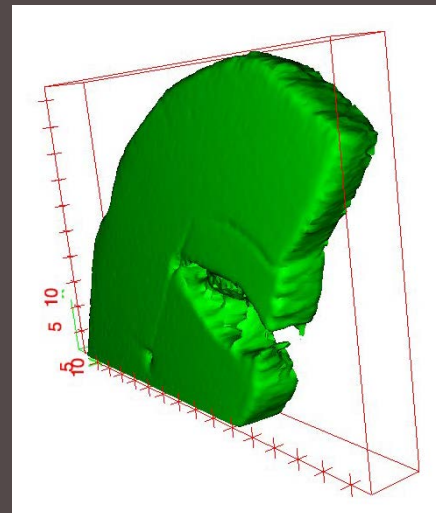
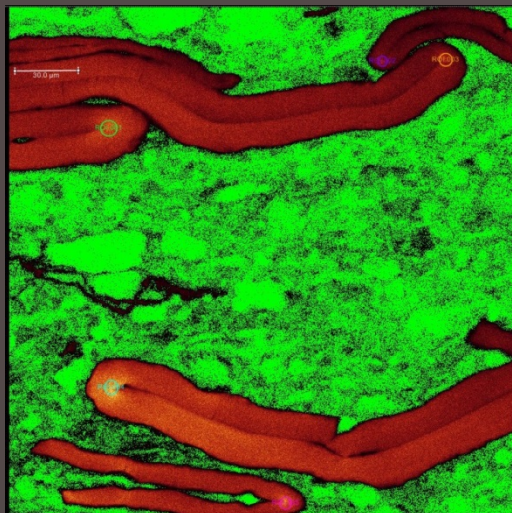


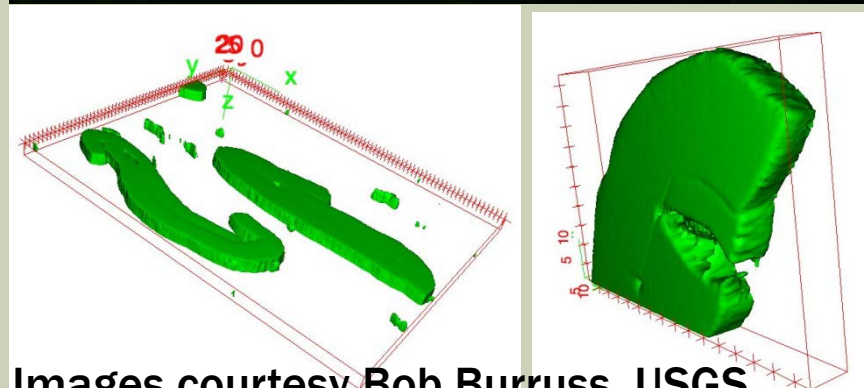
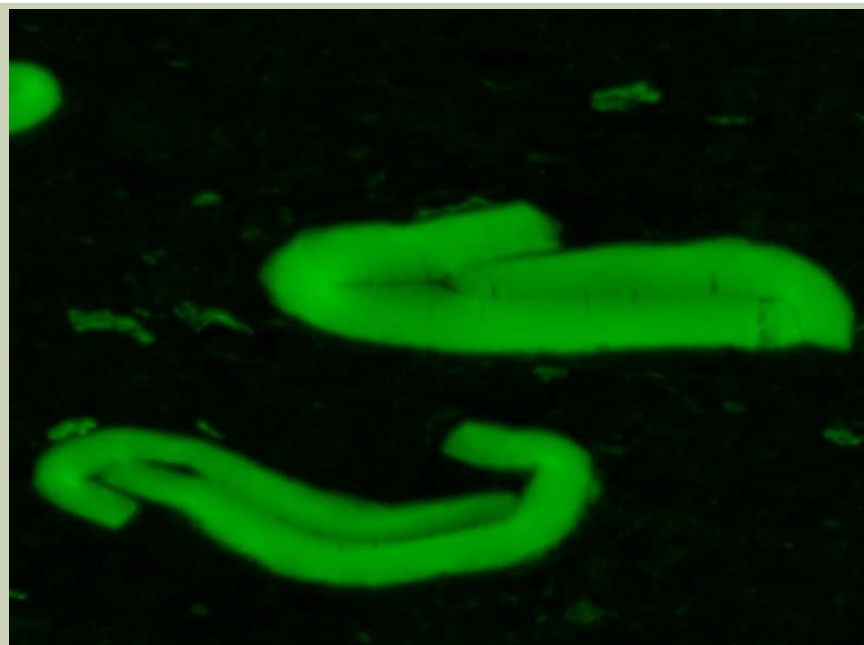
# ICCP CONFOCAL LASER SCANNING MICROSCOPY (CLSM) WORKING GROUP 2019

Paul C. Hackley  
Jolanta Kus



# WHY USE CLSM ON SEDIMENTARY ORGANIC MATTER?

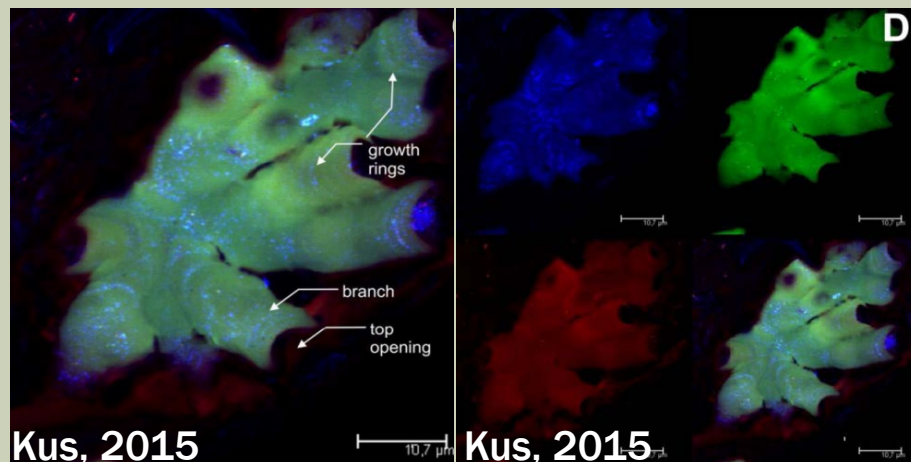
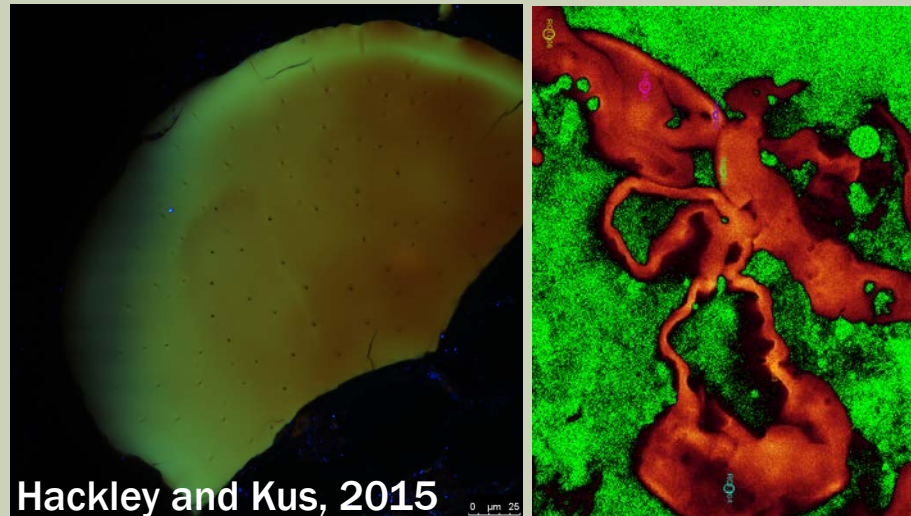
- ❑ Many applications
- ❑ Technique is broadly underutilized
- ❑ High resolution (~200 nm)
- ❑ 2-D and 3-D imaging
- ❑ 3-D reconstructions, video
- ❑ Non-destructive
- ❑ Fluorescence spectroscopy
- ❑ Useful for organic petrology!



Images courtesy Bob Burruss, USGS

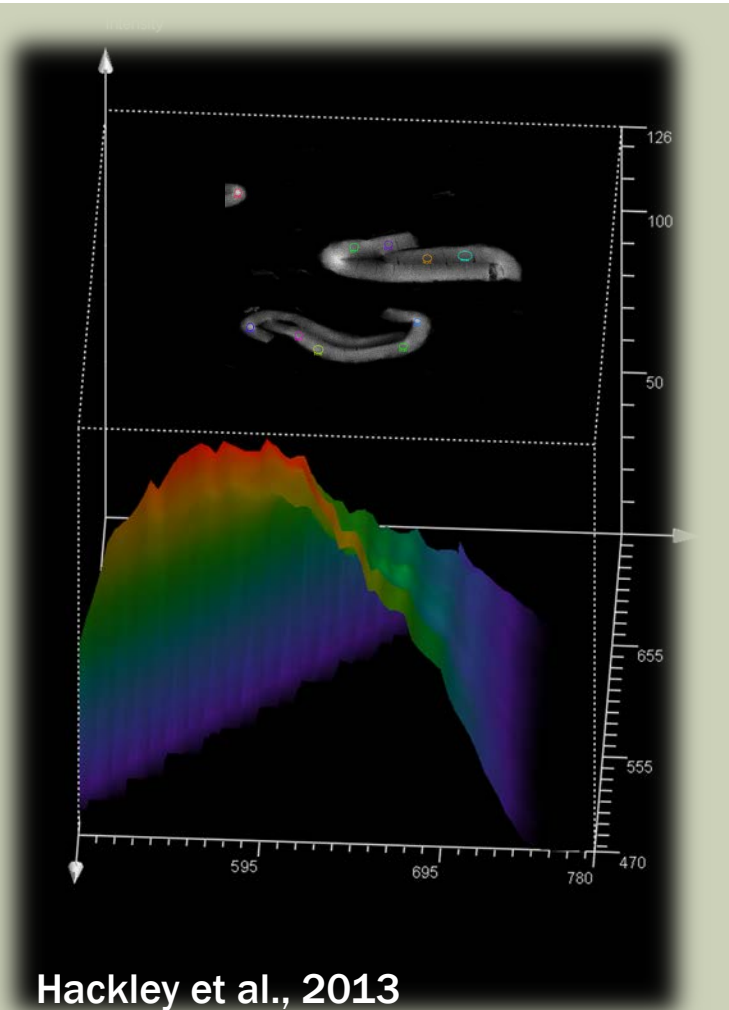
# HISTORY OF THE CLSM WG

- ❑ Working Group approved in Potsdam 2015
- ❑ Note in ICCP News 63, 2015
- ❑ Presentation at GSA, Baltimore Nov 2015
- ❑ User survey sent Feb 2016
- ❑ WG presentations ICCP 2016-2018
- ❑ Webpage established October 2017 (thanks Stavros)
- ❑ Presentation at TSOP, Bloomington Sep 2019



# ACTIVITIES TO-DATE

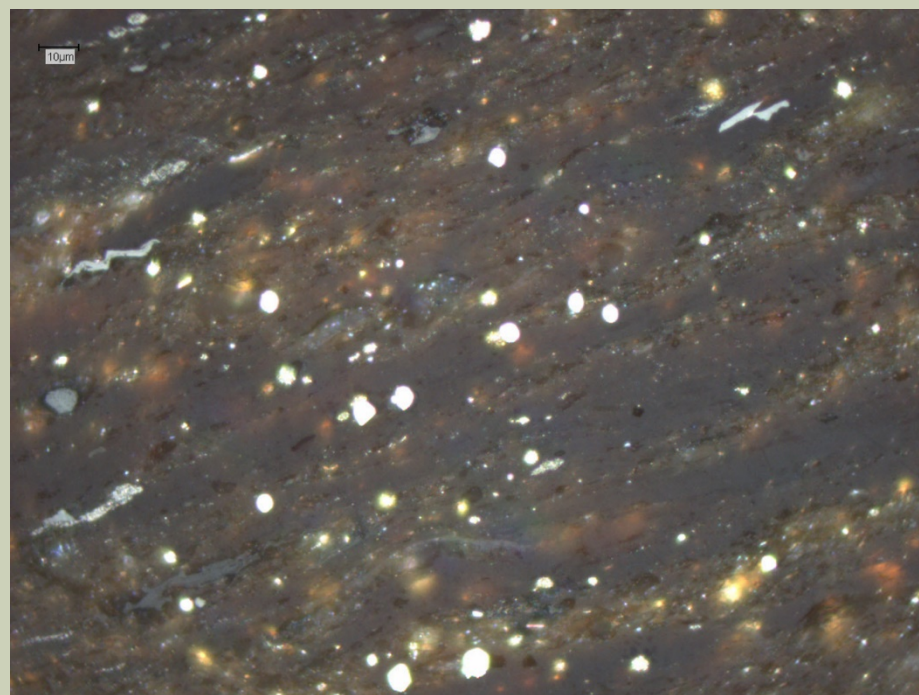
- ❑ **Kimmeridge sample selected for WG study in late 2017**
- ❑ **Sample distributed April 2018 to 13 participants, with no instructions, distributed as stew slide, kerogen concentrate, whole rock, chips**
- ❑ **Results received from 4 participants up to August 2019, Paul, Jola, Dragana, Andy Czaja**
- ❑ **1 participant dropped from the WG, Jim Schopf**
- ❑ **1 participant added to the WG, Shibu Arens**



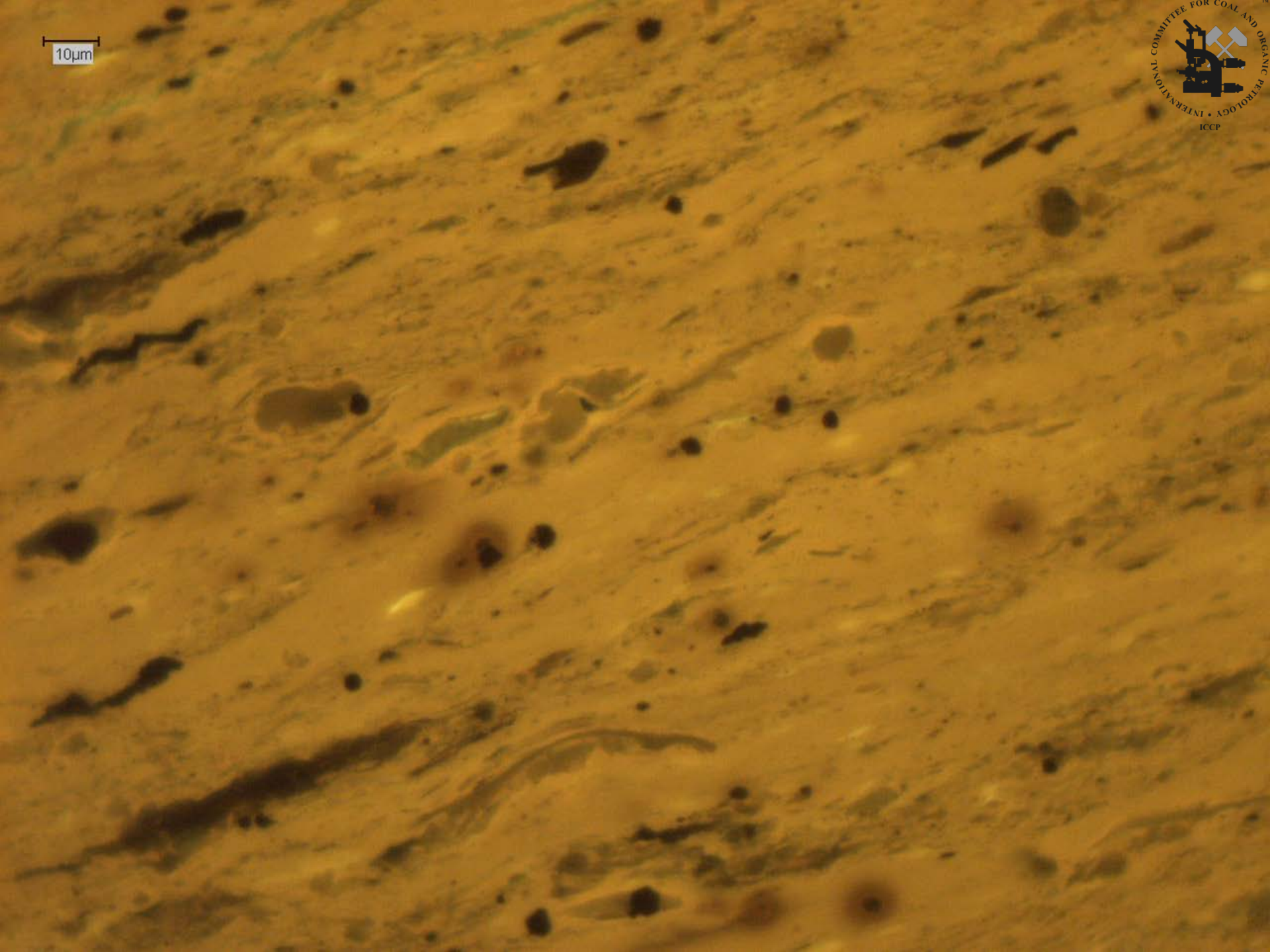
# CLSM WG SAMPLE: KIMMERIDGE CLAY

## Kimmeridge Clay: KC-1

- Kimmeridge Blackstone
- BRo: 0.29%
- VRo: 0.42%
- Tmax: 409 °C
- TOC: 44.1 wt. %
- HI: 737 mg HC/g TOC
- Fluorescent AOM, minor solid bitumen, vitrinite/inertinite, micrinite
- Other data ....



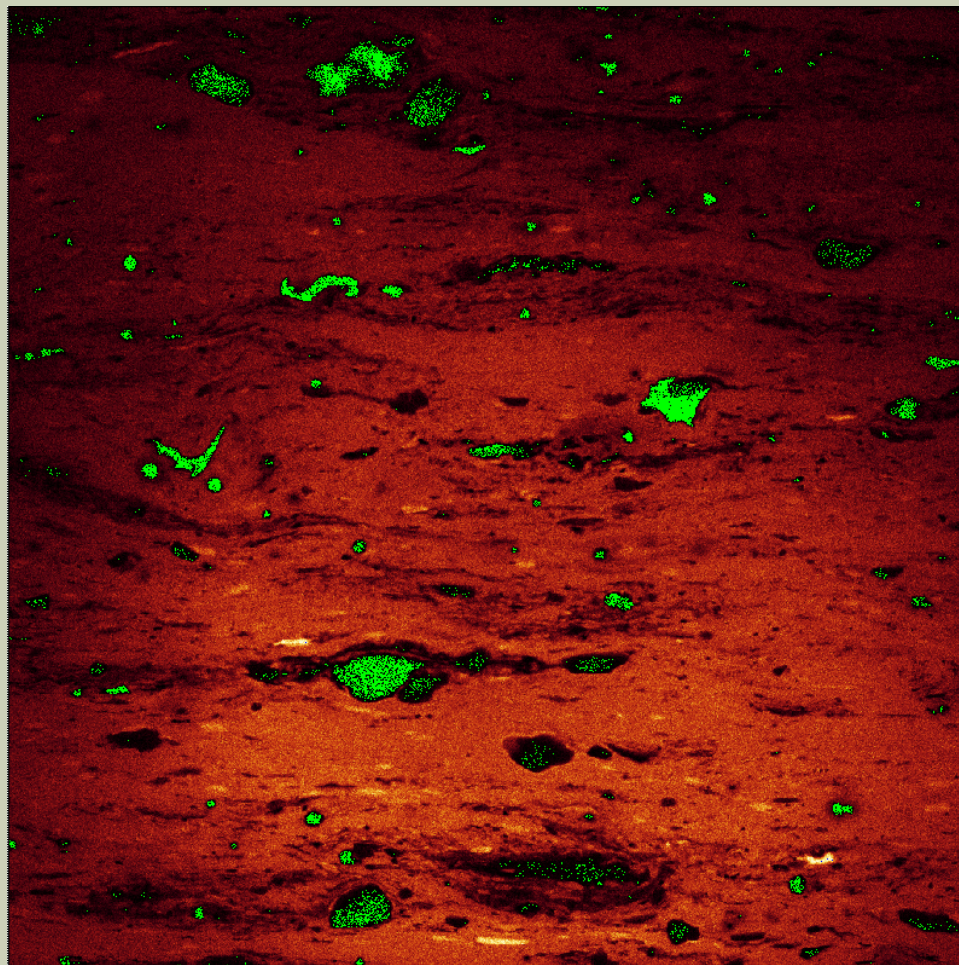
10µm



# CLSM WG RESULTS 2018-2019

## Contributors to-date:

- Paul Hackley, USGS
- Jolanta Kus, BGR
- Andy Czaja, Univ. Cincinnati
- Dragana Životić, Univ. Belgrade



# CLSM WG RESULTS 2018-2019



**Botryococcus: Branch  
with four openings  
(red arrows)**

**Framboidal pyrite  
(blue colour)**

0  $\mu\text{m}$  10

**Jolanta Kus**



# CLSM WG RESULTS 2018-2019

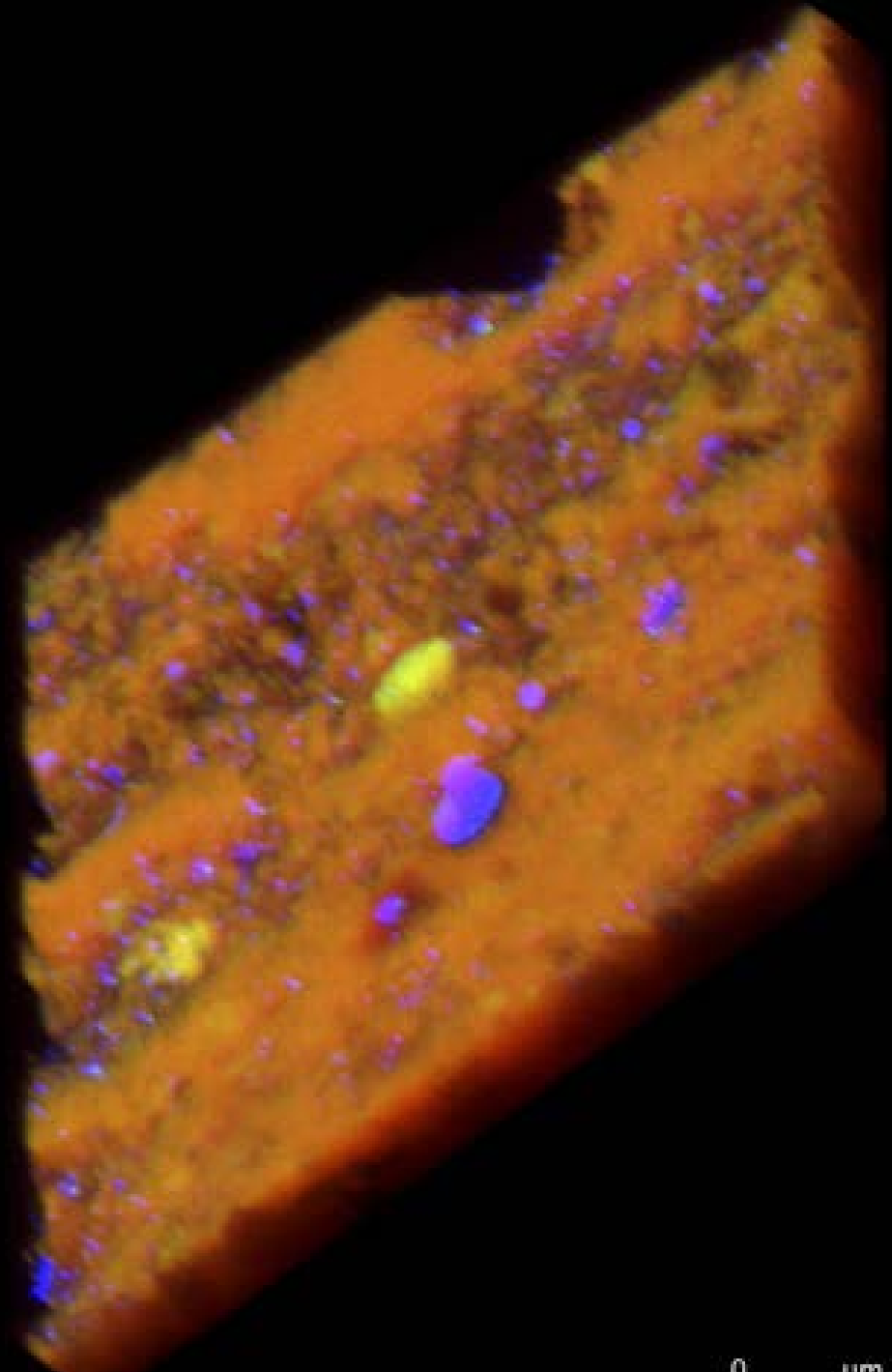
The same CLSM-image as previous slide but at a depth of 2-3  $\mu\text{m}$  below surface of the pellet

Botryococcus: Branch with four openings (red arrows)

Framboidal pyrite (blue colour)

0  $\mu\text{m}$  10

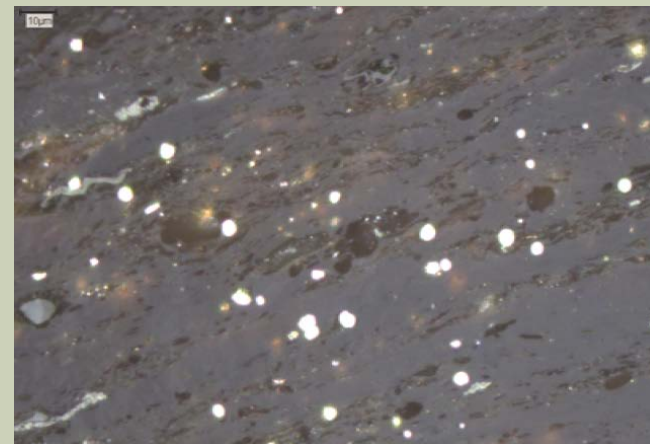
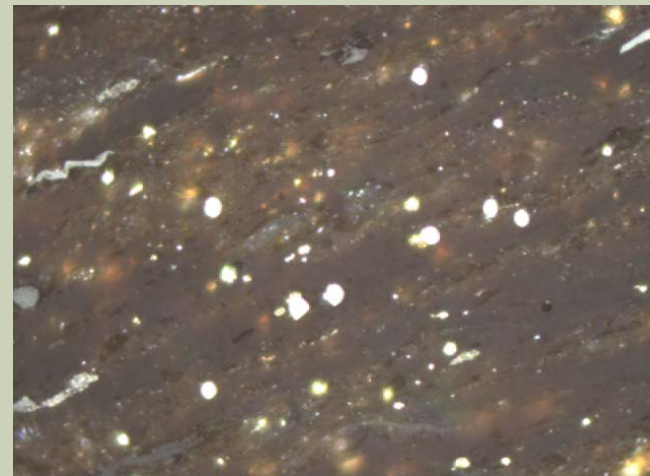
Jolanta Kus



# CLSM WG 2019 SUMMARY

## Summary:

- Kimmeridge Clay sample selected
- Distributed to 13 persons
- Results received from 4 persons
  
- 3-D rendering from image stacks
- Pyrite reflectance(?)
- Botryococcus(?)
- Awaiting results from others
  
- Discussion





THANKS!