Mirrors of Our Interest
were the offerings from Wei dynasty to the messengers of Queen Himiko of Yamatai state (Yayoi period, A.D.234) and distributed widely in Japan. Yamatai state is the oldest documented state in Japan and consequently it has been intensely studied. However, its location cannot be determined. The mirrors are considered as the key to solve its location.

Our Goal
is to estimate the manufacturing order of sibling mirrors. Sibling mirrors consist of (1) individual mirrors, cast from the original mold, and (2) their replicas called identical mirrors. If we acquire the information, we know how the mirrors are distributed and the distribution source.

The Estimating Method
sorts the manufacturing order of sibling mirrors by their local shape difference, caused during manufacturing. The shape difference is the combined result of an inherited crack and/or the abrasion of the mold. When the mold was worn by continuous usage, the mold produced more spread crack or a dull uneven pattern on its surface. Spread cracks indicate the order of production, because later cast mirrors will have more spread cracks than earlier ones.

Our Proposed System

Experiment
The shape difference is visualized by the signed distance between a pair of mirrors. In our Experiment, Dsamida08 was set as a check mirror and the others as base mirrors.

Global difference is unrelated to the manufacturing process so it is removed from the detected shape difference.

Finally, the manufacturing order can be estimated from the observed difference.

*Collaborating with Kashihara Archaeological Institute
Remove Global Difference

Observe Cross Section

Result