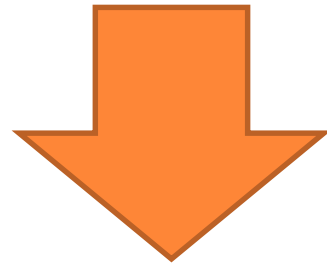# The Grain Size Distribution of Sand Deposits along the Kakogawa Coast

KEYWORDS

Sand dunes

⬇

They are made by the wind

PREVIOUS RESEARCH

Aoki (1983)	Found 2 sand deposits East of the Kakogawa River
Tanaka (1989)	Found an additional 2 sand deposits West of the Kakogawa River
Fuziwara (2003)	Claimed the sand deposits were sand dunes

PURPOSE

To determine whether previous research reporting the existence of sand dunes in Kakogawa was accurate

METHOD

① Decide on the area to bore using a basic land map and aerial photograph

② Boring and sampling

③ Particle size analysis using an automatic shaker

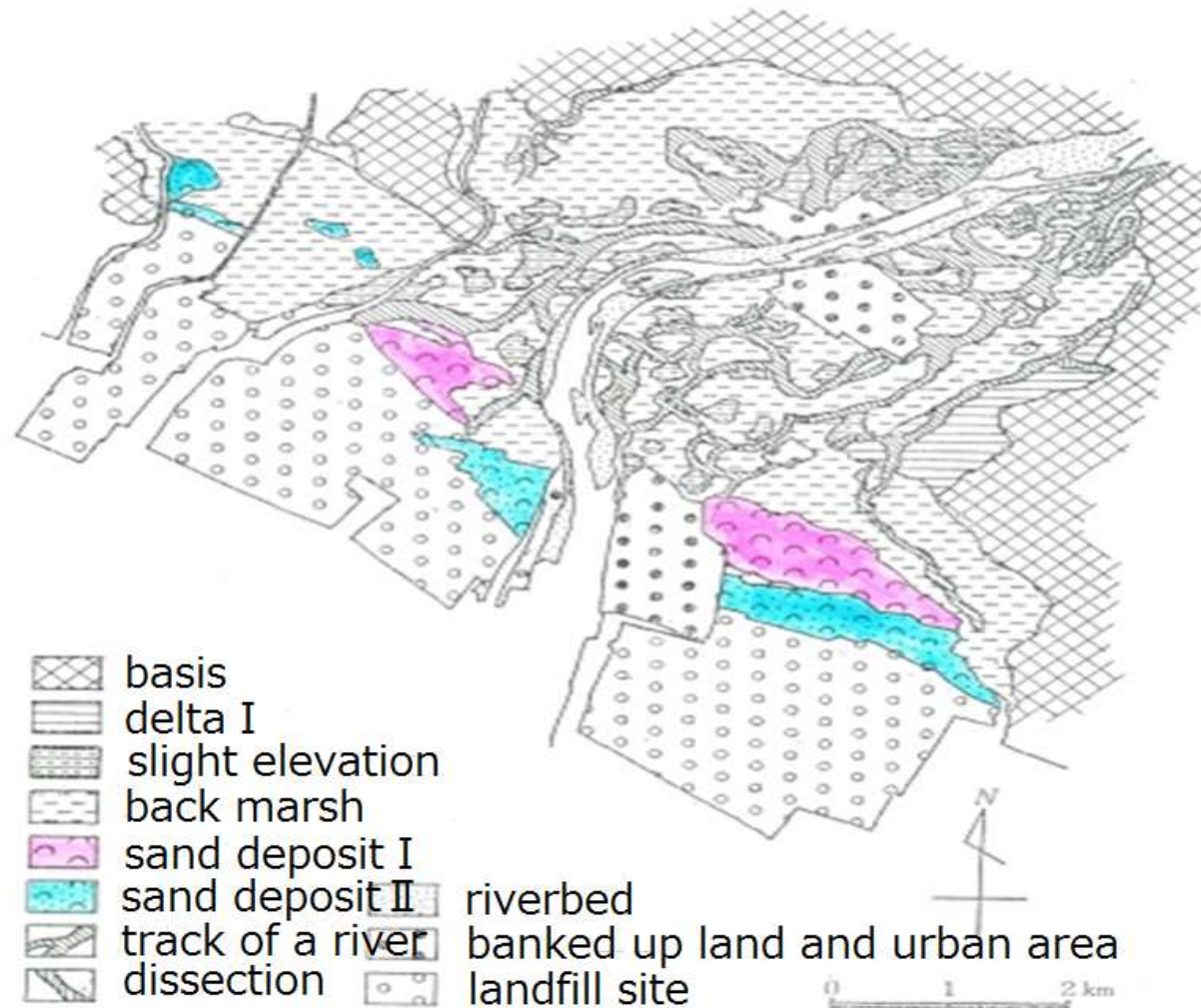④ Make a scatter plot and histogram and check for sand dunes

SETTING UP THE BORING POINT

① Make a one meter contour diagram by using a 1 to 2500 basic land map

② See geomorphological map in advance for photographic interpretation
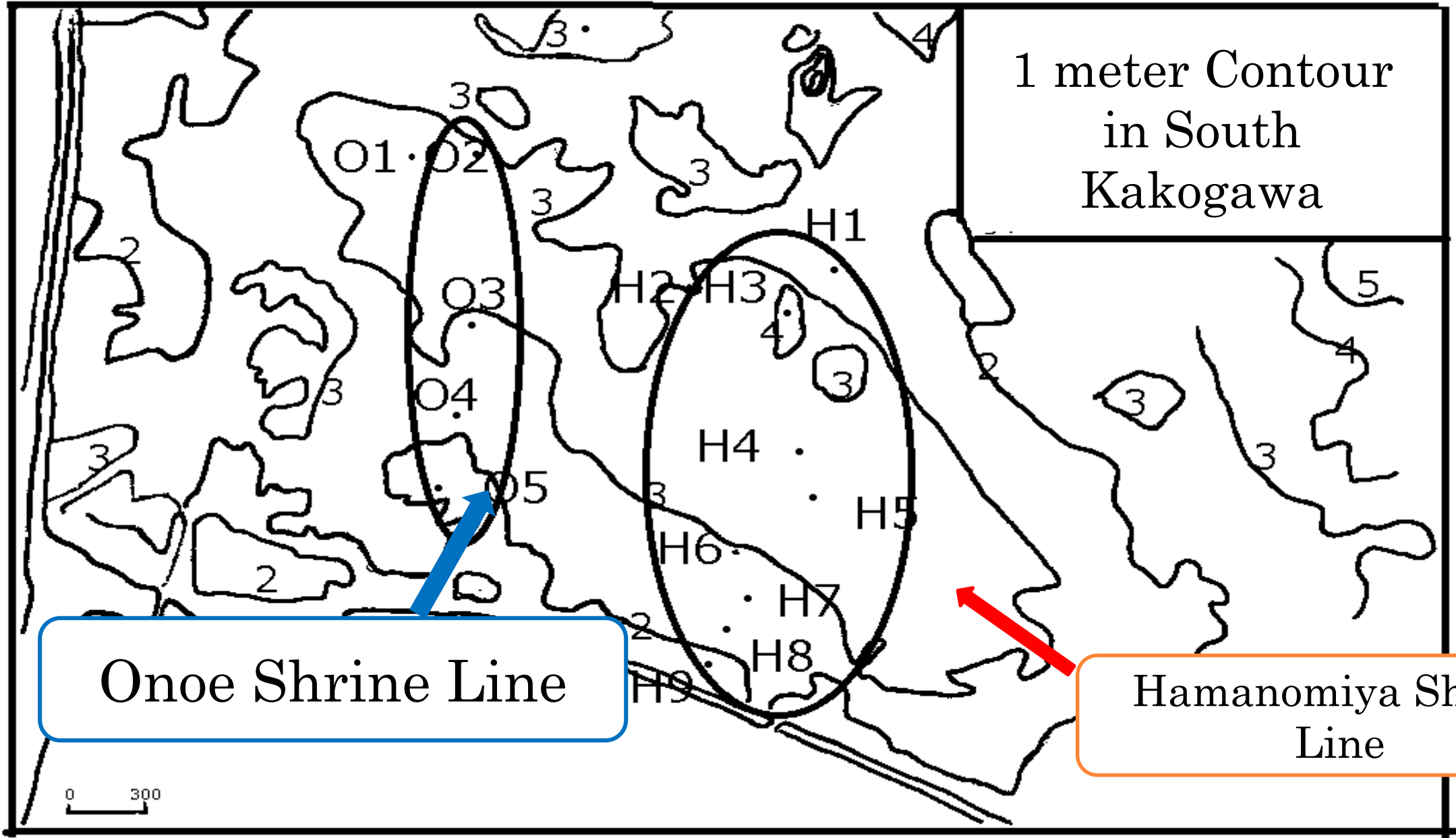
GEOMORPHOLOGICAL MAP OF THE KAKOGAWA FIELD

Reference；Aoki（1983）

basis
delta I
slight elevation
back marsh
sand deposit I
sand deposit II   riverbed
track of a river   banked up land and urban area
dissection   landfill site

0   1   2 km

1 meter Contour in South Kakogawa

Onoe Shrine Line

Hamanomiya Shrine Line

1.5 m boring stick

Retrieval repeated 5 times

Observe for sand color and particle size

Sand retrieved in 0.3 m increments

Whole process repeated twice

$$\phi : \text{THE SIZE OF THE MESH}$$

$$t\phi = 2^{-t}$$

$$\text{EX)} \quad -1\phi = 2 \quad (t = -1)$$

$$4\phi = \frac{1}{16} \quad (t = 4)$$
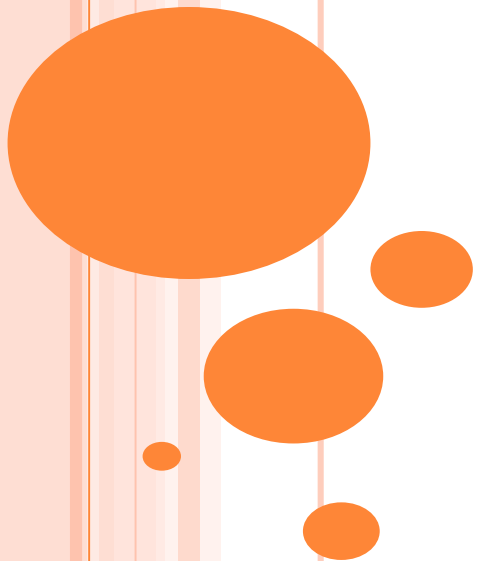
$-1\phi \longleftrightarrow 4\phi$

LARGE   SMALL

Particle size analysis

① Dry naturally

② Split each sample into 4 of 50 g

③ Measure the weight of samples and mesh

④ Divide them by particle size with an automatic shaking apparatus

⑤ Measure the sample's weight of each mesh

⑥ Calculate mean diameter, selective value and skewness

ANALYSIS

Based on particle size analysis

FORMULAS

- Mean diameter $\quad \bar{x}\phi = \frac{1}{100}\sum f_i \cdot m_i\phi$

- Selective value $\quad \sigma\phi = \sqrt{\frac{1}{100}\sum f_i \cdot (m_i\phi - \bar{x}\phi)^2}$

- Skewness $\quad \alpha\phi = \frac{1}{100\cdot\sigma_\phi{}^3}\sum f_i \cdot (m_i\phi - \bar{x}\phi)^3$

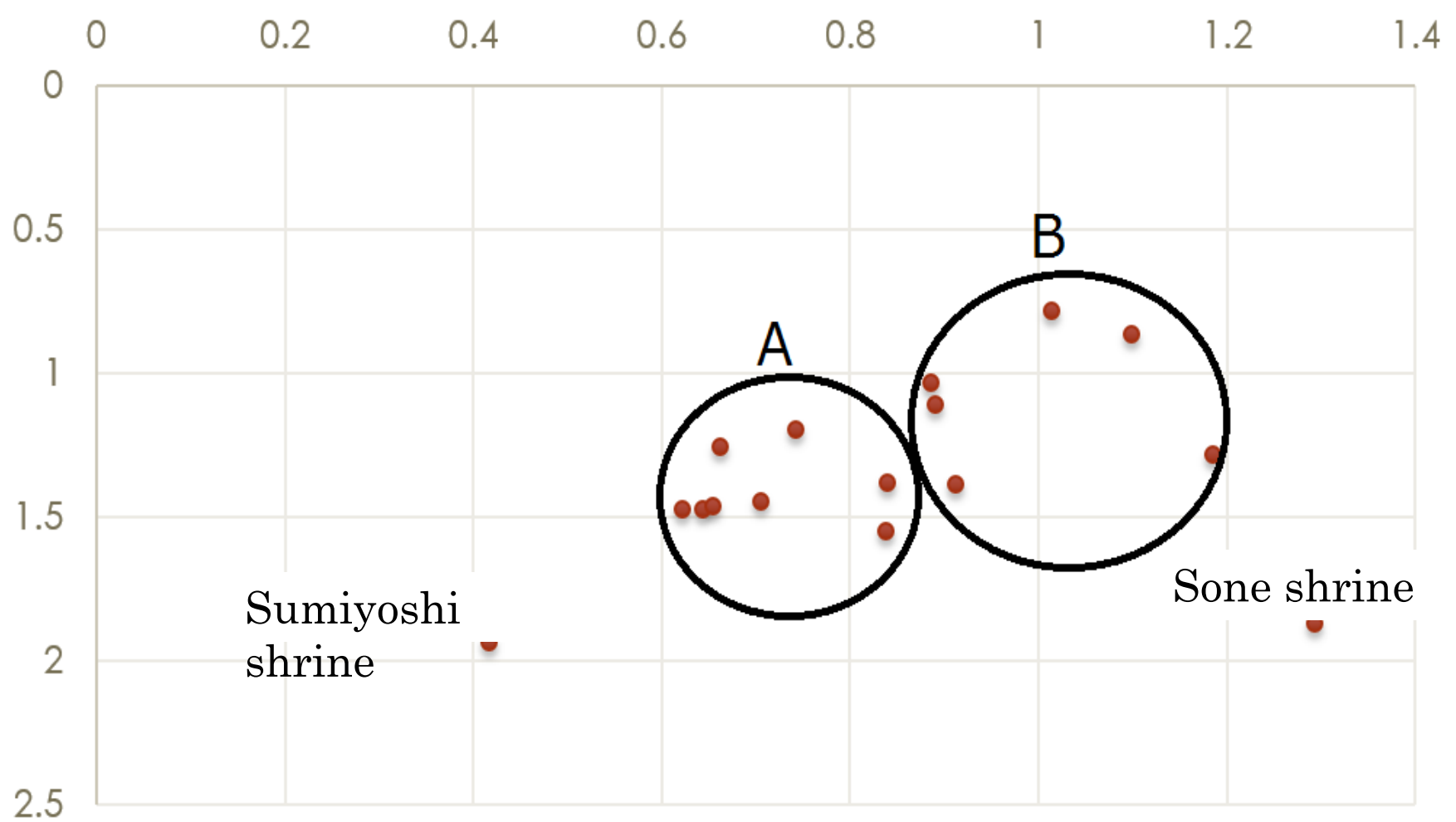f_i:weight percentage of each particle size

$m_i\phi$: ϕmedium value of each particle size

	Mean Diameter	Selective value	Skewness
H1	1.46	0.65	-0.58
H2	1.25	0.66	-0.24
H3	1.44	0.71	-0.10
H4	1.47	0.62	-1.29
H5	1.55	0.84	-1.04
H6	1.47	0.64	-0.68
H7	1.11	0.89	-0.47
H8	0.78	1.01	-0.79
H9	1.03	0.89	-0.16
O1	1.38	0.84	-0.62
O2	1.28	1.18	-0.26
O3	1.19	0.74	-0.73
O4	1.39	0.91	-0.38
O5	0.86	1.10	-0.34
Sone Shrine	1.87	1.29	0.04
Sumiyoshi Shrine	1.93	0.42	0.27

Selective value and skewness of each point
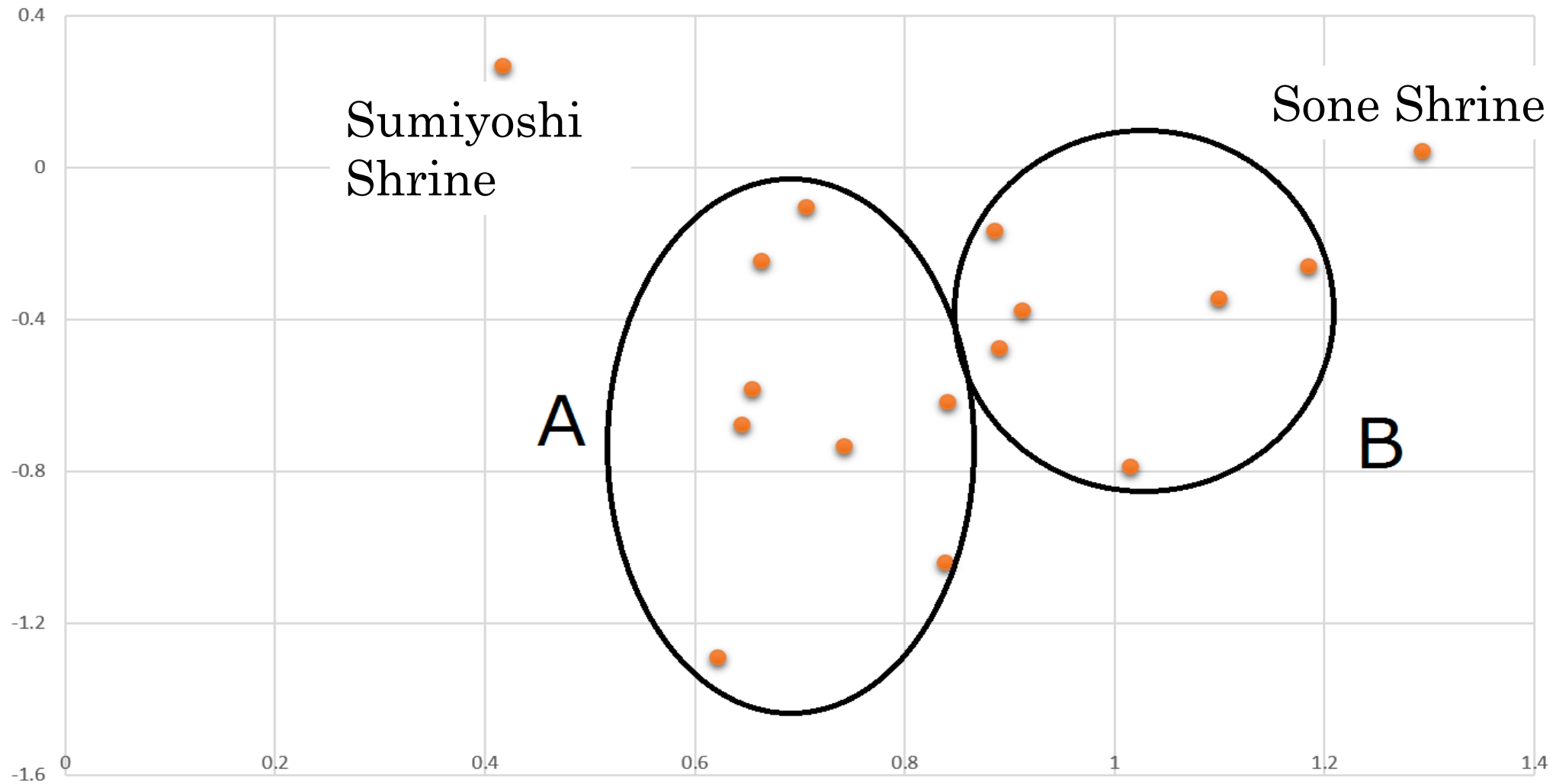
Skewness and selective value of each points.

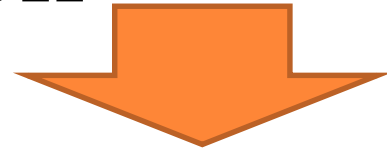|	Mean Diameter	Selective value	Skewness
H1	1.46	0.65	-0.58
H2	1.25	0.66	-0.24
H3	1.44	0.71	-0.10
H4	1.47	0.62	-1.29
H5	1.55	0.84	-1.04
H6	1.47	0.64	-0.68
H7	1.11	0.89	-0.47
H8	0.78	1.01	-0.79
H9	1.03	0.89	-0.16
O1	1.38	0.84	-0.62
O2	1.28	1.18	-0.26
O3	1.19	0.74	-0.73
O4	1.39	0.91	-0.38
O5	0.86	1.10	-0.34

Area A   Area B

- Area A: The environment is inside the bay → good selection
- Area B: The environment is outside of the bay → bad selection

- Thus, we can divide the sandbank into two parts → Confirmed Aoki's point with particle analysis

IN CONCLUSION

- We couldn't make sure of the presence of sand dunes
- There are two pieces of sandbank in the East coast of the Kakogawa River

REFERENCES

- Aoki Tetsuya (1983); Changes of palaeogeography in Kakogawa, Ritsumeikan University, Volume 454-456, pp 190~215
- (1989); Kakogawa City History Volume 1, pp 61~67
- Fuziwara Yuzi (2003); Hyougo Kyoiku University Graduation Thesis, pp 1~51
- Matsumoto Hideaki (1983); Grain size distribution of eolian marine deposit in the coast, pp1~10
- 「http://docolog.cocolognifty.com/photos/uncategorized/2007/08/26/kc390120.jpg」

Neutral Skewness

$$\text{Skewness} \quad \alpha\phi = \frac{1}{100 \cdot \sigma_\phi{}^3} \sum f_i \cdot (m_i\phi - \bar{x}\phi)^3$$

$m_i\phi : \phi$ median value of each particle size