

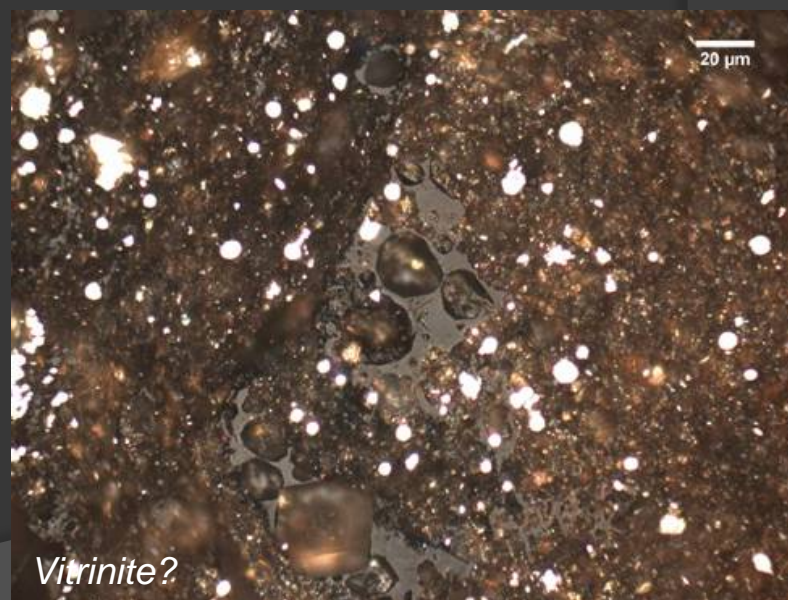
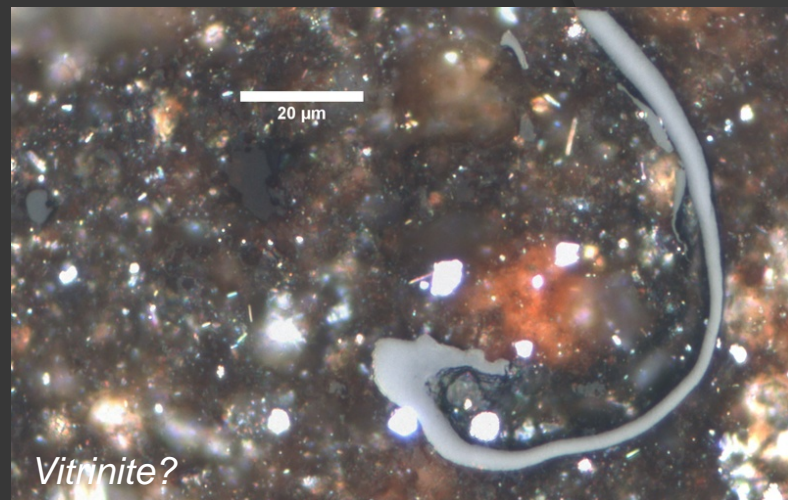
# ICCP WORKING GROUP IDENTIFICATION OF PRIMARY VITRINITE IN SHALE 2015 REPORT

Paul C. Hackley - U.S. Geological Survey, Reston, Virginia, USA

*Presented for ICCP Commission II, September, 2015*

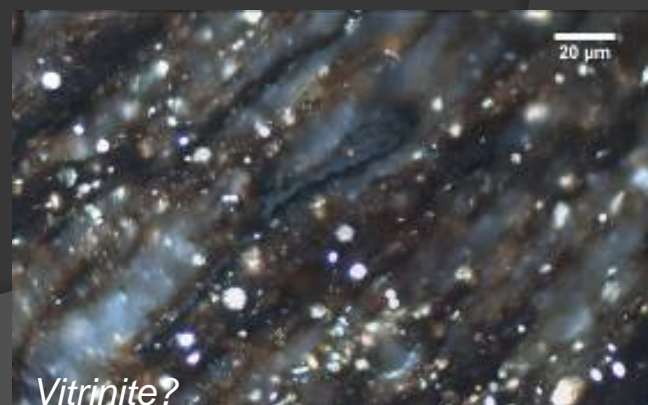
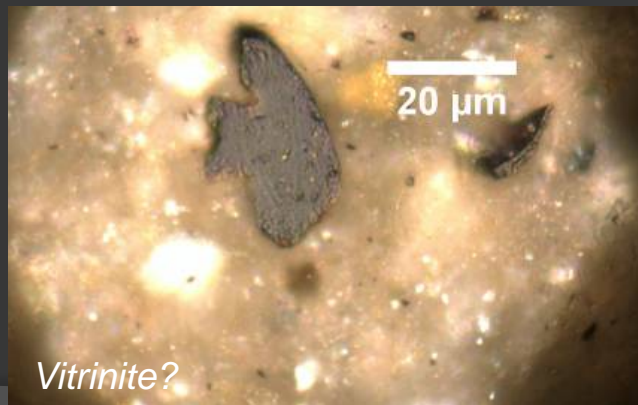
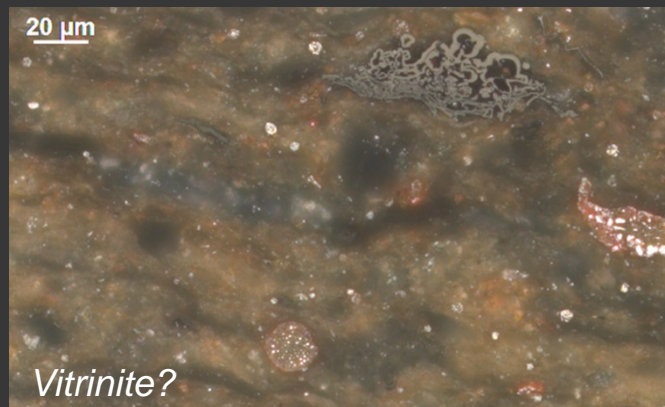
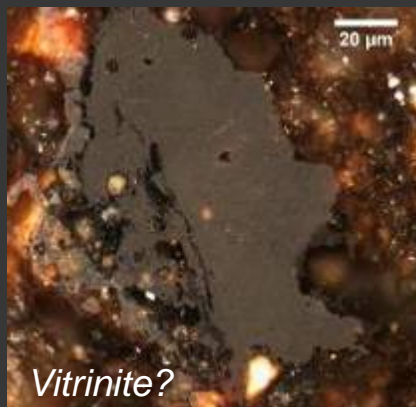
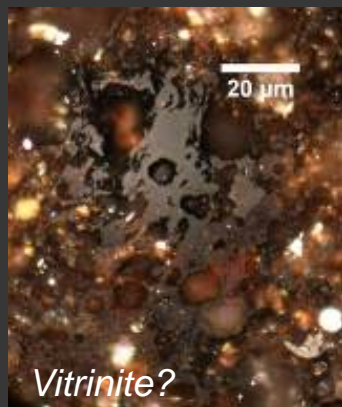
# Outline of this presentation

- Problem to be solved
- History of the working group
- Findings and products to-date
- Discussion and future directions



## Objective of the Working Group

- Provide guidelines for identification of the primary vitrinite population in dispersed organic matter



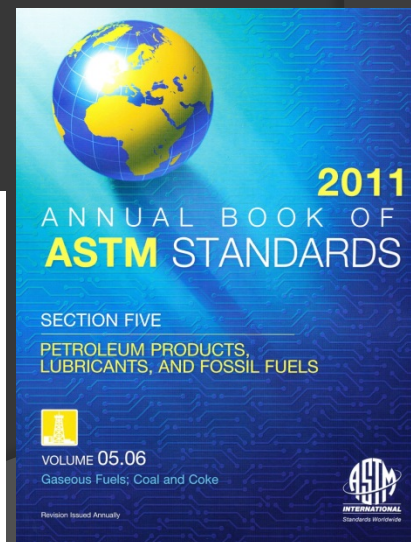
# Identification of primary vitrinite: History of the working group

- Working group proposed by Angeles Borrego at September 2008 Oviedo ICCP meeting
- Results of survey about DOMVR analysis and identification of primary vitrinite presented at 2009 Gramado meeting and published in ICCP News No. 48, Nov. 2009
- New ASTM standard for DOMVR published in 2011 Annual Book of ASTM Standards September 2011



Designation: D7708 – 11

**Standard Test Method for  
Microscopical Determination of the Reflectance of Vitrinite  
Dispersed in Sedimentary Rocks<sup>1</sup>**



*Oviedo 2008*

*Gramado 2009*

*Belgrade 2010*

*Porto 2011*

# Identification of primary vitrinite: History of the working group cont.

- Six samples used to test ASTM D7708 via interlaboratory study with twenty-two laboratories in 2012-2013
- Round robin results presented to ICCP in Sosnowiec, 2013
- Results presented to oil and gas community at AAPG, Houston, USA, April 2014
- Results published in J. Marine and Petroleum Geology, 2015

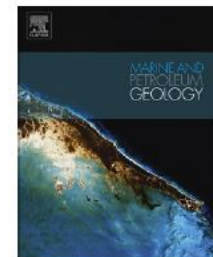
# Results of the 2012-2013 interlaboratory study

Marine and Petroleum Geology 59 (2015) 22–34

Contents lists available at ScienceDirect

## Marine and Petroleum Geology

journal homepage: [www.elsevier.com/locate/marpetgeo](http://www.elsevier.com/locate/marpetgeo)



Research paper

### Standardization of reflectance measurements in dispersed organic matter: Results of an exercise to improve interlaboratory agreement

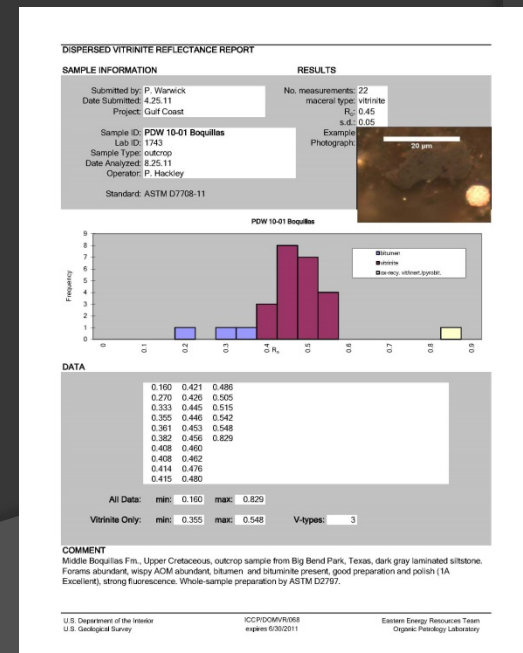
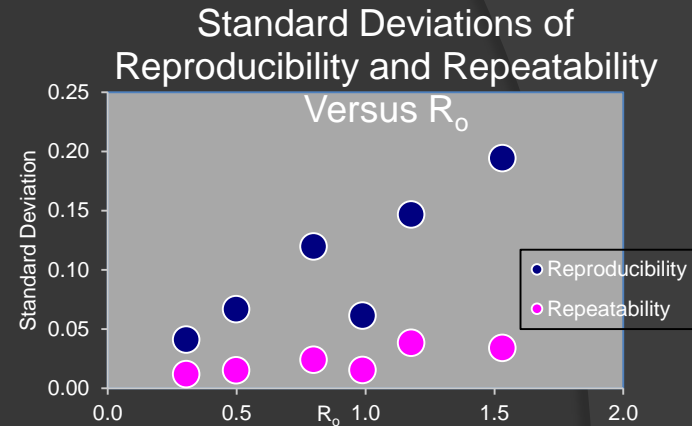


Paul C. Hackley<sup>a,\*</sup>, Carla Viviane Araujo<sup>b</sup>, Angeles G. Borrego<sup>c</sup>, Antonis Bouzinos<sup>d</sup>, Brian J. Cardott<sup>e</sup>, Alan C. Cook<sup>f,1</sup>, Cortland Eble<sup>g</sup>, Deolinda Flores<sup>h</sup>, Thomas Gentzis<sup>i</sup>, Paula Alexandra Gonçalves<sup>h</sup>, João Graciano Mendonça Filho<sup>j</sup>, Mária Hámor-Vidó<sup>k</sup>, Iwona Jelonek<sup>l</sup>, Kees Kommeren<sup>m</sup>, Wayne Knowles<sup>n</sup>, Jolanta Kus<sup>o</sup>, Maria Mastalerz<sup>p</sup>, Taíssa Rêgo Menezes<sup>b</sup>, Jane Newman<sup>q</sup>, Ioannis K. Oikonomopoulos<sup>i</sup>, Mark Pawlewicz<sup>r</sup>, Walter Pickel<sup>s</sup>, Judith Potter<sup>t</sup>, Paddy Ranasinghe<sup>u</sup>, Harold Read<sup>s</sup>, Julito Reyes<sup>v</sup>, Genaro De La Rosa Rodriguez<sup>w</sup>, Igor Viegas Alves Fernandes de Souza<sup>b</sup>, Isabel Suárez-Ruiz<sup>c</sup>, Ivana Sýkorová<sup>x</sup>, Brett J. Valentine<sup>a</sup>

**Thirty-one authors, twenty-two laboratories, fourteen countries**

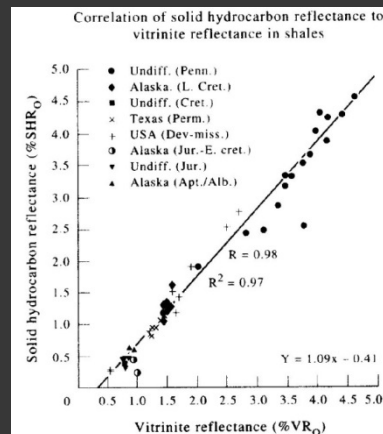
# Important Findings

- Repeatability and reproducibility limits degraded consistently with increasing maturity and decreasing organic content (except for Type III sample)
- Operators did not meet reporting requirements, indicating need for a template to improve data quality

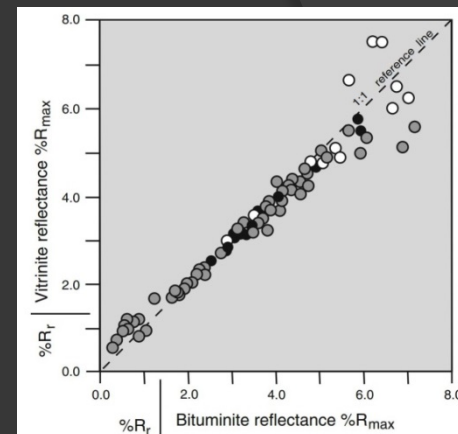


# Important Findings

- No statistical difference between  $R_o$  from bitumen and vitrinite (contradictory to empirical conversions schemes)



*Landis and Castaño, 1995*  
*Also Jacob, 1989 and*  
*Schoenherr et al, 2007*

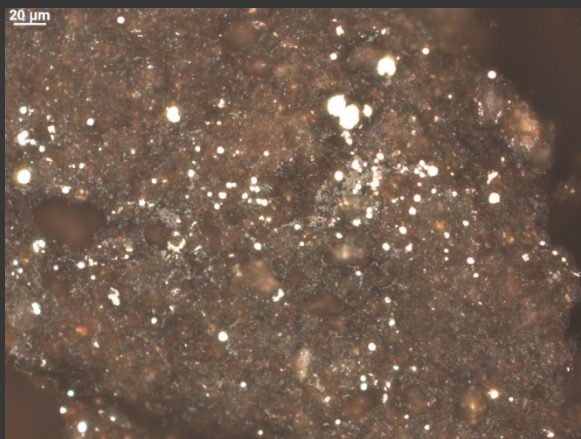


*Mählmann and Frey, 2012*

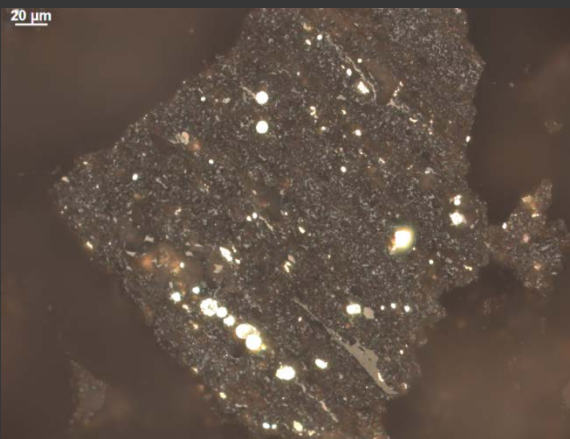
- Reproducibility was improved compared to historical exercises (summarized in Borrego, 2009)

# Proposal for 2015-2016

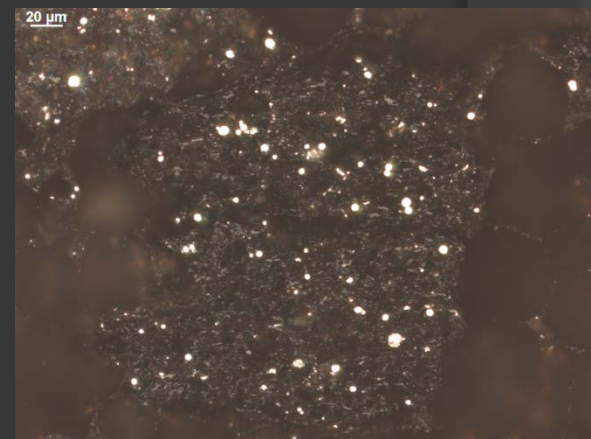
- Use high maturity samples with high TOC – current USA shale gas/oil plays: e.g., Eagle Ford, Marcellus, Haynesville, Barnett, Bakken
- Using several samples from NA with ‘name recognition’ will generate high impact result/paper
- Round robin with 4 samples over 2015-2016



Jurassic: TOC 2.66 wt.%,  $R_o > 1.0\%$



Upper Cretaceous: TOC 5.07 wt.%,  $R_o > 1.0\%$



Devonian: TOC 5.17 wt.%,  $R_o > 1.0\%$

***Then we will be finished!***

# Acknowledgments

- Participants in the DOMVR survey of 2009
- All members of the writing committee for ASTM D7708
- Participants in the 2012-2013 ASTM D7708 round robin and contributors to the JMPG paper
- All Commission II members
- **THANKS ICCP!**