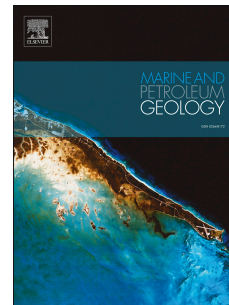


# Accepted Manuscript

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PII: S0264-8172(17)30027-2

DOI: [10.1016/j.marpetgeo.2017.01.017](https://doi.org/10.1016/j.marpetgeo.2017.01.017)

Reference: JMPG 2795

To appear in: *Marine and Petroleum Geology*

Received Date: 8 November 2016

Revised Date: 8 January 2017

Accepted Date: 17 January 2017

Please cite this article as: Bansal, U., Banerjee, S., Pande, K., Arora, A., Meena, S.S., The distinctive compositional evolution of glauconite in the Cretaceous Ukra Hill Member (Kutch basin, India) and its implications, *Marine and Petroleum Geology* (2017), doi: 10.1016/j.marpetgeo.2017.01.017.

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**The distinctive compositional evolution of glauconite in the Cretaceous Ukra Hill Member (Kutch basin, India) and its implications**

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**Abstract:**

An integrated study involving sedimentology, mineral chemistry and spectroscopy highlights a distinctive compositional evolution of Cretaceous glauconite within the Ukra Hill Member. Glauconite occurs at the top part of transgressive systems tract deposits built on a marine shelf. The concentration of glauconite steadily increases towards the maximum flooding surface, maximizing around 50%, and sharply falls at the onset of progradation. Unlike most Phanerozoic examples, Ukra glauconite forms by the variable degree of replacement of quartz, feldspar and mica grains. XRD, FEG-SEM and spectroscopy of glauconite pellets indicate an 'evolved' stage of maturation. Mossbauer spectroscopy reflects a minor substitution of  $Al^{3+}$ - $Fe^{3+}$  (total) in tetrahedral sites and significant substitution of the same in octahedral sites. A consistently high value of  $K_2O$  as well as  $Fe_2O_3$  contradicts the two popular theories, 'layer lattice' and 'verdissement', and support replacement origin of glauconite in a high  $a_{Si^{4+}}$  and high  $a_{K^+}$  pore water environment. Incipiently formed glauconite records a marginal increase in  $K_2O$  content accompanied by release of  $Al_2O_3$  and  $SiO_2$  to form evolved glauconite pellets; those forming

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