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POTENTIAL OF SHORT WAVELENGTH LASER ABLATION OF ORGANIC MATERIALS

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INTRODUCTION
Although the literature contains several articles on UV laser ablation of synthetic polymers [1] and human tissue for surgical applications, to our knowledge there is no published record on organic geochemical applications for UV laser pyrolysis—gas chromatography—mass spectrometry (LA-GC-MS). In this study we have investigated the use of a 213 nm UV laser for ablating kerogens and organic rich rocks to liberate and analyse hydrocarbon signatures and compared the results against IR laser pyrolysis and traditional Py-GC-MS.

EXPERIMENTAL
Laser ablation work was performed using a Nd:YAG 213 nm laser (New Wave Research) and an off-line static helium filled cell, the cell was subsequently solvent extracted. Laser ablation pits were ~300 μm x 300 μm. Separate analysis of the same samples using a more traditional flash pyrolysis approach was performed with a CDS Pyroprobe and IR laser pyrolysis [3] for comparative purposes.

As can be seen in Fig 1 and 2 UV laser ablation is able to liberate relatively high molecular weight fragments with only small amounts of alkenes or other pyrolysis artefacts detected. SEM images of ablation pits indicate there is no obvious thermal alteration of the sample (Figure 3).

RESULTS
As can be seen in Fig 1 and 2 UV laser ablation is able to liberate relatively high molecular weight fragments with only small amounts of alkenes or other pyrolysis artefacts detected. SEM images of ablation pits indicate there is no obvious thermal alteration of the sample (Figure 3).

PLANNED WORK
Future work will include ablation of model compounds, synthetic polymers, experiments with shorter wavelength lasers and development of an on-line system.

REFERENCES