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Studying the Relationship Between hydrocarbons Saturation and Frequency Domain With Continuous Wavelet Transform (CWT)

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ABSTRACT

Low frequency shadows is one of hydrocarbons indicators. It can be detected by means of a time-frequency decomposition which can provide higher frequency resolution at lower frequencies and higher time resolution at higher frequencies. This is desirable for analyzing seismic data, because the hydrocarbons in reservoir are diagnostic at lower frequencies. we have carried out such analyses with post-stack data sets on Fahda field which is located in Aleppo uplift, it contains oil. Adding a frequency axis to a 2D seismic section makes the data 3D axis. The comparison of the single frequency sections from such 3D volume can be utilized to detect low frequency shadows. A preferentially illuminated single frequency section at lower frequencies from Fahda field, shows high amplitude low frequency anomalies beneath oil zones. These anomalies disappear at higher frequencies.

Key words: Hydrocarbon, Decomposition, Resolution, Seismic, Diagnostic, Post-stack, Low frequency shadows.

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[Sheriff, R. E.,

.Geldart; L.P. 1995]

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[Yilmaz; O. 1998]

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.[John J. Benedetto;1999]

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(Continuous Wavelet Transform CWT)
 (correlation)
 (scaling) (wavelet)

[Dwight F. Mix, Kraig J. Olejczak;
 .2003 and Addison, P. S; 2002]

$$\varphi(t) = \frac{2}{\sqrt{3} \sqrt[4]{\pi}} (1 - t^2) e^{-\frac{t^2}{2}} \quad (1)$$

$$\varphi\left(\frac{t-b}{a}\right) = \left[1 - \left(\frac{t-b}{a}\right)^2\right] e^{-\frac{1}{2}\left(\frac{t-b}{a}\right)^2} \quad (2)$$

(scale) a (translation) b

$$T(a,b) = w(a) \int_{-\infty}^{\infty} x(t) \varphi\left(\frac{t-b}{a}\right) dt \quad (3)$$

$w(a)$ $x(t)$ $T(a,b)$

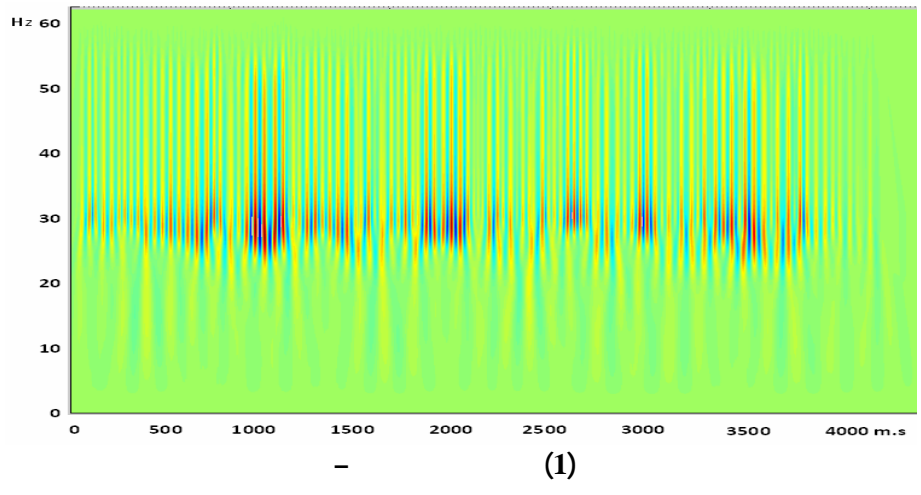
[Kauppinen,J. Partanen,J;2001 and John J. Benedetto;1999]

) [Iske,A and Randen; T. 2005]

$$f = \frac{f_c}{a} \quad (4)$$

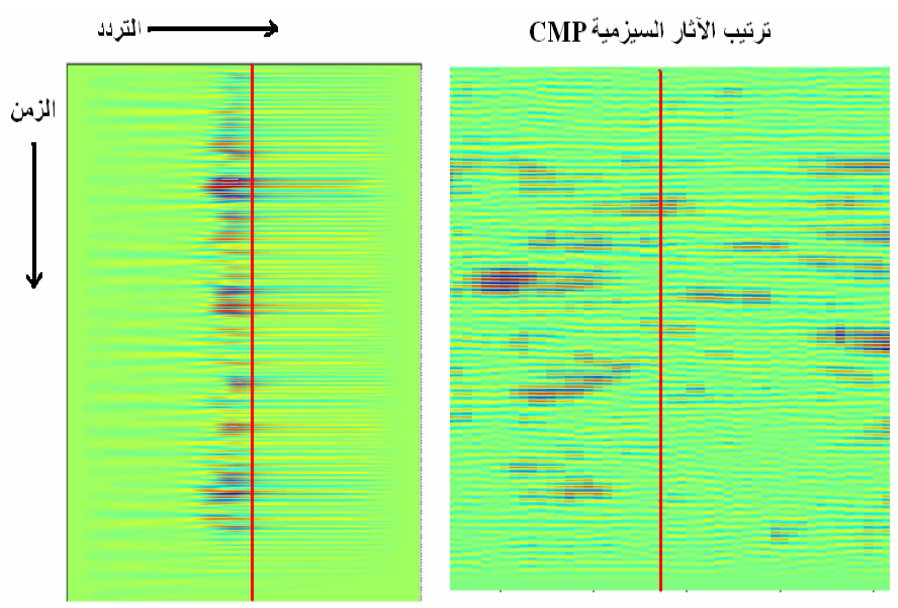
f_c f a

[Mertins;A.1999](narrow band section)



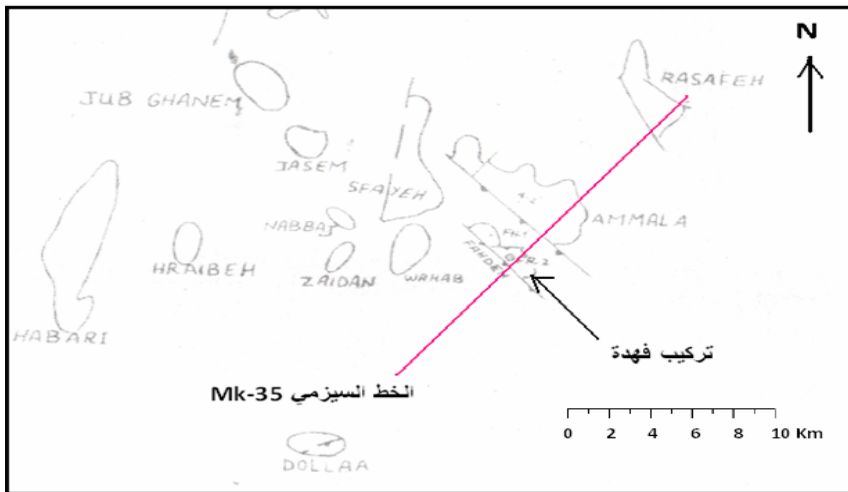
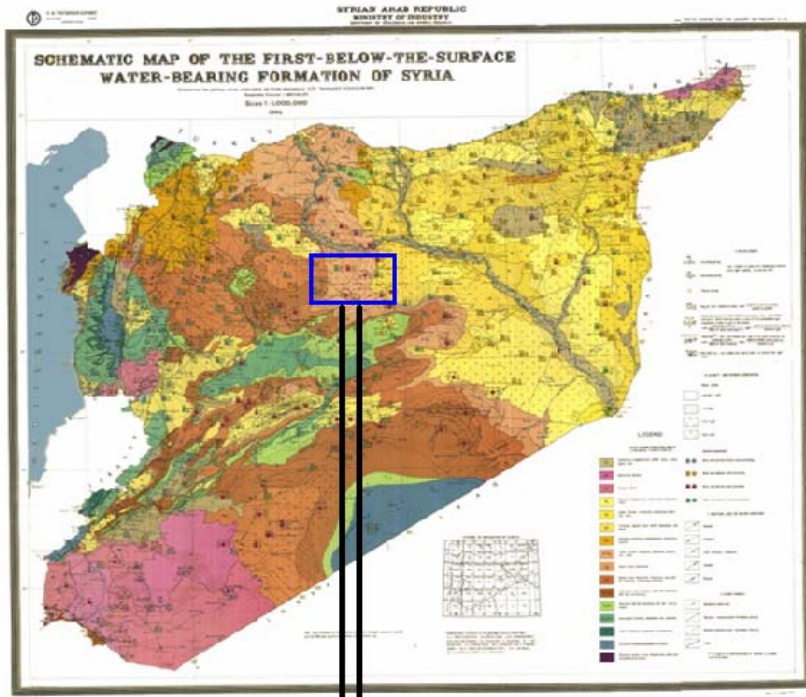
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(2)



CMP (2)

Mk-35 (3)



(3)

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Mk-35

(4)

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(5)
(CMP)

950

900

553

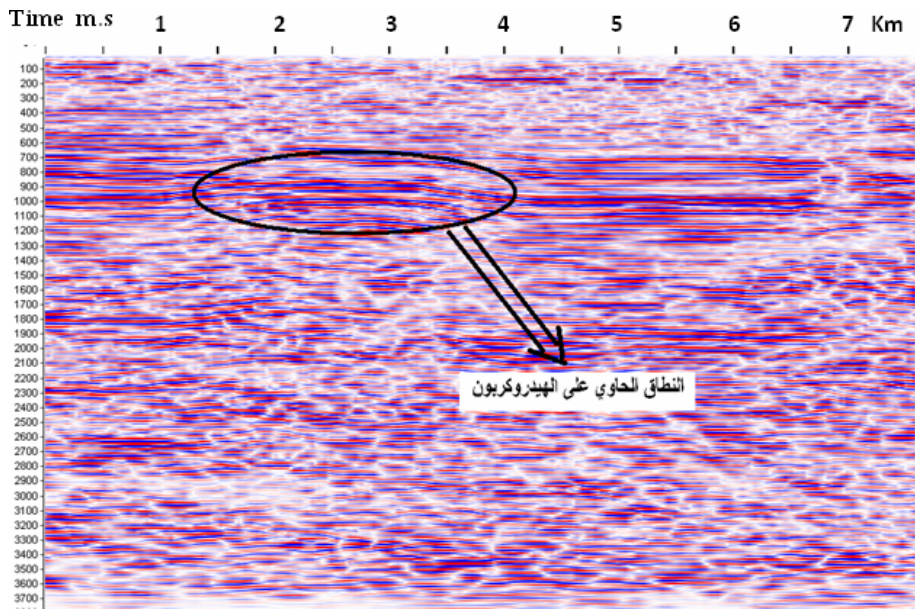
510

%65

(% 85)

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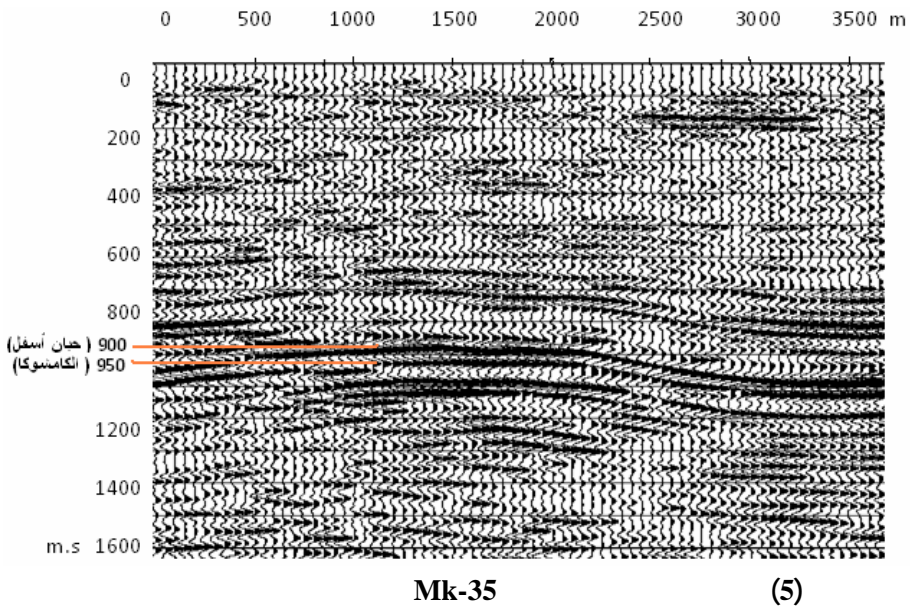
Mk-35



Mk-35

(4)

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(Mk-35)

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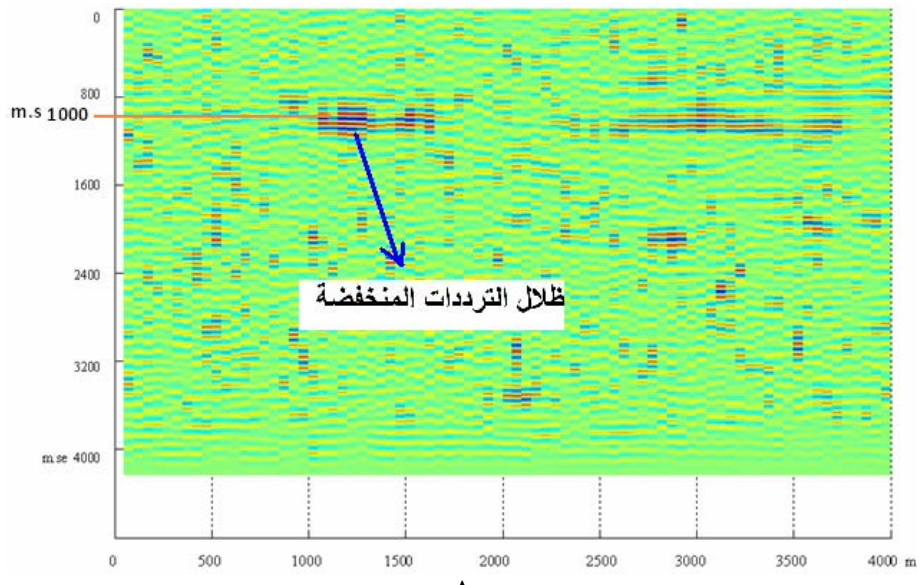
(7) 25

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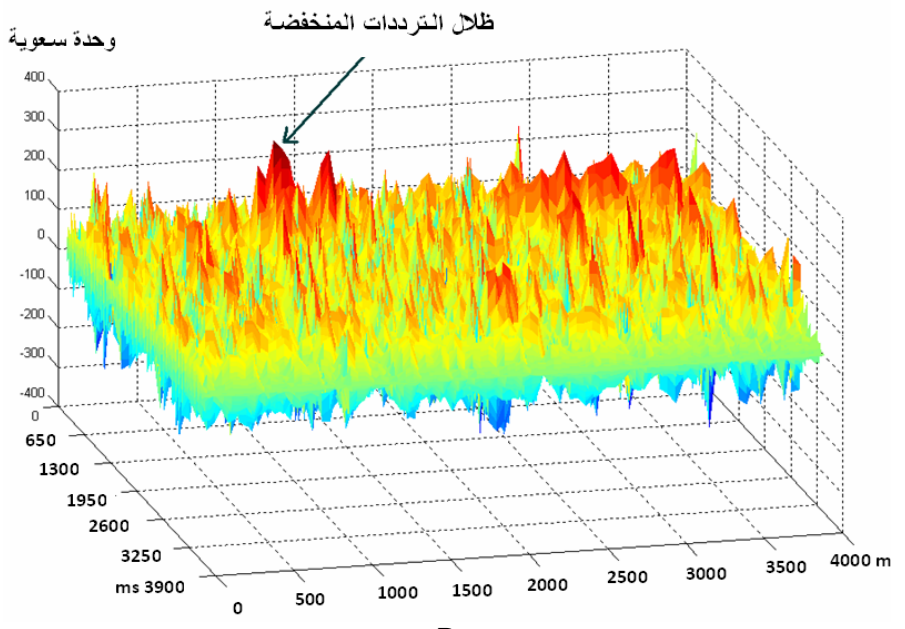
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(8)

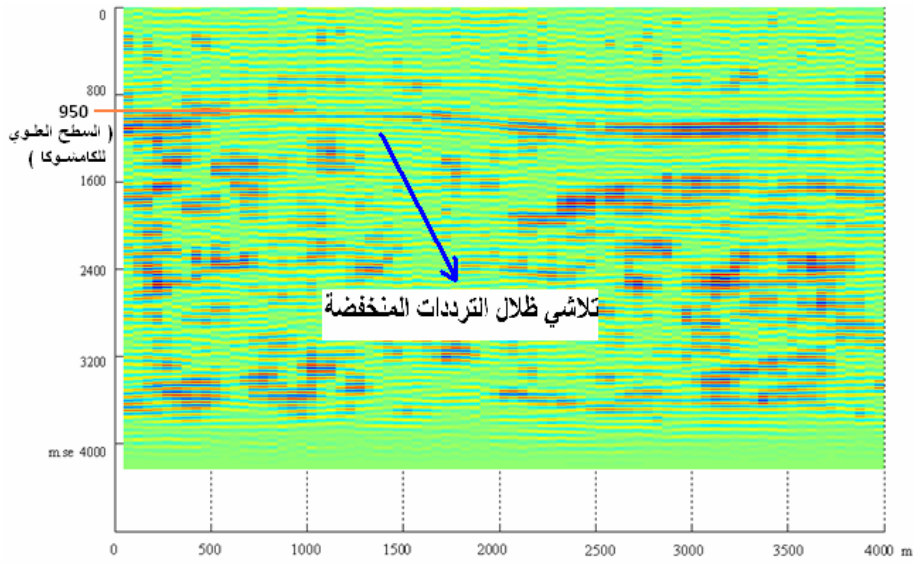
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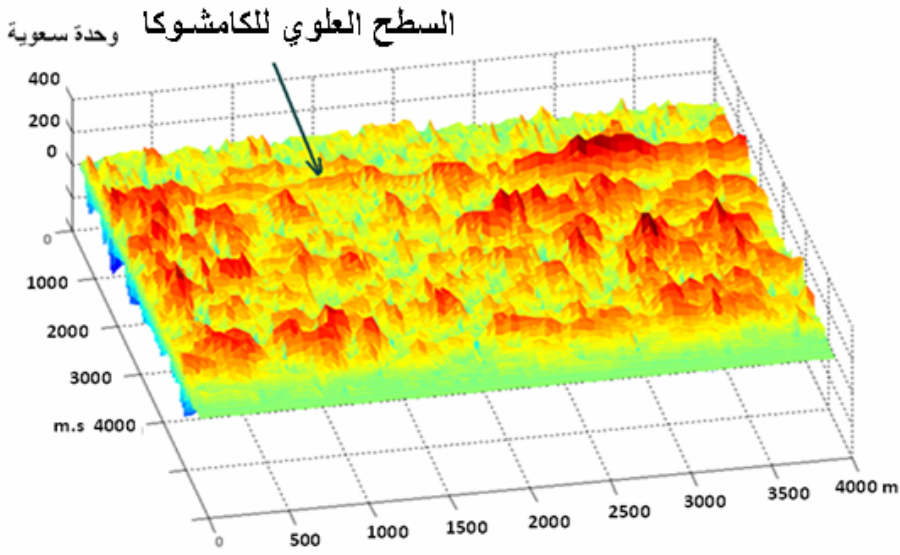
A



B
A 10 (6)



A



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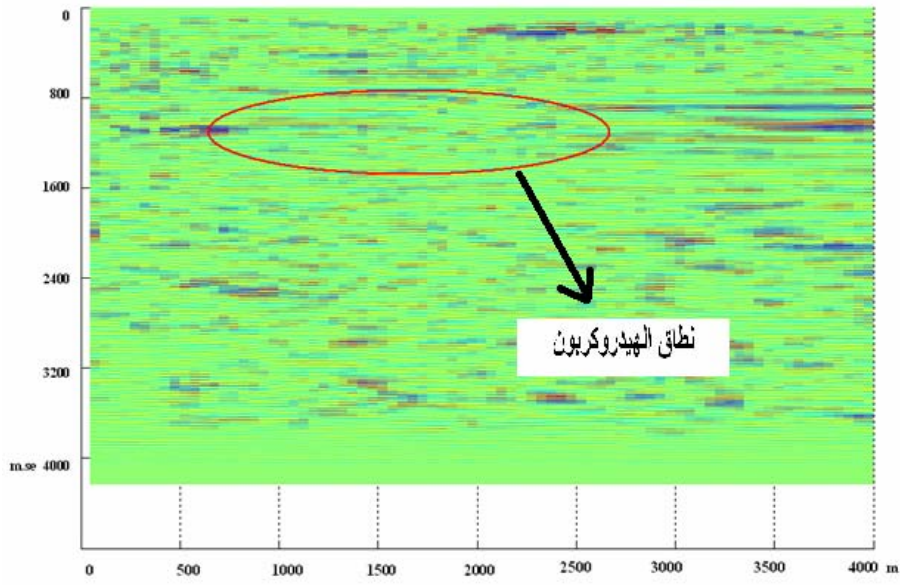
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A

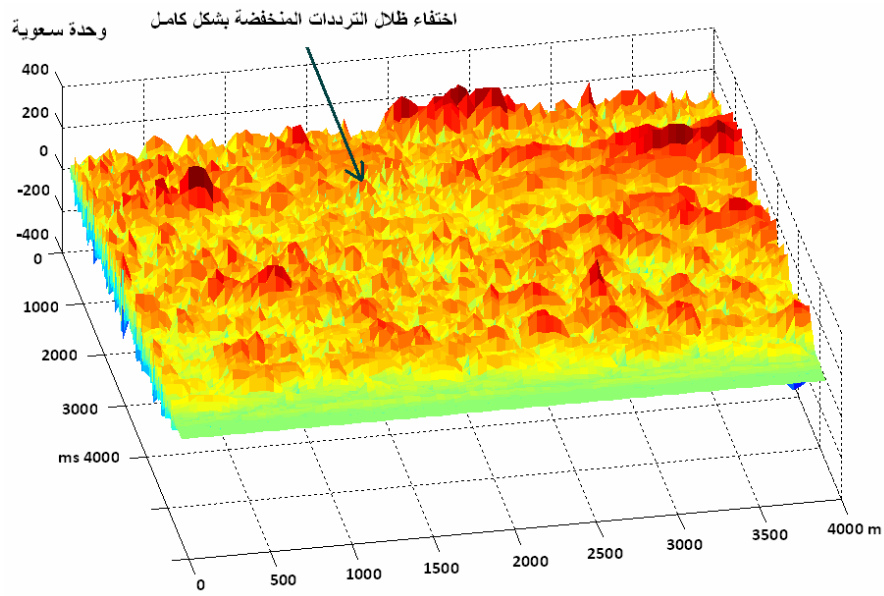
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(7)

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A



B

B A 35 (8)

(6)

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(CWT)

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.[Rauscher, C; 2001]

(narrow-band)

*Taner et al., (1979)**Castagna et al. (2003)*

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