短報

The case in support of the investigation of oceanographic data in the Rio de Janeiro Olympic Games race area for sailing
セーリング競技におけるリオオリンピックレースエリアの海象データ調査事例

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I. Introduction

Olympic classes of sailing include racing under momentary changes of oceanographic conditions (e.g., winds, tides, and waves). Thus, proper evaluation of such changes is important for sailing performance. The Japanese sailing Olympic team planned their racing strategy in preparation for the Rio Olympic Games of 2016 (Rio-2016), and the Japan Institute of Sports Sciences supported the investigation of oceanographic data. This report introduces the case in support of investigating features of typical wind (sea breeze) and basic tide flow in the Rio-2016 race area.

II. Method

1. Investigation location and periodThe investigation area was within and outside Guanabara Bay, which covered the Rio-2016 racing area 2).

The total investigation days were 63, consisting of four periods: 28 July – 22 August 2015, 6–18 December 2015, 8–17 May 2016, and 12–25 June 2016.

2. Overview of this investigation

Wind and tide data were gathered using at least two but no more than four boats; the number of boats varied with investigation period. This investigation was conducted at nearly the same time as races, 1300 to 1700 during a day 1).

The detailed measurement procedure and study locations were determined from discussion with the national sailing coach on every study day. Our basic concept was to evaluate using measured wind and tide data at a minimum of two locations during the investigation period.

3. Measurement of wind and tide data

Wind data (direction and speed) were measured by an instrument (High Accuracy Wind Measurement System, North Sail Japan, Kanagawa, Japan) on an inflatable boat (VSR5.8, VSR Lab, Portorož, Slovenia).

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Wind data over the water were measured continuously during the study.

Tide data (direction and speed) were measured by a tide measurement system (Advanced Data Client, North Sail Japan) on a stick for evaluating tide flow (direction and speed).

4. Data analysis and feedback

The wind data were expressed by visualization software (Wind Viewer, North Sail Japan). The tide data were expressed by map software (Google Earth, Mountain View, California, USA) and visualization software (Advanced Performance Analyzer, North Sail Japan). The diagrams for feedback were constructed from the visualized data, with the objective of easy comprehension by athletes and coach.

III. Results and practical application

1. Wind data

Figure 1 is a typical case of sea breeze circulation over Rio waters, which occurred very frequently during the investigation. This diagram shows wind and locations of relatively high/low wind speed in the race area.

2. Tide data

Figure 2 shows basic tide flow in Rio waters at high and low tide. This diagram shows tide flow direction

and locations of relatively fast/slow tide speed in the race area.

This report demonstrates support for investigating oceanographic data for the Japanese Olympic sailing team. The feedback from these diagrams was highly regarded by athletes and the coach, because it was visualized from normally unavailable information. Therefore, the data were helpful in planning strategy and tactics for the sailing competition in the Rio-2016 race area.

IV. Acknowledgements

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V. References

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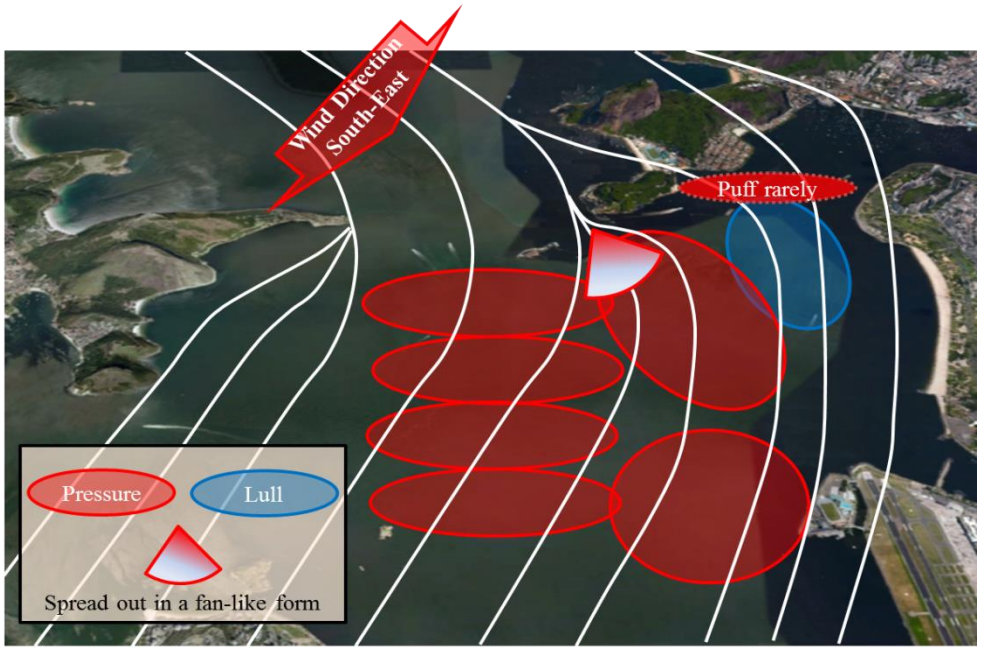

Fig. 1. Diagram of typical wind direction (south-east) in sea breeze case.
South is upward rather than north because to display upward wind direction is easier to visualize by athletes and coach. White lines show wind flow (the bending of the wind), pressure and lull means for each high and low wind speed location.

Fig. 2. Diagram of basic tide flow in high and low tide cases.
South is upward, as in Fig. 1. Direction and length of white arrows represent tide direction and speed, respectively (length is proportional to speed).