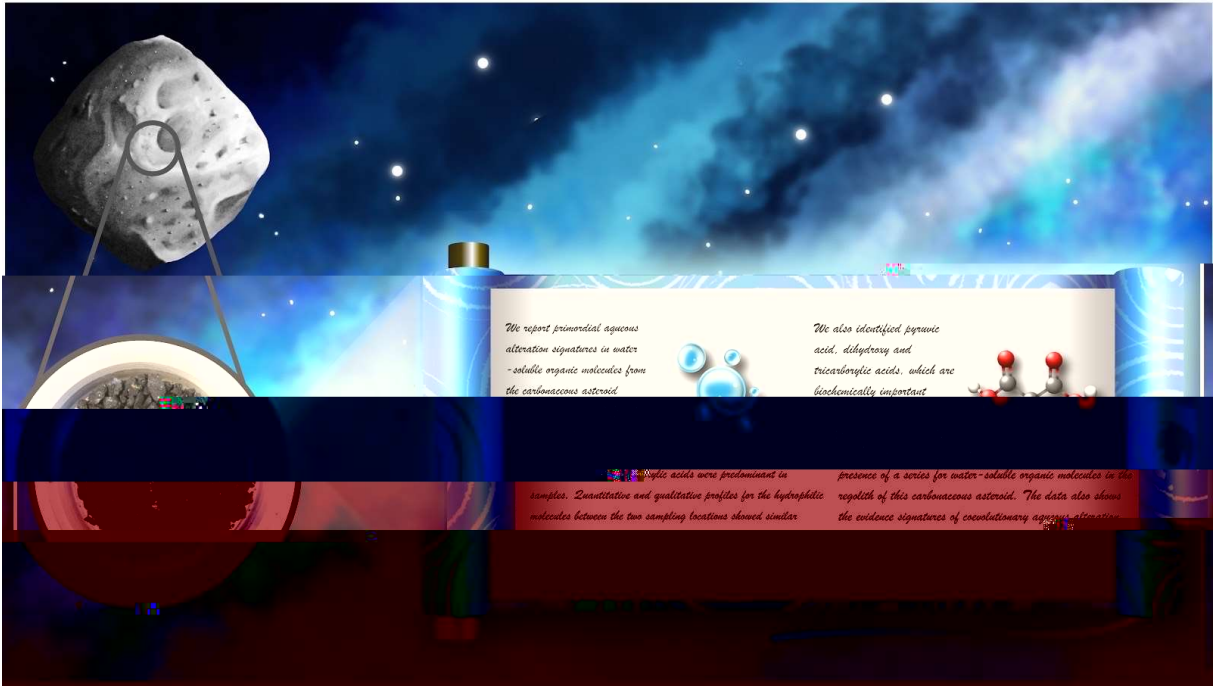


7 10 18  
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[press@jamstec.go.jp](mailto:press@jamstec.go.jp)





*We report primordial aqueous alteration signatures in water-soluble organic molecules from the carbonaceous asteroid*

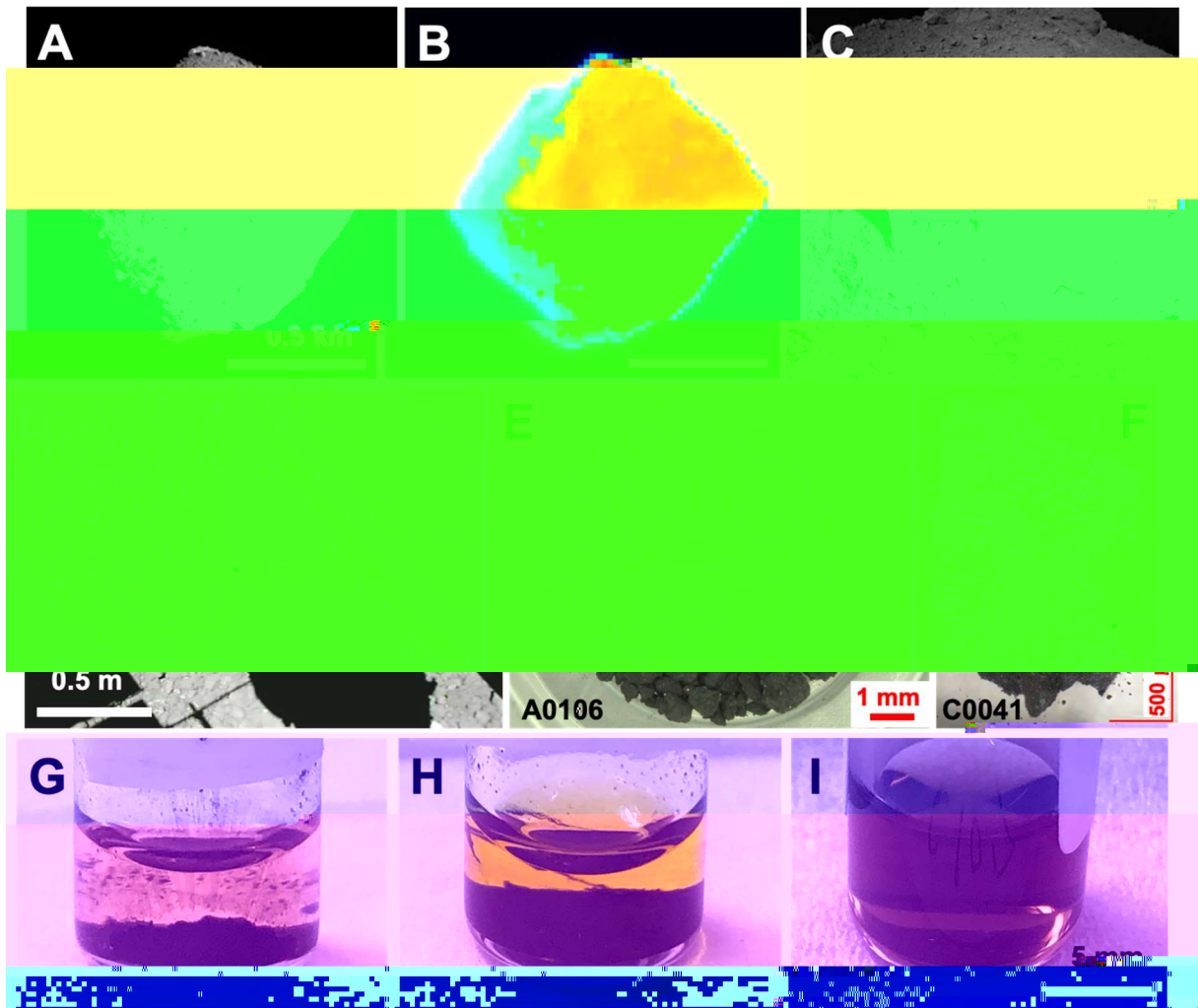


*We also identified pyruvic acid, dehydroxy and tricarboxylic acids, which are biochemically important*



*Carboxylic acids were predominant in samples. Quantitative and qualitative profiles for the hydrophilic molecules between the two sampling locations showed similar*

*presence of a series for water-soluble organic molecules in the regolith of this carbonaceous asteroid. The data also shows the evidence signatures of coevolutionary aqueous alteration*



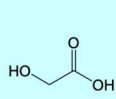
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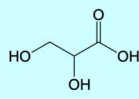
ヒドロキシ酸およびトリカルボン酸



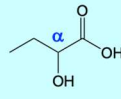
Glycolic acid  
(C<sub>2</sub>H<sub>4</sub>O<sub>3</sub>)



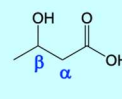
Lactic acid  
(C<sub>3</sub>H<sub>6</sub>O<sub>3</sub>)



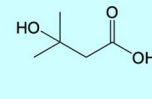
Glyceric acid  
(C<sub>3</sub>H<sub>6</sub>O<sub>4</sub>)



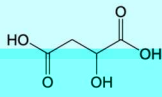
2-Hydroxybutyric acid  
(C<sub>4</sub>H<sub>8</sub>O<sub>3</sub>)



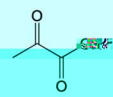
3-Hydroxybutyric acid  
(C<sub>4</sub>H<sub>8</sub>O<sub>3</sub>)



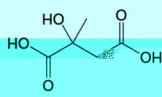
β-Hydroxyisovaleric acid  
(C<sub>5</sub>H<sub>10</sub>O<sub>3</sub>)



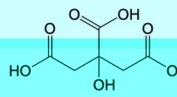
Malic acid  
(C<sub>4</sub>H<sub>6</sub>O<sub>5</sub>)



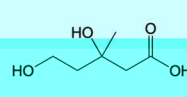
Pyruvic acid  
(C<sub>3</sub>H<sub>4</sub>O<sub>3</sub>)



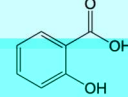
Citramalic acid  
(C<sub>5</sub>H<sub>8</sub>O<sub>5</sub>)



Citric acid  
(C<sub>6</sub>H<sub>8</sub>O<sub>7</sub>)

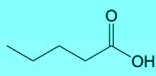


Mevalonic acid  
(C<sub>6</sub>H<sub>12</sub>O<sub>4</sub>)

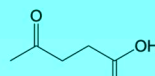


Hydroxybenzoic acid  
(C<sub>7</sub>H<sub>6</sub>O<sub>3</sub>)

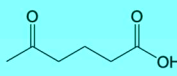
モノカルボン酸



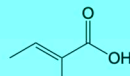
Valeric acid  
(C<sub>5</sub>H<sub>10</sub>O<sub>2</sub>)



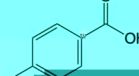
4-Oxovaleric acid  
(C<sub>5</sub>H<sub>8</sub>O<sub>3</sub>)



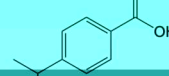
5-Oxohexanoic acid  
(C<sub>6</sub>H<sub>10</sub>O<sub>3</sub>)



Tiglic acid  
(C<sub>5</sub>H<sub>8</sub>O<sub>2</sub>)

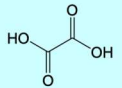


Toluic acid  
(C<sub>8</sub>H<sub>8</sub>O<sub>2</sub>)

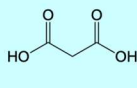


Cumic acid  
(C<sub>10</sub>H<sub>12</sub>O<sub>2</sub>)

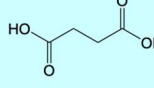
ジカルボン酸



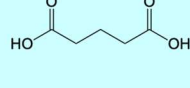
Oxalic acid  
(C<sub>2</sub>H<sub>2</sub>O<sub>4</sub>)



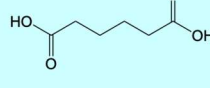
Malonic acid  
(C<sub>3</sub>H<sub>4</sub>O<sub>4</sub>)



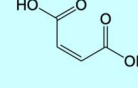
Succinic acid  
(C<sub>4</sub>H<sub>6</sub>O<sub>4</sub>)



Glutaric acid  
(C<sub>5</sub>H<sub>8</sub>O<sub>4</sub>)

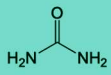


Adipic acid  
(C<sub>6</sub>H<sub>10</sub>O<sub>4</sub>)

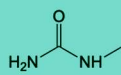


Maleic acid  
(C<sub>4</sub>H<sub>4</sub>O<sub>4</sub>)

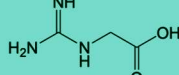
含窒素化合物



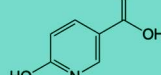
Urea  
(C<sub>2</sub>H<sub>4</sub>N<sub>2</sub>O)



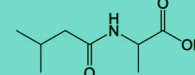
Methyl-urea  
(C<sub>2</sub>H<sub>6</sub>N<sub>2</sub>O)



Glycocyanine  
(C<sub>3</sub>H<sub>7</sub>N<sub>3</sub>O<sub>2</sub>)



6-Hydroxynicotinic acid  
(C<sub>6</sub>H<sub>5</sub>NO<sub>3</sub>)



Isovalerylalanine  
(C<sub>8</sub>H<sub>15</sub>NO<sub>3</sub>)



5,6-Dihydroxyindole  
(C<sub>8</sub>H<sub>7</sub>NO<sub>2</sub>)

環状硫黄化合物



Cyclic hexaatomic sulfur



Cyclic heptaatomic sulfur

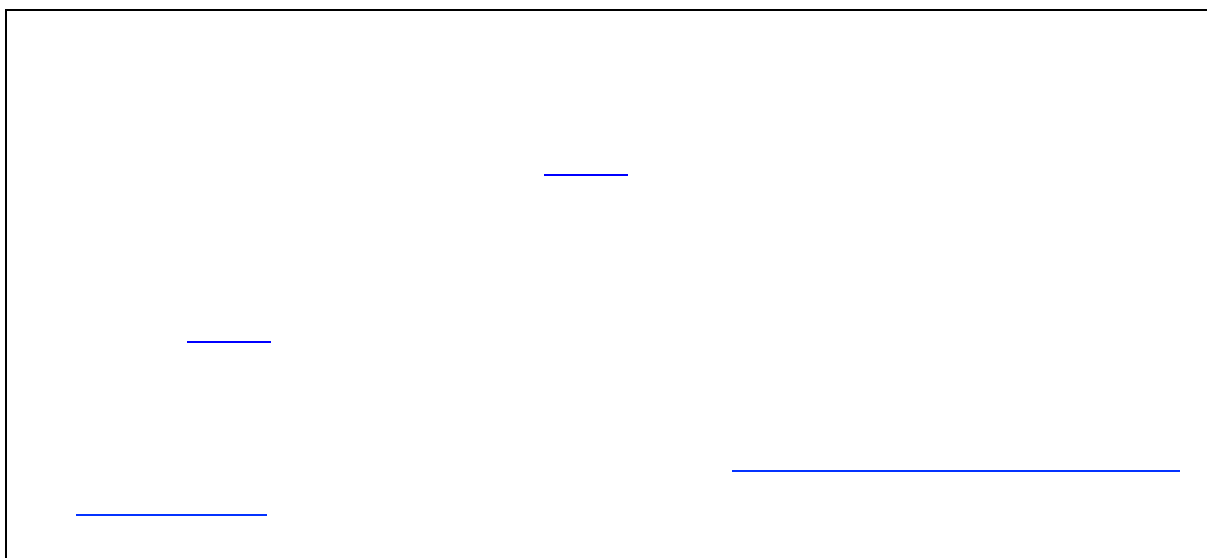
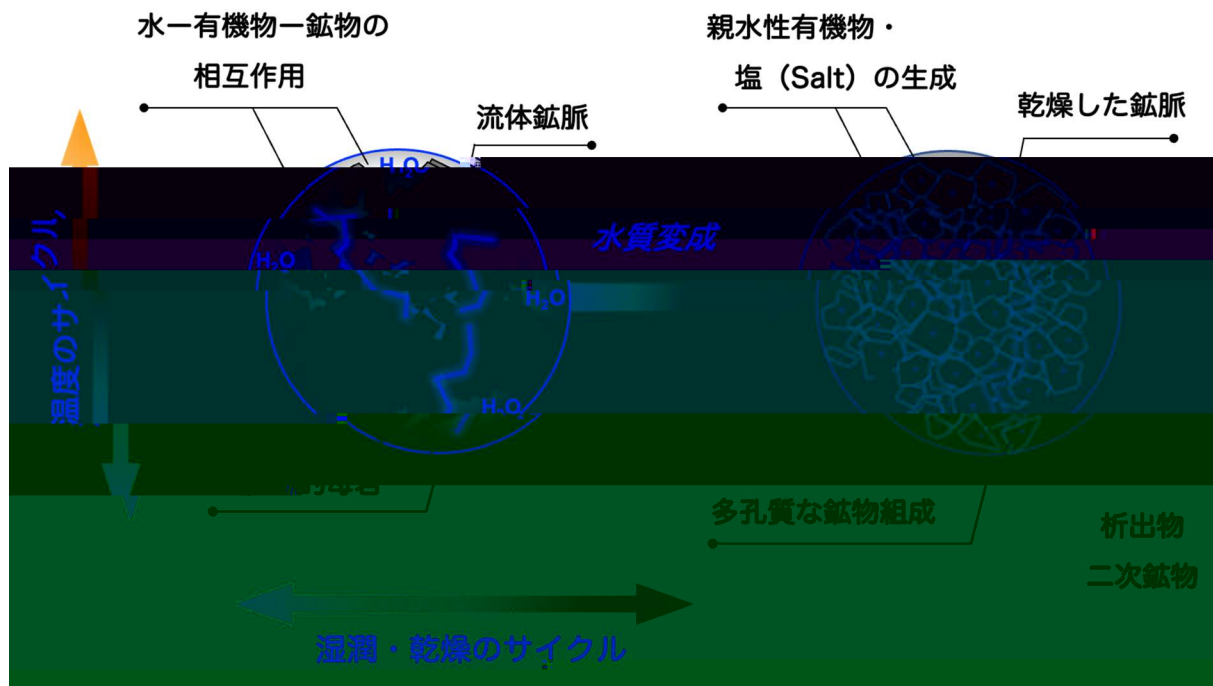


Cyclic octaatomic sulfur









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