## The application of graptolites in shale gas sweet spots optimization

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## Introduction

Longmaxi shale in Sichuan Basin, as the most promising target for shale gas production has attributed  $102.9 \times 10^8 \text{m}^3$  gas in 2018. However, as the fine-grained sedimentation, it is difficult to discriminate the lithology by naked eyes. Some experts argued that the layer correlation can be done by using logging curves. But in different areas, the logging curves are also different. The well preserved graptolites in Wufeng-Longmaxi enable us to correlate the shale in both spatial and temporal scales.

## Methods

We follow the graptolite biozonation reported by Chen et al. [1](Fig.1) to divide biozonations in different wells. Then all experiments data were compared and analysed.

## **Results and discussions**

XRD results show that siliceous shale is the major component for Rhuddanian and Katian stage, while argillaceous and silty shale are dominant in other stages. Cathodoluminescence analysis reveals that up to 60% of quartz in siliceous shale has an authigenic origin, which not only provides gas storage space but also resists to compaction. Organic rich shale are mainly deposited in both Rhuddanian and Katian stages with TOC ranging from 2.2% to 5.6%, on average 3.6%. Both Katian and Rhuddanian

Series	Stage	Biozonation	ć	Age Ma)	1	
	Telvchian	N2 Spirographic turri	adator at	anni.	T	
		LM9/N1 Spirographic gue	etchi	K RO	t	
	ronian	LM8 Stimulographics sed	includin.	(10)	1	
č.		LM7 Lineigraptics com	abetter	8.211	1	
dovi	Ac	LM6 Demirastrites trian	enlance	(TT)	1	
-	nuddanian	LM5 Coronographie c)	mbasi	(37)	1	
		LM4 Costographer vesic	soloran ar	1271	ŀ	
ľ		LM3 Parakidograptus aci	antonature ar	can Z	1	
	2	LM2 Akidographic asc		- 68		
	117	LMI Persculptoge pers	internet and	mantin	1	
	2	WF4 Normaloge extraordig	9500 E	dann	ſ	
lisi.	Katian	S 3 Diceroruge	NSR M	mosia	1	
rdov		WF3 3b Tangragrag	taos typicaes	141 141	1	
Cr O		3a Lowers	ubcone	473121	1	
5		WF2 Dicellographic con	optexis .	67.621	1	
		WF1 = Foliomena-Nankin	odiation		ľ	
		Fig.1 Chronostrat framework and g piozonation of Or	raptoli	te	12	

stages are featured by high paleoproductivity and stronger reducing sediment environment. Compared with other stages, early Rhuddanian(LM1-LM3) in Sichuan Basin is the most favourable target for shale gas exploration and development.

[1] Xu. C(2000), Geological Magazine137, 623-650