Dolomite of Uppermost Ordovician Wufeng Formation, Southwestern China: Implications for marine sediments of white smoker?

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Introduction
The interval from Ordovician to Silurian is a very important period during the whole geological history. The Hirnantian Glaciation, Mass Extinction and Hirnantian isotope curves excursion (HICE) happened during this period.
The strata deposited across the glaciation corresponding to the upper Ordovician Wufeng Formation and lower Silurian Longmaxi Formation are widely developed in south China upper-middle Yangtze Platform. A stratum of shelly limestone at the upper most of Wufeng Formation, which contains a lot of Hirnantia-Dalmanitina Fauna named Guanyinqiao Member was deposited during Hirnantian (445.2–443.8 Ma) (Nie et al., 2017). The lithology of sedimentary rocks vary from black shales (Wufeng Formation) to shelly limestone (Guanyinqiao Member). Some researchers found the special dolomite occurred in the shelly limestone and studied the geochemistry feature of it in Canada (Ahn et al., 2017). However, the dolomites in this stratum are unusual in China and few scholars noticed that which have special significance. In this research, we are trying to unravel the origin of dolomite, reconstruct paleoclimate and biochemical processes and try to discuss the relationships with the mass extinction by studying the Guanyinqiao Member dolomites.

Results

1-Micritic to powder crystalized dolomites and the holes filled with asphalt can be seen in dolostone. 2-Dolomite formed in different diagenetic stages due to the different size of dolomite crystals. 3-The Hirnantian δ¹³C_carb isotopic curve shows strongly positive excursion in Guanyinqiao Member (~12‰) and decrease at the end of Hirnantian stage. The δ¹³C_carb isotopic values of dolostone indicate slightly positive shift and strongly shifted (~2‰) under the dolostone.

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Preliminary results of clumped isotope measurements

<table>
<thead>
<tr>
<th>Sample</th>
<th>δ¹³C_carb (VPDB)</th>
<th>δ¹³C_carb (VPDB)</th>
<th>δ¹³C_carb (VPDB)-fluid source</th>
<th>δ¹³C_carb (VPDB)-fluid source</th>
</tr>
</thead>
<tbody>
<tr>
<td>QL-6</td>
<td>-2.5</td>
<td>11.06</td>
<td>68</td>
<td>4.4</td>
</tr>
<tr>
<td>QL-7</td>
<td>-3.04</td>
<td>11.06</td>
<td>68</td>
<td>6.0</td>
</tr>
<tr>
<td>QL-8</td>
<td>-2.50</td>
<td>11.26</td>
<td>68</td>
<td>4.6</td>
</tr>
</tbody>
</table>

Analyzed dolomite samples formed from a rather hot fluid source with meteoric oxygen isotope composition. However, as we analyzed only few replicates the preliminary results come with a big uncertainty, especially the hot T estimates of QL-7. More replicates are required.

Anticipated outcomes
1-Micritic to powder crystalized dolomites are developed in the uppermost Ordovician Guanyinqiao Member. 2-The δ¹³C_carb and δ¹³C_carb isotopes of the dolostone in Guanyinqiao Member show positive excursion and are coincide with the corresponding strata in North America (Ahn et al., 2017) and Middle Vistze Region (Chen et al., 2017). 3-The dolomite correspond to a diagenetic phase that formed later during burial.