

## Estimation of the wind variety using morphology of isolated sand dunes

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Sand dunes change their shaped depending on the wind variety. The shape of sand dunes is often used for an indicator of wind condition in areas where the wind conditions do not be known yet (e.g. extraterrestrial sand dunes on Mars and Titan).

Although sand dunes were used for estimation of long-term averaged wind direction only, a new method for estimating wind conditions was developed based on a series of flume experiments. The method using a phase diagram of isolated sand dunes can indicate bidirectionally-approximated wind variety (i.e. the angular variation and intensity ratio of the bidirectional flows).

In order to confirm the method, the method was applied to some dune field in Western Sahara and Mauritania, because the wind variety in this area was know by previous studies (direct measurement and meteorological reanalysis). The distribution of isolated sand dunes showed bidirectional wind condition consisting of northerly and easterly wind and gradual change of the intensity ratio of bidirectional wind elements. The estimation consisted with the data from the previous s studies.

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