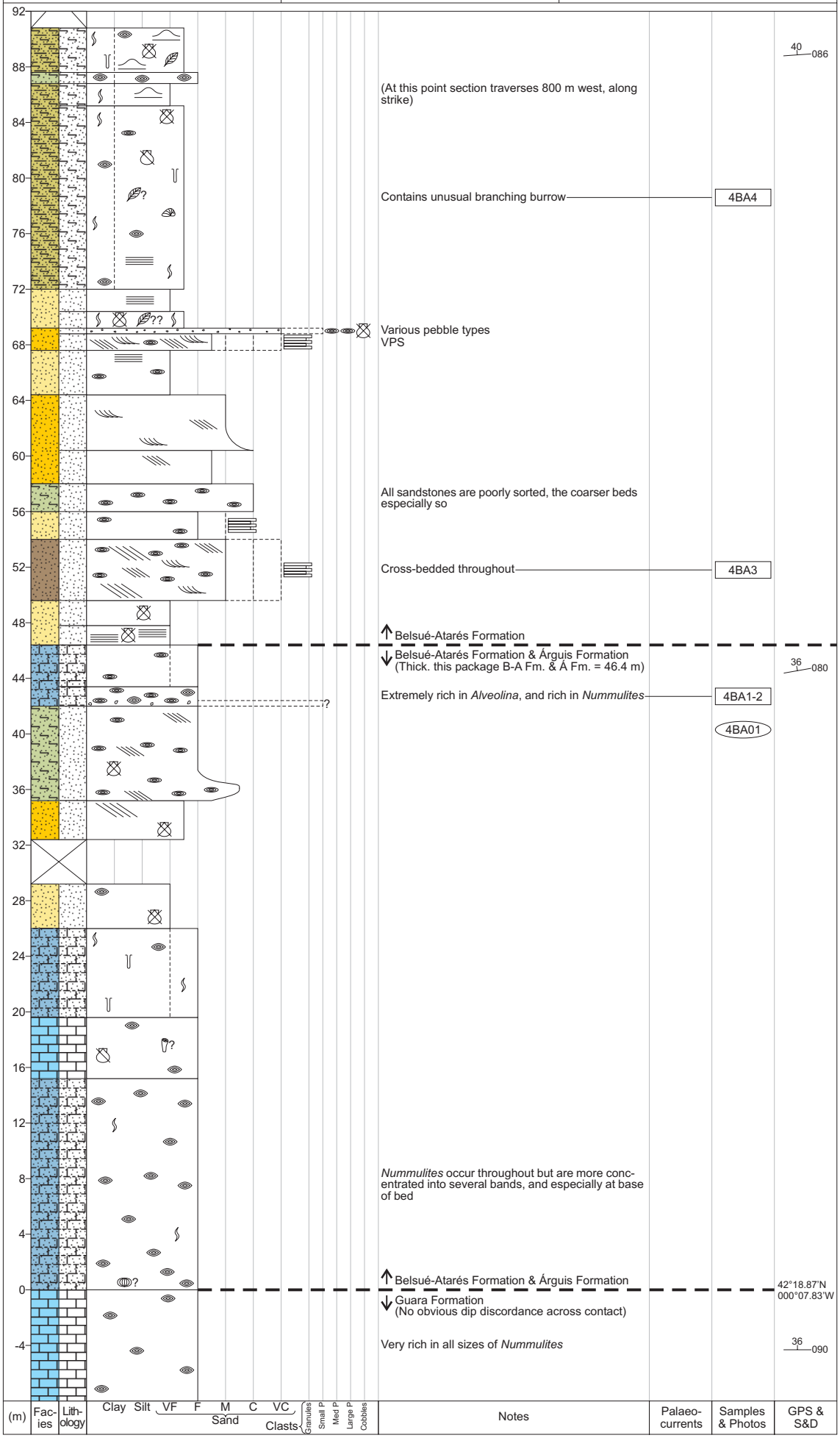
Sector: SE Jaca Basin	**Las Almunias (Lower)**	Page: 1 of 1
Dates Logged: 7/6/02		Logged By: Jamie Moss



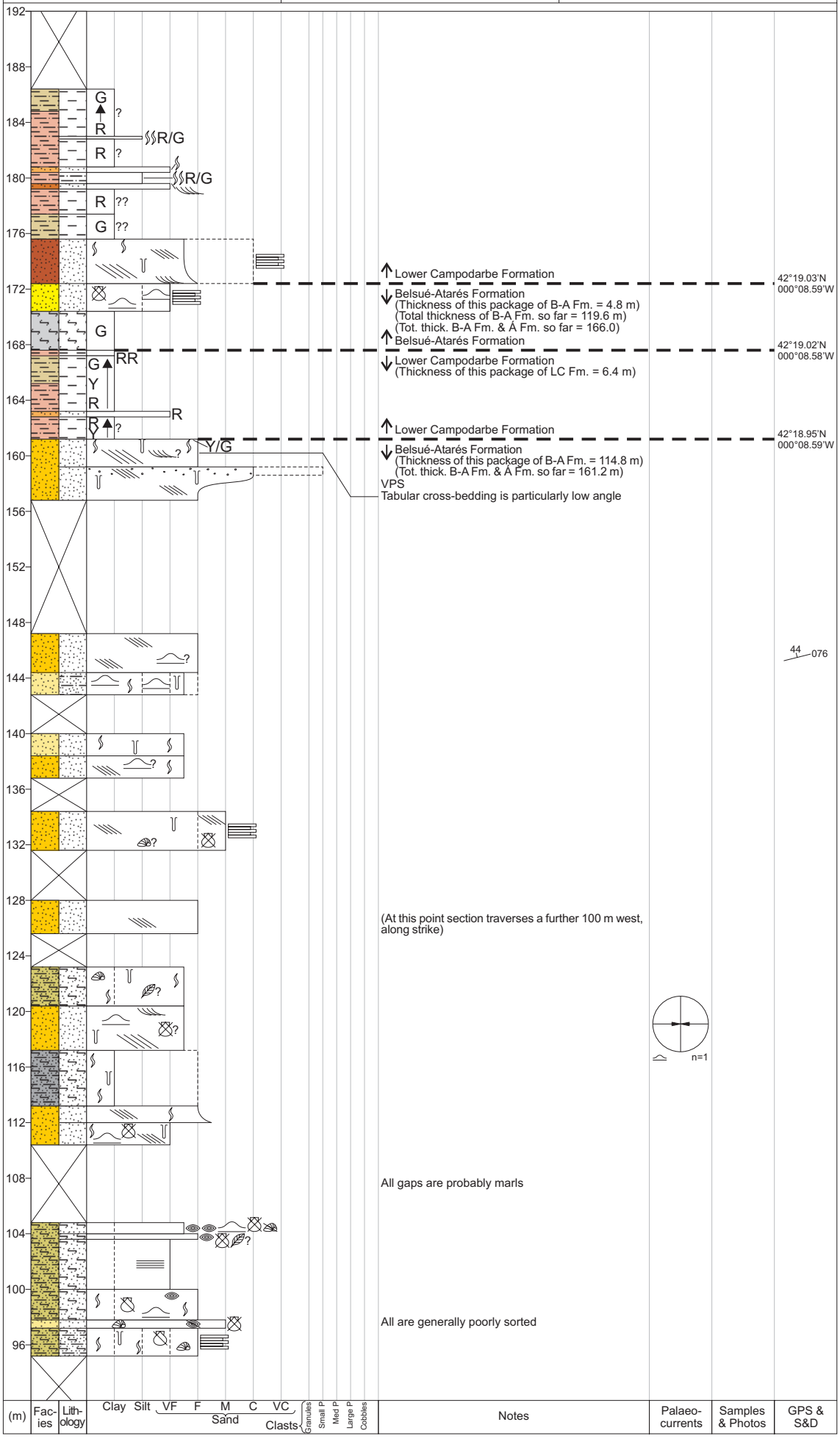
Sector: SE Jaca Basin	**Pedruel**	Page: 1 of 1
Date Logged: 10/6/02		Logged By: Jamie Moss



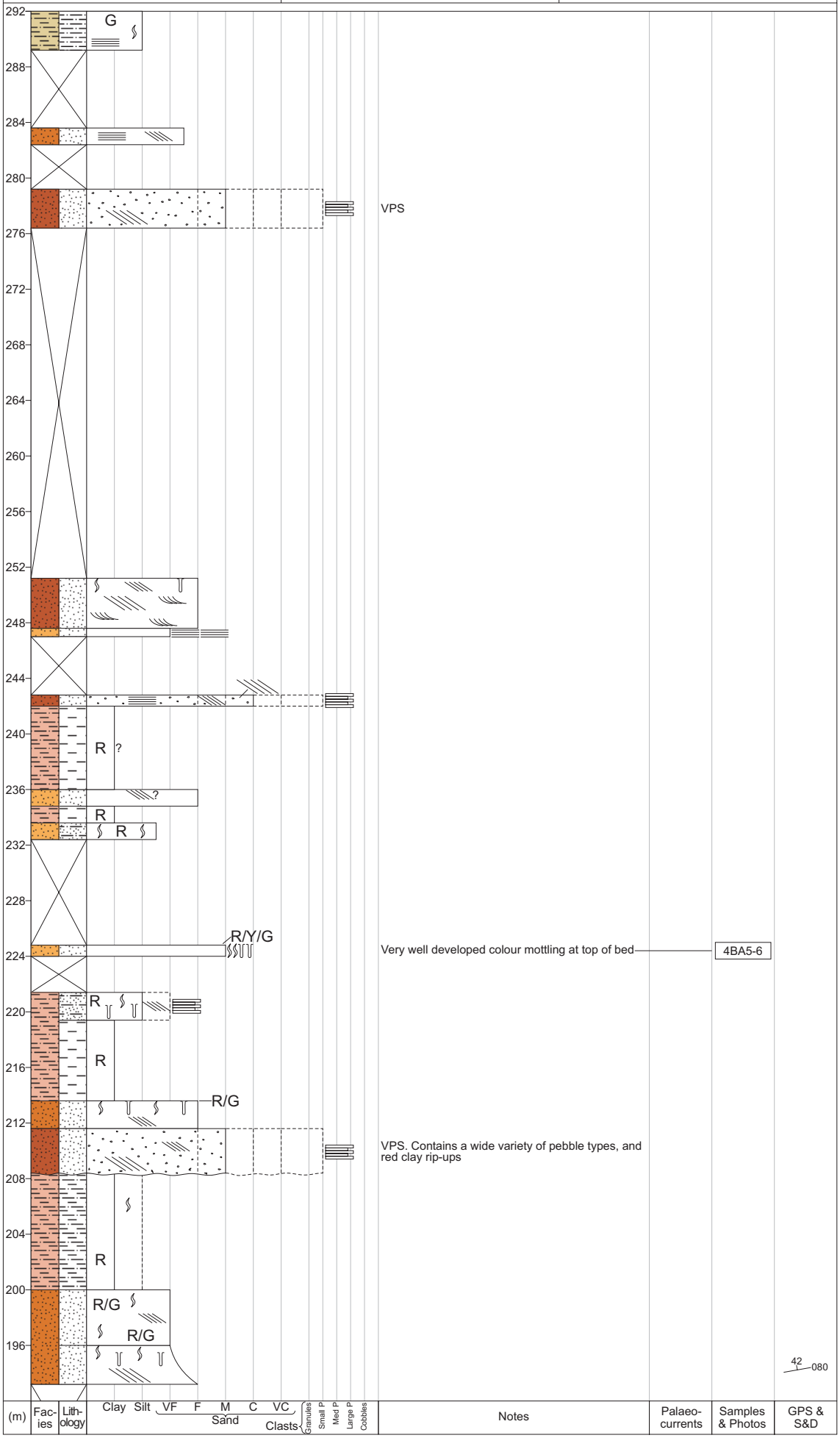
Sector: SE Jaca Basin	**Bara**	Page: 1 of 7
Dates Logged: 6-7/9/03		Logged By: Jamie Moss



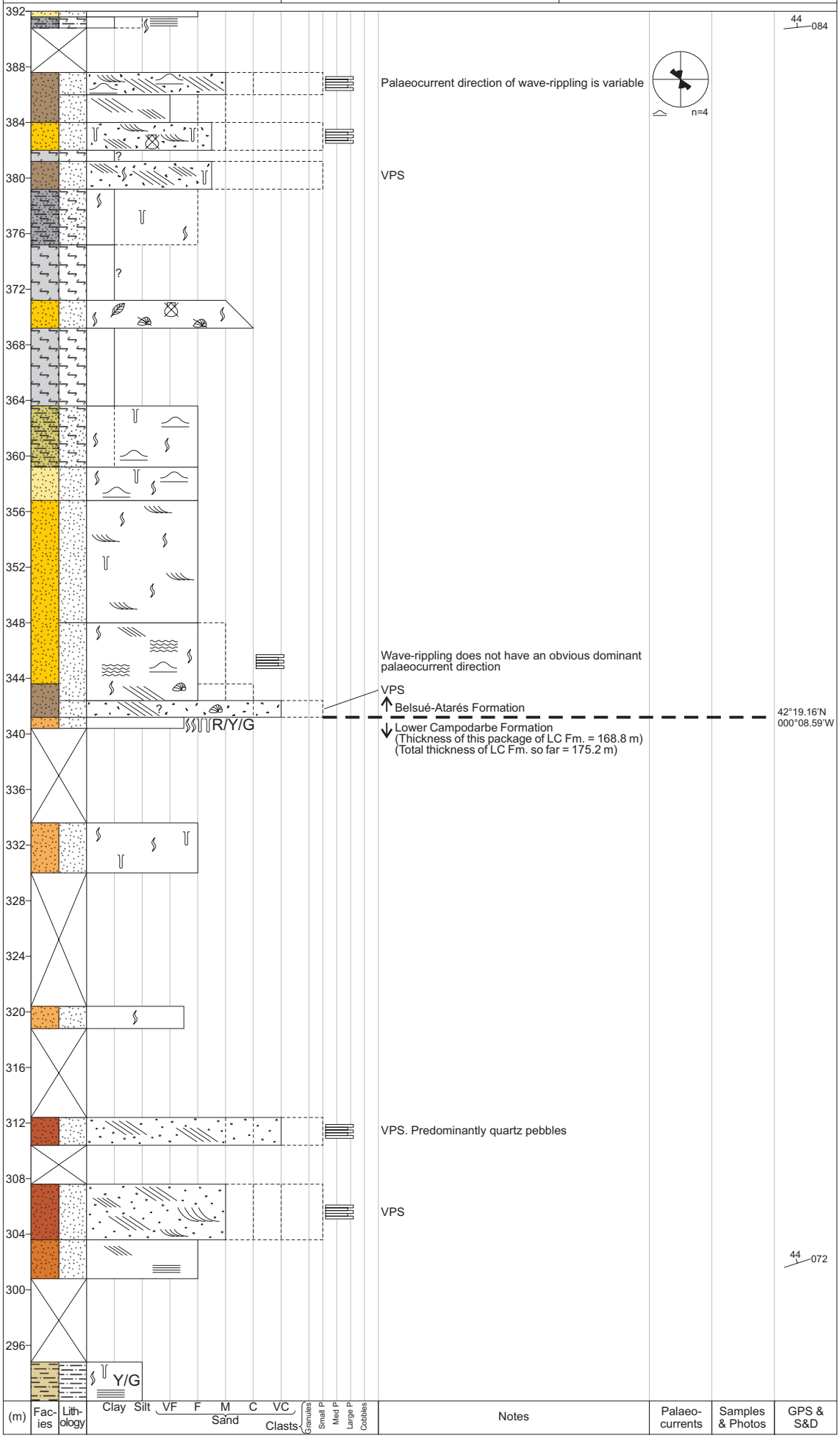
Sector: SE Jaca Basin	**Bara**	Page: 2 of 7
Dates Logged: 6-7/9/03		Logged By: Jamie Moss



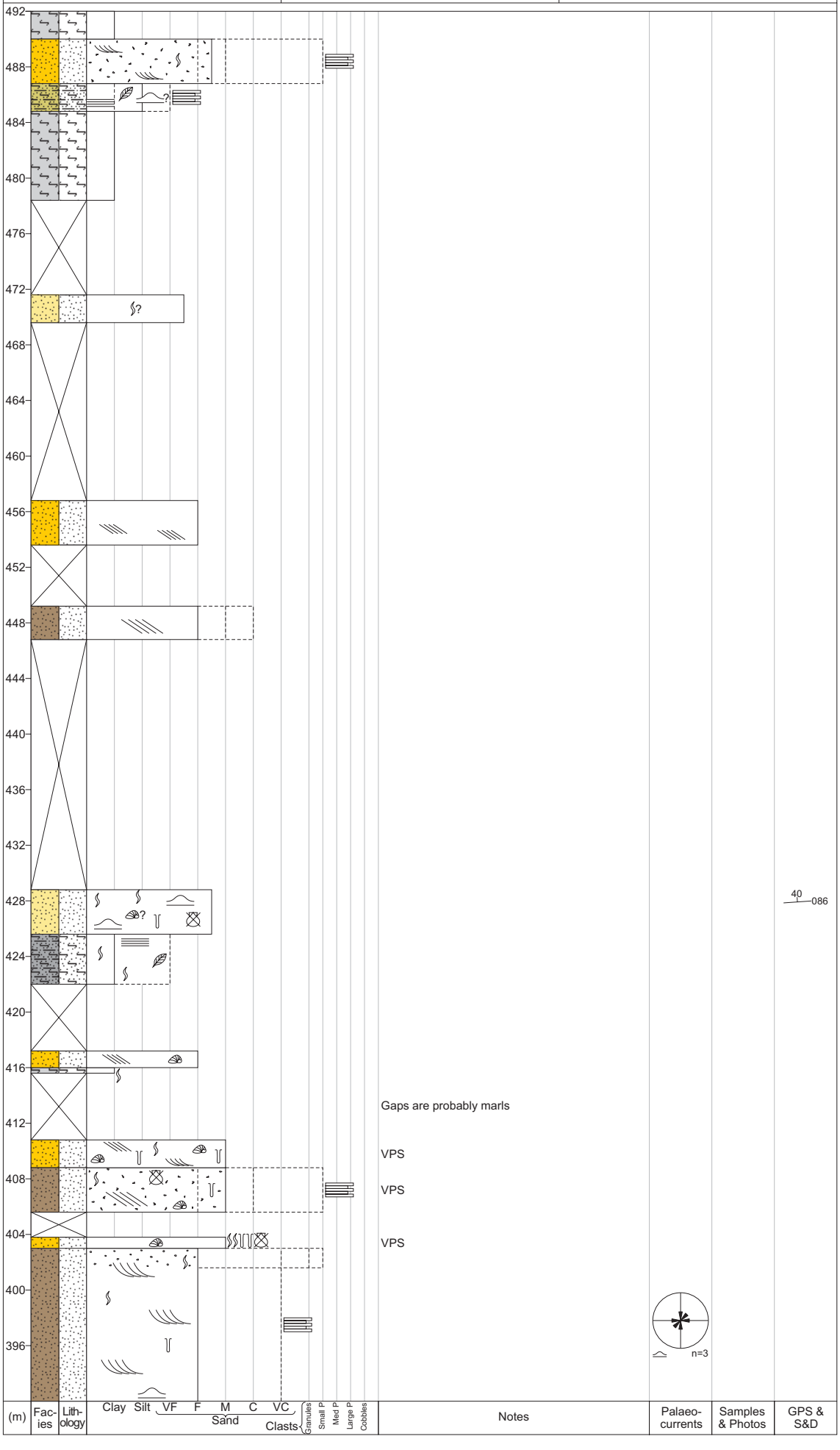
Sector: SE Jaca Basin	**Bara**	Page: 3 of 7
Dates Logged: 6-7/9/03		Logged By: Jamie Moss



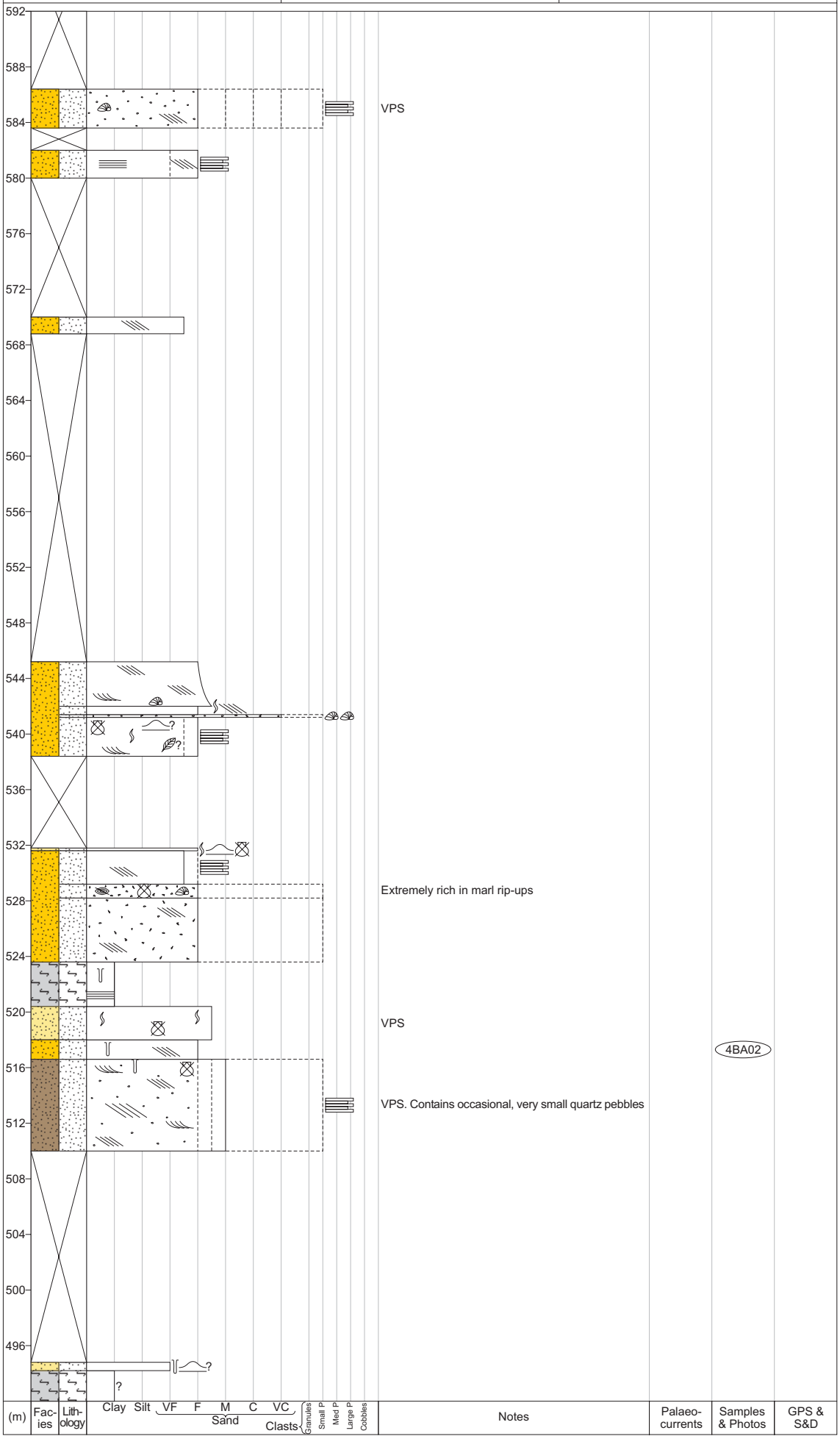
Sector: SE Jaca Basin	**Bara**	Page: 4 of 7
Dates Logged: 6-7/9/03		Logged By: Jamie Moss



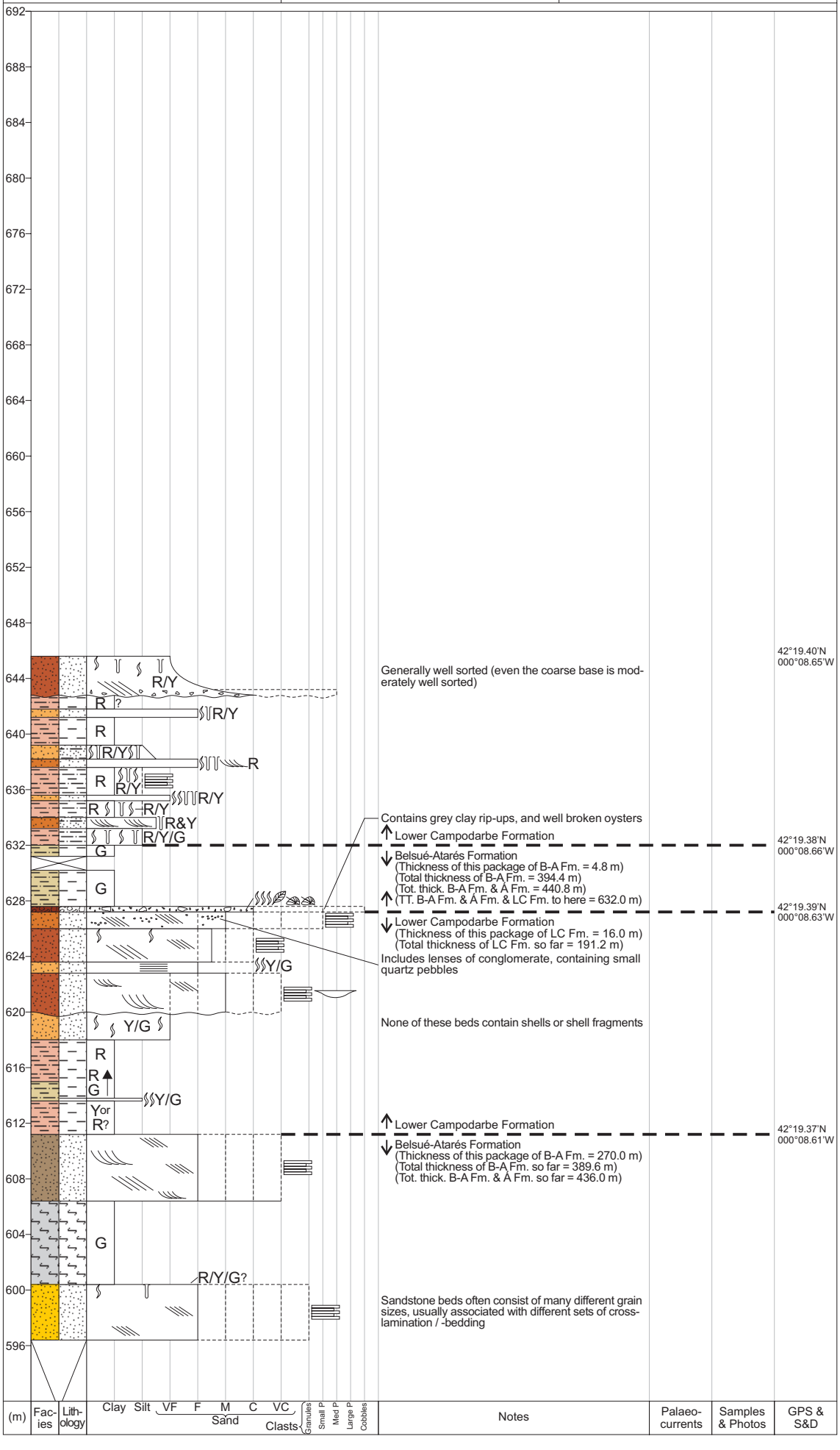
Sector: SE Jaca Basin	**Bara**	Page: 5 of 7
Dates Logged: 6-7/9/03		Logged By: Jamie Moss



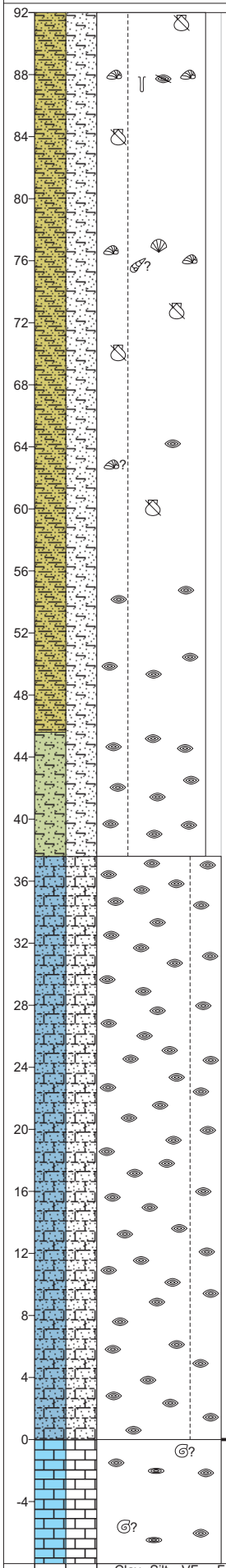
Sector: SE Jaca Basin	**Bara**	Page: 6 of 7
Dates Logged: 6-7/9/03		Logged By: Jamie Moss



Sector: SE Jaca Basin	**Bara**	Page: 7 of 7
Dates Logged: 6-7/9/03		Logged By: Jamie Moss



Sector: SE Jaca Basin	**Nocito**	Page: 1 of 12
Dates Logged: 8-10/9/03		Logged By: Jamie Moss



Oyster horizon

Nummulites are concentrated into bands, and are generally far fewer in number. Very little lime content

Very rich in *Nummulites* of all sizes, including some particularly large ones. High lime content

↑ Belsué-Atarés Formation & Árguis Formation

↓ Guara Formation

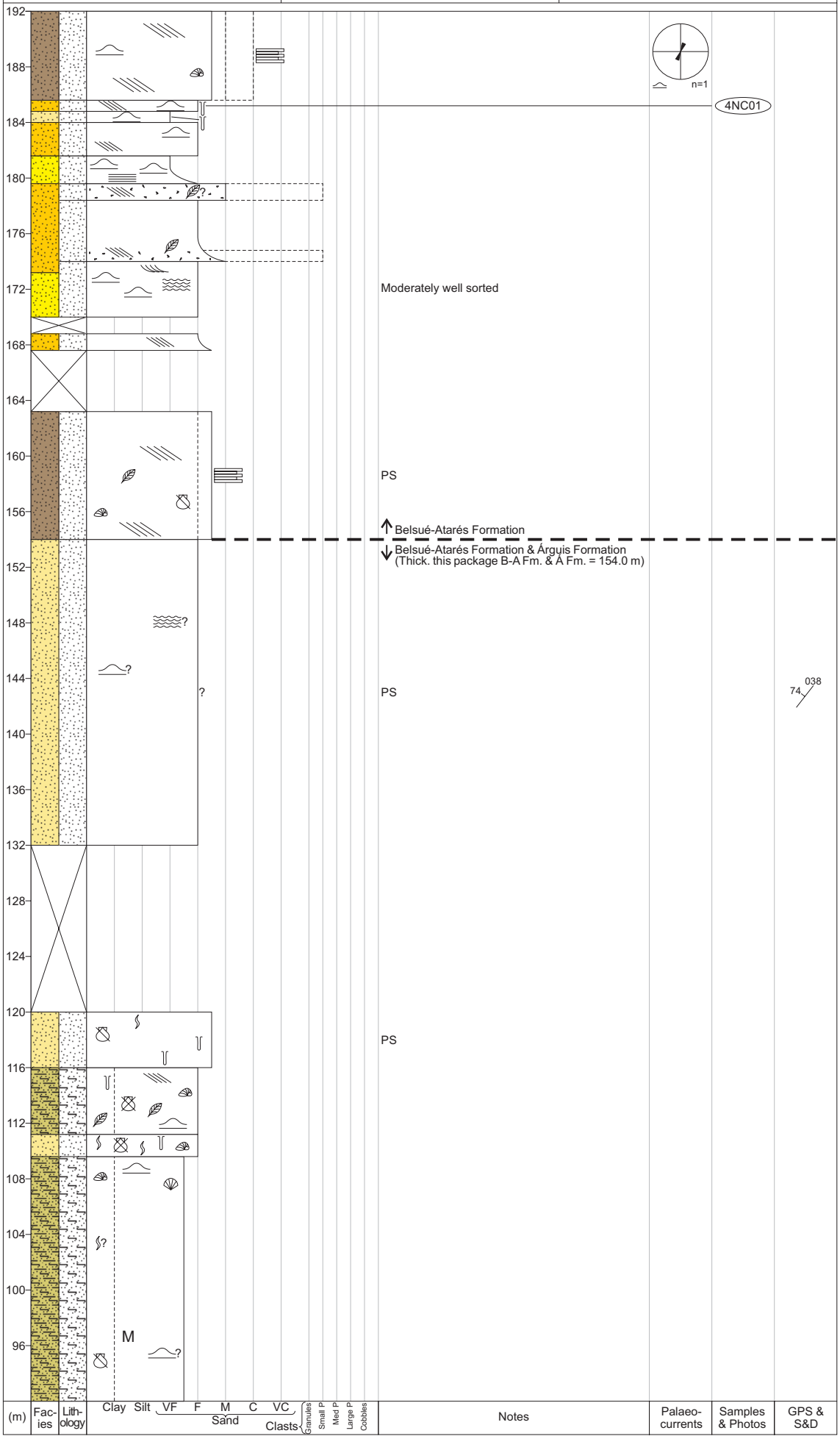
42°18.18'N
000°15.07'W

Bedded micrite. *Nummulites* and *Alveolina* are concentrated into horizons

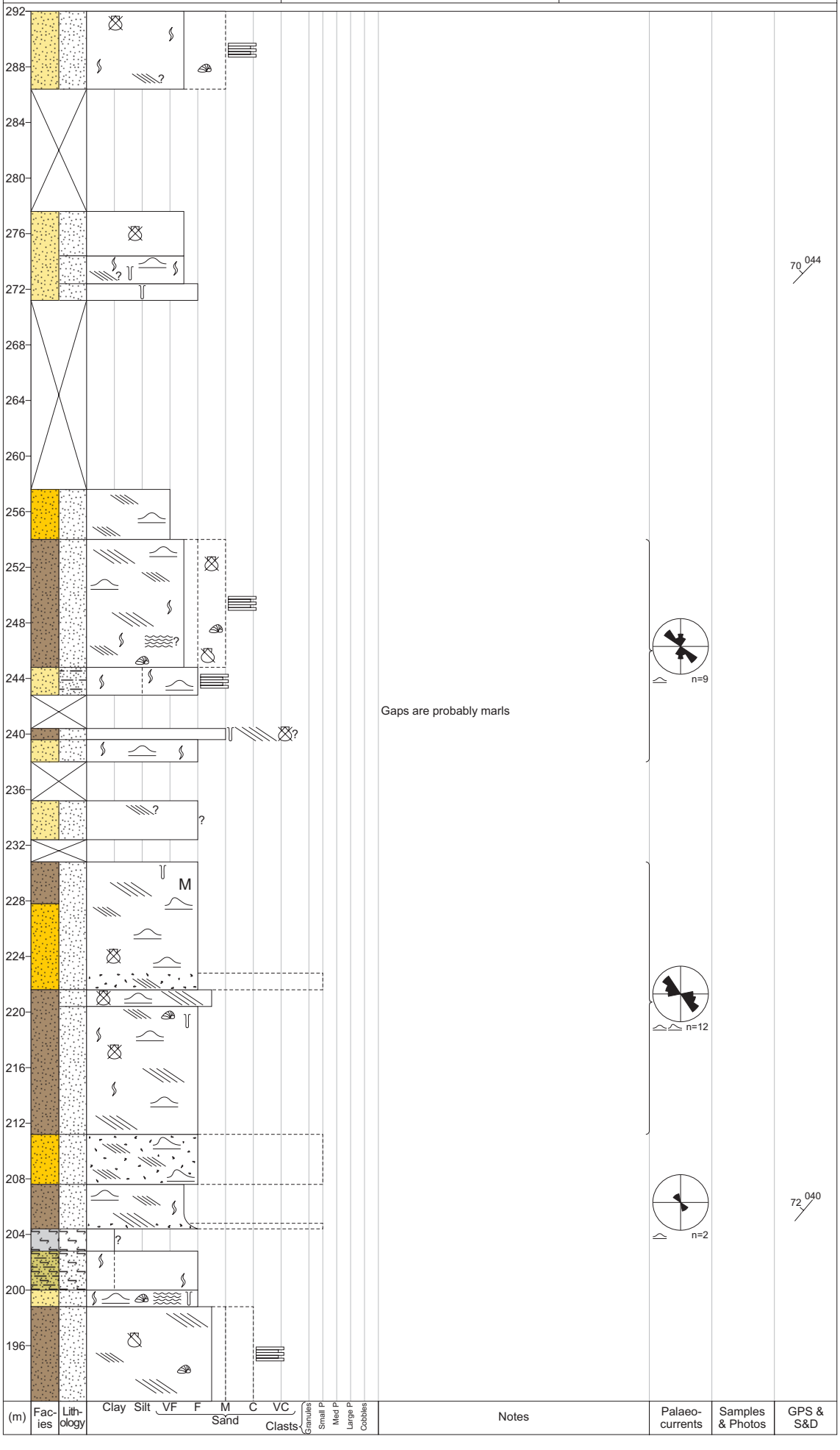
034
90 ?

(m)	Facies	Lithology	Clay	Silt	VF	F	M	C	VC	Sand	Clasts	Granules	Small P	Med P	Large P	Cobbles	Notes	Palaeo-currents	Samples & Photos	GPS & S&D

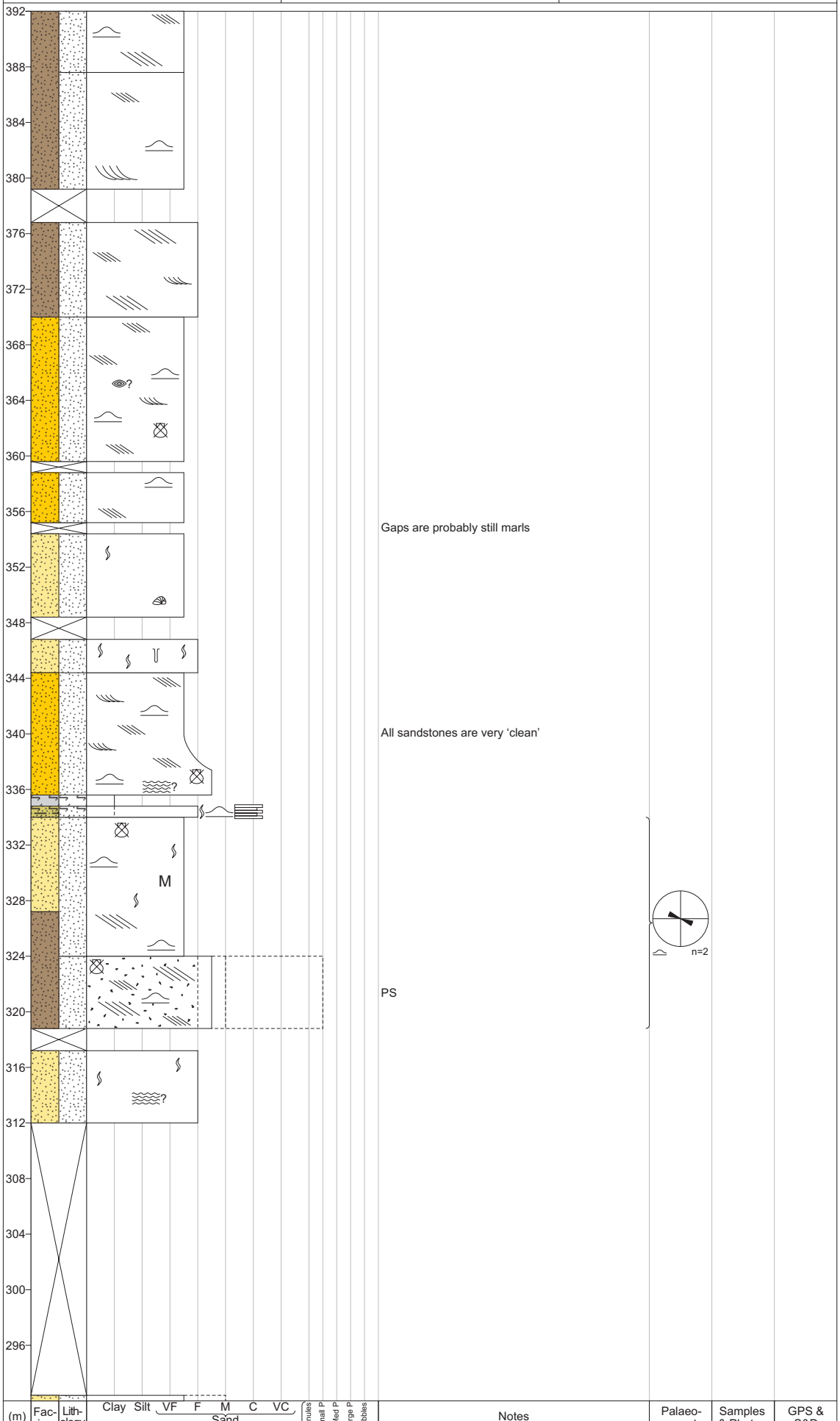
Sector: SE Jaca Basin	**Nocito**	Page: 2 of 12
Dates Logged: 8-10/9/03		Logged By: Jamie Moss



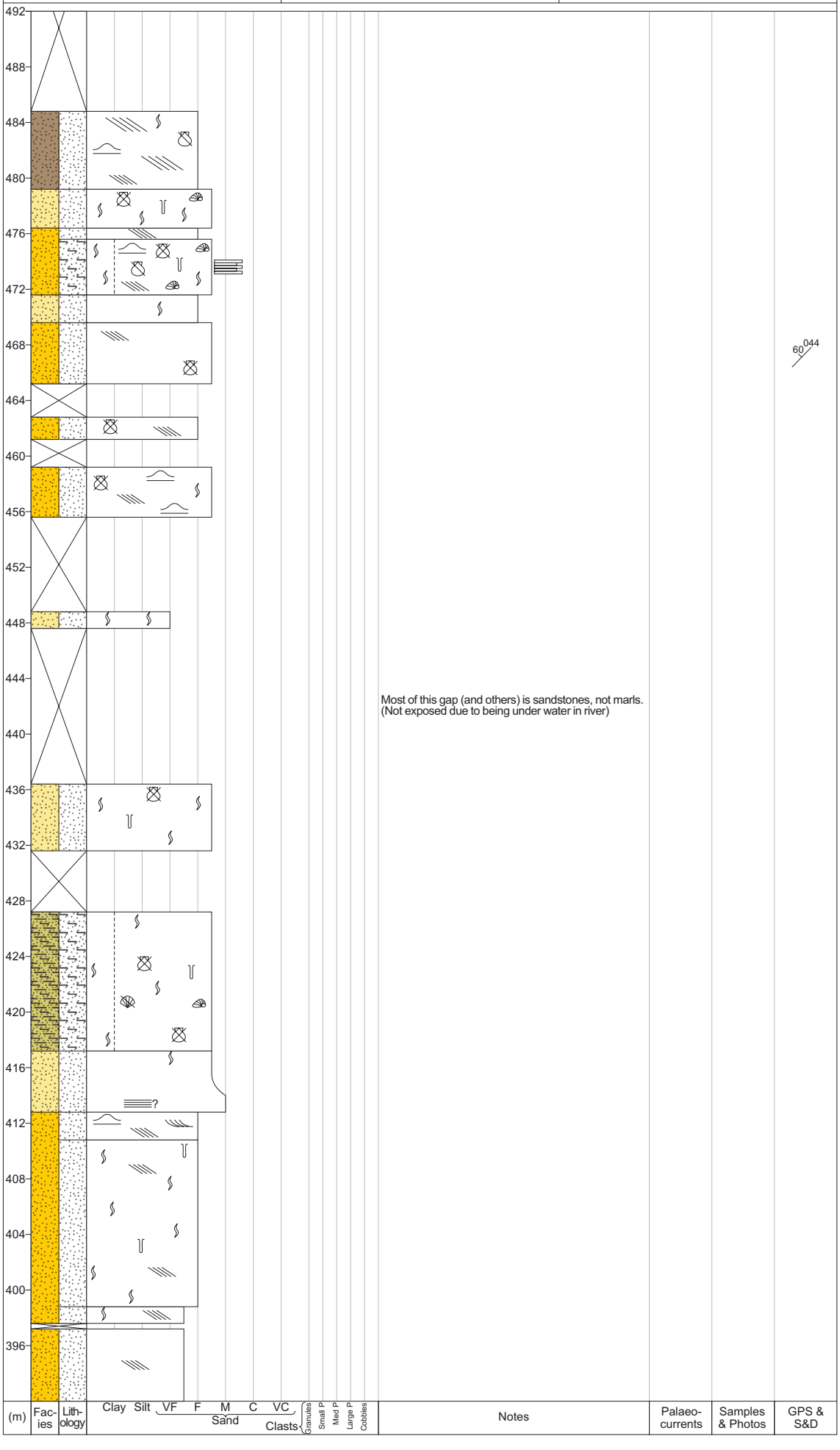
Sector: SE Jaca Basin	**Nocito**	Page: 3 of 12
Dates Logged: 8-10/9/03		Logged By: Jamie Moss



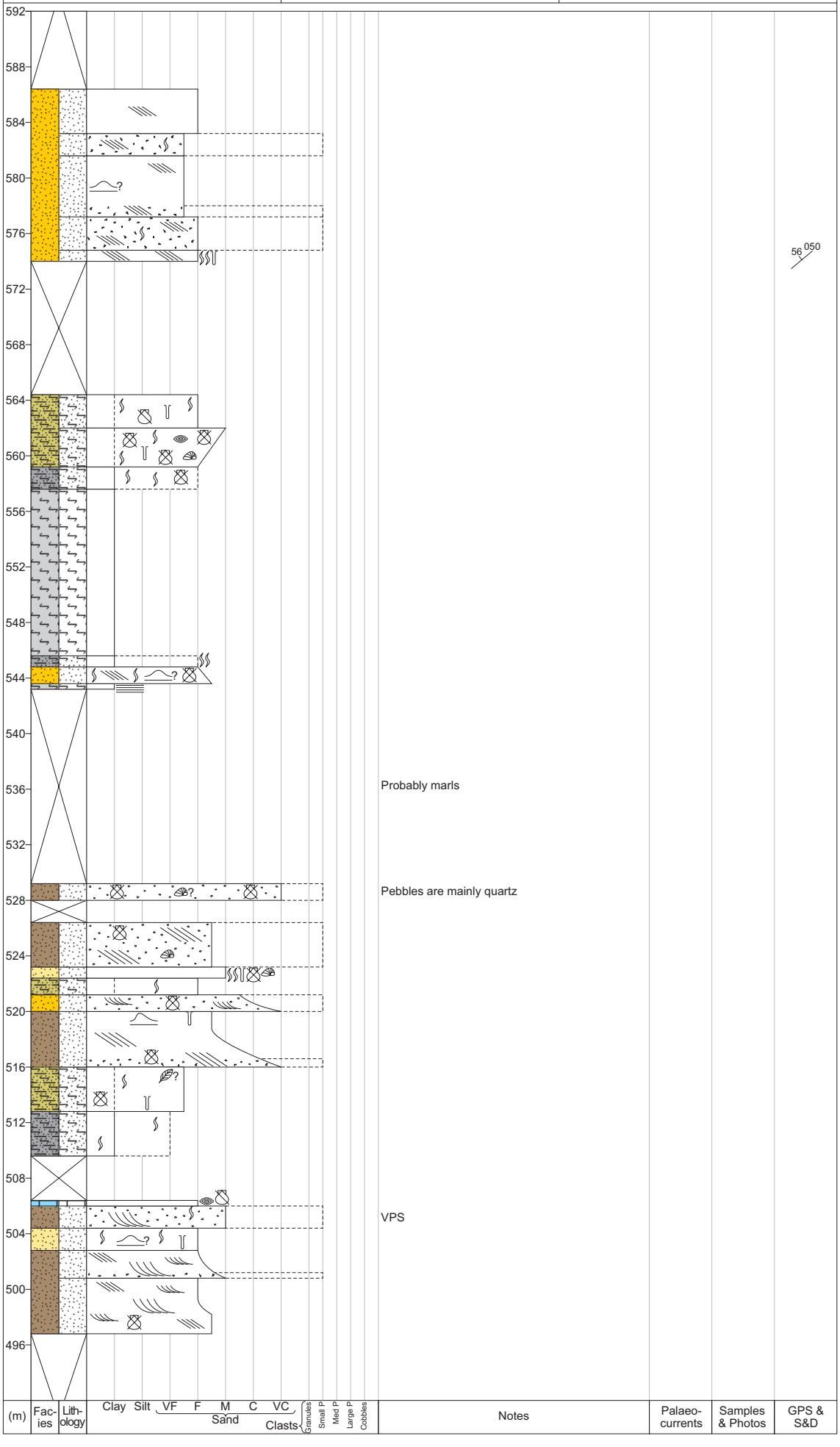
Sector: SE Jaca Basin	**Nocito**	Page: 4 of 12
Dates Logged: 8-10/9/03		Logged By: Jamie Moss



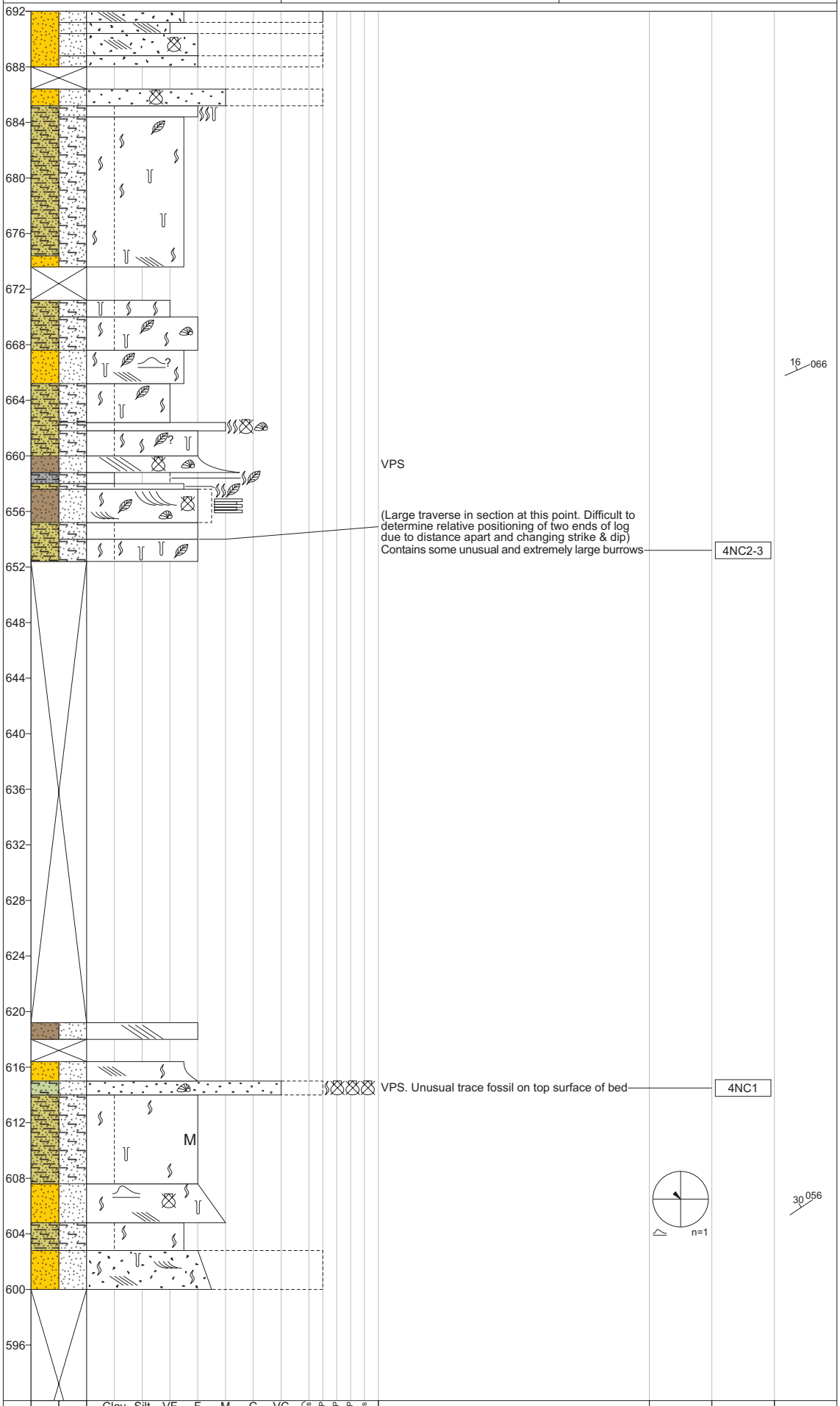
Sector: SE Jaca Basin	**Nocito**	Page: 5 of 12
Dates Logged: 8-10/9/03		Logged By: Jamie Moss



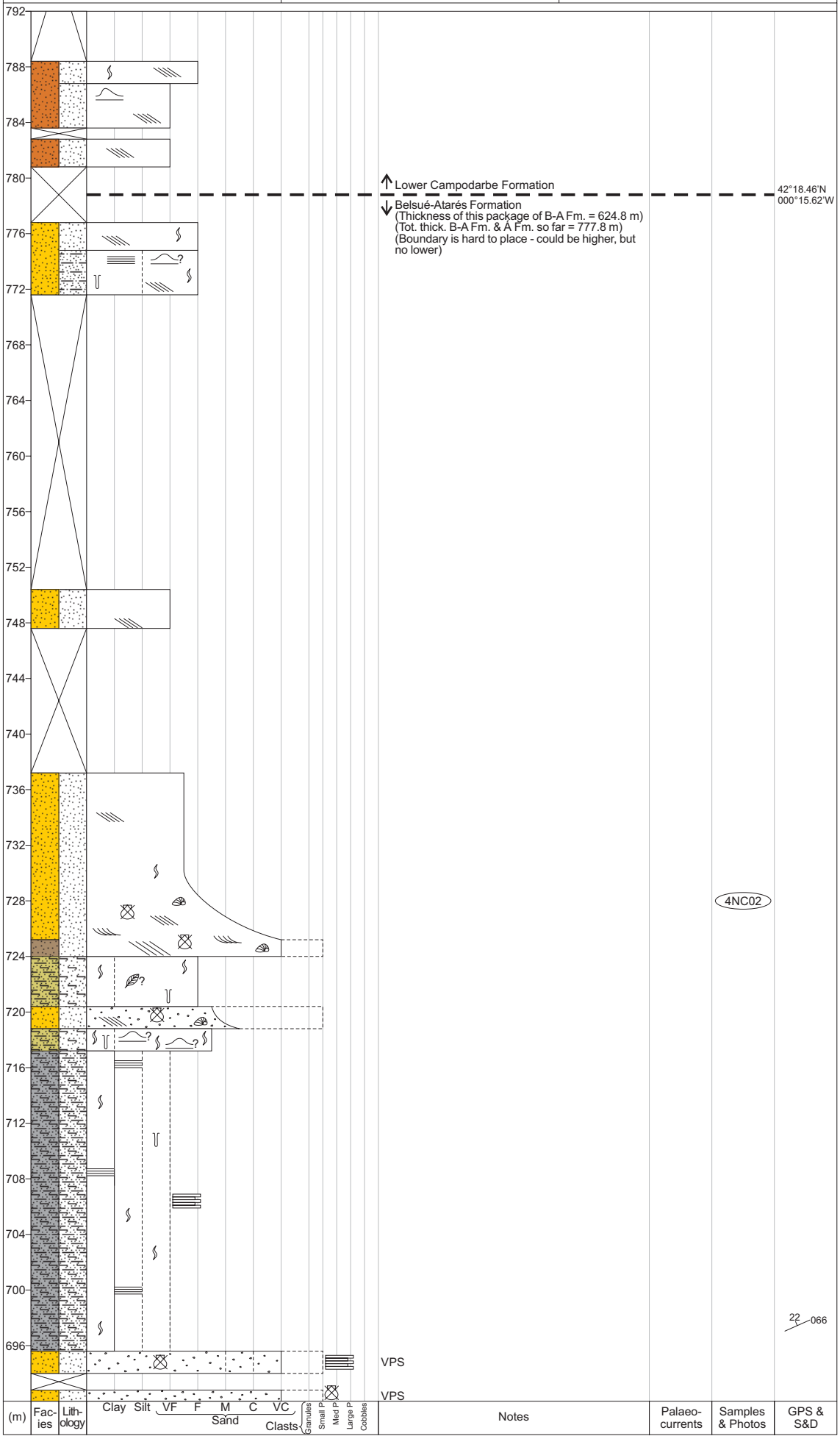
Sector: SE Jaca Basin	**Nocito**	Page: 6 of 12
Dates Logged: 8-10/9/03		Logged By: Jamie Moss



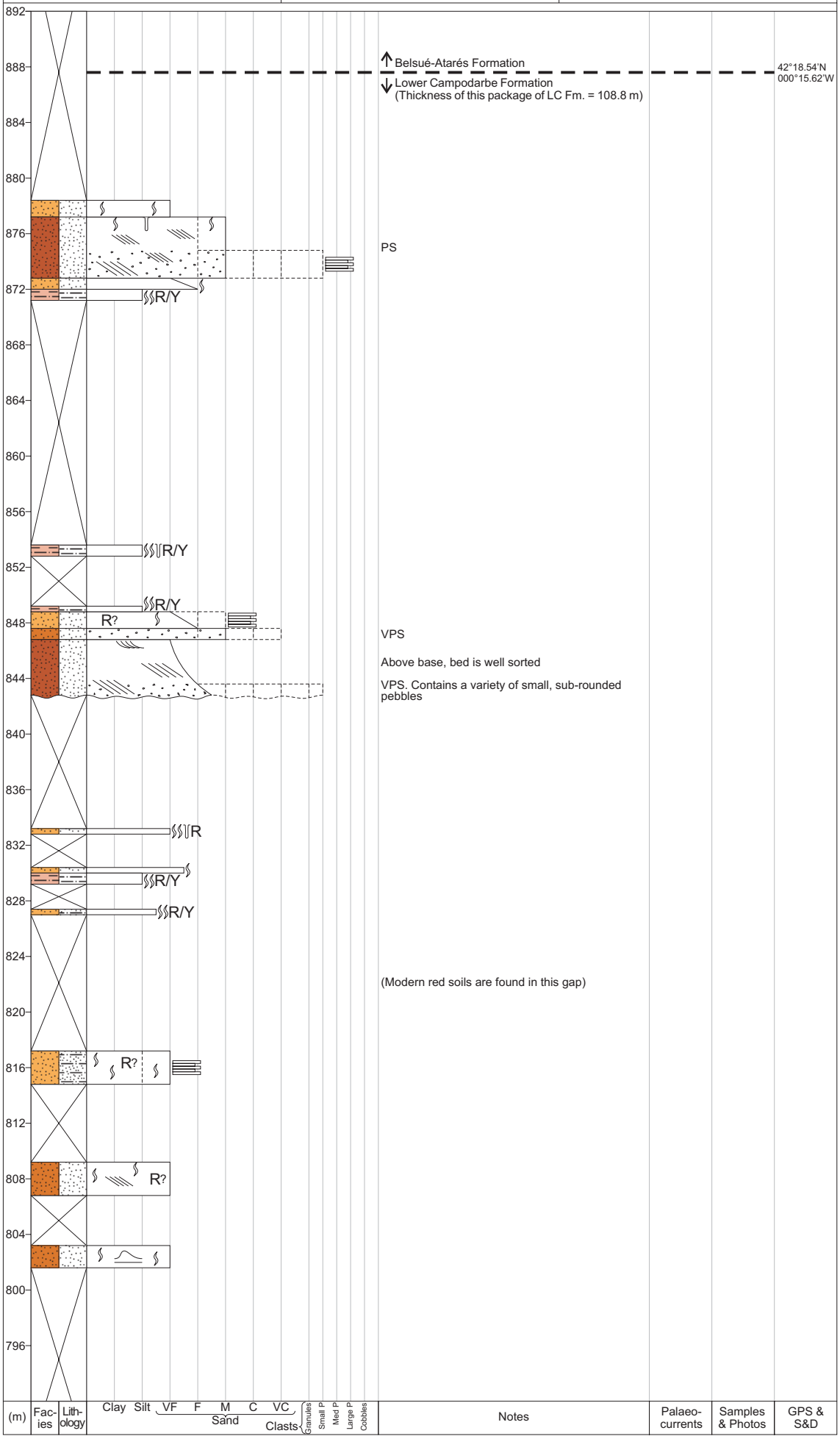
Sector: SE Jaca Basin	**Nocito**	Page: 7 of 12
Dates Logged: 8-10/9/03		Logged By: Jamie Moss



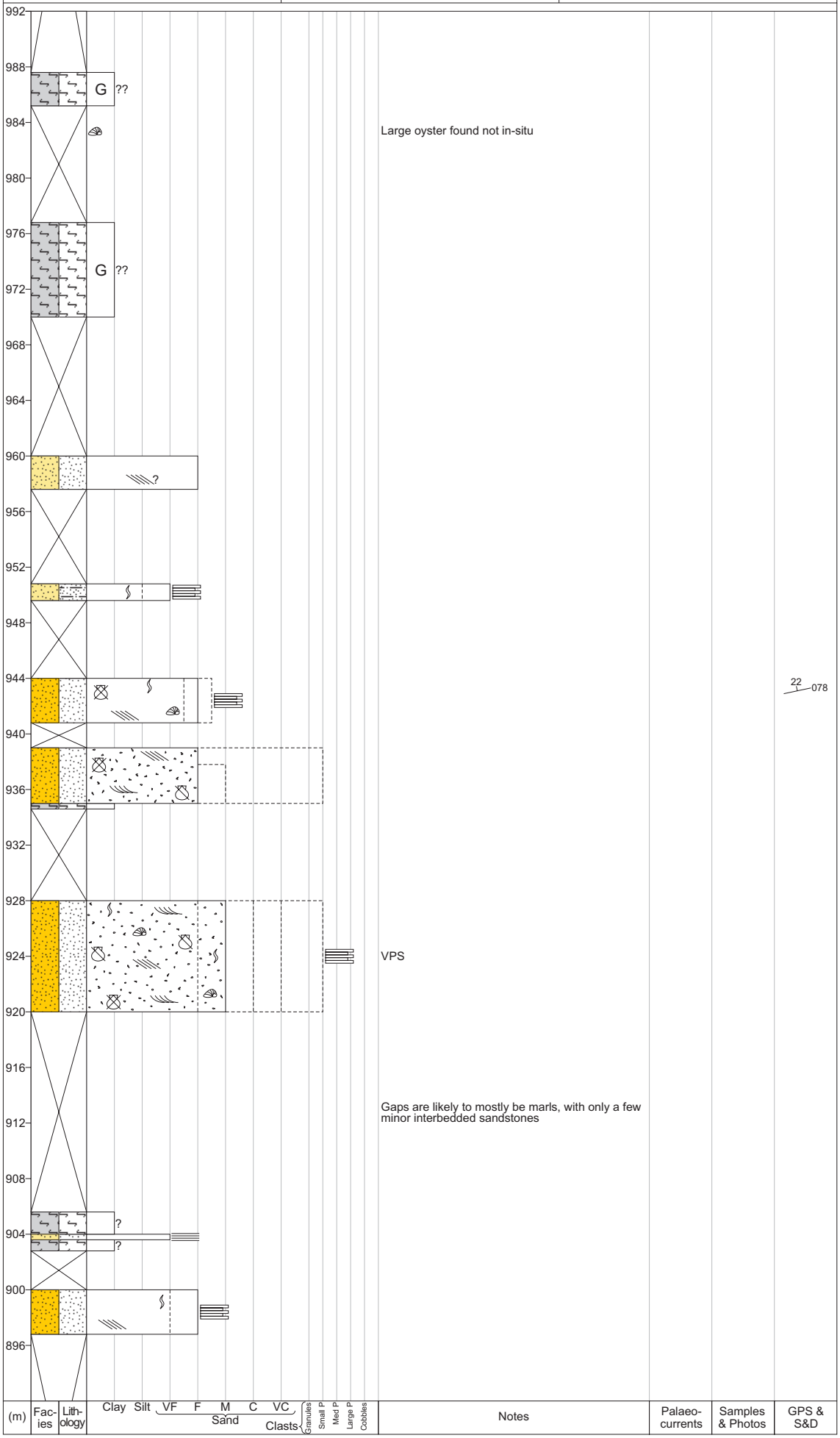
Sector: SE Jaca Basin	**Nocito**	Page: 8 of 12
Dates Logged: 8-10/9/03		Logged By: Jamie Moss



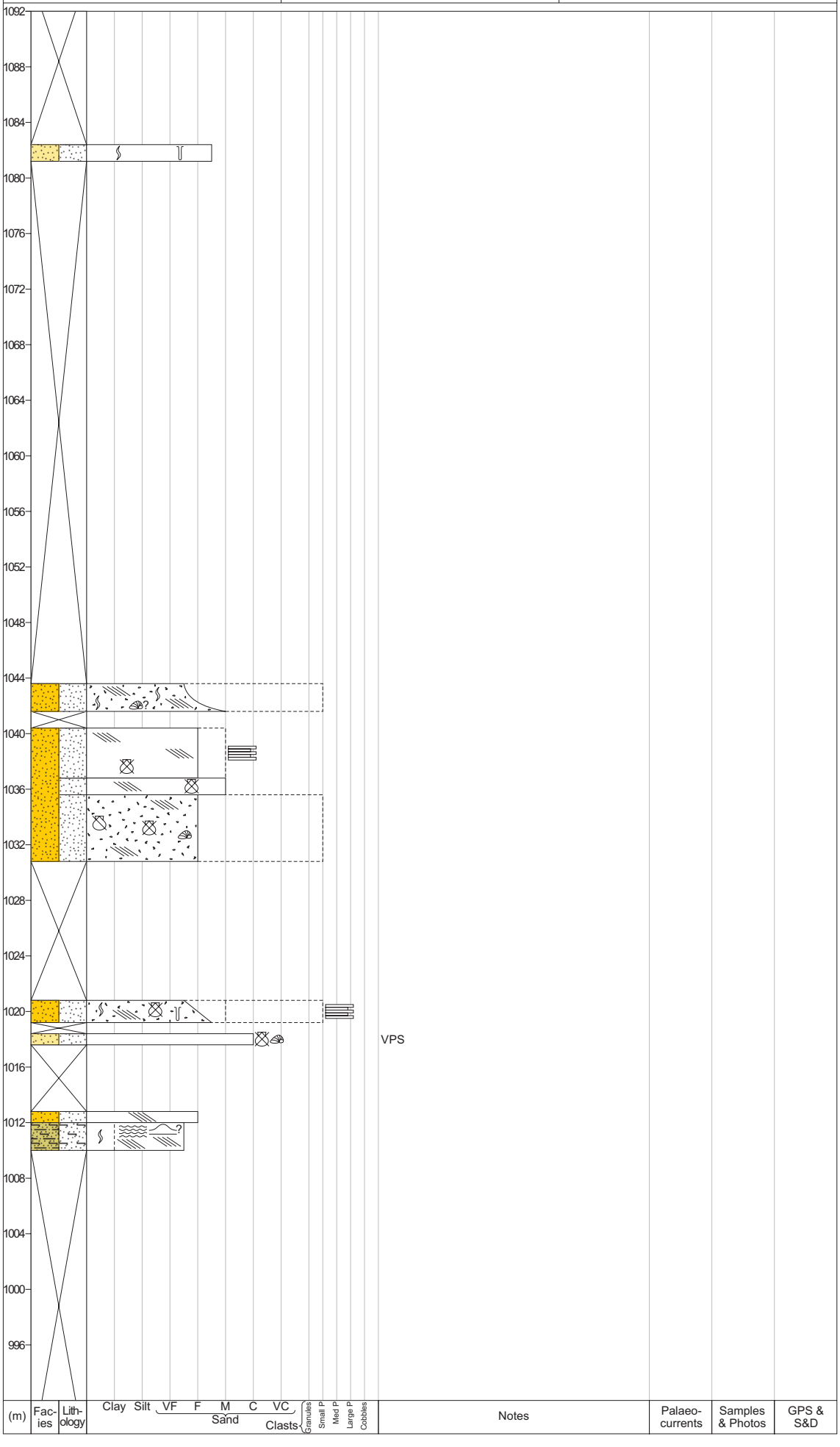
Sector: SE Jaca Basin	**Nocito**	Page: 9 of 12
Dates Logged: 8-10/9/03		Logged By: Jamie Moss



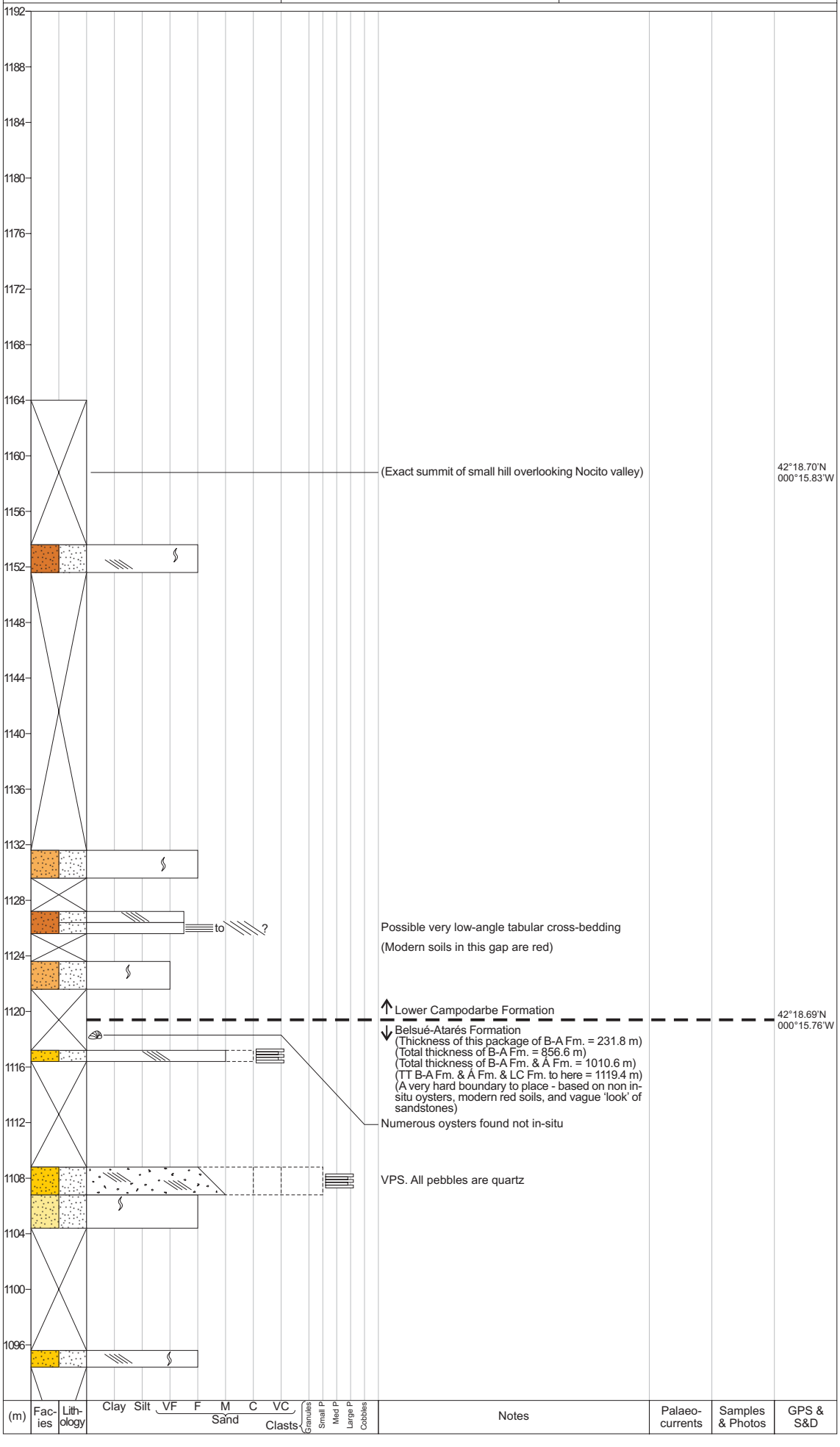
Sector: SE Jaca Basin	**Nocito**	Page: 10 of 12
Dates Logged: 8-10/9/03		Logged By: Jamie Moss



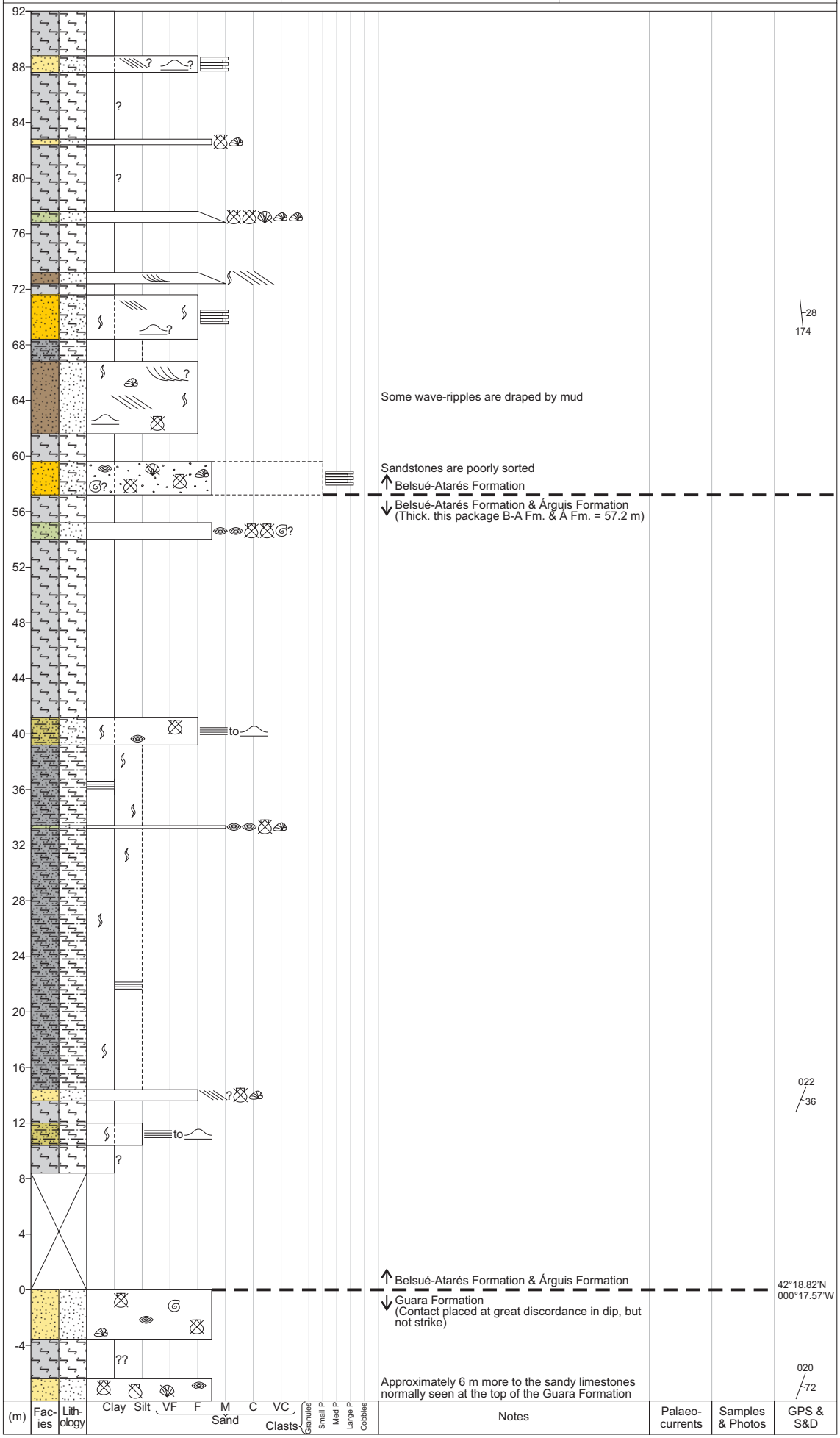
Sector: SE Jaca Basin	**Nocito**	Page: 11 of 12
Dates Logged: 8-10/9/03		Logged By: Jamie Moss



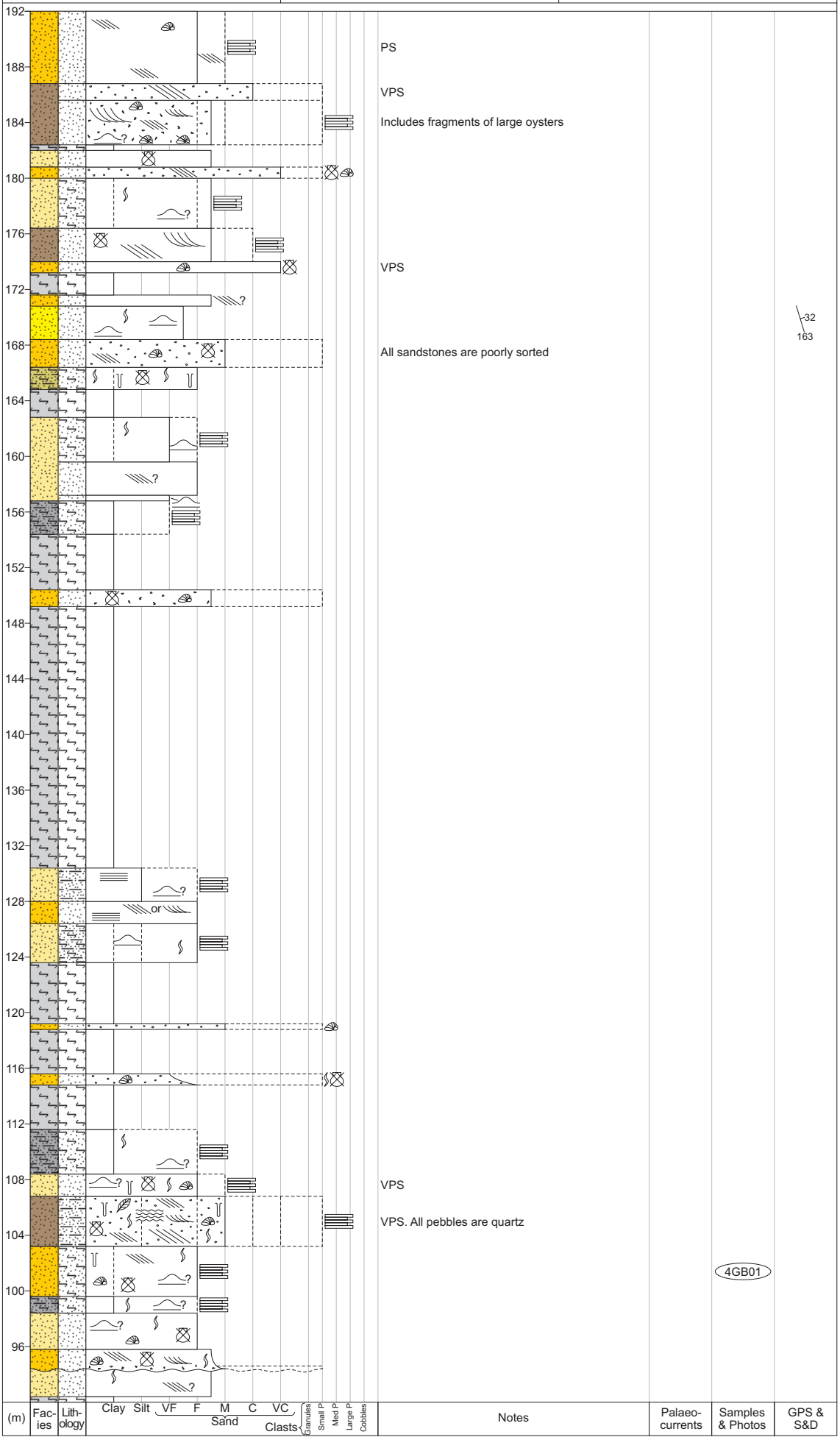
Sector: SE Jaca Basin	**Nocito**	Page: 12 of 12
Dates Logged: 8-10/9/03		Logged By: Jamie Moss



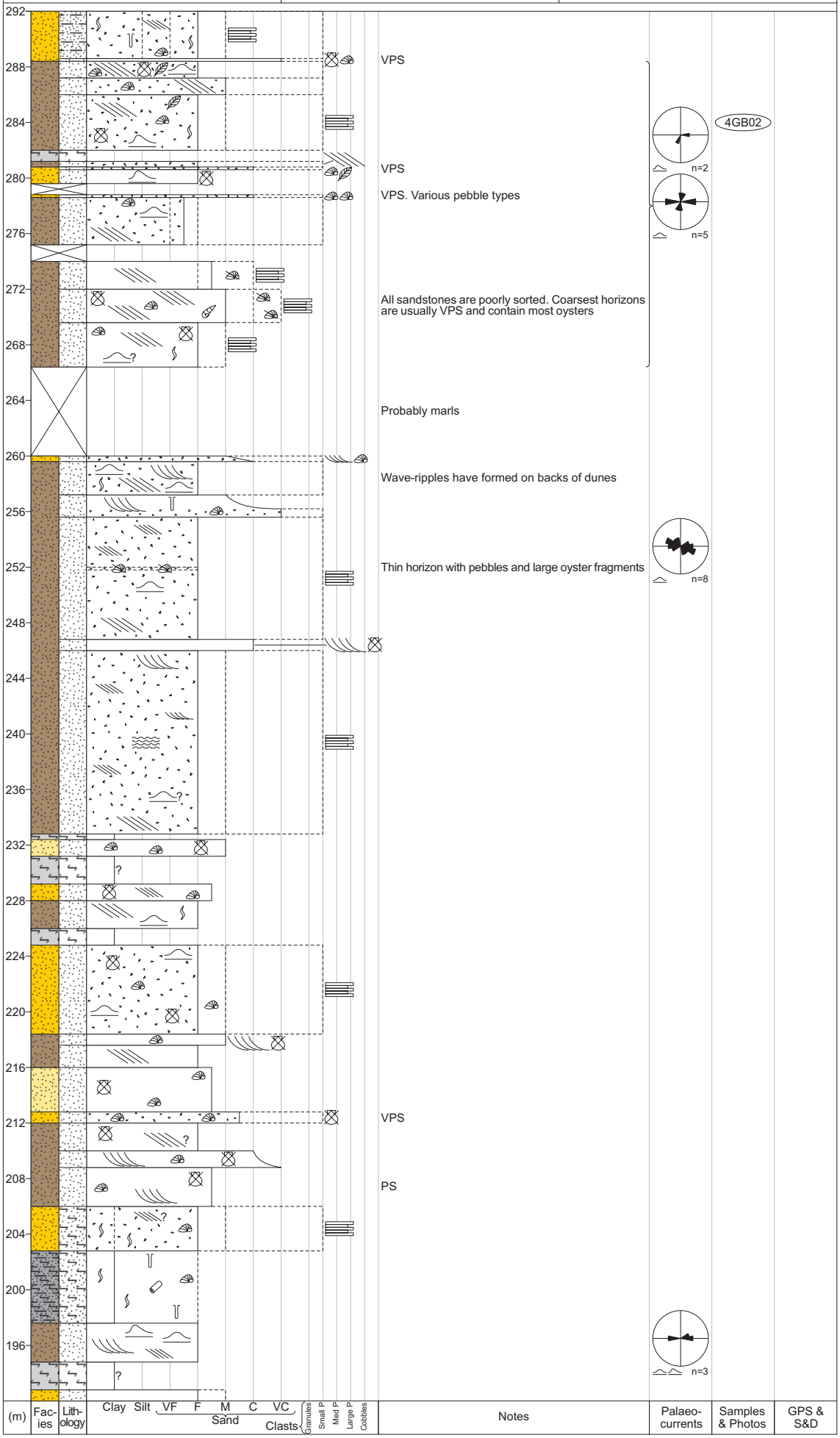
Sector: SE Jaca Basin	**Gabardiella**	Page: 1 of 4
Dates Logged: 4-5/9/03		Logged By: Jamie Moss



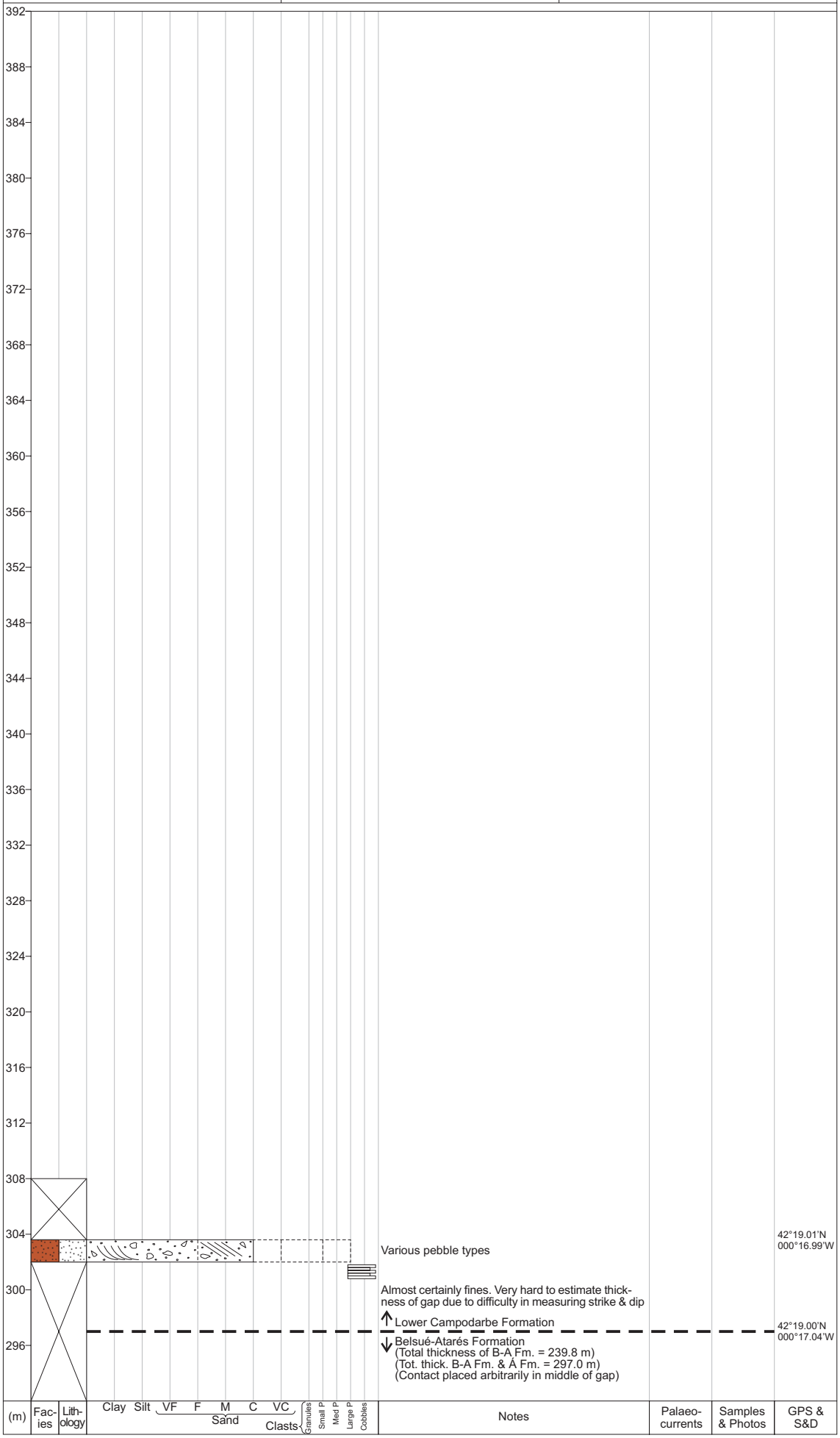
Sector: SE Jaca Basin	**Gabardiella**	Page: 2 of 4
Dates Logged: 4-5/9/03		Logged By: Jamie Moss



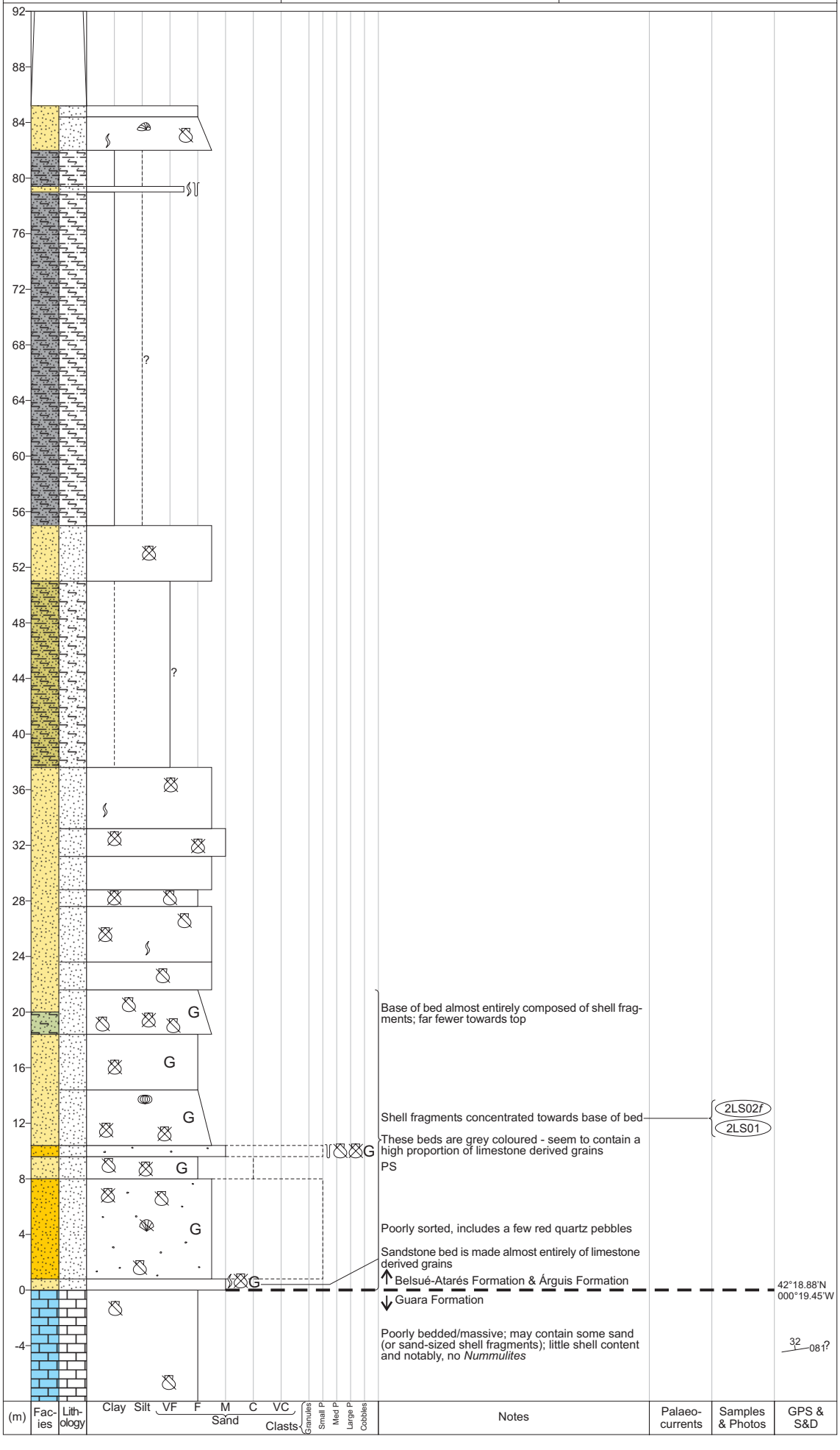
Sector: SE Jaca Basin	**Gabardiella**	Page: 3 of 4
Dates Logged: 4-5/9/03		Logged By: Jamie Moss



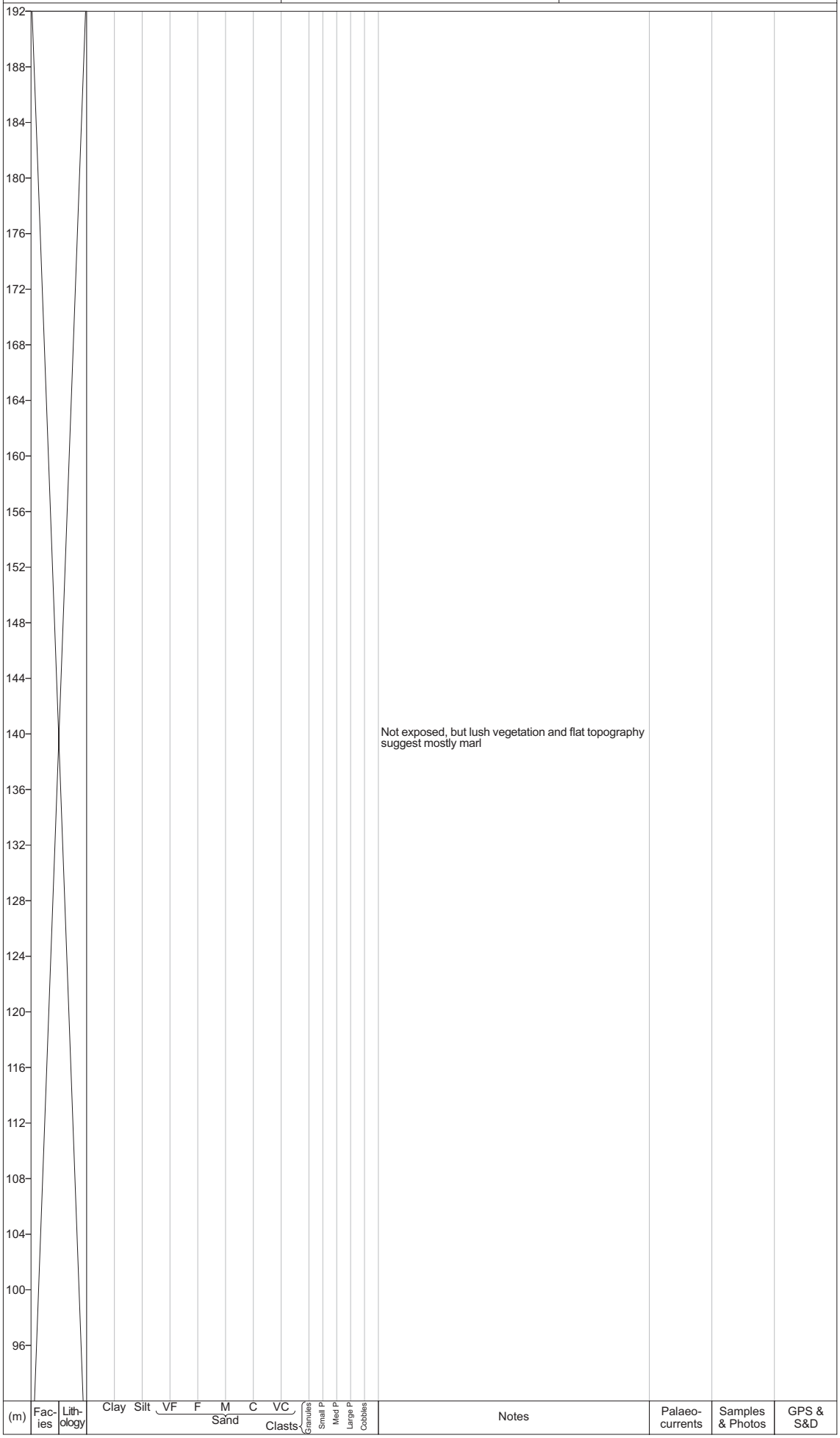
Sector: SE Jaca Basin	**Gabardiella**	Page: 4 of 4
Dates Logged: 4-5/9/03		Logged By: Jamie Moss



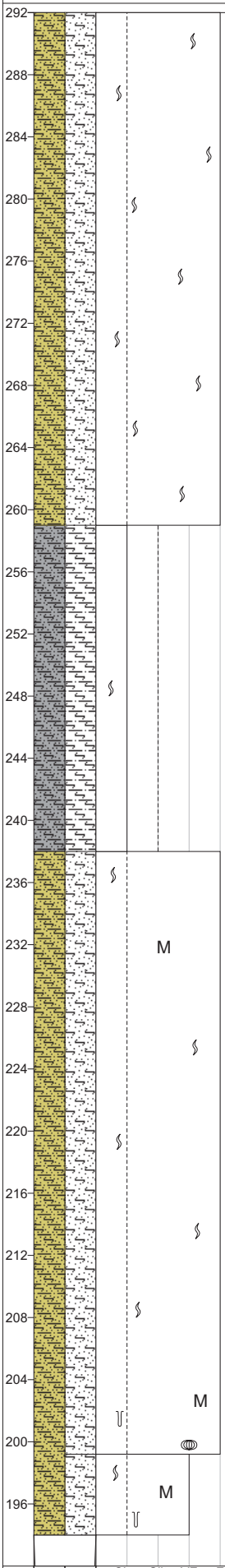
Sector: Southern Jaca Basin	**Lúsera**	Page: 1 of 11
Dates Logged: 3/6/02, 1-2/5/03 & 7-8/6/03		Logged By: Jamie Moss



Sector: Southern Jaca Basin	**Lúsera**	Page: 2 of 11
Dates Logged: 3/6/02, 1-2/5/03 & 7-8/6/03		Logged By: Jamie Moss



Sector: Southern Jaca Basin	**Lúsera**	Page: 3 of 11
Dates Logged: 3/6/02, 1-2/5/03 & 7-8/6/03		Logged By: Jamie Moss



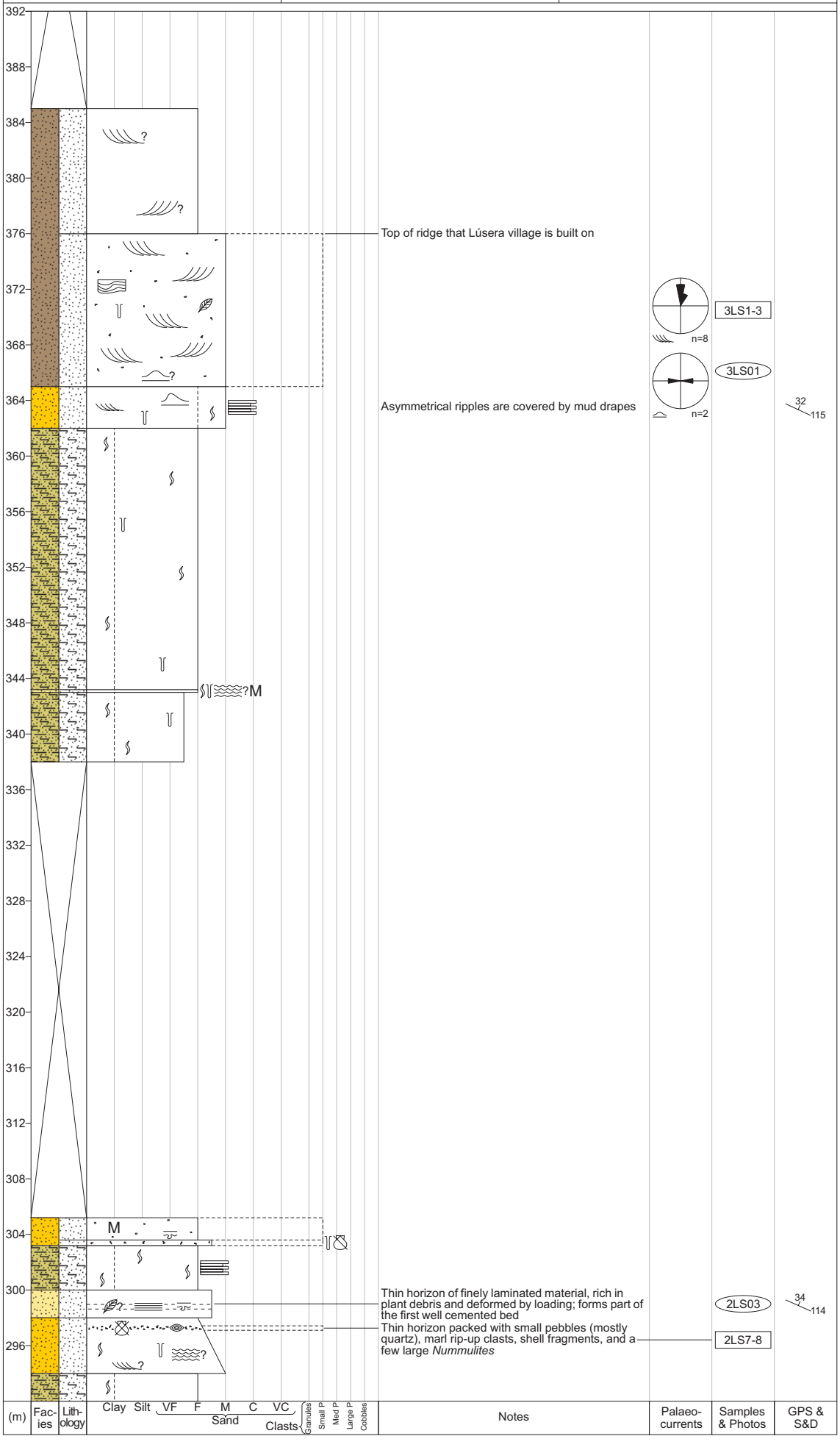
Quite heavily bioturbated throughout

Largely massive

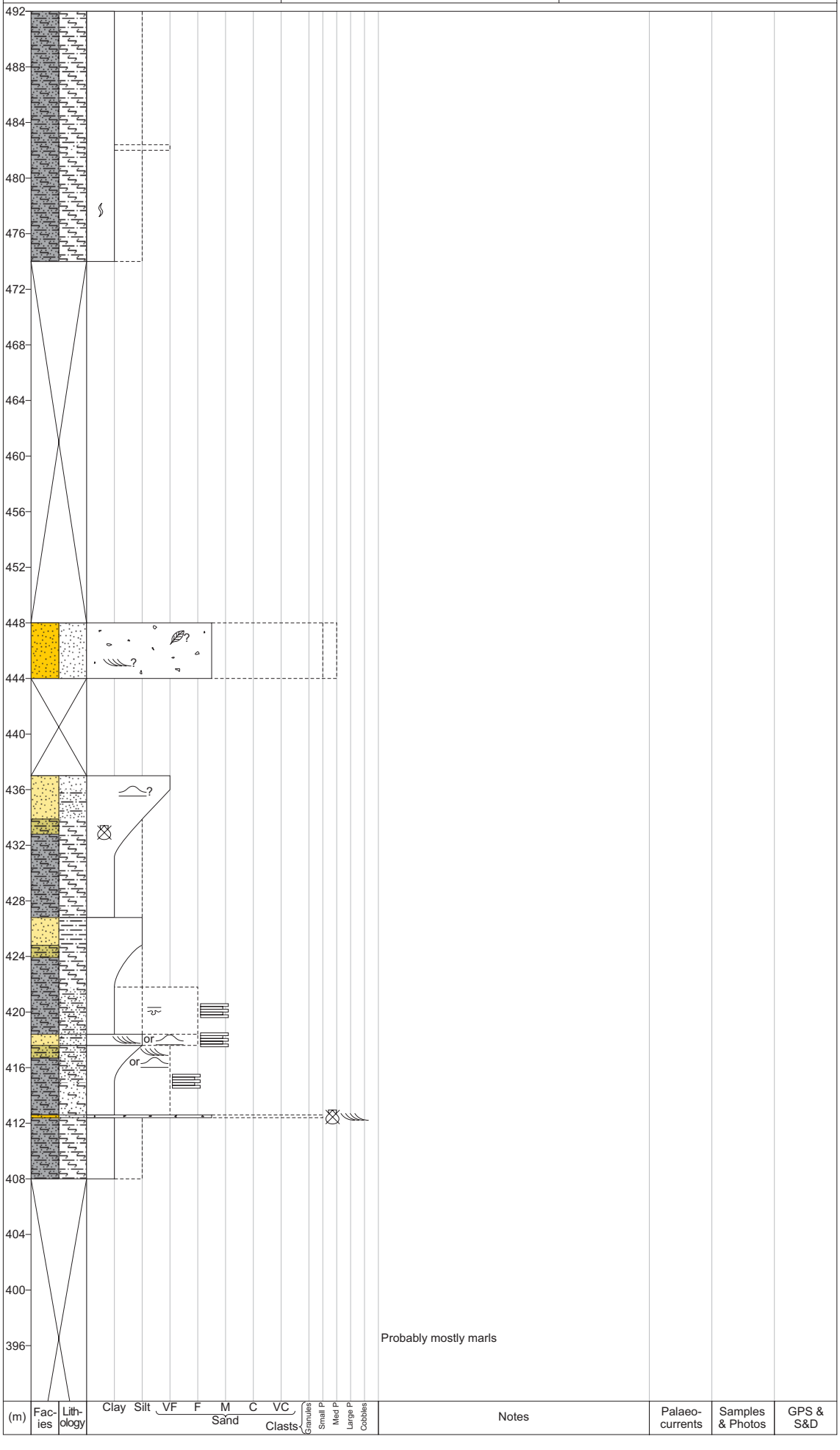
42°19.06'N
000°19.50'W

(m)	Facies	Lithology	Clay Silt VF F M C VC (Sand) Clasts: Granules, Small P, Med P, Large P, Cobbles	Notes	Palaeo-currents	Samples & Photos	GPS & S&D

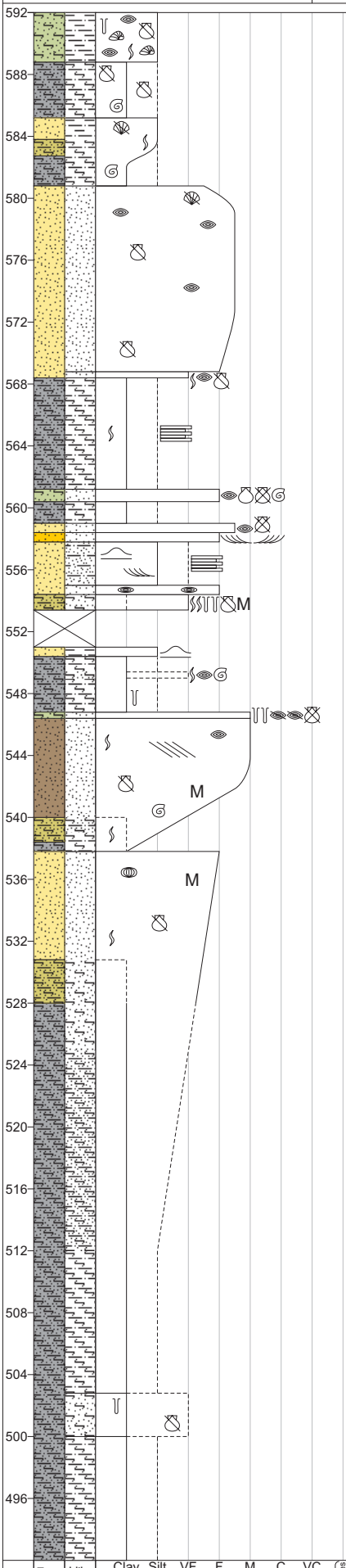
Sector: Southern Jaca Basin	**Lúsera**	Page: 4 of 11
Dates Logged: 3/6/02, 1-2/5/03 & 7-8/6/03		Logged By: Jamie Moss



Sector: Southern Jaca Basin	**Lúsera**	Page: 5 of 11
Dates Logged: 3/6/02, 1-2/5/03 & 7-8/6/03		Logged By: Jamie Moss

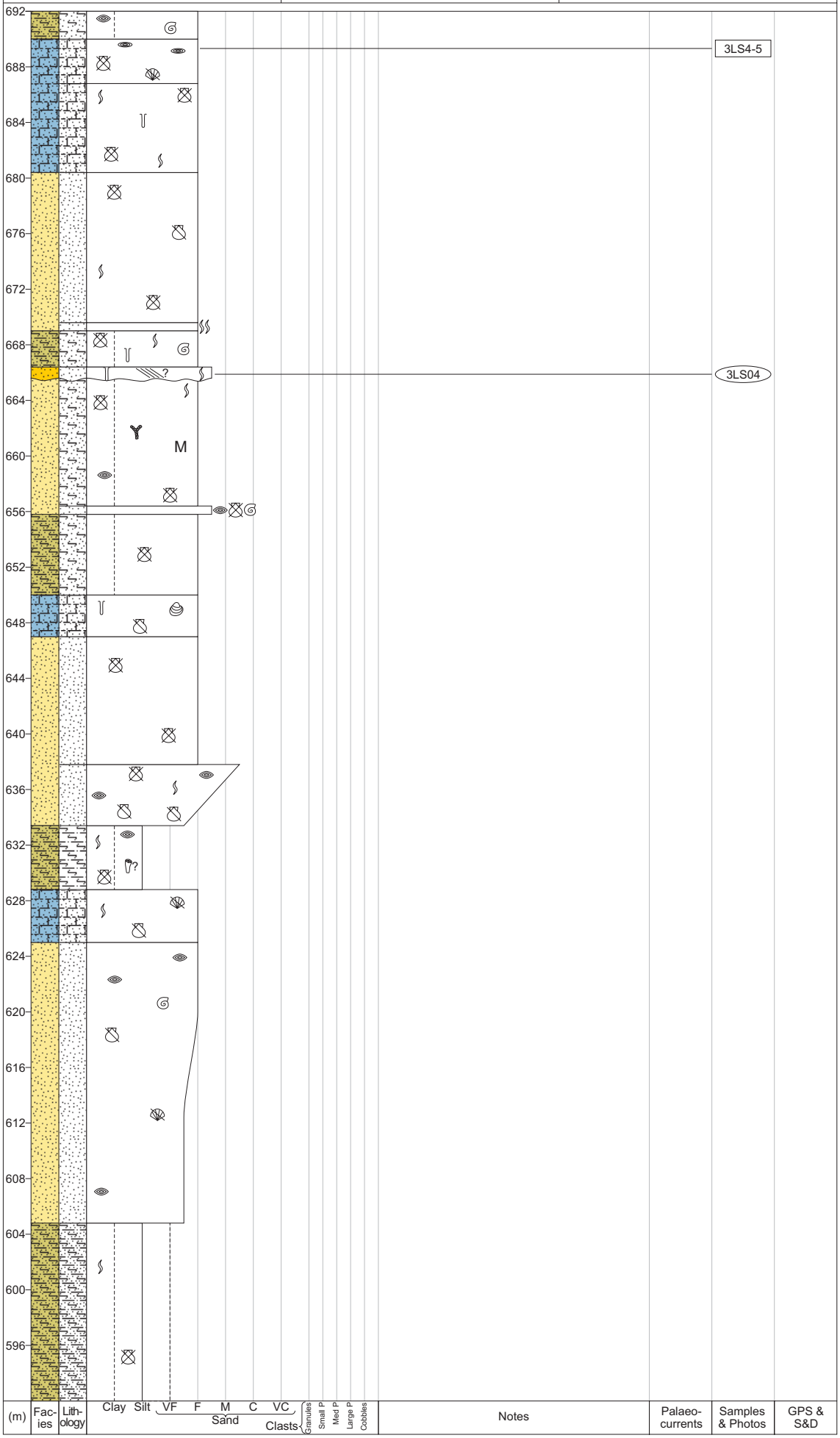


Sector: Southern Jaca Basin	**Lúsera**	Page: 6 of 11
Dates Logged: 3/6/02, 1-2/5/03 & 7-8/6/03		Logged By: Jamie Moss

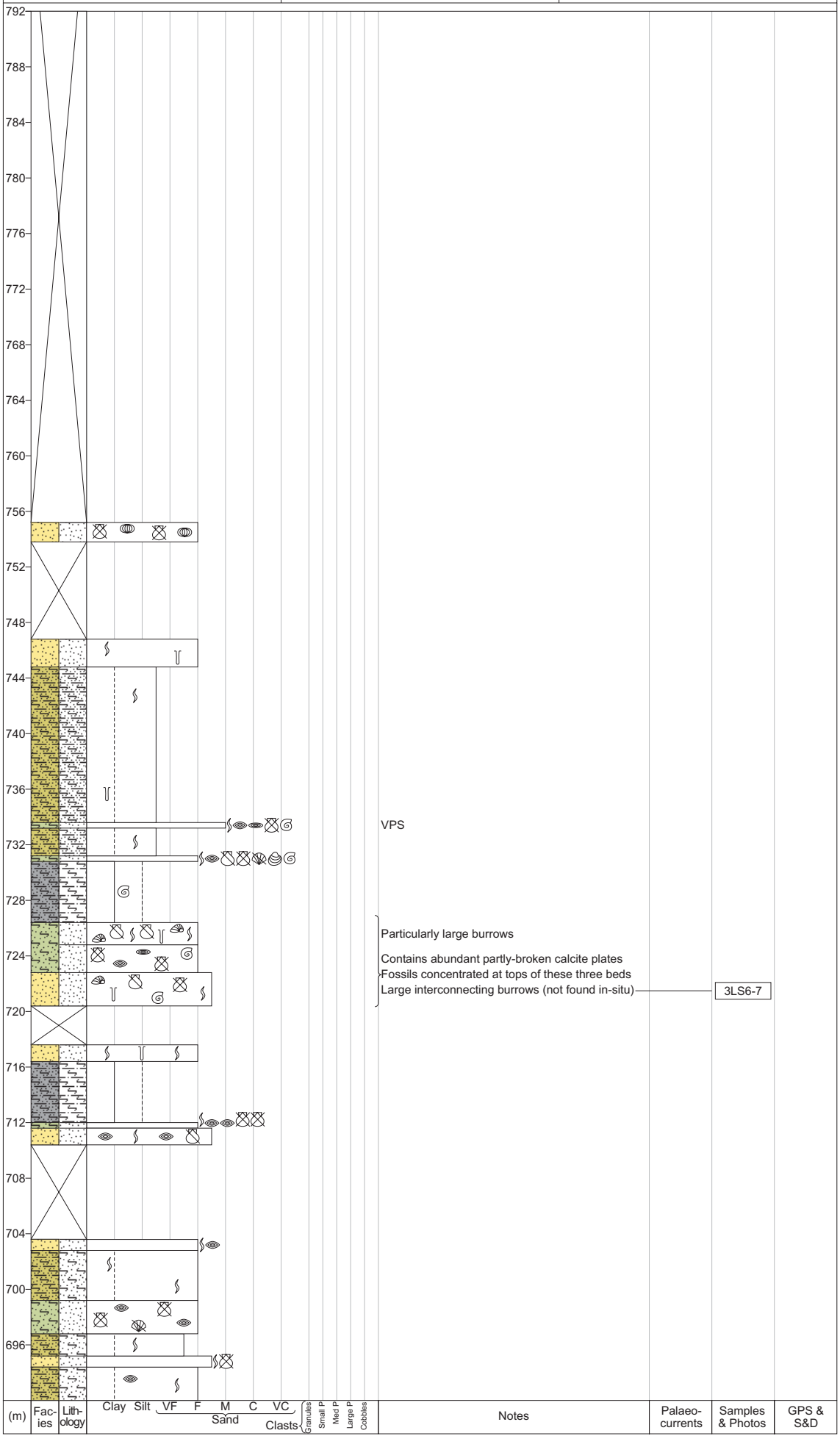


Notes	Palaeo-currents	Samples & Photos	GPS & S&D
Several very large burrows			
Fossil content increases upwards			3LS03f
	n=6		
Intense burrowing confined to top portion of bed			25 096
		3LS02	
Decreasing marl content			

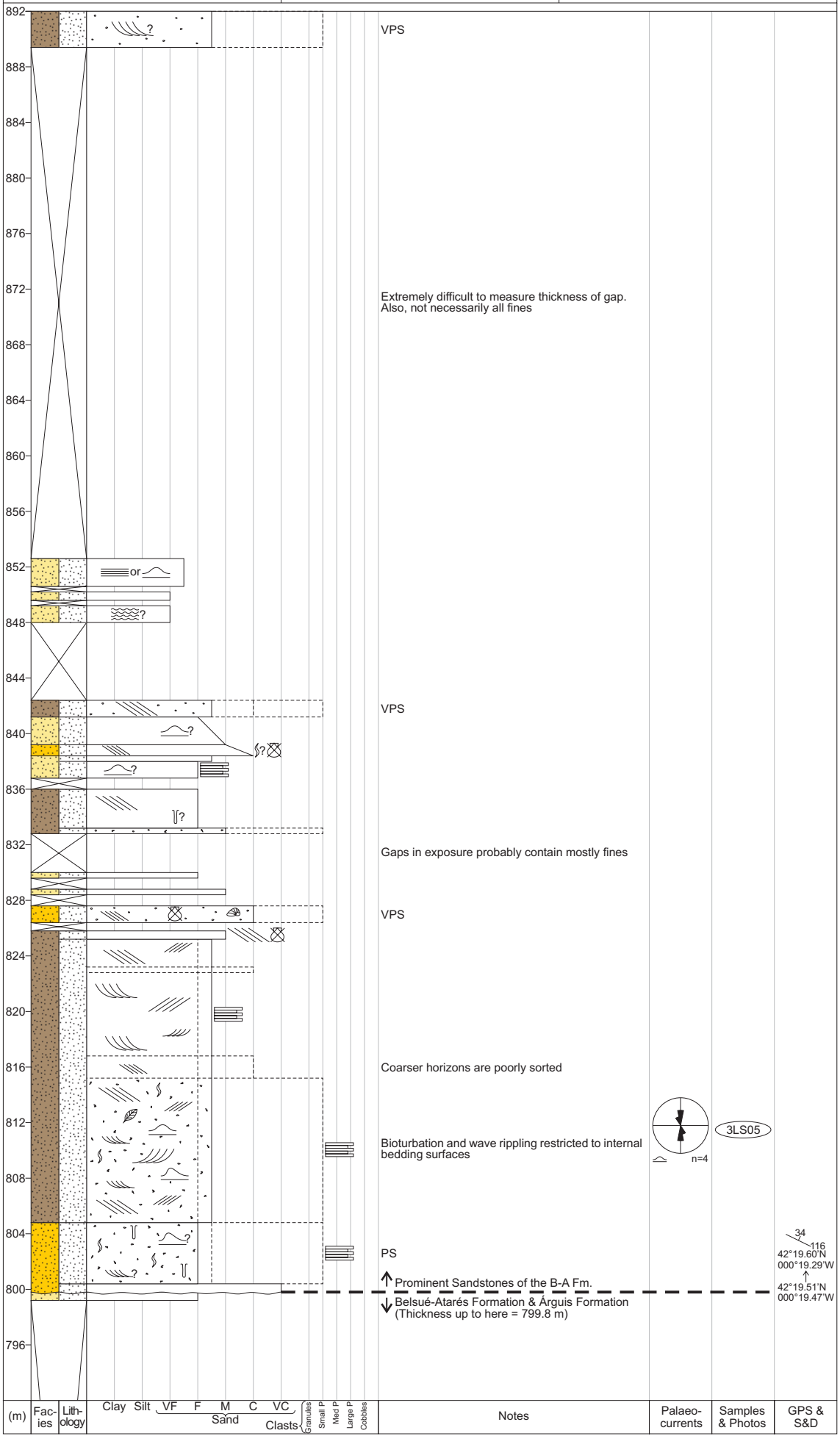
Sector: Southern Jaca Basin	**Lúsera**	Page: 7 of 11
Dates Logged: 3/6/02, 1-2/5/03 & 7-8/6/03		Logged By: Jamie Moss



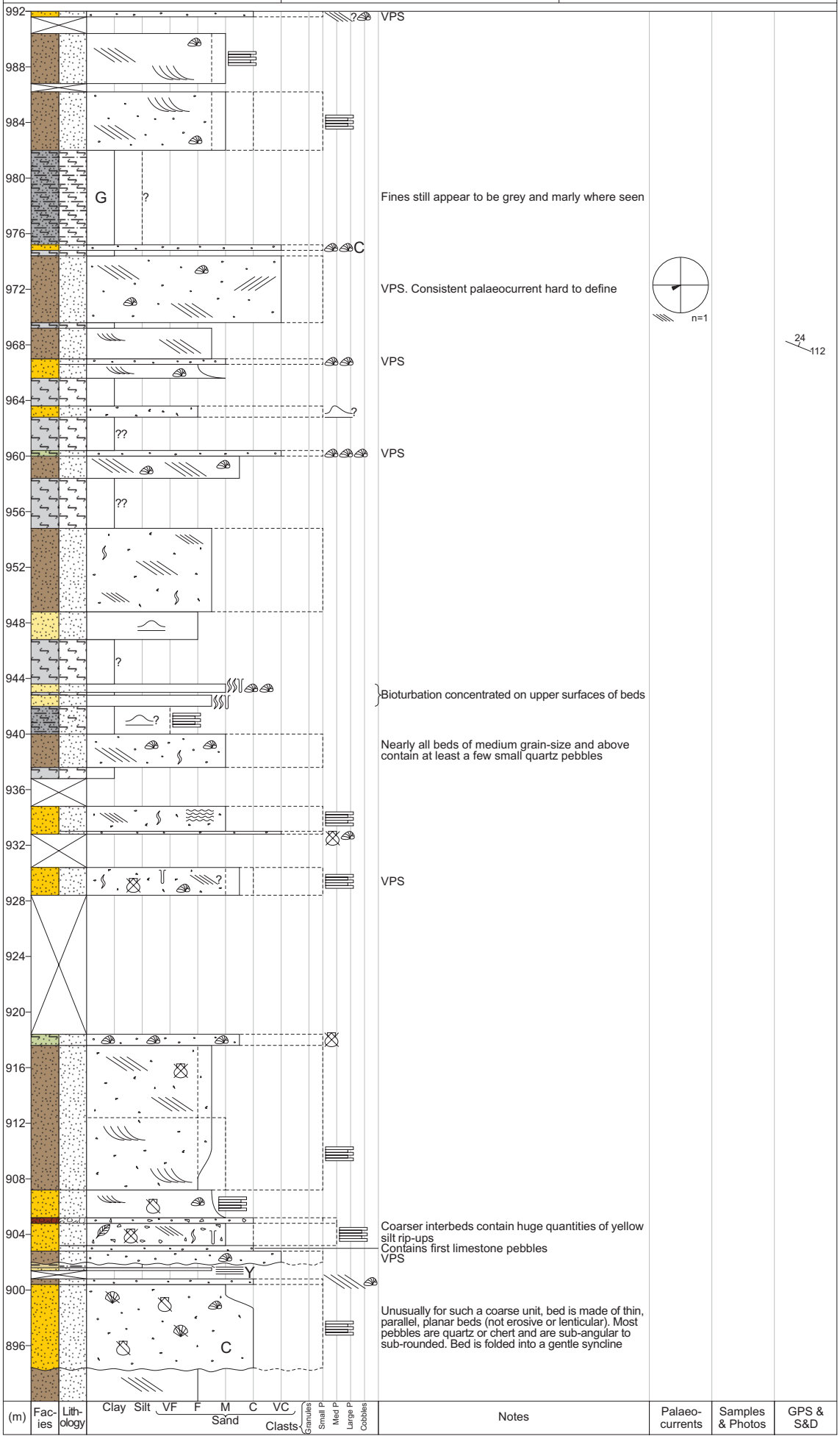
Sector: Southern Jaca Basin	**Lúsera**	Page: 8 of 11
Dates Logged: 3/6/02, 1-2/5/03 & 7-8/6/03		Logged By: Jamie Moss



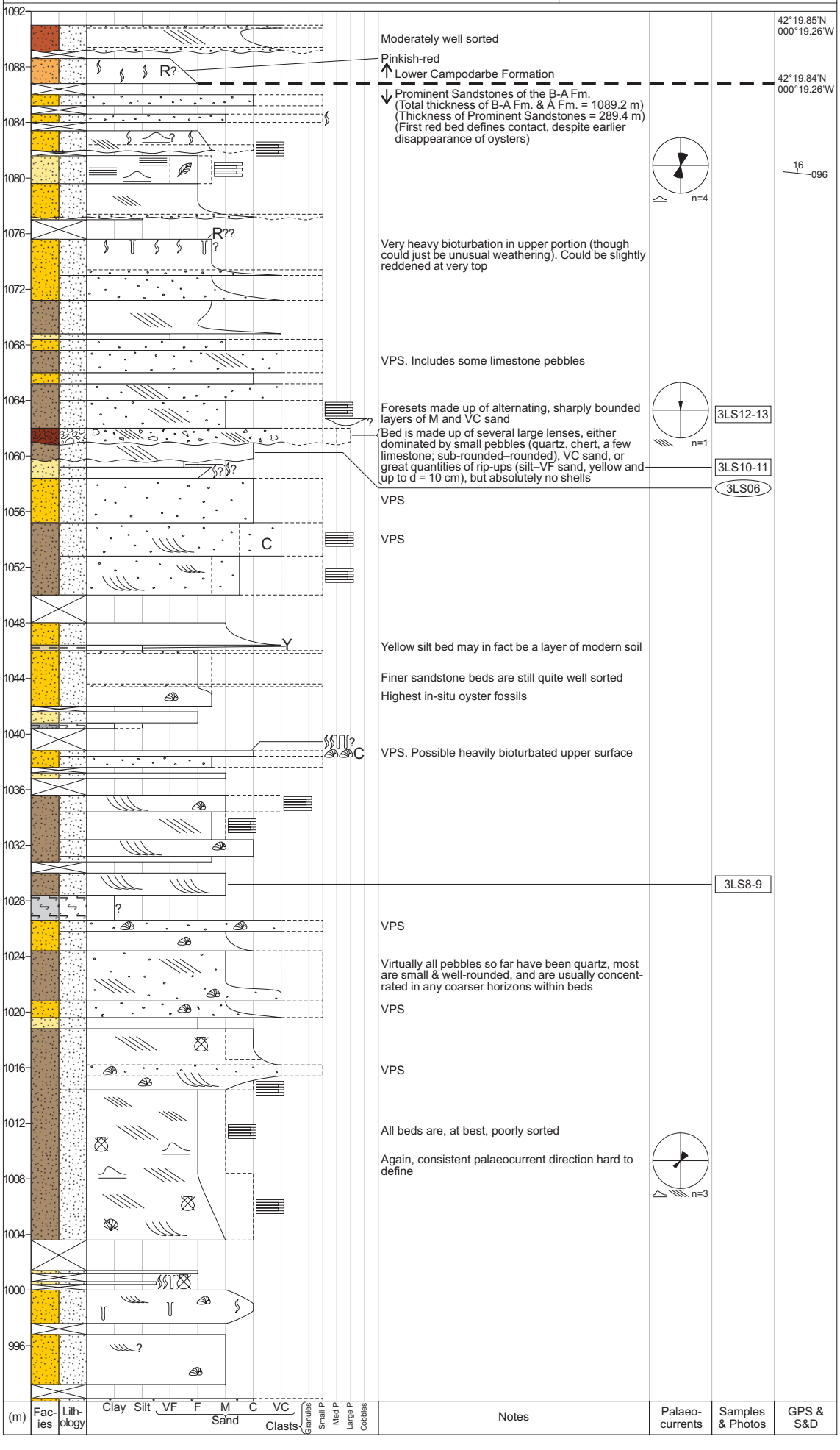
Sector: Southern Jaca Basin	**Lúsera**	Page: 9 of 11
Dates Logged: 3/6/02, 1-2/5/03 & 7-8/6/03		Logged By: Jamie Moss



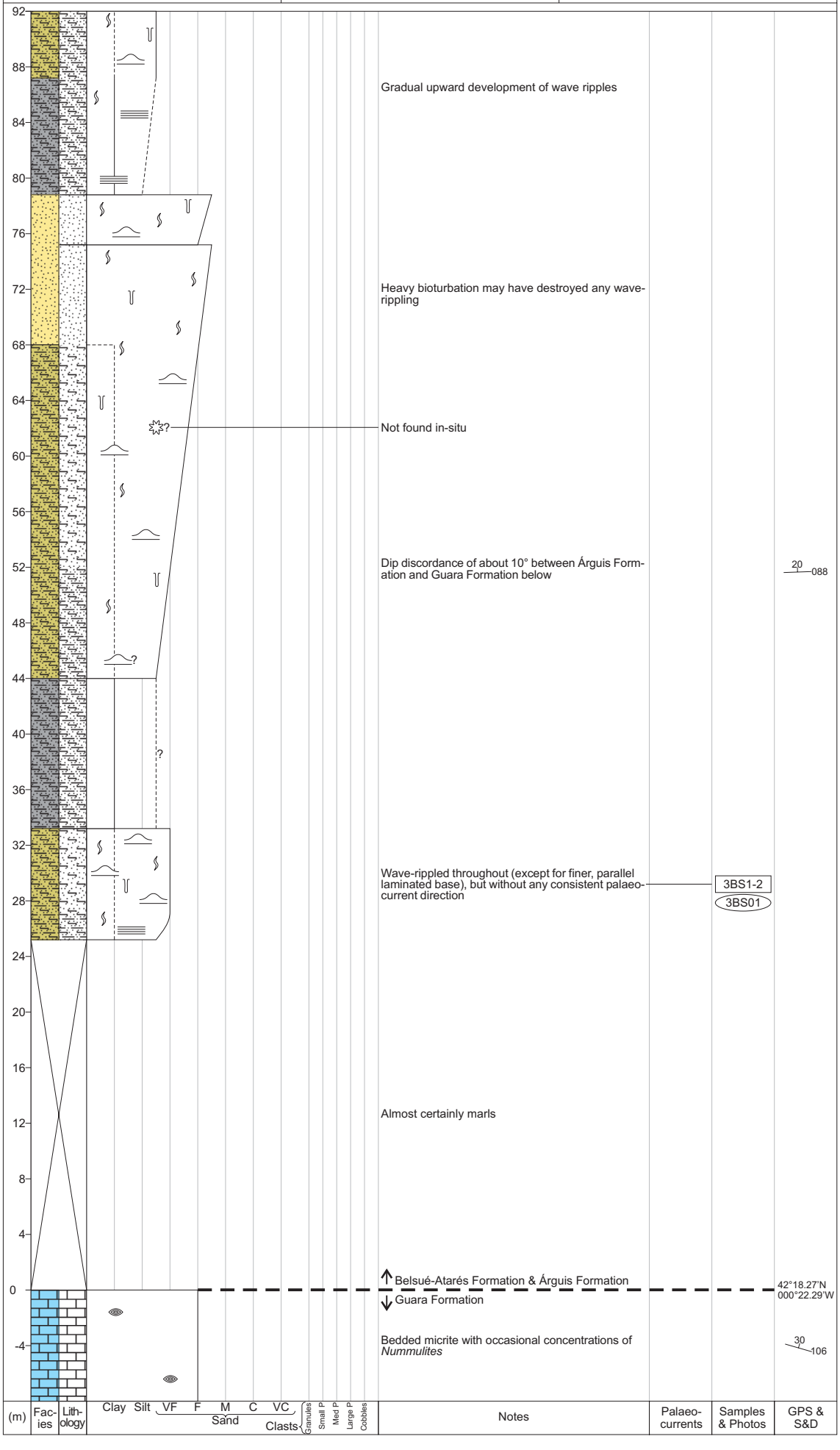
Sector: Southern Jaca Basin	**Lúsera**	Page: 10 of 11
Dates Logged: 3/6/02, 1-2/5/03 & 7-8/6/03		Logged By: Jamie Moss



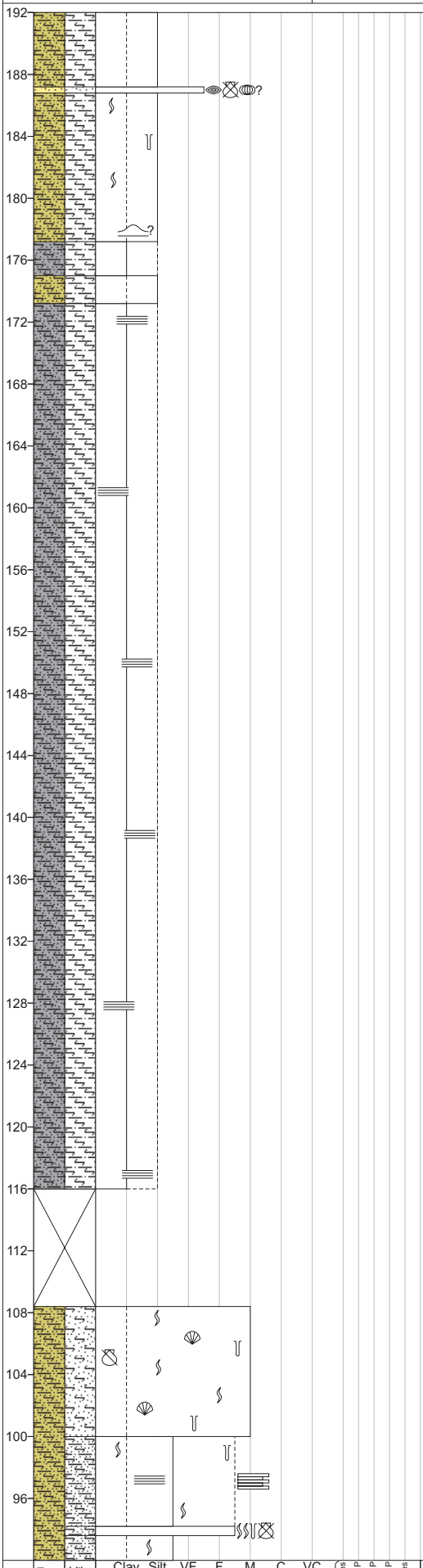
Sector: Southern Jaca Basin	**Lúsera**	Page: 11 of 11
Dates Logged: 3/6/02, 1-2/5/03 & 7-8/6/03		Logged By: Jamie Moss



Sector: Southern Jaca Basin	**Belsué**	Page: 1 of 11
Dates Logged: 20-21&25-26/5/02 & 2&9/6/03		Logged By: Jamie Moss & Stuart Jones



Sector: Southern Jaca Basin	**Belsué**	Page: 2 of 11
Dates Logged: 20-21&25-26/5/02 & 2&9/6/03		Logged By: Jamie Moss & Stuart Jones



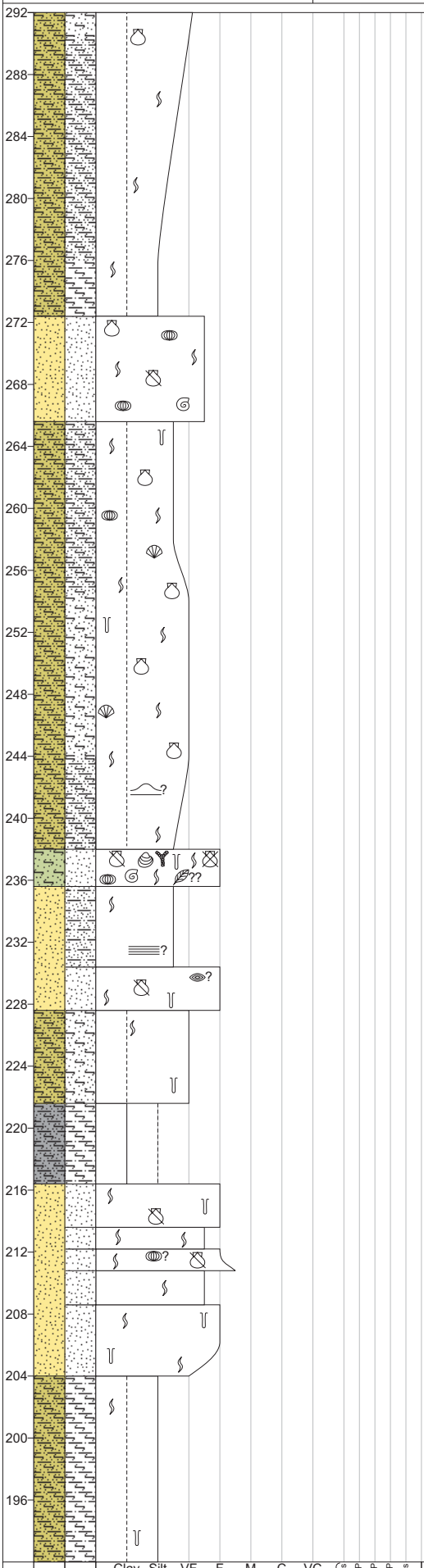
Nummulites very small; echinoids not found in-situ

Poorly sorted with many sub-angular grains

Green mineral, probably glauconite, concentrated into burrows

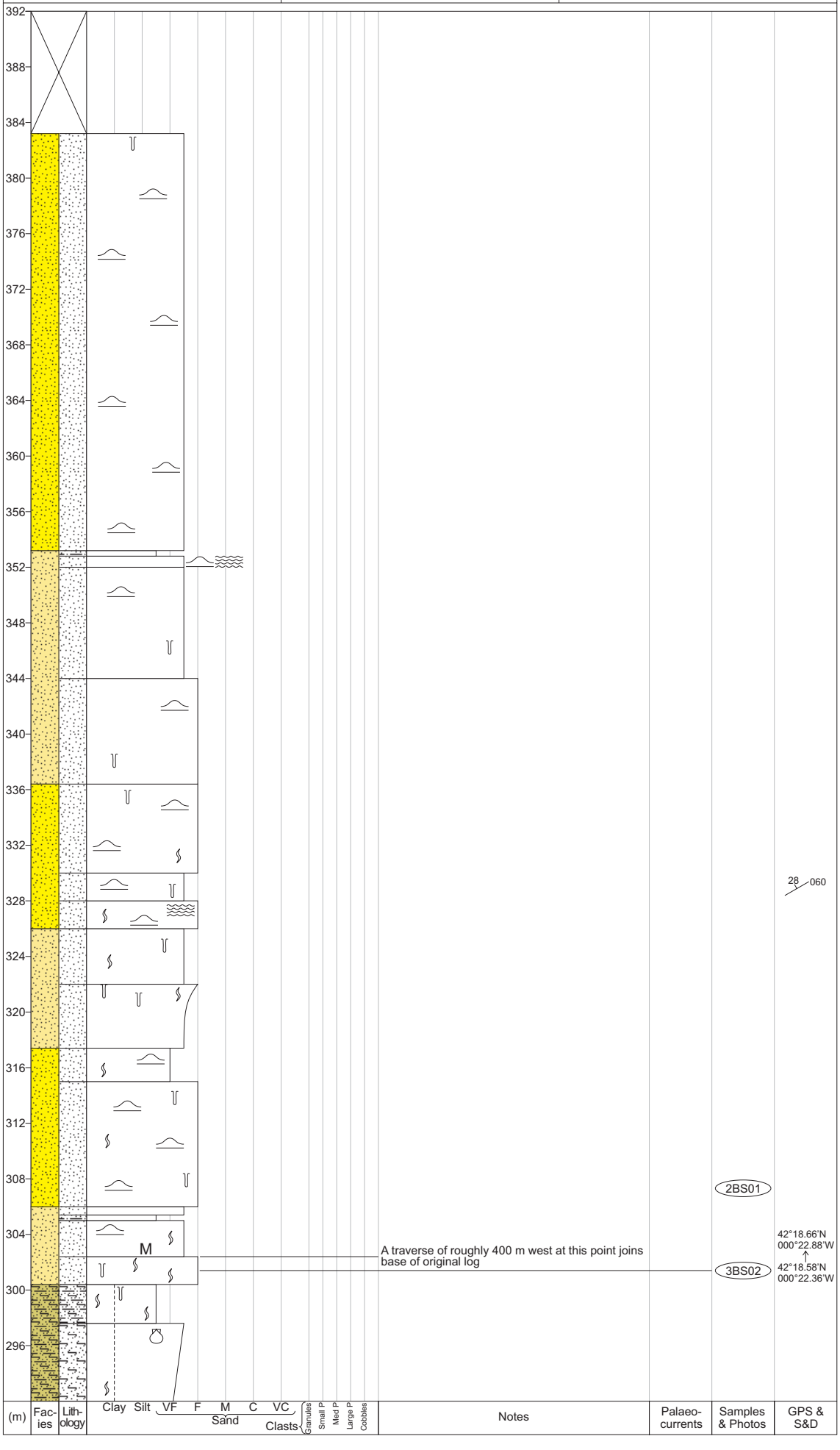
Notes	Palaeo-currents	Samples & Photos	GPS & S&D

Sector: Southern Jaca Basin	**Belsué**	Page: 3 of 11
Dates Logged: 20-21&25-26/5/02 & 2&9/6/03		Logged By: Jamie Moss & Stuart Jones

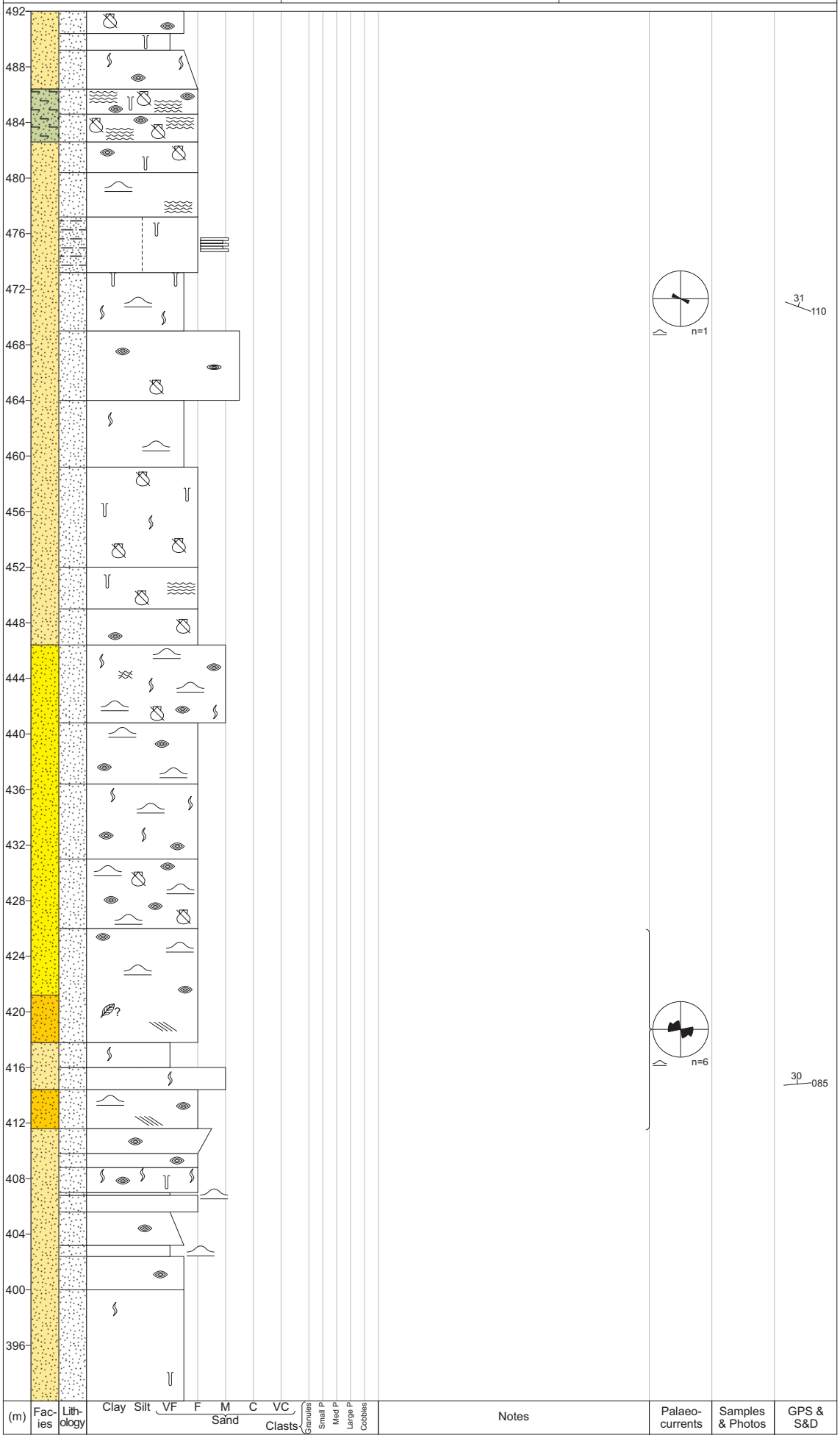


Notes	Palaeo-currents	Samples & Photos	GPS & S&D
Contacts between beds may be more gradational than indicated - but drape of weathering debris at top and base of most beds makes it difficult to tell			
Contains some very large burrows			

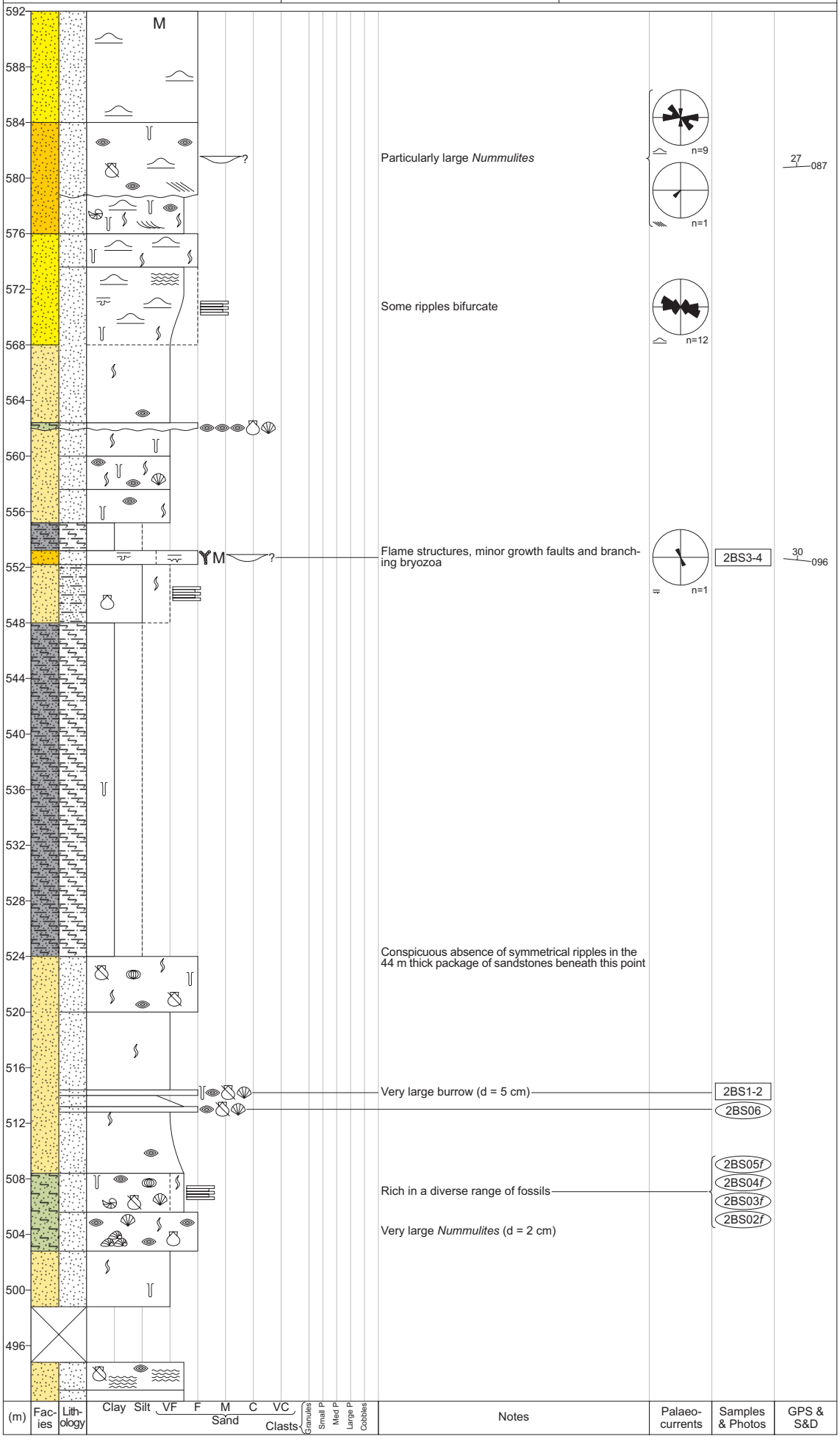
Sector: Southern Jaca Basin	**Belsué**	Page: 4 of 11
Dates Logged: 20-21&25-26/5/02 & 2&9/6/03		Logged By: Jamie Moss & Stuart Jones



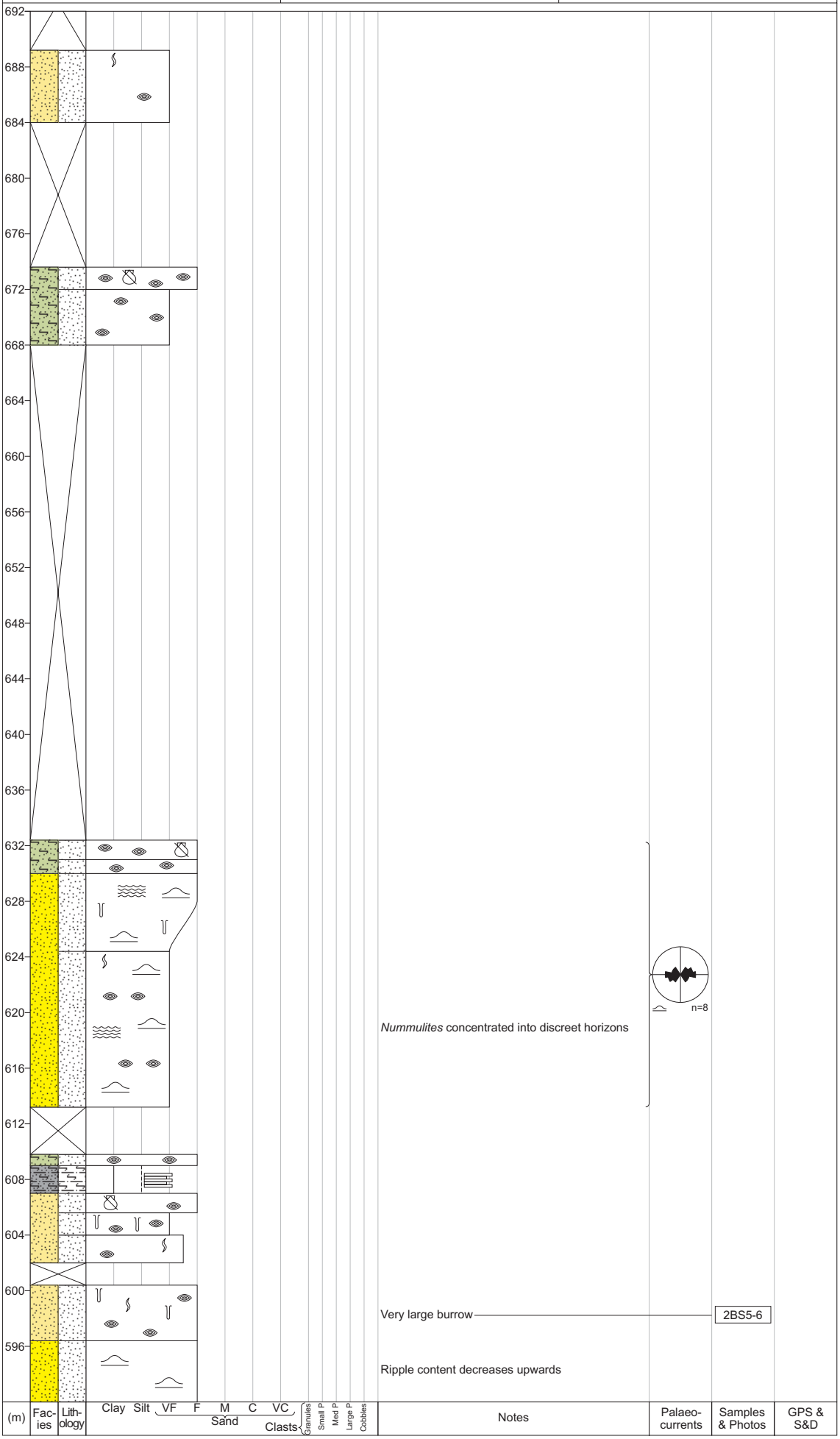
Sector: Southern Jaca Basin	**Belsué**	Page: 5 of 11
Dates Logged: 20-21&25-26/5/02 & 2&9/6/03		Logged By: Jamie Moss & Stuart Jones



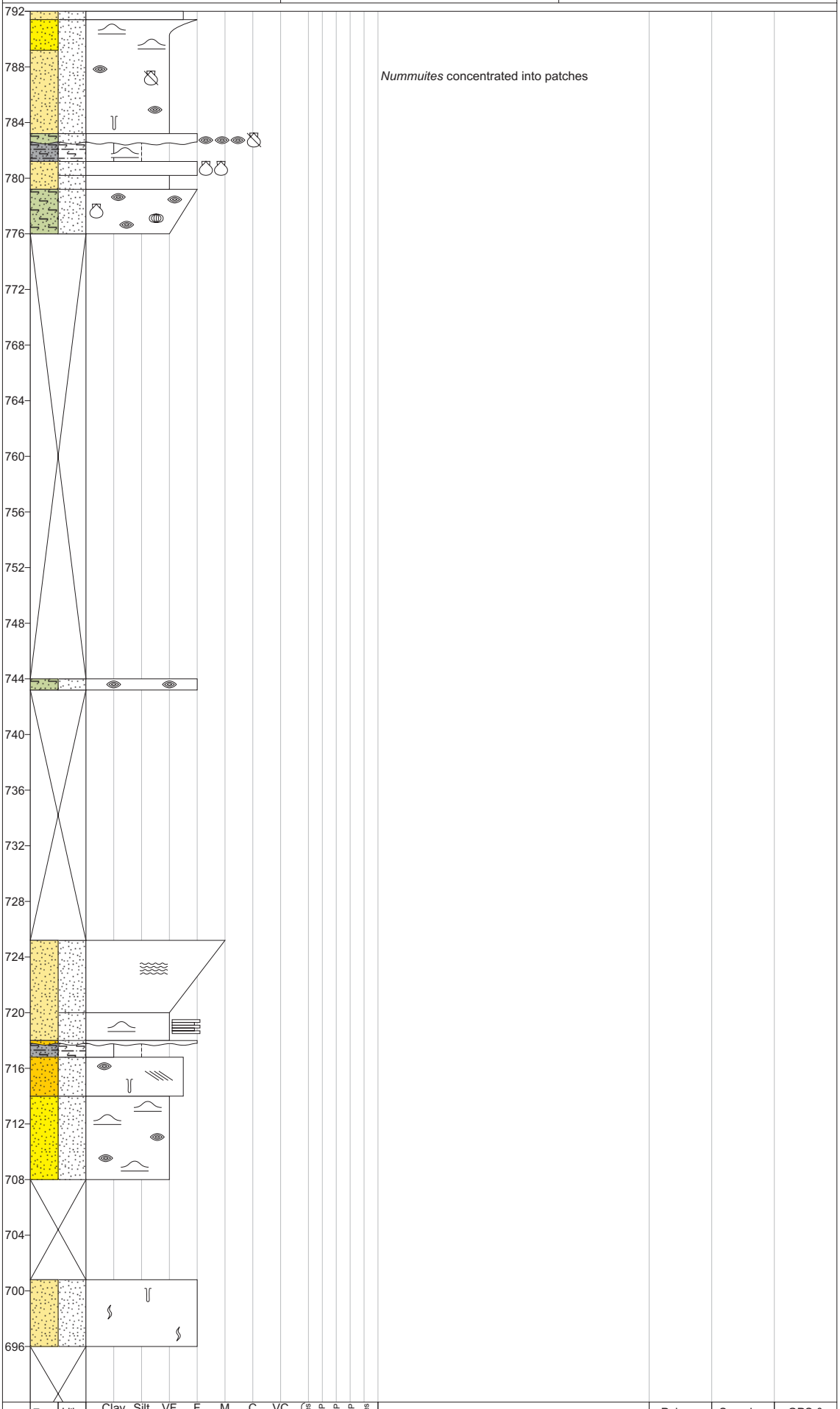
Sector: Southern Jaca Basin	**Belsué**	Page: 6 of 11
Dates Logged: 20-21&25-26/5/02 & 2&9/6/03		Logged By: Jamie Moss & Stuart Jones



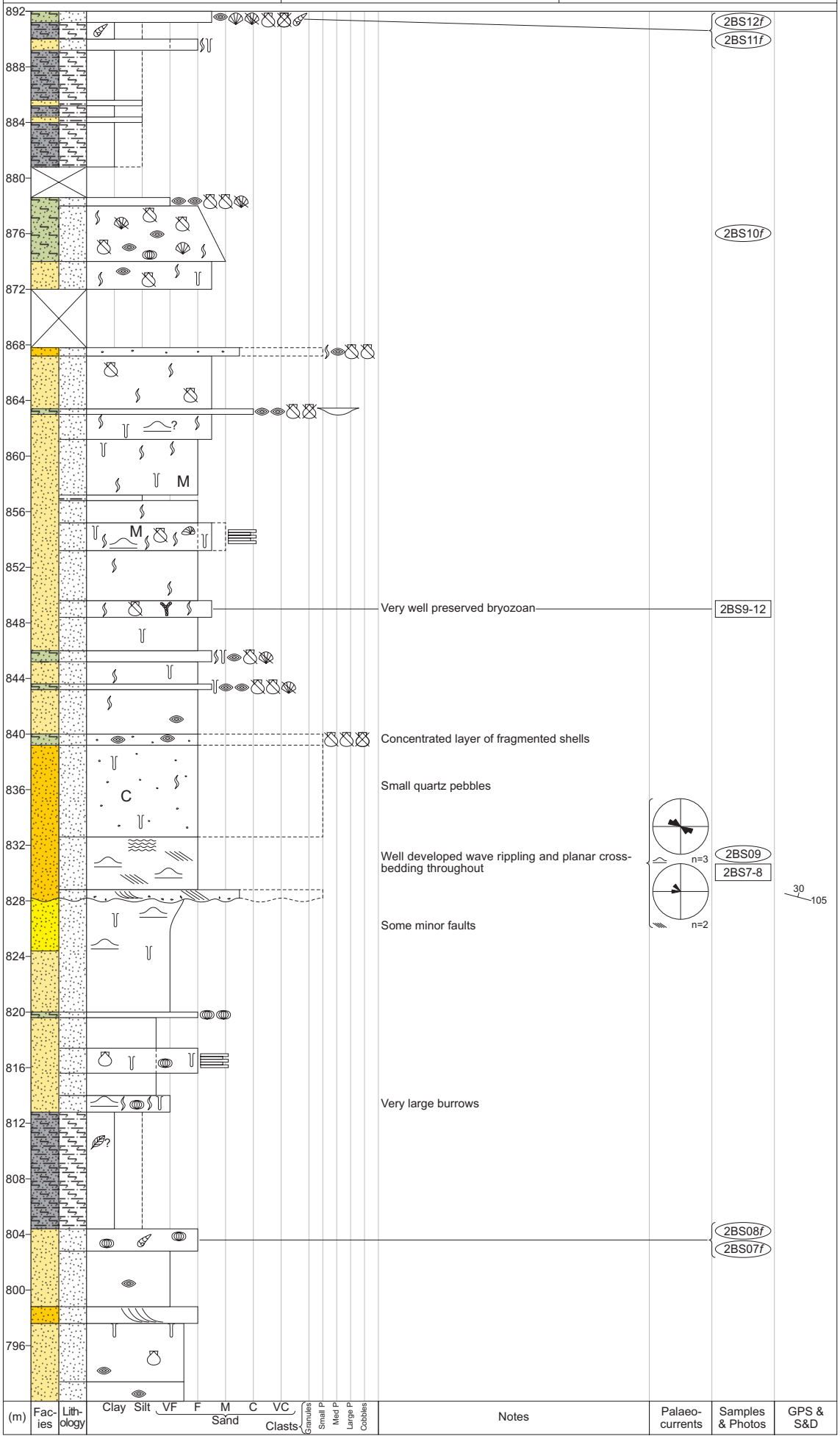
Sector: Southern Jaca Basin	**Belsué**	Page: 7 of 11
Dates Logged: 20-21&25-26/5/02 & 2&9/6/03		Logged By: Jamie Moss & Stuart Jones



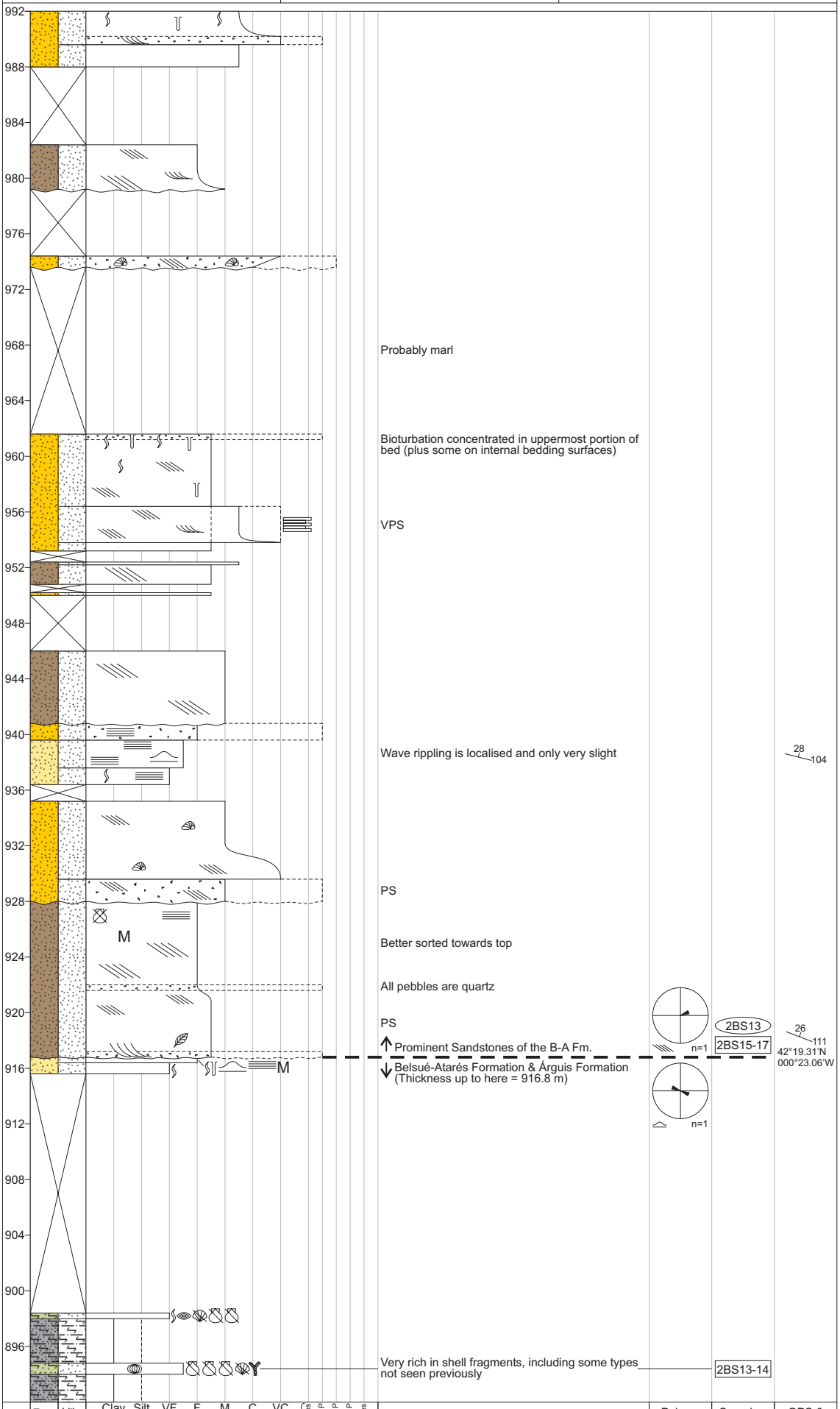
Sector: Southern Jaca Basin	**Belsué**	Page: 8 of 11
Dates Logged: 20-21&25-26/5/02 & 2&9/6/03		Logged By: Jamie Moss & Stuart Jones



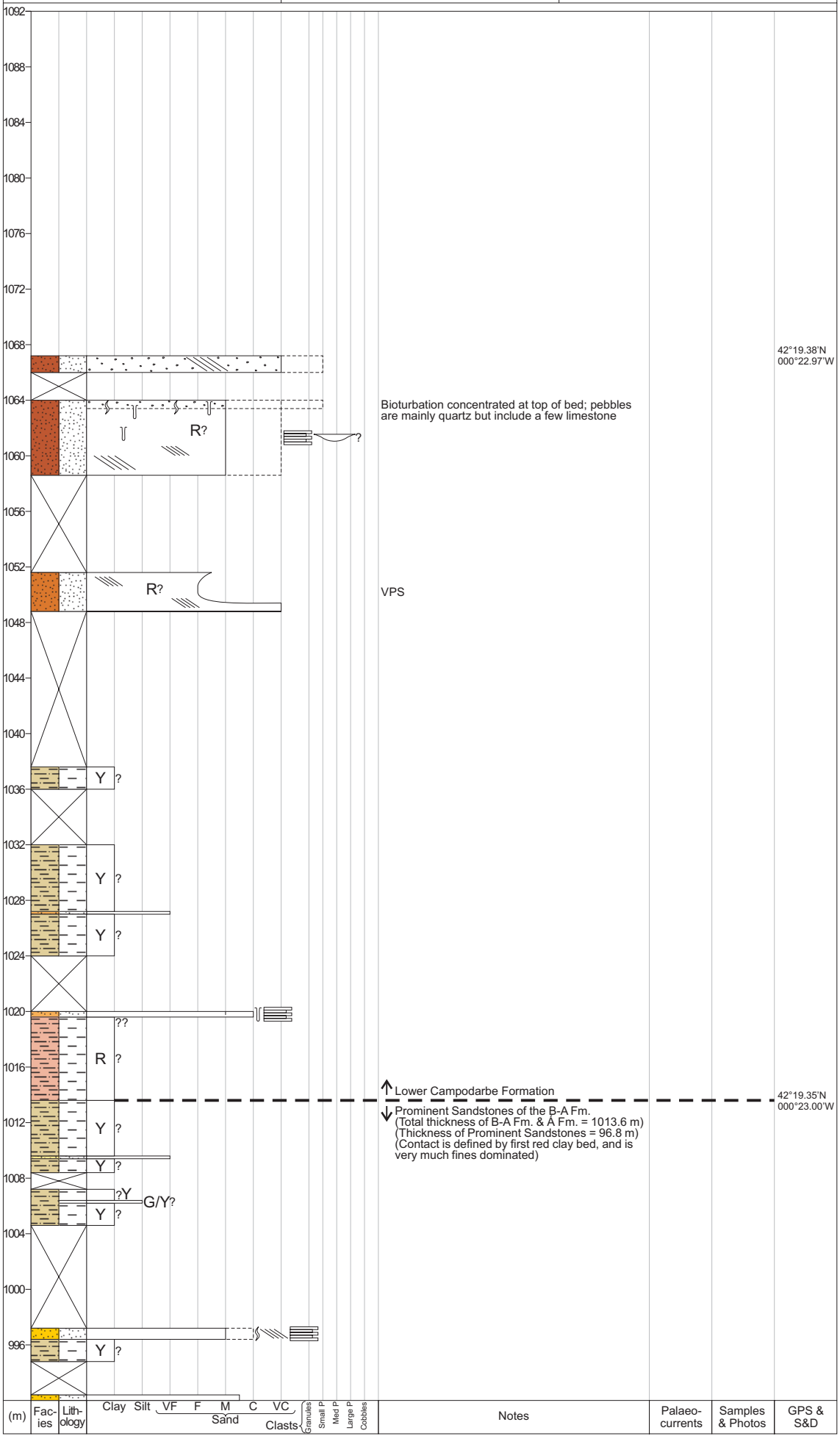
Sector: Southern Jaca Basin	**Belsué**	Page: 9 of 11
Dates Logged: 20-21&25-26/5/02 & 2&9/6/03		Logged By: Jamie Moss & Stuart Jones



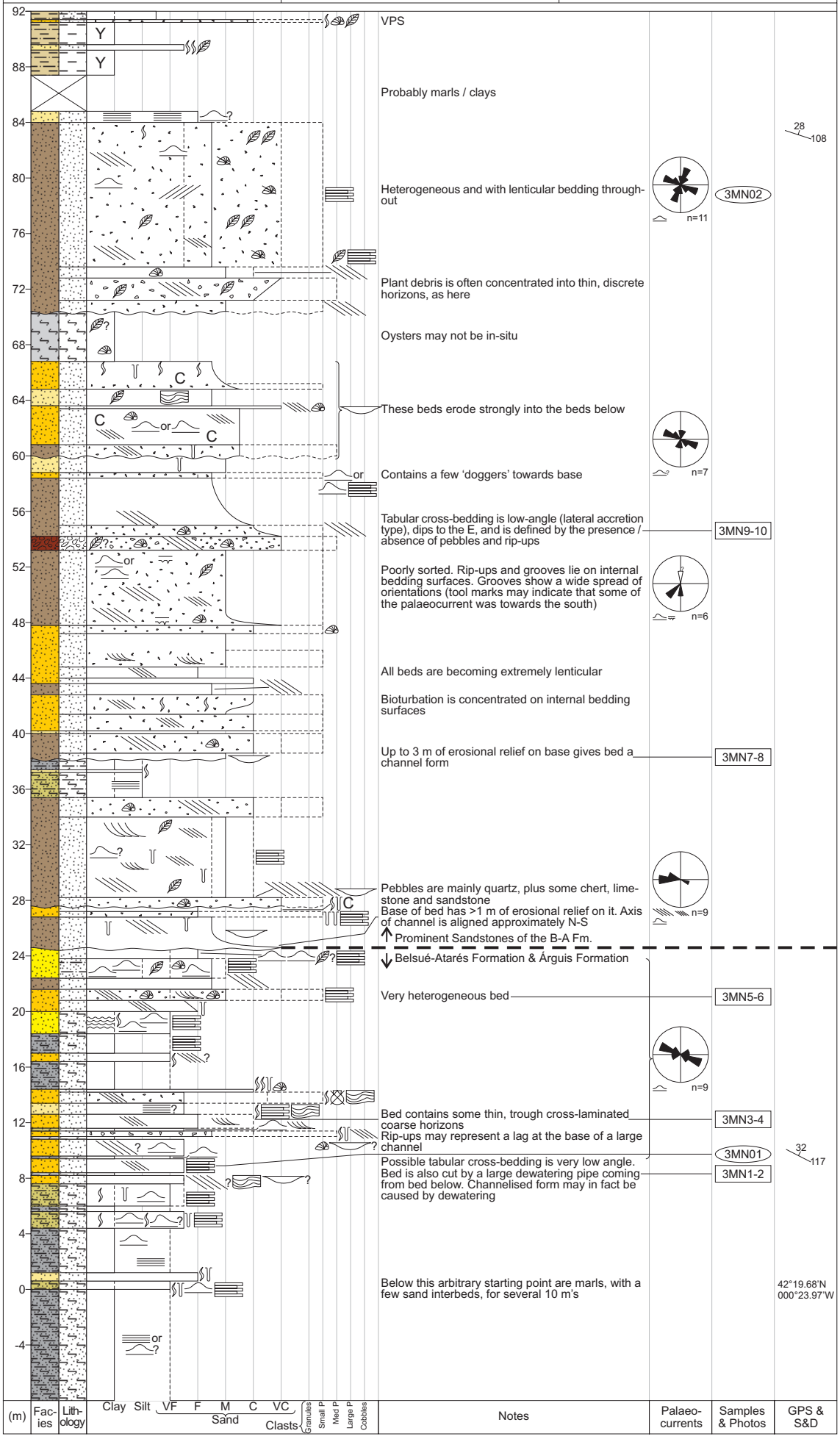
Sector: Southern Jaca Basin	**Belsué**	Page: 10 of 11
Dates Logged: 20-21&25-26/5/02 & 2&9/6/03		Logged By: Jamie Moss & Stuart Jones



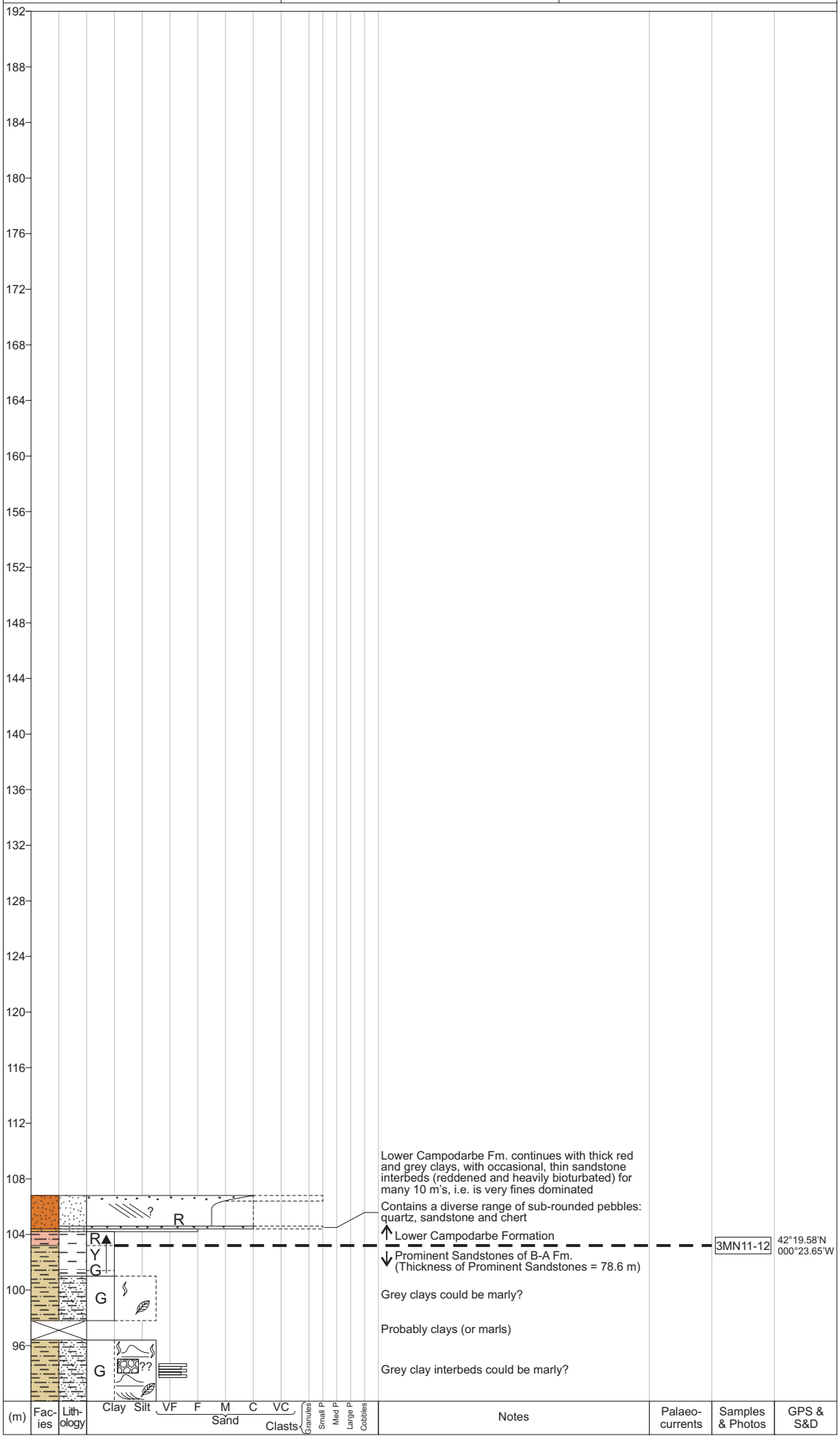
Sector: Southern Jaca Basin	**Belsué**	Page: 11 of 11
Dates Logged: 20-21&25-26/5/02 & 2&9/6/03		Logged By: Jamie Moss & Stuart Jones



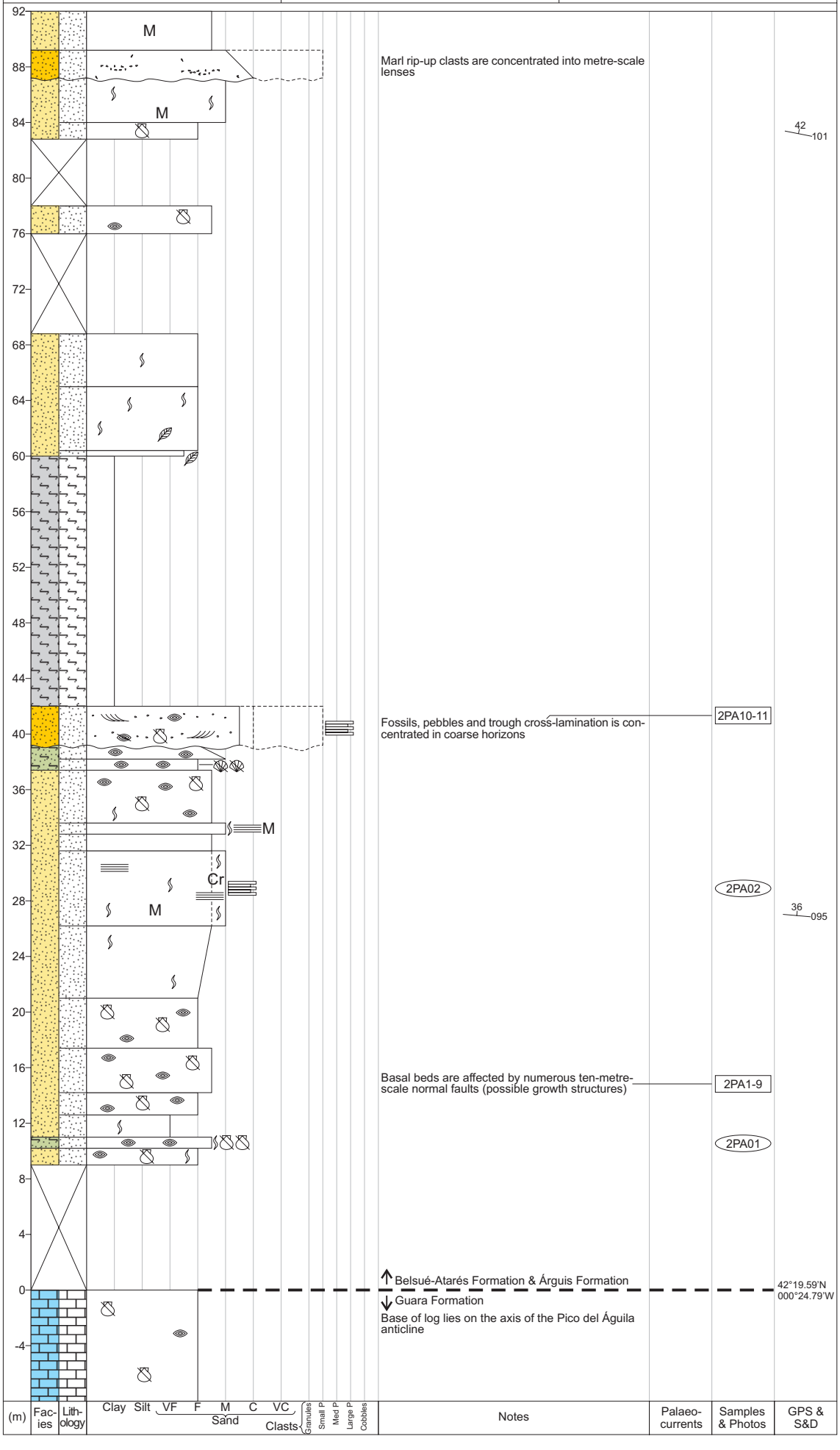
Sector: Southern Jaca Basin	**Monrepos**	Page: 1 of 2
Dates Logged: 6-11/6/03		Logged By: Jamie Moss



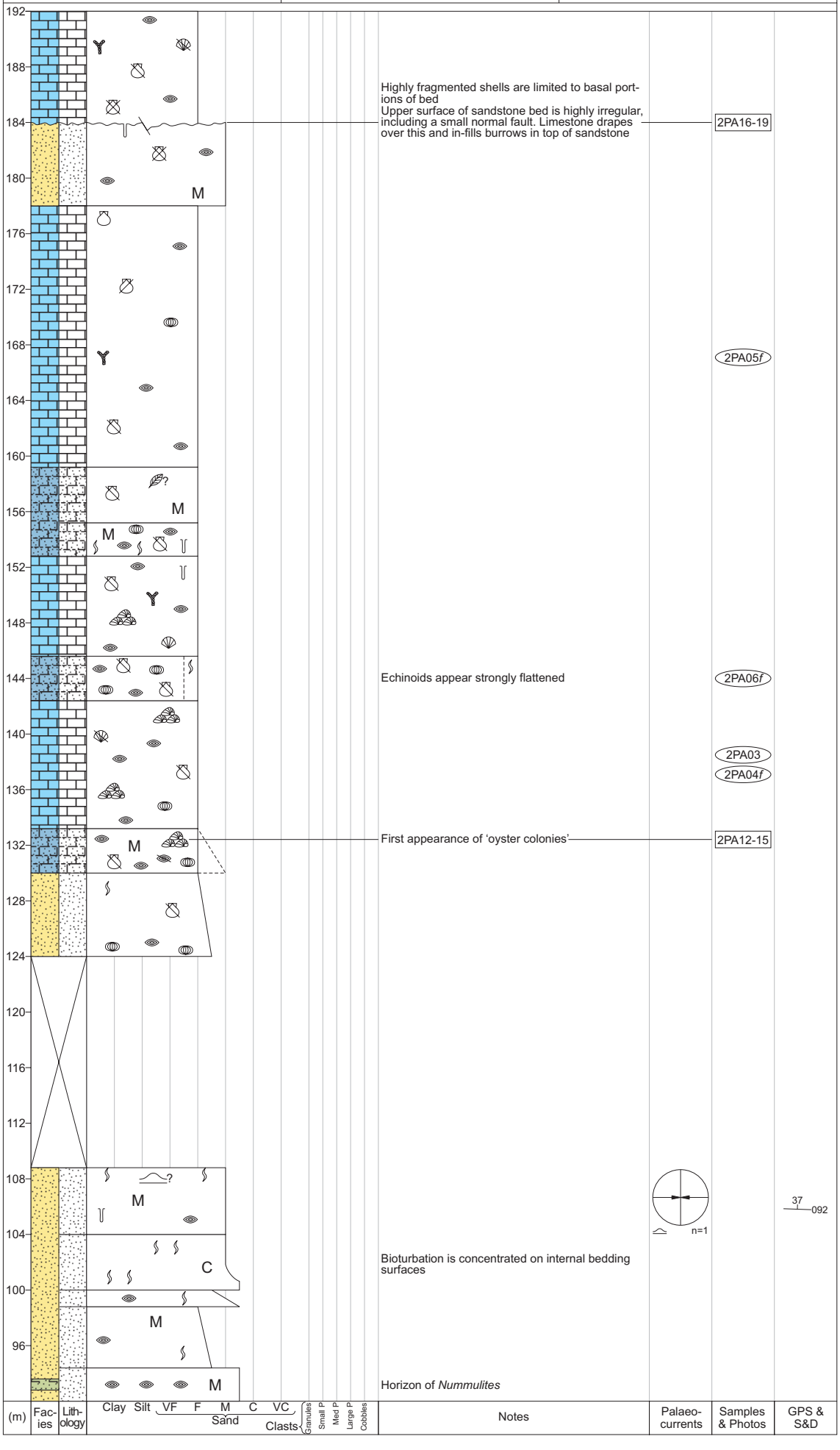
Sector: Southern Jaca Basin	**Monrepos**	Page: 2 of 2
Dates Logged: 6-11/6/03		Logged By: Jamie Moss



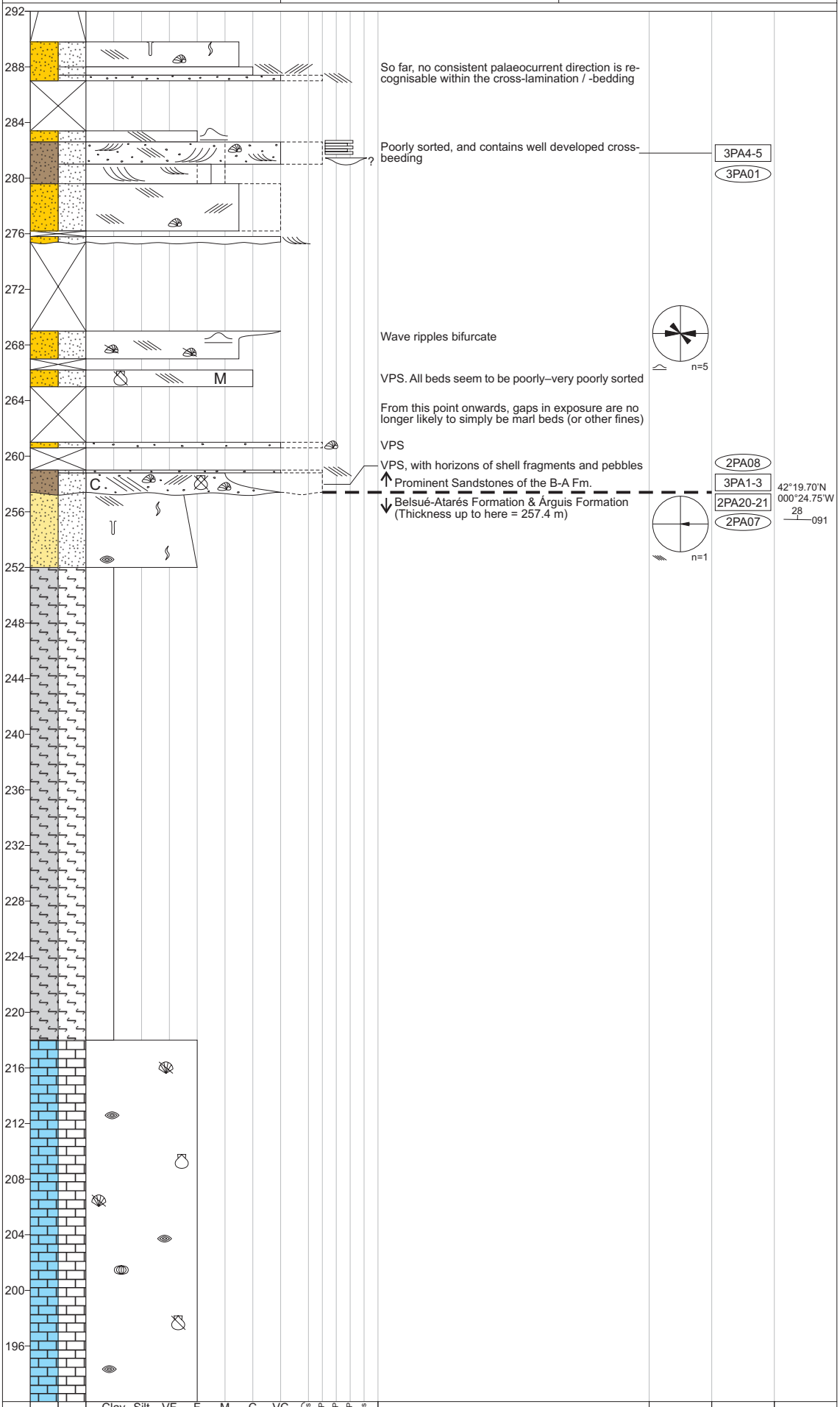
Sector: Southern Jaca Basin	**Pico del Águila**	Page: 1 of 4
Dates Logged: 26-27/5/02 & 6/6/03		Logged By: Jamie Moss



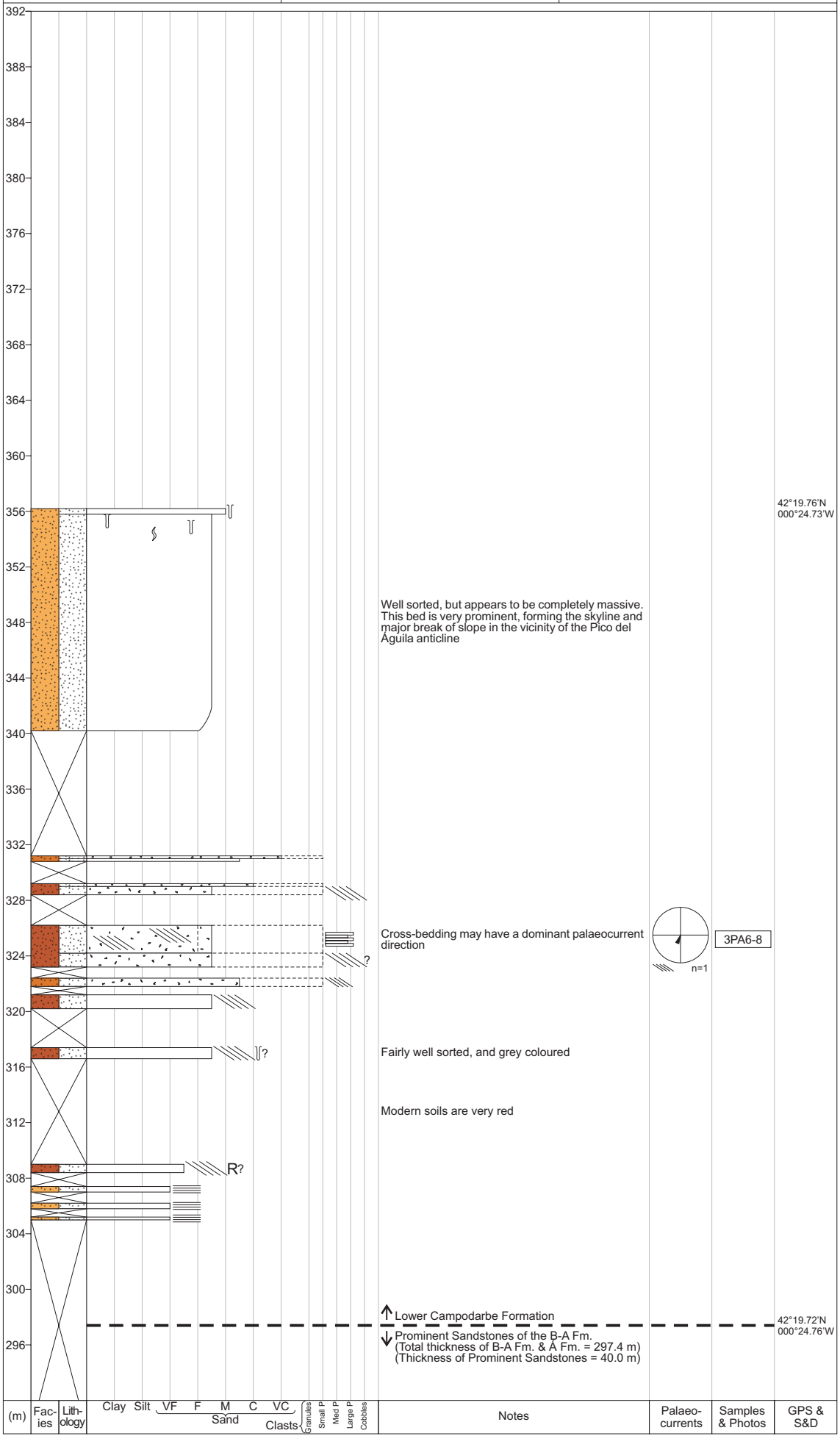
Sector: Southern Jaca Basin	**Pico del Águila**	Page: 2 of 4
Dates Logged: 26-27/5/02 & 6/6/03		Logged By: Jamie Moss



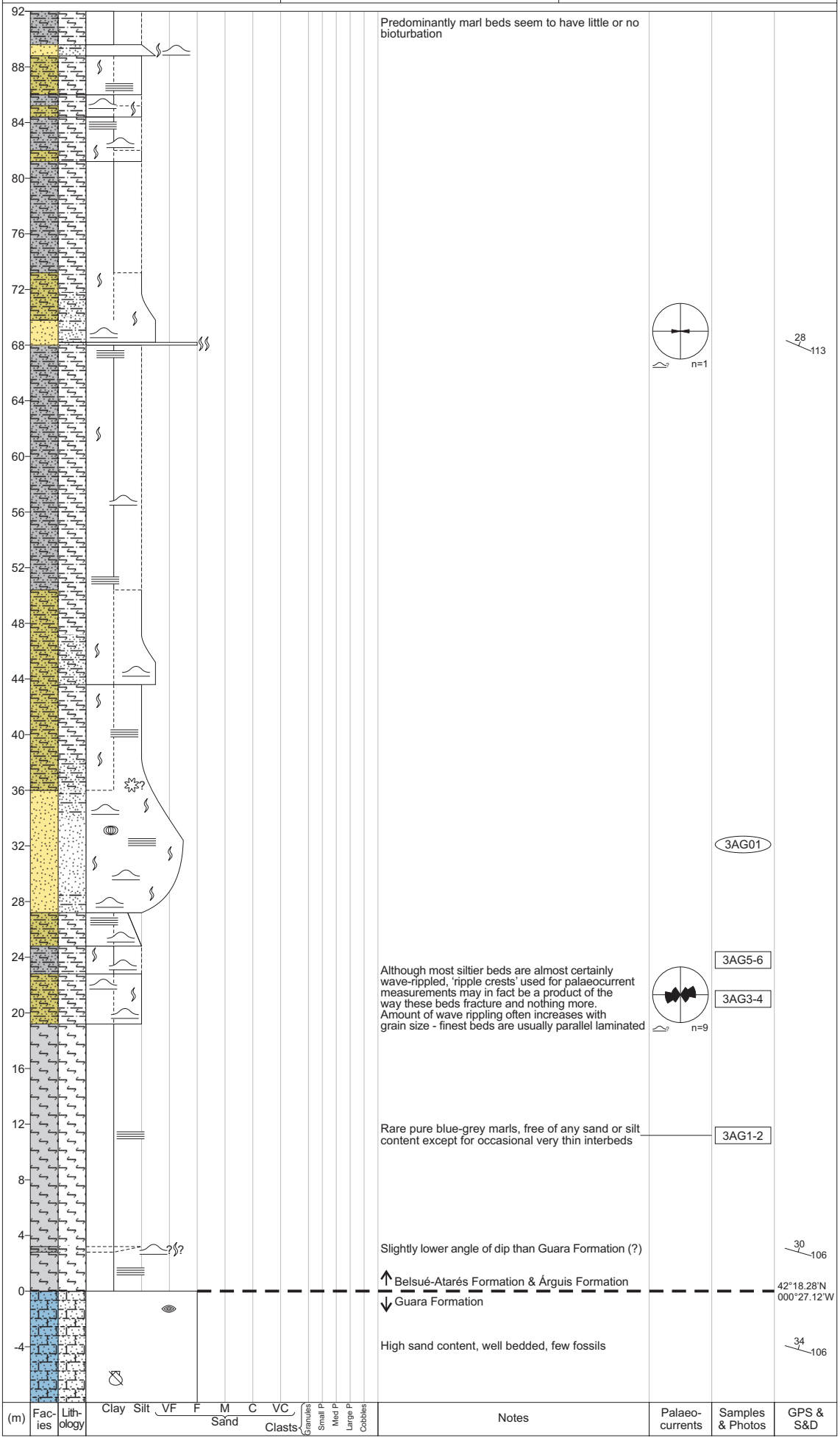
Sector: Southern Jaca Basin	**Pico del Águila**	Page: 3 of 4
Dates Logged: 26-27/5/02 & 6/6/03		Logged By: Jamie Moss



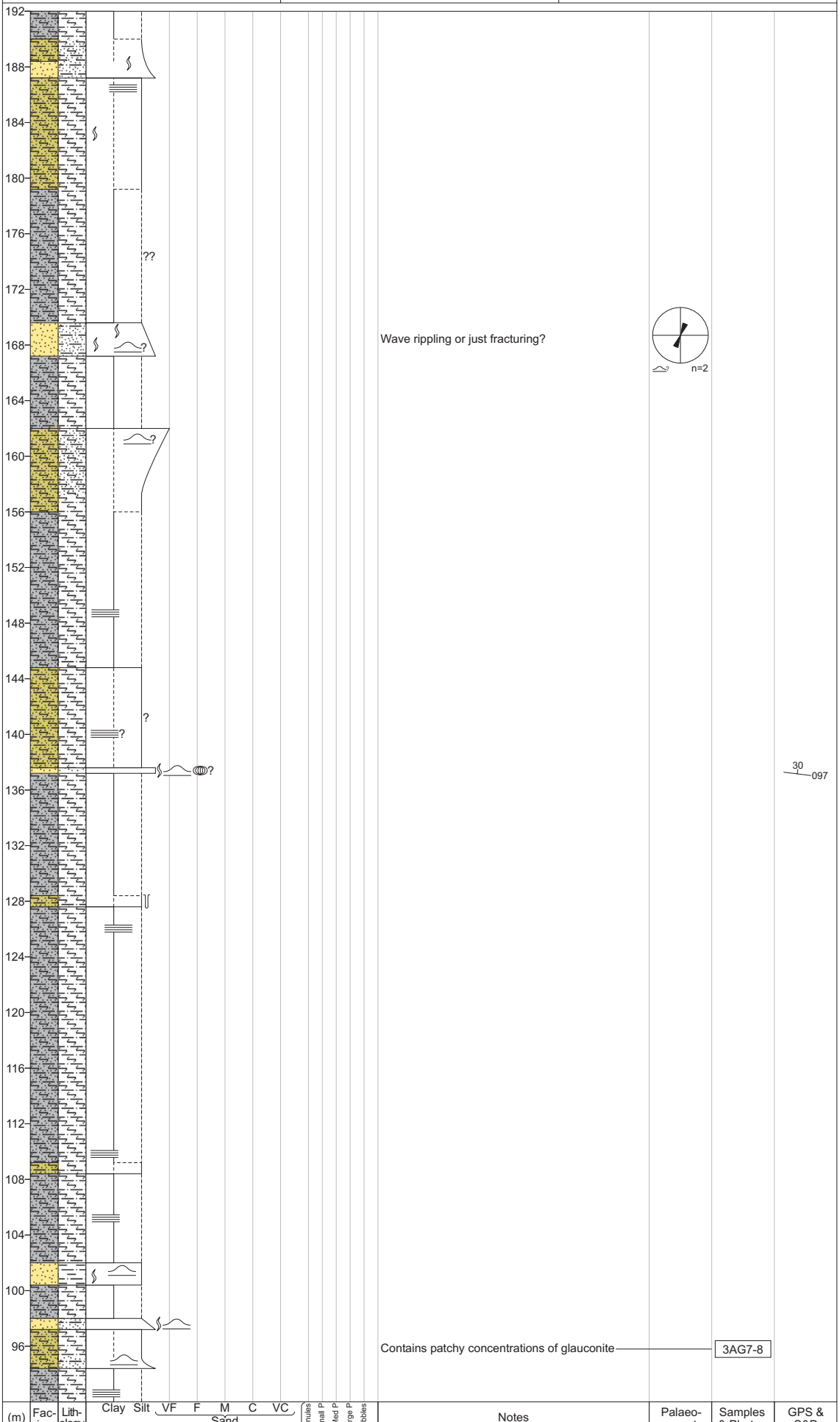
Sector: Southern Jaca Basin	**Pico del Águila**	Page: 4 of 4
Dates Logged: 26-27/5/02 & 6/6/03		Logged By: Jamie Moss



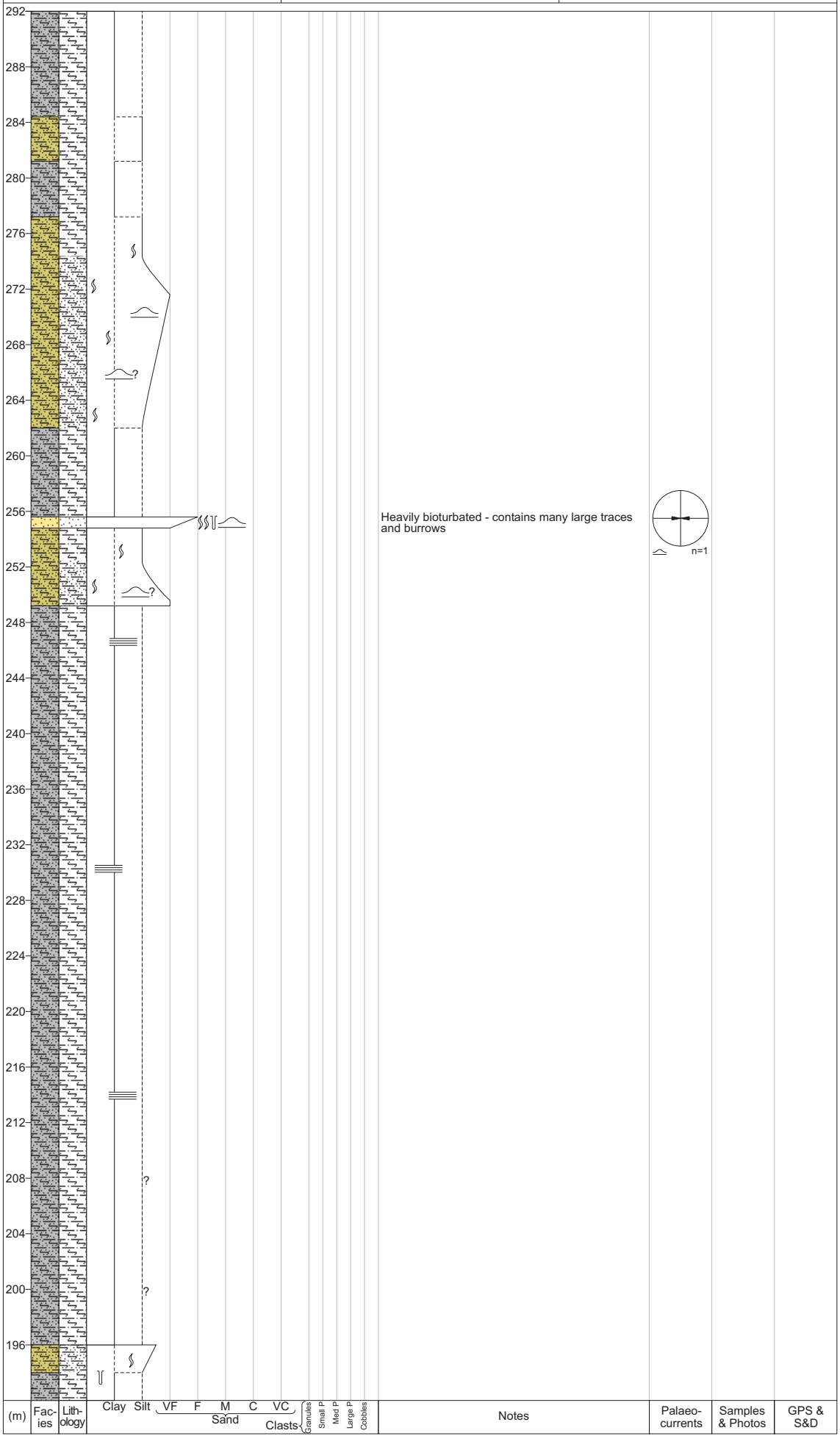
Sector: Southern Jaca Basin	**Árguis**	Page: 1 of 14
Dates Logged: 28-29/5/02 & 3-5/6/03		Logged By: Jamie Moss



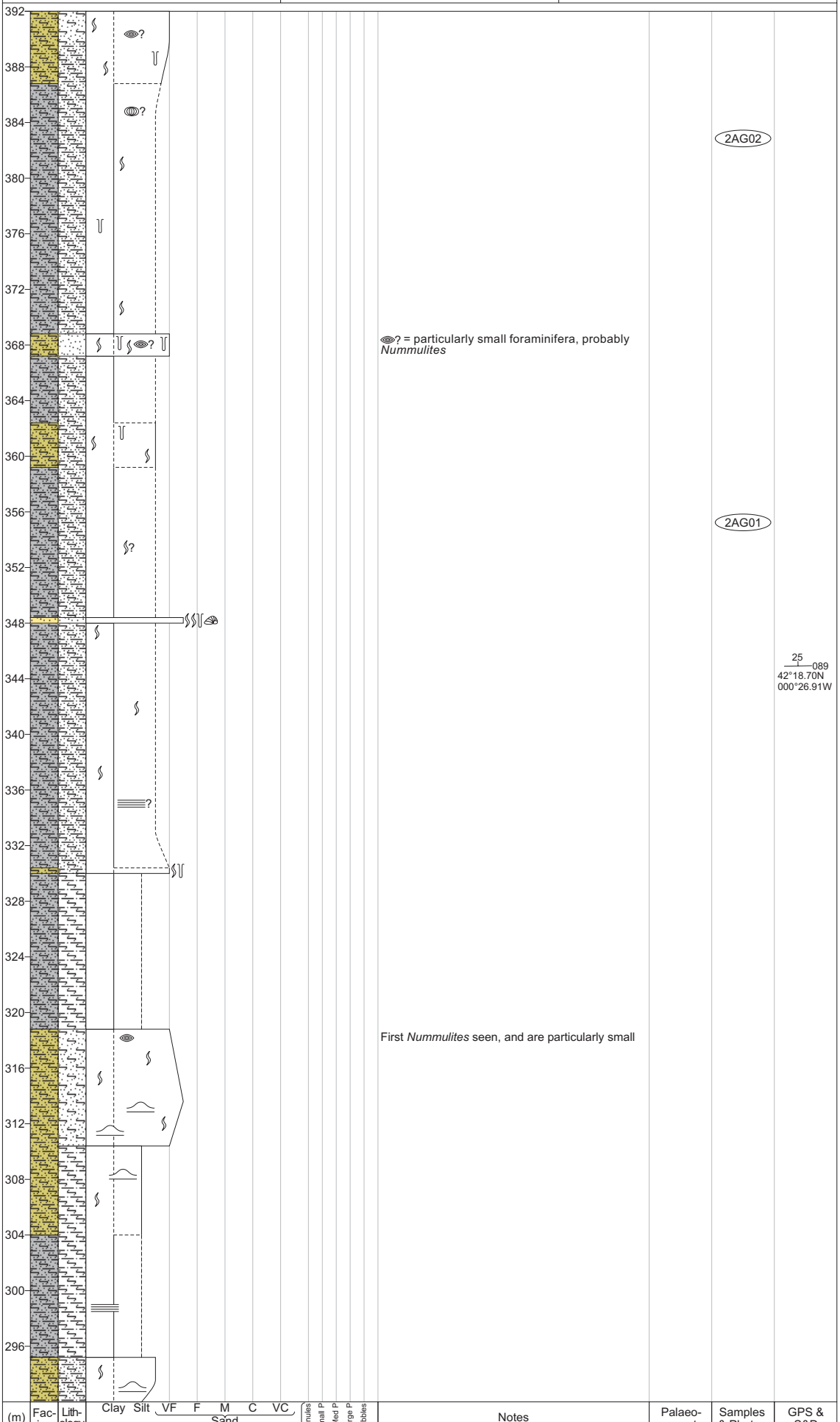
Sector: Southern Jaca Basin	**Árguis**	Page: 2 of 14
Dates Logged: 28-29/5/02 & 3-5/6/03		Logged By: Jamie Moss



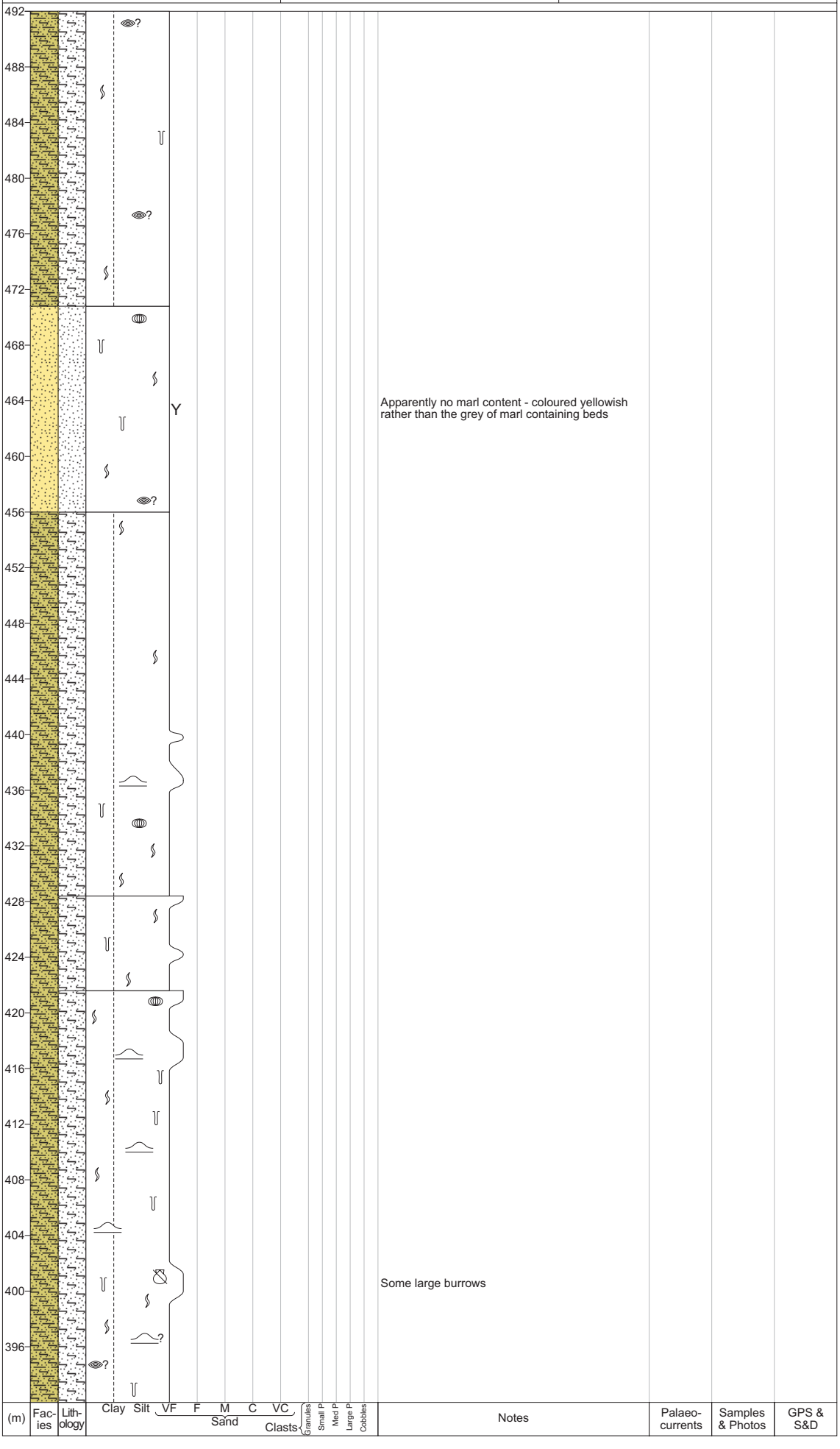
Sector: Southern Jaca Basin	**Árguis**	Page: 3 of 14
Dates Logged: 28-29/5/02 & 3-5/6/03		Logged By: Jamie Moss



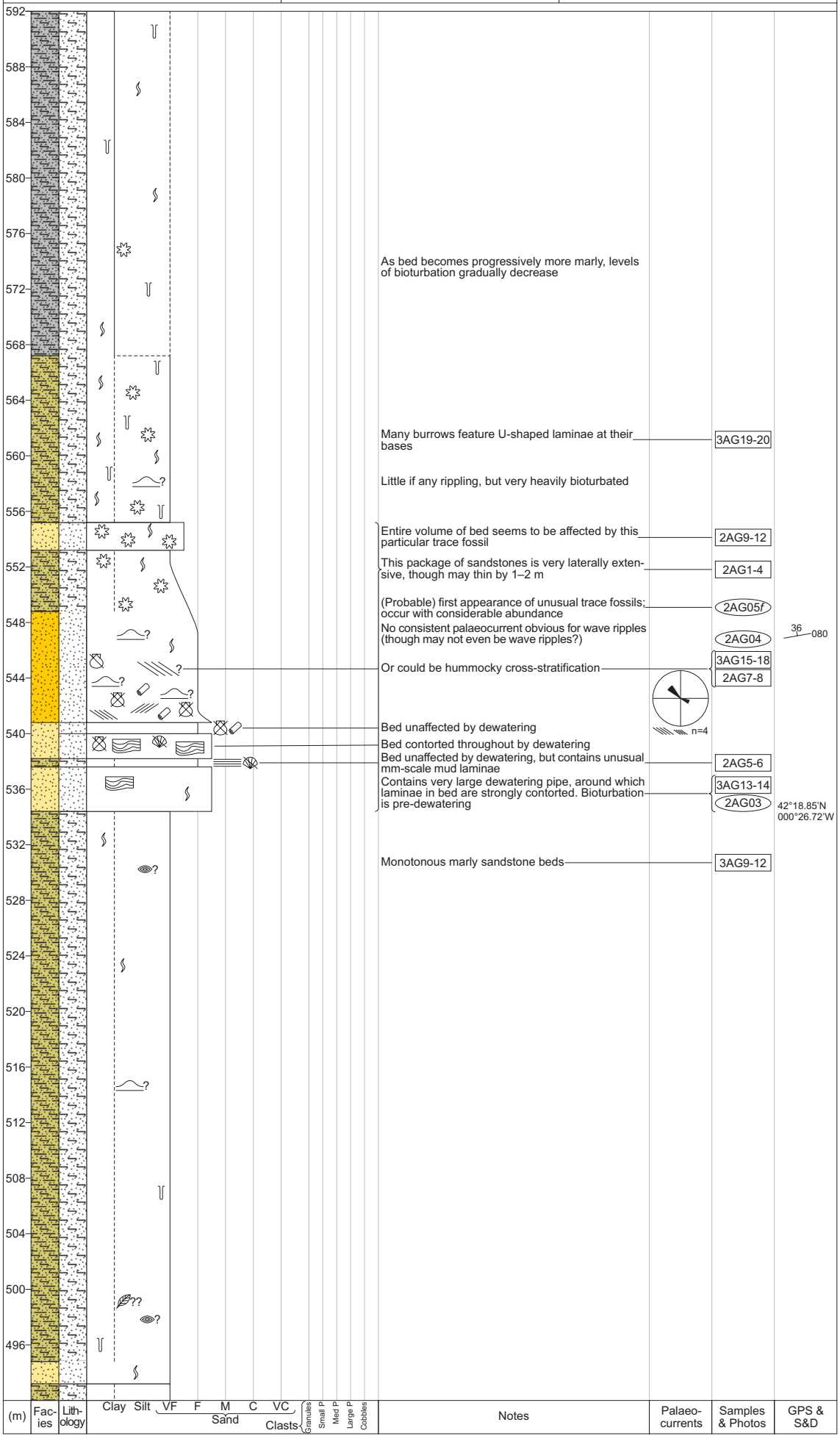
Sector: Southern Jaca Basin	**Árguis**	Page: 4 of 14
Dates Logged: 28-29/5/02 & 3-5/6/03		Logged By: Jamie Moss



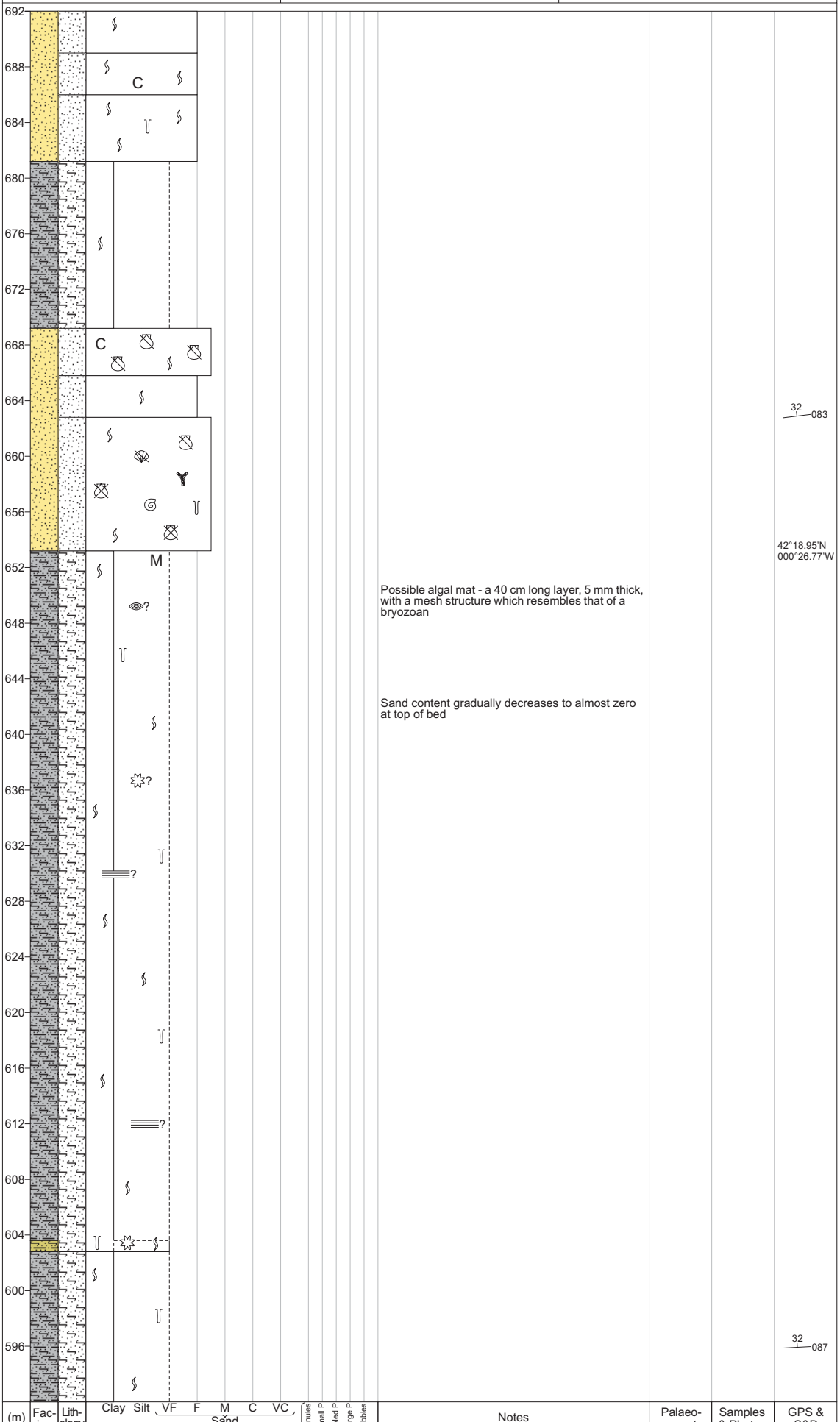
Sector: Southern Jaca Basin	**Árguis**	Page: 5 of 14
Dates Logged: 28-29/5/02 & 3-5/6/03		Logged By: Jamie Moss



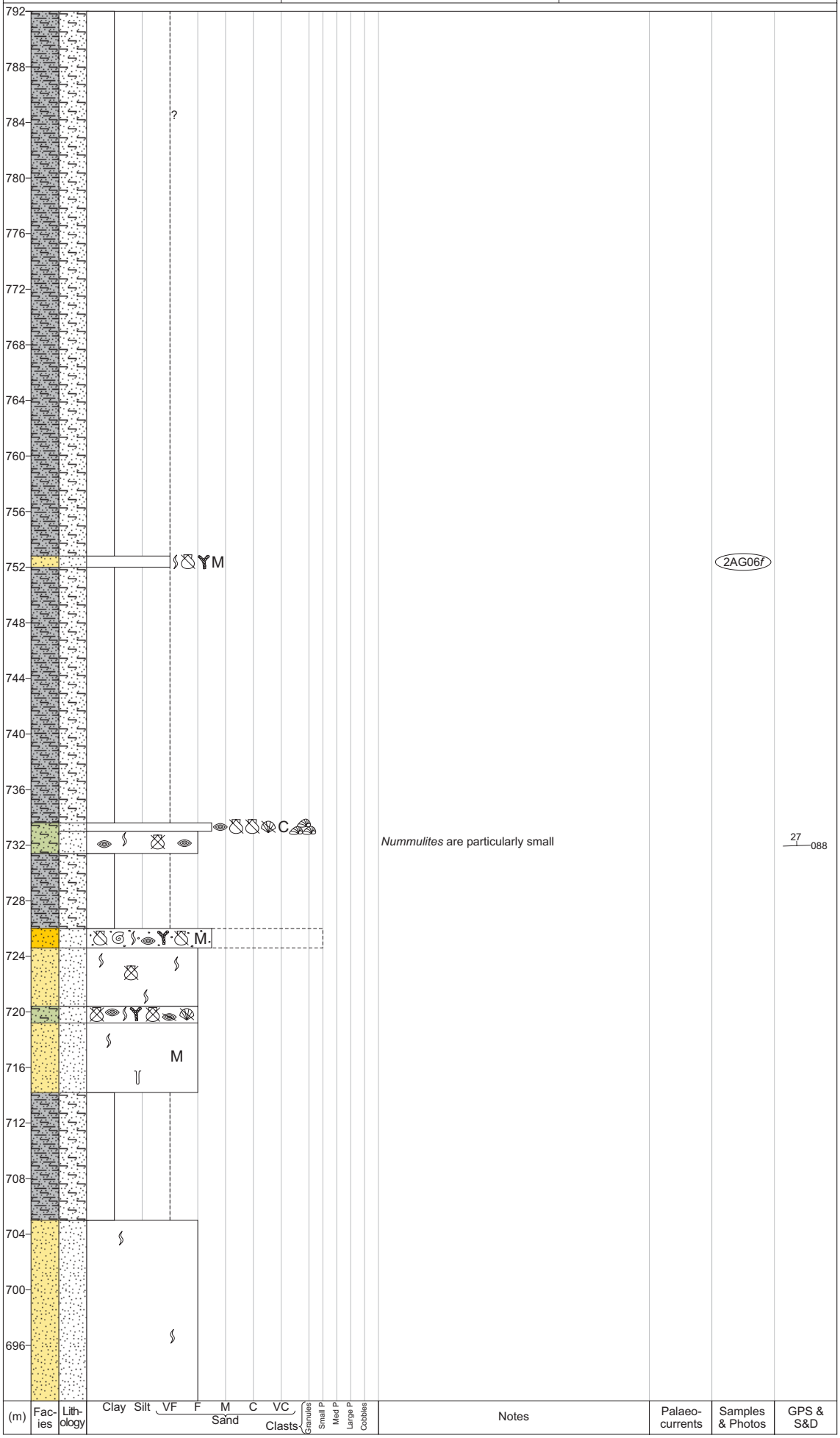
Sector: Southern Jaca Basin	**Árguis**	Page: 6 of 14
Dates Logged: 28-29/5/02 & 3-5/6/03		Logged By: Jamie Moss



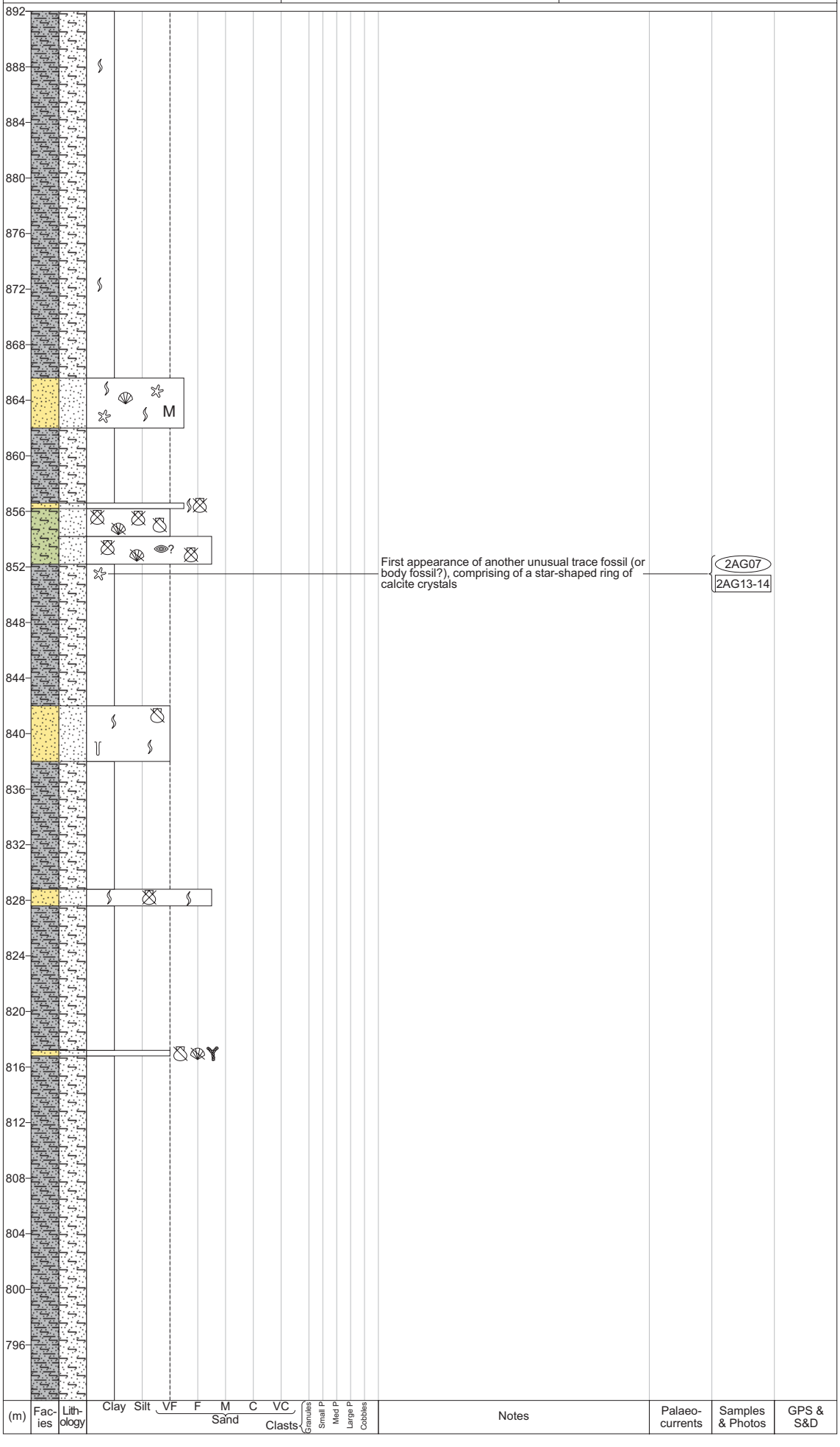
Sector: Southern Jaca Basin	**Árguis**	Page: 7 of 14
Dates Logged: 28-29/5/02 & 3-5/6/03		Logged By: Jamie Moss



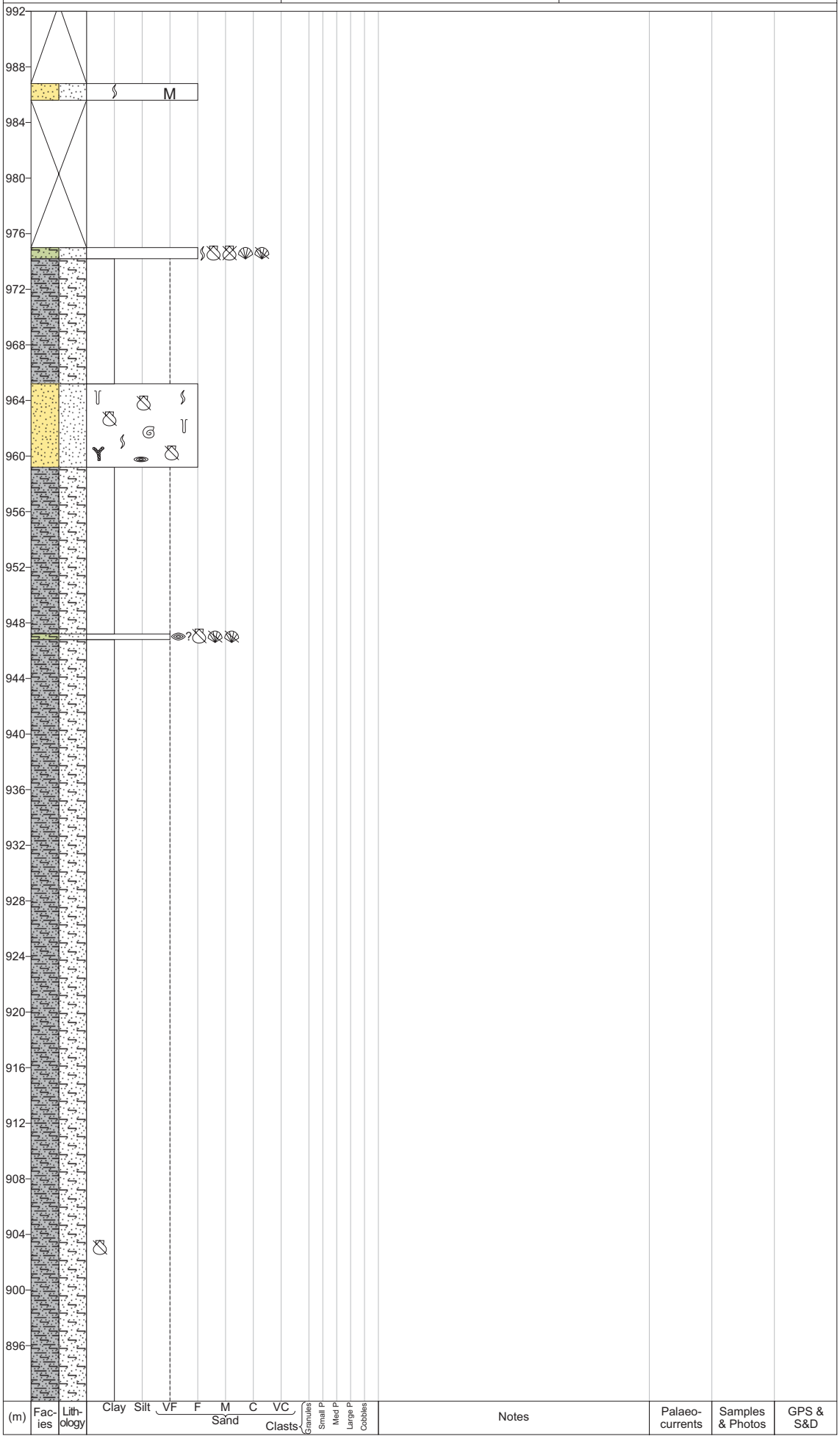
Sector: Southern Jaca Basin	**Árguis**	Page: 8 of 14
Dates Logged: 28-29/5/02 & 3-5/6/03		Logged By: Jamie Moss



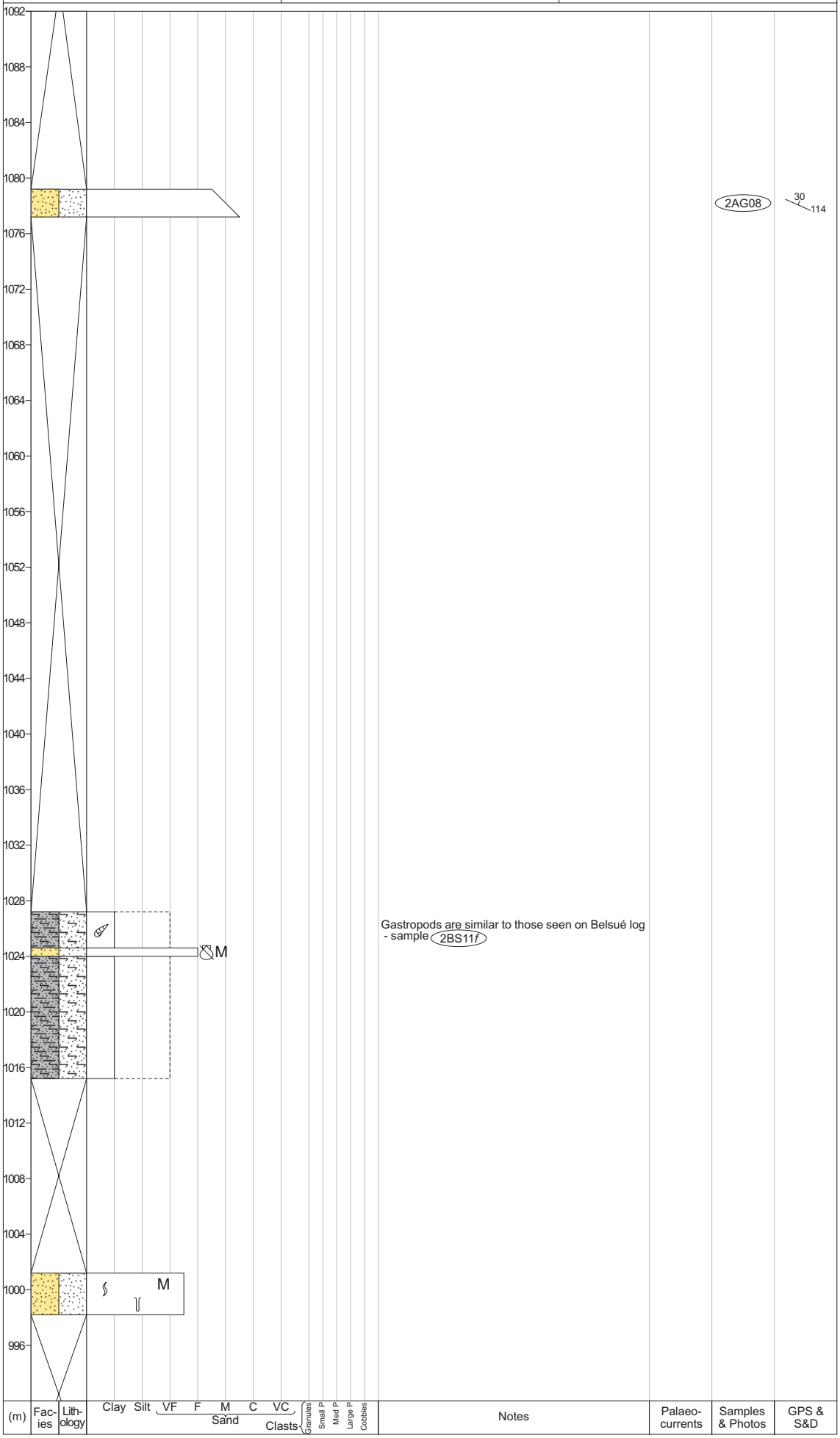
Sector: Southern Jaca Basin	**Árguis**	Page: 9 of 14
Dates Logged: 28-29/5/02 & 3-5/6/03		Logged By: Jamie Moss



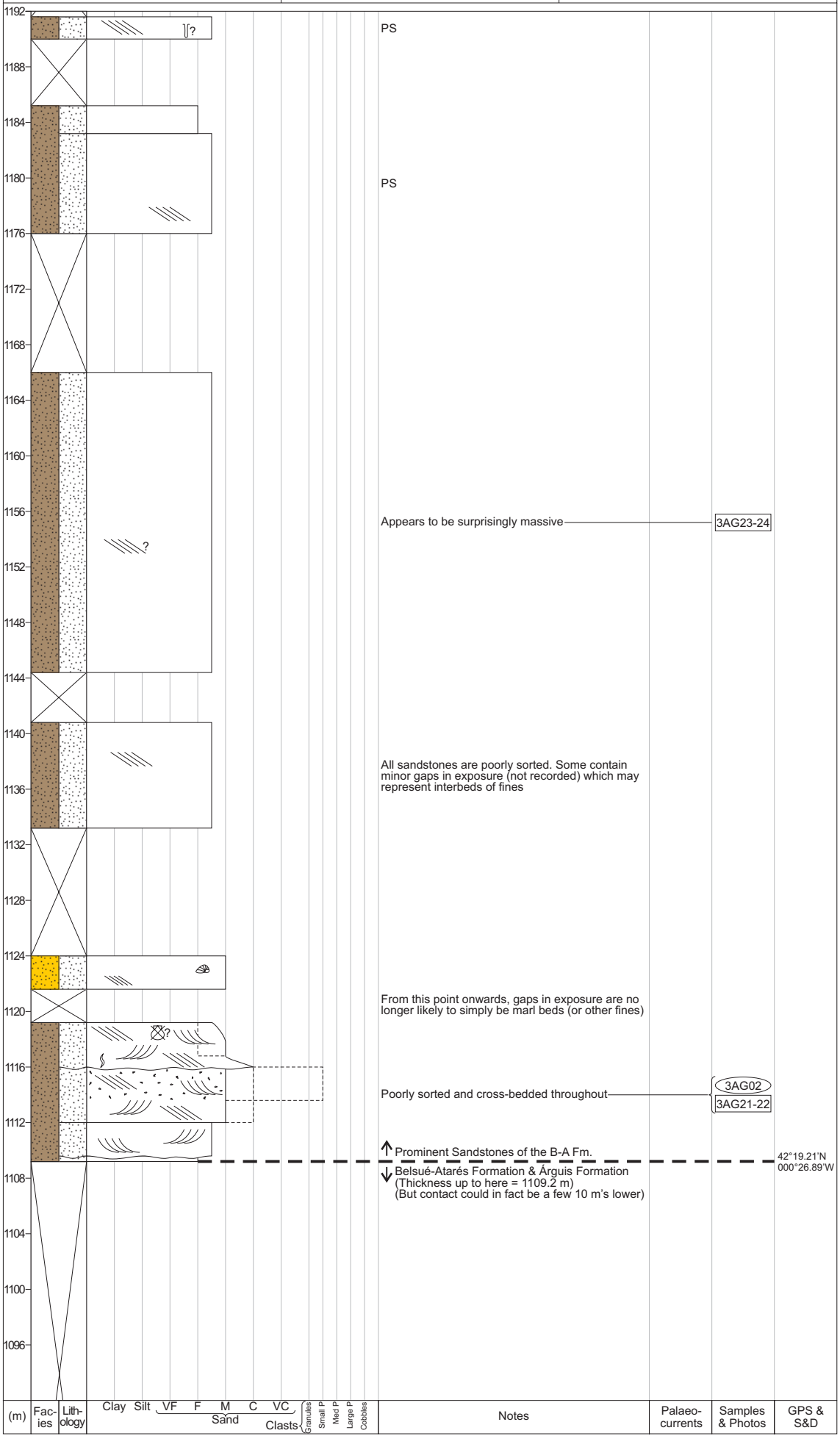
Sector: Southern Jaca Basin	**Árguis**	Page: 10 of 14
Dates Logged: 28-29/5/02 & 3-5/6/03		Logged By: Jamie Moss



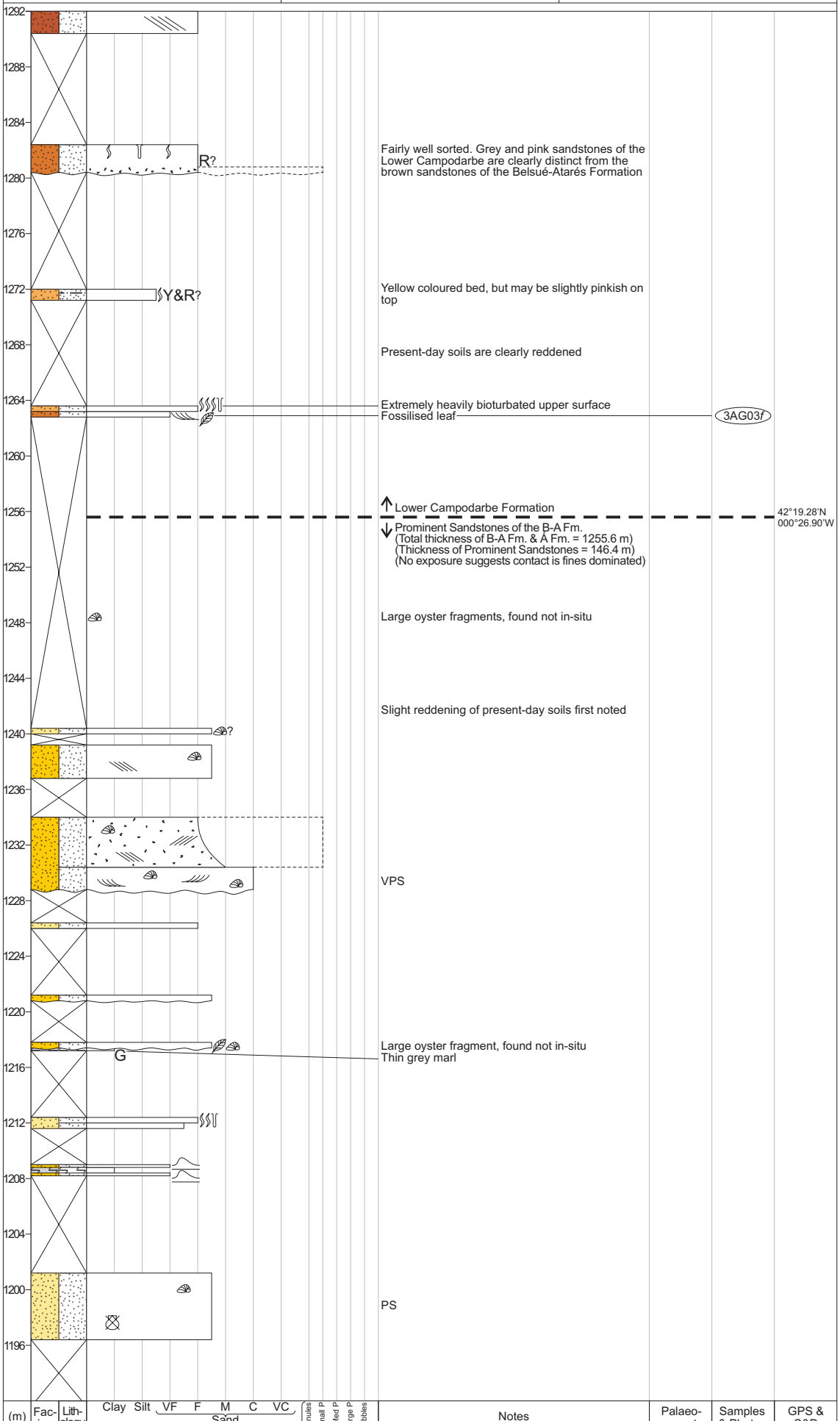
Sector: Southern Jaca Basin	**Árguis**	Page: 11 of 14
Dates Logged: 28-29/5/02 & 3-5/6/03		Logged By: Jamie Moss



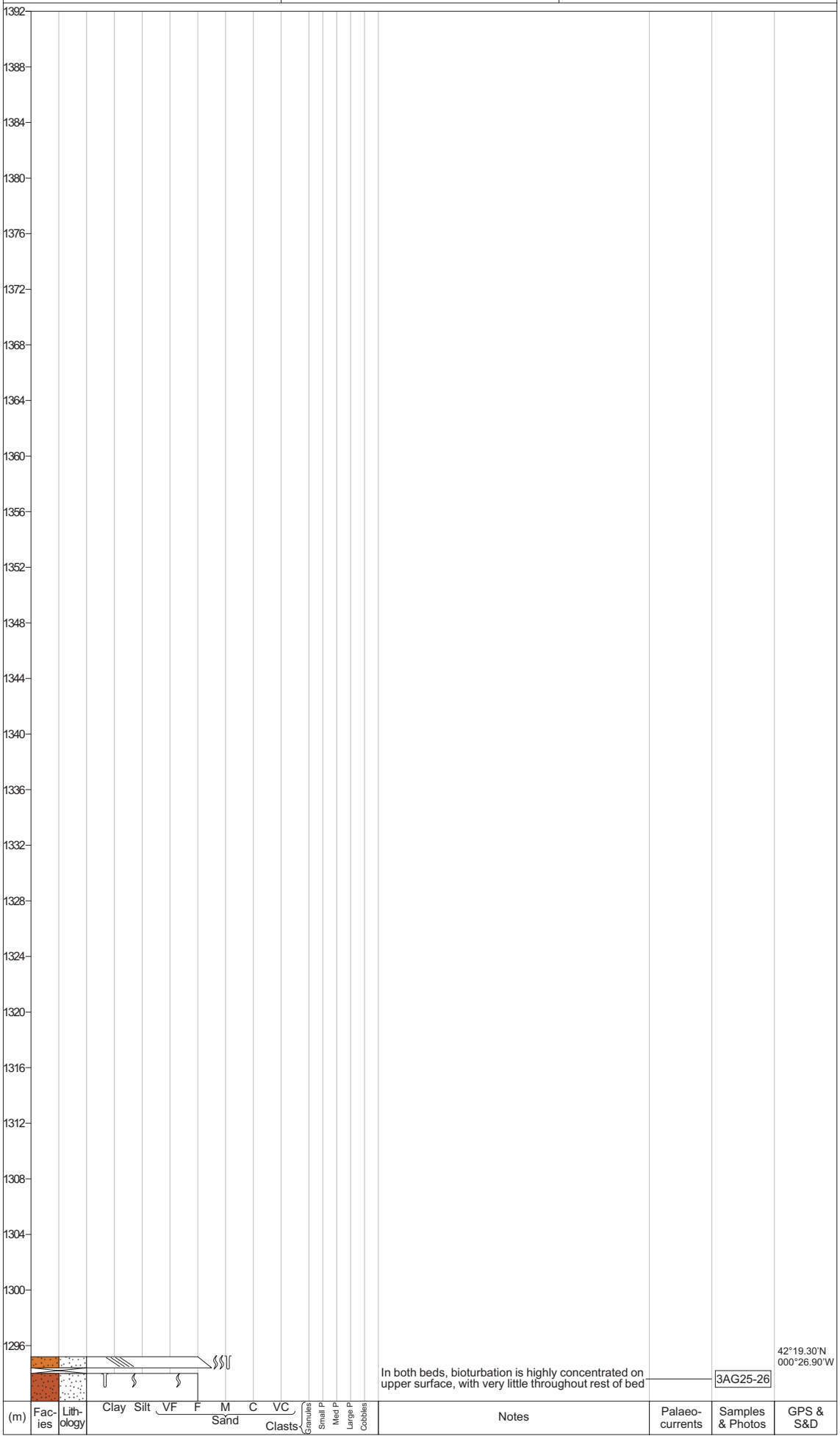
Sector: Southern Jaca Basin	**Árguis**	Page: 12 of 14
Dates Logged: 28-29/5/02 & 3-5/6/03		Logged By: Jamie Moss



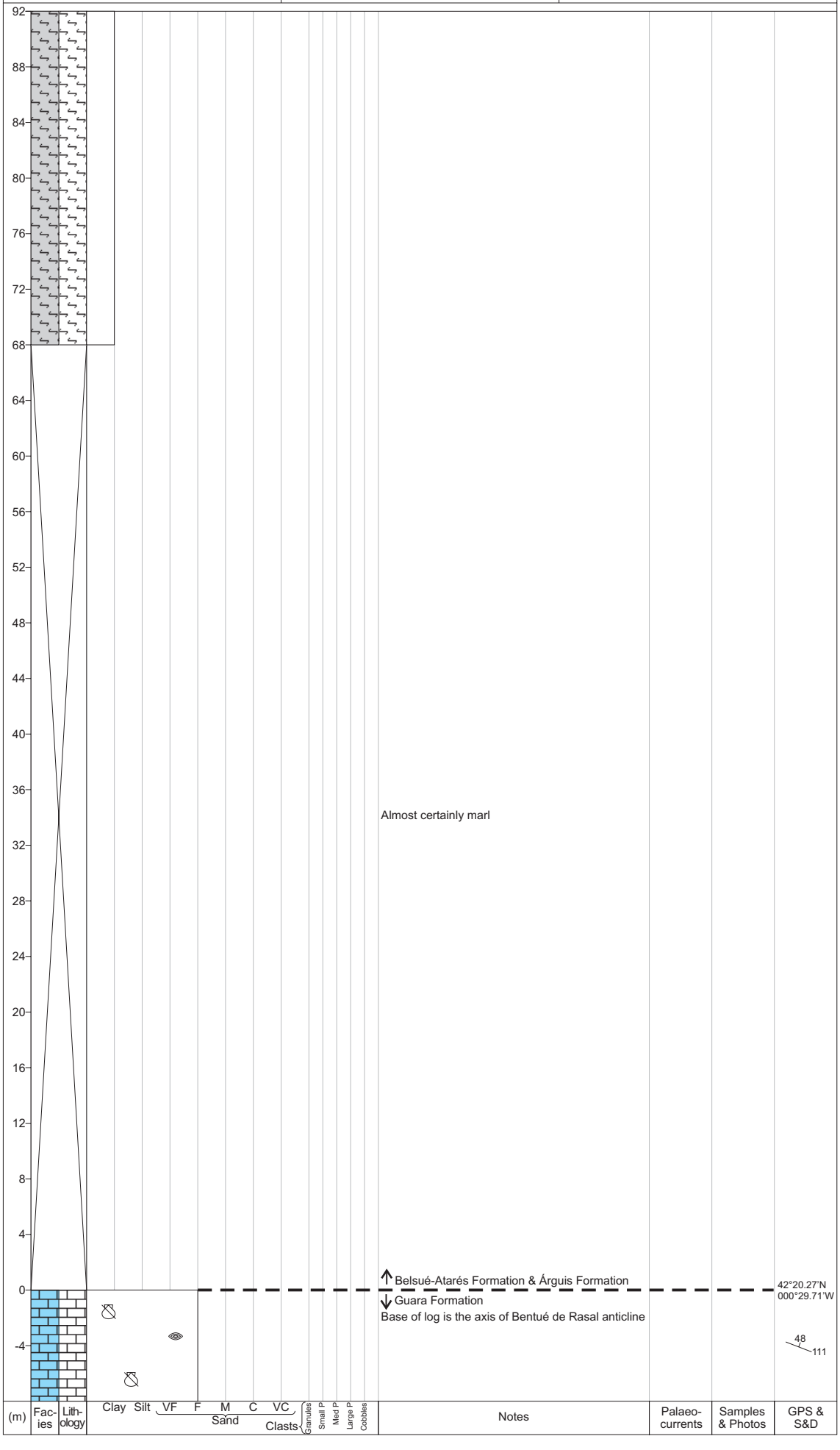
Sector: Southern Jaca Basin	**Árguis**	Page: 13 of 14
Dates Logged: 28-29/5/02 & 3-5/6/03		Logged By: Jamie Moss



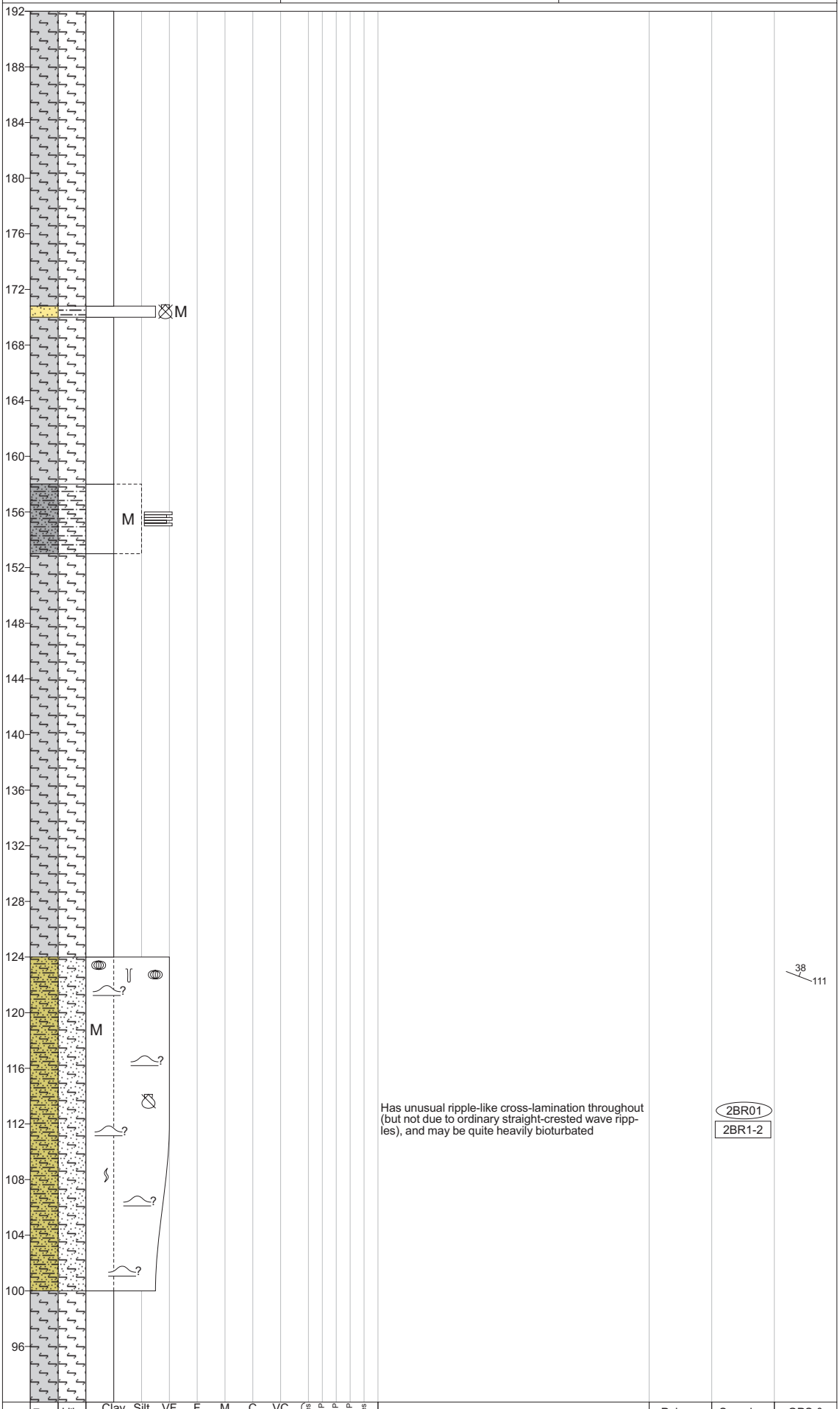
Sector: Southern Jaca Basin	**Árguis**	Page: 14 of 14
Dates Logged: 28-29/5/02 & 3-5/6/03		Logged By: Jamie Moss



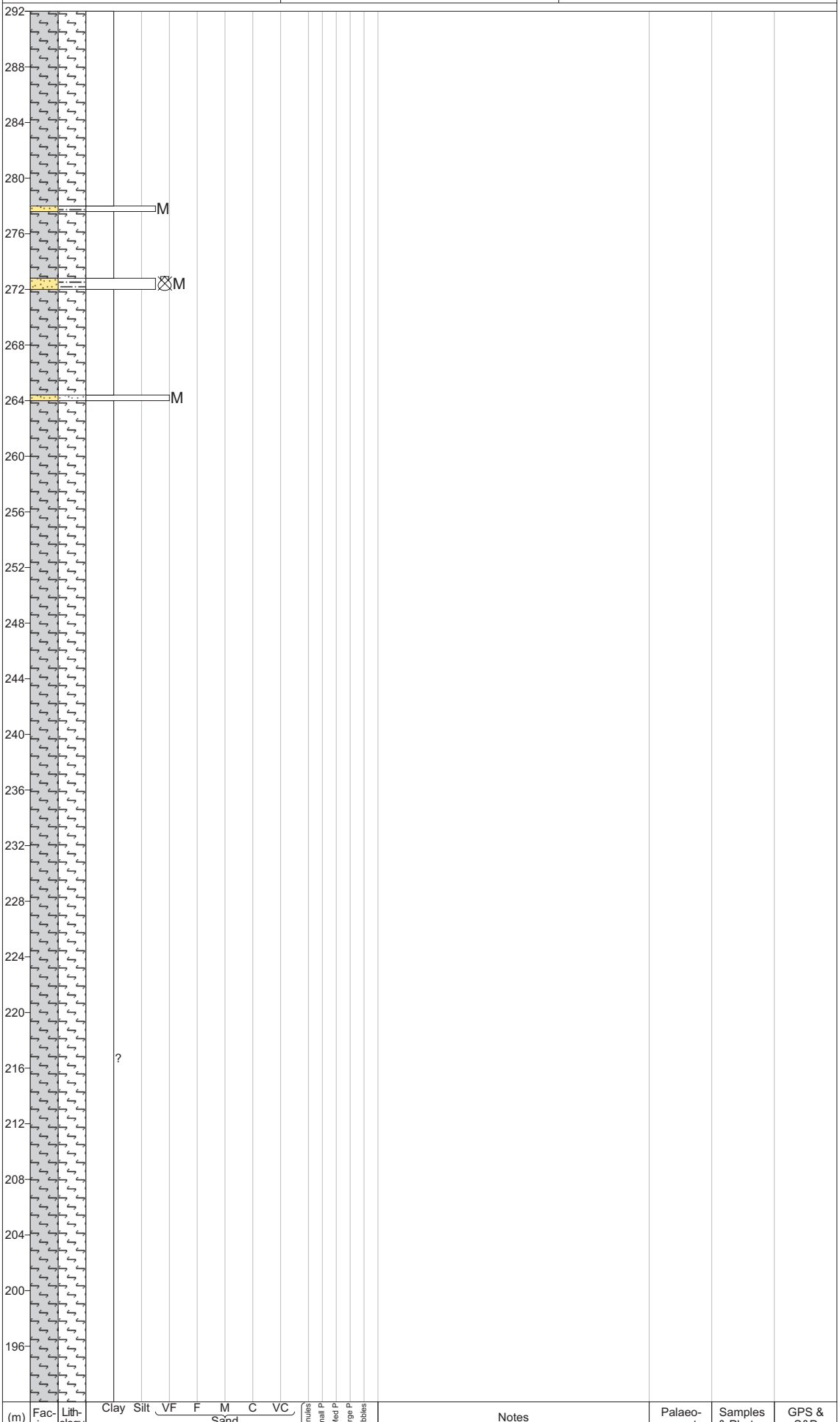
Sector: Southern Jaca Basin	**Bentué de Rasal**	Page: 1 of 8
Dates Logged: 30-31/5/02 & 10/6/03		Logged By: Jamie Moss



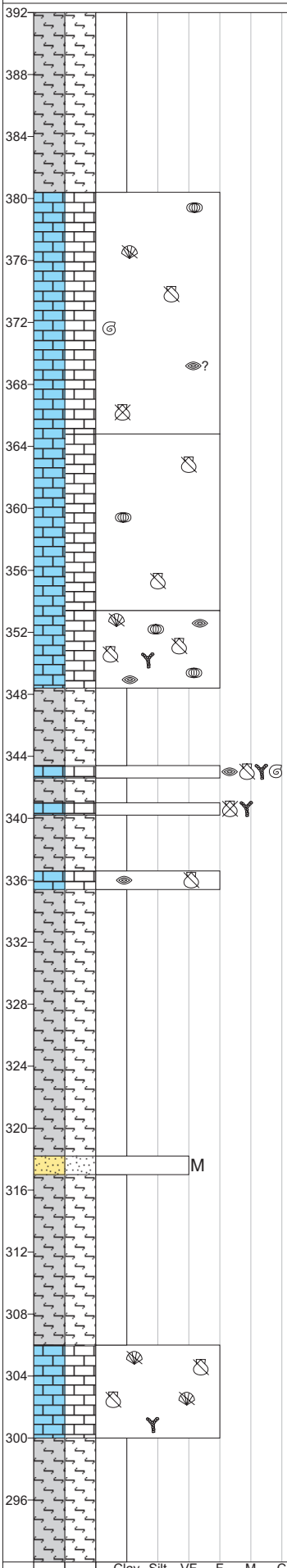
Sector: Southern Jaca Basin	**Bentué de Rasal**	Page: 2 of 8
Dates Logged: 30-31/5/02 & 10/6/03		Logged By: Jamie Moss



Sector: Southern Jaca Basin	**Bentué de Rasal**	Page: 3 of 8
Dates Logged: 30-31/5/02 & 10/6/03		Logged By: Jamie Moss

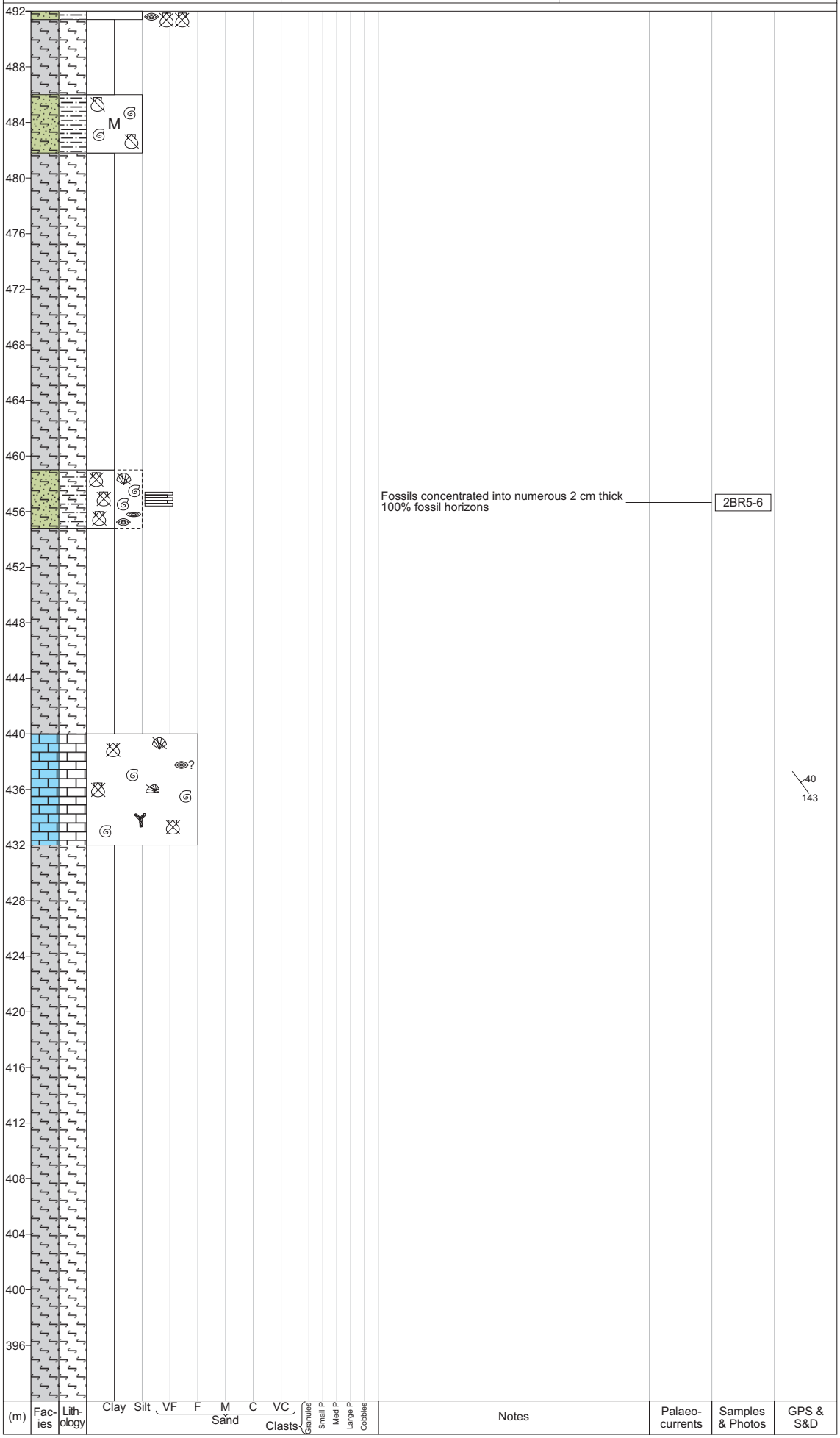


Sector: Southern Jaca Basin	**Bentué de Rasal**	Page: 4 of 8
Dates Logged: 30-31/5/02 & 10/6/03		Logged By: Jamie Moss

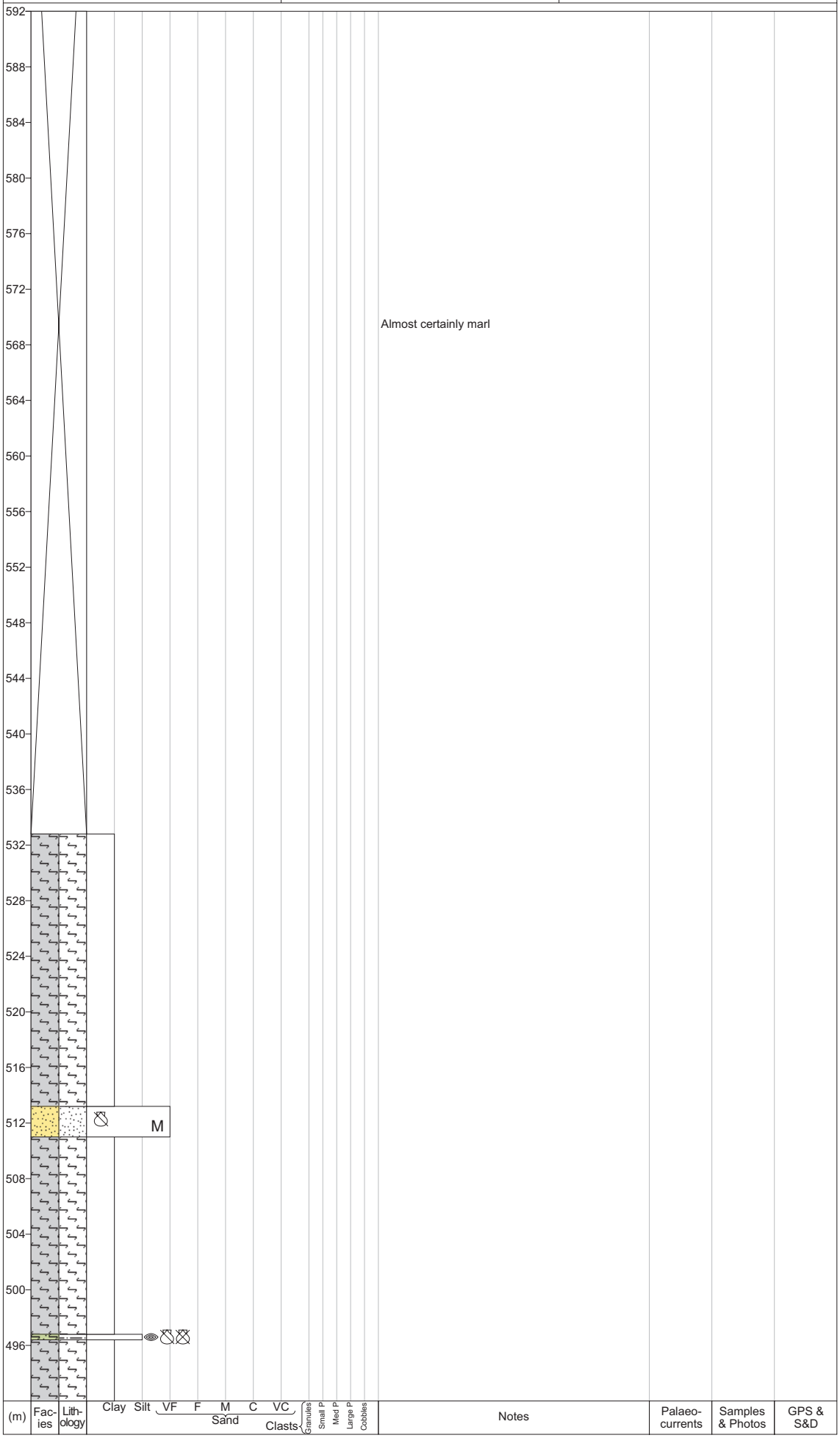


(m)	Facies	Lithology	Clay Silt VF F M C VC (Sand) Clasts (Granules, Small P, Med P, Large P, Cobbles)	Notes	Palaeocurrents	Samples & Photos	GPS & S&D
				Poorly bedded		2BR05	44 / 153
				Possible very small *Nummulites*			
						2BS04	
				Well bedded limestone; shell fragments are mostly concentrated into discreet horizons		2BR03*f* 2BR02 2BR3-4	
				First appearance of *Nummulites*; are unusually small (and continue to be so throughout rest of section)			
							42°20.48'N 000°29.60'W

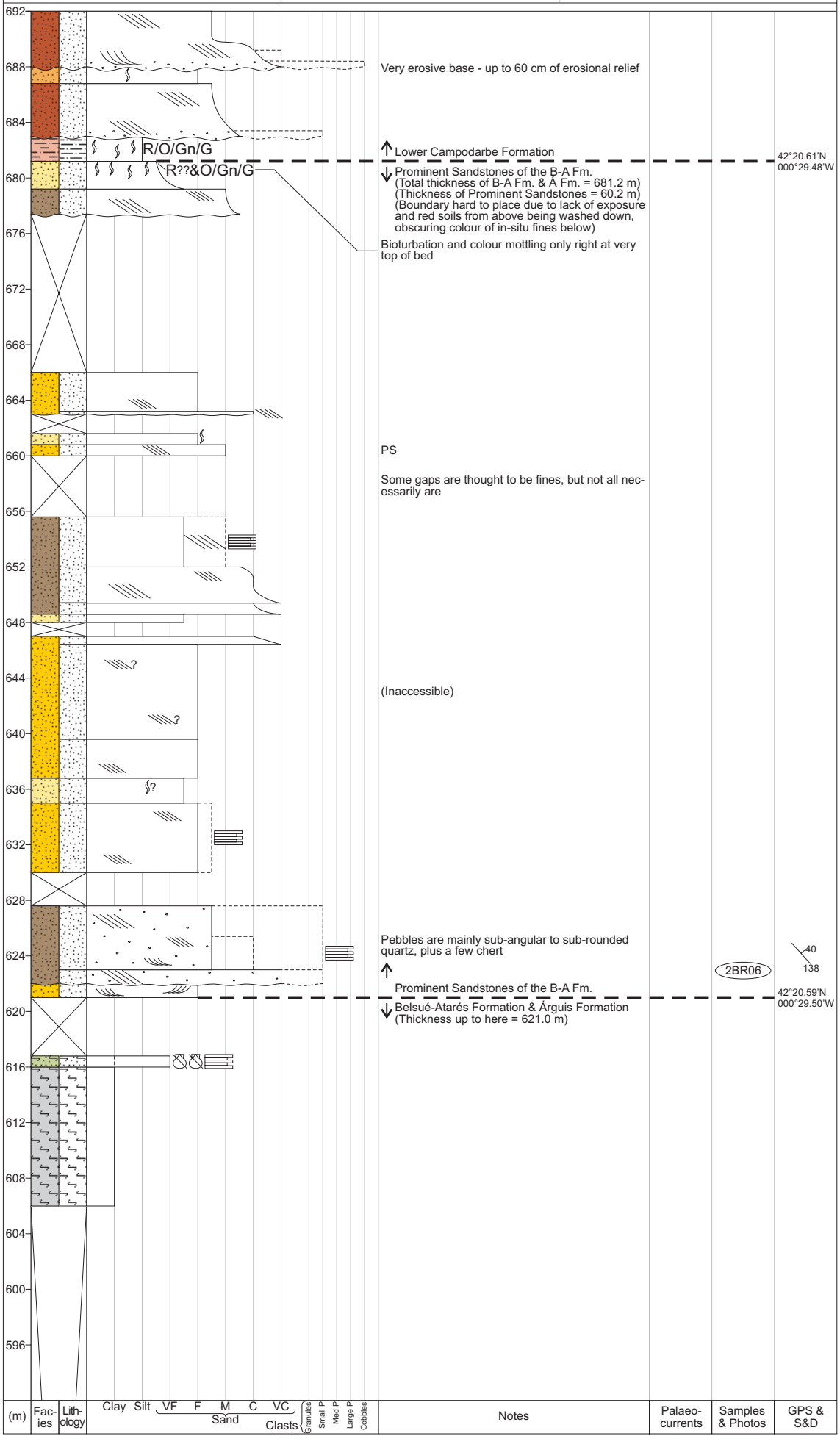
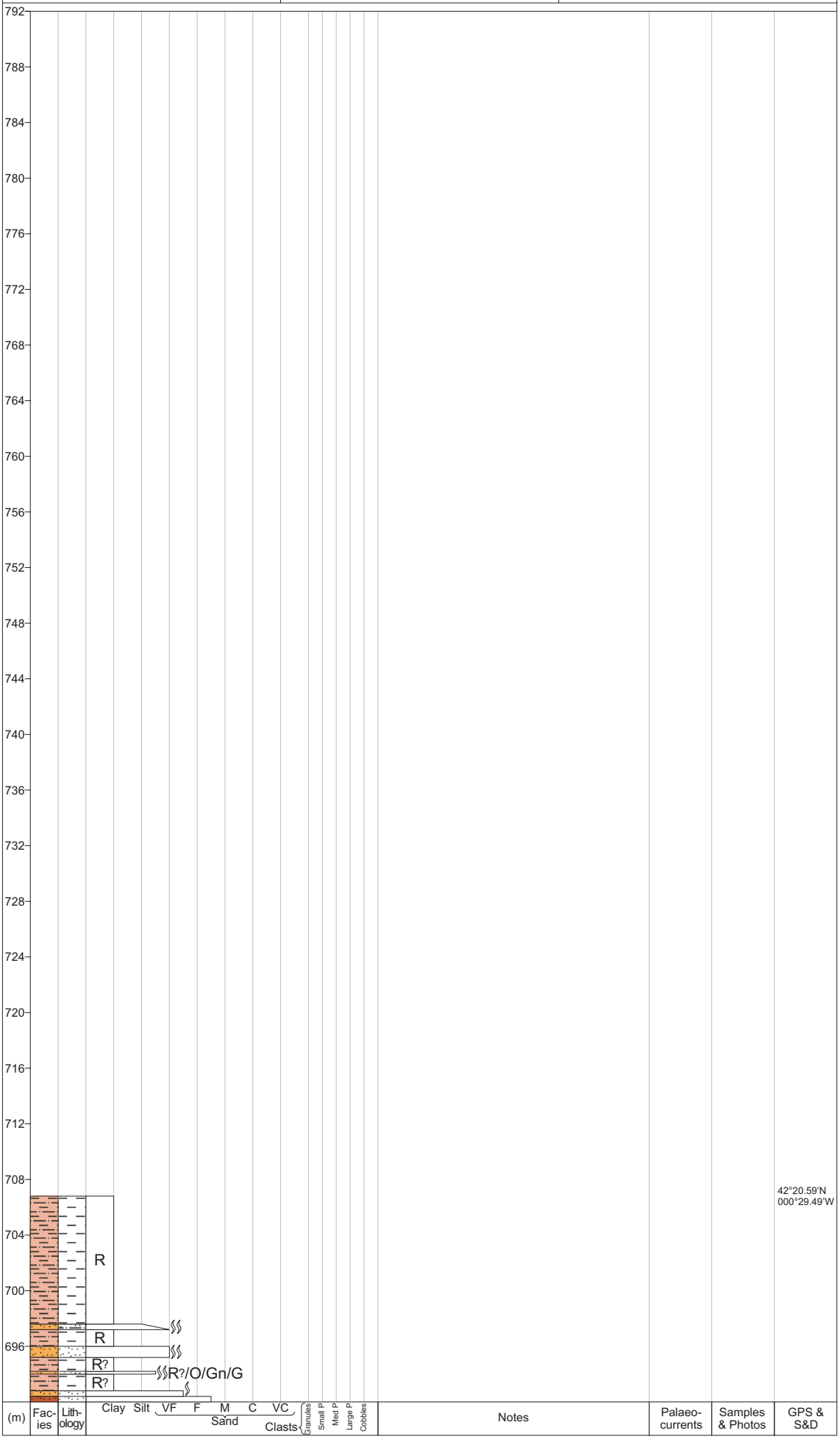
Sector: Southern Jaca Basin	**Bentué de Rasal**	Page: 5 of 8
Dates Logged: 30-31/5/02 & 10/6/03		Logged By: Jamie Moss



Sector: Southern Jaca Basin	**Bentué de Rasal**	Page: 6 of 8
Dates Logged: 30-31/5/02 & 10/6/03		Logged By: Jamie Moss



Sector: Southern Jaca Basin	**Bentué de Rasal**	Page: 7 of 8
Dates Logged: 30-31/5/02 & 10/6/03		Logged By: Jamie Moss



Sector: Southern Jaca Basin	**Bentué de Rasal**	Page: 8 of 8
Dates Logged: 30-31/5/02 & 10/6/03		Logged By: Jamie Moss