Testing Hypotheses of Black Shale Deposition in the Late Devonian Catskill Basin, Watkins Glen State Park, New York

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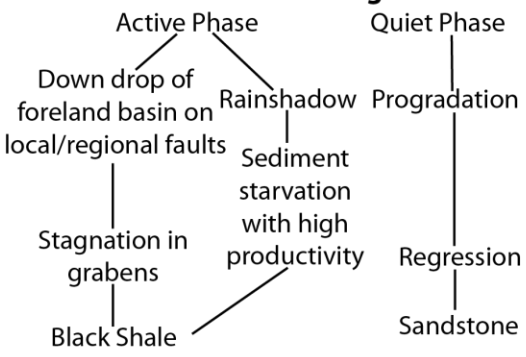
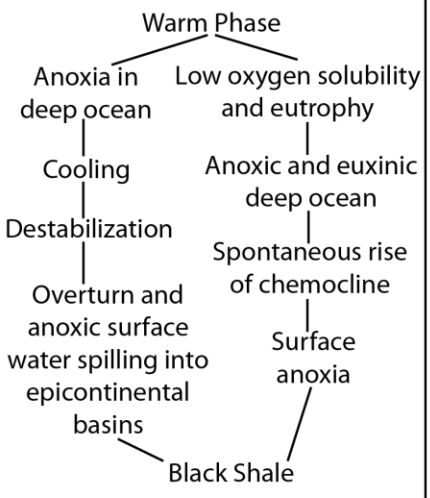
Hypotheses:

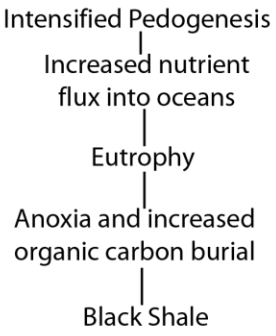
Acadian Mountain Building



Climate



Rise of Forests



Predictions:

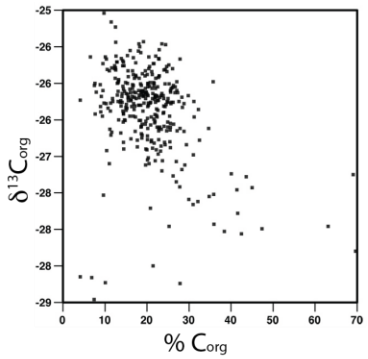
1. Evidence of paleoseismicity associed with shale deposition.
2. Black shale intervals uncorrelated with events (e.g., Kellwasser) outside of the basin.
3. No $\delta^{13}C$ excursion.

4. Positive excursion in $\delta^{13}C_{org}$.
5. Black shale intervals correlated with global events (e.g., Kellwasser).

6. Positive excursion in $\delta^{13}C_{org}$.
7. High and continuous diversity of land plants.

Observations & Preliminary Conclusions:

• No positive excursions were observed in $\delta^{13}C_{org}$ suggesting that the mechanism that produced black shales during the Kellwasser and related oceanographic events did not produce black shales in this section. Absence of a positive excursion in $\delta^{13}C_{org}$ also suggests that fertilization by land plants did not produce black shales.



• The strong ($p < 0.001$) negative relationship between percent organic carbon in shales and the carbon isotopic composition of that organic carbon suggests that rather than being driven by changes in carbon source (e.g., atmospheric CO2 or DOC), the variation in isotopic composition my reflect differing organic input (e.g., terrestrial versus marine carbon sources).

Together, these results suggest that control of organic deposition is controlled within the basin rather than by global forcing.

Continuing Investigation:

Palynofacies analysis will assess the degree of terrestrial sedimentary input throughout the section. If black shales are produced in local down-drop basins by regional tectonic activity, we expect to see reduced terrestrial input in high organic carbon facies.