

I 次の文を読んで、問いに答えなさい。

The Southern Ocean is not somewhere most people choose to spend an hour, let alone a month. Circling the icy continent of Antarctica¹, it is the planet's wildest and most remote ocean. But in March, four sailing teams came through the area as part of a marathon race round the bottom of the Earth, from Cape Town in South Africa to Itajaí in Brazil. The Ocean Race is known as the toughest, and certainly the longest, professional sporting event in the world, attracting sailors of the highest level who form diverse crews. However, this year scientists have noticed an opportunity for their research to benefit as well.

Because the boats visit the most remote part of the ocean, which even scientific vessels struggle to access, this year the crews will put scientific instruments all around Antarctica. The aim is to measure 15 different types of environmental data, from ocean temperature to information about the atmosphere. Information from the devices will help scientists with everything from weather forecasting to the climate emergency. "The Southern Ocean is a very important driver² of climate on a global scale, but there is very little data," says German scientist Toste Tanhua. "Data from the sailing races in the Southern Ocean is very important for us to understand the uptake³ of carbon dioxide (CO₂) by the ocean."

Each boat has weather sensors⁴ on board that measure wind speed and direction in addition to air pressure and temperature. Each team will drop two kinds of buoys⁵ which capture data. One type drifts⁶ on the surface in order to provide data for scientists to study ocean currents and forecast extreme weather events, such as hurricanes and typhoons. A second type of buoy operates below the surface at depths of up to two kilometers, moving slowly with deep currents and sending information every ten days. The data is used for climate analysis as well as for long-

range weather forecasts. Meanwhile, the crews will take regular water samples using other devices to measure the levels of carbon dioxide, oxygen, and salt, as well as temperature. This data is then analysed in Germany where the information can be seen while it is being collected out at sea.

Tanhua says this kind of data reveals new patterns. For example, it shows how carbon dioxide varies over a year—higher when the water warms up in summer and lower during a bloom, which is a sudden increase in the population of phytoplankton⁷. It also shows how the ocean takes carbon from the surface and transports it to the bottom. “In the Southern Ocean, you have three major systems where water is either going down vertically or coming up. Depending on the depth, the level of carbon differs. In addition, circular currents of water called eddies also transport carbon up and down,” Tanhua says. Scientists will now be able to observe these systems and eddies up close, compare them with satellite data, and fill in the gaps.

The boats will also be taking samples of trace elements⁸ which are essential for the growth of phytoplankton. Not only are phytoplankton the base of the food chain, but they are responsible for most of the transfer of CO₂ from the atmosphere to the ocean. “This data is extremely important,” says Dr. Arne Bratkič, a scientist in Spain, who analyses the trace element results. “It is important to know how much food is available for animals that will feed on phytoplankton eventually, and how much CO₂ the phytoplankton are going to absorb from the atmosphere.” Bratkič says that taking these kinds of samples normally requires special scientific voyages that are limited in number and are costly to operate. The Ocean Race is a way of testing investigations on non-scientific ships at sea. “We are paying attention to the design of the sampling devices—what works and what does not. It’s really exciting.”

To add to the phytoplankton study, the sailors have equipment that automatically records images and provides insights into the diversity of phytoplankton species. This helps scientists like Dr. Veronique Green, who are also studying oxygen. She says, “Boats sail through remote parts of the world ocean where observations are really scarce⁹. Getting more oxygen data is crucial¹⁰ to get a better estimate of the amount of oxygen in the ocean and thus of the oceanic oxygen loss. The more data we have, the more accurately we can understand the ocean’s capacity to cope with climate change and predict what will happen to the climate in future.”

According to Dr. Katsiaryna Pabortsava, who helps with the analysis, “The Ocean Race will be delivering samples from places that otherwise we’d have difficulty getting data from. The other thing is the ease of collection of this information. You don’t need trained staff, as you would have with research vessels.” The hope is that this method for obtaining samples could eventually be used on other non-scientific ships, such as cruise or ferry boats. The sailors benefit, too. “It’s a win-win situation, because six hours after dropping the buoys, the sailors will download a new weather forecast,” using data from the buoys, says Martin Kramp, ship coordinator. “In areas where data is scarce, such as the Southern Ocean, that can make a significant difference — the forecast will be much better.”

(Adapted from a work by Yvonne Gordon)

(注)

- | | |
|-------------------|--------------------|
| 1. Antarctica | 南極大陸 |
| 2. driver | 影響を与える力 (要因) |
| 3. uptake | 吸収 |
| 4. weather sensor | 気温や湿度などを観測する機器 |
| 5. buoy | 浮標 (ブイ) |
| 6. drift | 漂う |
| 7. phytoplankton | 植物プランクトン |
| 8. trace element | 生物が生きていくために必要な微量元素 |
| 9. scarce | 不十分な |
| 10. crucial | 極めて重要な |

[1] 本文の意味, 内容にかかわる問い(A)~(D)それぞれの答えとして, 本文にしたがってもっとも適当なものを(1)~(4)から一つ選び, その番号を解答欄にマークしなさい。

- (A) What is the primary purpose of the journey from South Africa to Brazil?
- (1) For experts to teach non-scientists about climate change
 - (2) For experienced sailors to compete in challenging ocean waters
 - (3) For professional crews to bring scientific vessels to remote parts of the ocean
 - (4) For scientists to take accurate measurements of the continent of Antarctica

- (B) What is the difference between the two types of buoys?
- (1) One operates on the surface of the water while the other operates below.
 - (2) One moves quickly with the ocean currents while the other moves slowly.
 - (3) One forecasts extreme weather while the other forecasts ocean temperature.
 - (4) One measures the uptake of carbon dioxide while the other measures oxygen.
- (C) According to the text, what is the connection between phytoplankton and climate change?
- (1) Phytoplankton blooms are affected by eddies.
 - (2) Phytoplankton remove carbon dioxide from the air.
 - (3) Trace elements affect the food supply of phytoplankton.
 - (4) Pollution is removed naturally from the ocean by phytoplankton.
- (D) According to the text, what is one reason that it has been challenging to conduct research in the Southern Ocean?
- (1) There are too many ships sailing there.
 - (2) It is difficult and expensive to go there by boat.
 - (3) Scientists only have a chance to go there every few years.
 - (4) Not enough people are trained in the necessary data collection methods.

[2] 次の(1)～(5)の文の中で、本文の内容と一致するものには1の番号を、一致しないものには2の番号を、また本文の内容からだけではどちらとも判断しかねるものには3の番号を解答欄にマークしなさい。

- (1) Teams from Europe take part in the Ocean Race.
- (2) Scientists will pay the sailors for their assistance.
- (3) The water samples are used to measure the amount of phytoplankton in the water.
- (4) Sailing teams have expressed an interest in collecting water samples from the ocean.
- (5) Carbon is moved from the surface of the ocean to deeper below by eddies.

[3] 本文の内容をもっともよく表しているものを(1)～(5)から一つ選び、その番号を解答欄にマークしなさい。

- (1) Participants in a boat race help scientists collect data for their research.
- (2) Sailing teams have improved their performance with the help of scientists.
- (3) More scientific data about the ocean is needed to understand climate change.
- (4) Sailors are using buoys to improve weather forecasting in the Southern Ocean.
- (5) Scientists are taking measurements of carbon dioxide levels in the water near Antarctica.

II 次の文を読んで、問いに答えなさい。

In 2013, Ethan Welty and Caleb Phillips launched Fallingfruit.org, a free online map that records edible¹ plants in cities around the globe to encourage foraging² within urban settings. They wanted a better tool to record locations and harvest schedules, recognizing the vast resource of food available (A) the sizable number of people interested in foraging. Welty and Phillips started by adding plant lists from governments and universities to the map. But they also designed the map to allow users to add locations and information about the plants to make it inclusive³ and more valuable.

Since its inception⁴, Falling Fruit—which currently features 1,533,034 locations around the world—has had over two million people visit the website. The site’s diversity is evident in its available languages and its wide variety of plants around the globe. Foragers are finding oranges originally from China in Australia, berries native to Asia in South Africa, and rare tropical fruits in urban Brazil. Thanks to this knowledge gained,^⑤ Welty says he now knows much more about which plants are edible and how to prepare them. (B), he’s learned that the fruit of the cherry dogwood tree is popular in Iran, and can be preserved as jam, made into refreshing drinks, pickled in vinegar and mint, or simply lightly salted and eaten raw.

Welty sees great potential in Falling Fruit to reimagine cities as places (C) food for residents. “We share our cities with all kinds of food-bearing plants, almost accidentally,” he says passionately. “There is a lot growing that we should be more aware and taking advantage of, and ideally building a sense of community around, so that in the future we can actually demand more and expect more from our city. Then we can imagine a more edible, urban future.”

Welty views Falling Fruit as a sort of activism⁵. He notes that the project brings up questions of private property, who should have a voice in the future of cities, and how everyone can benefit. Foraging on private property can be (D). Welty won't take a tree or plant off the map if an owner requests it because a user could easily put it back on. Instead, he asks that the description state that the plant is on private property, so foragers can ask owners if they can pick. Welty likes this approach^③ because it encourages people to talk to each other.

Welty believes that a new way of thinking is required to incorporate⁶ foraging in planning cities, like creating areas to be harvested. He suggests reimagining spaces between buildings or tearing out roads, whatever will maximize the space's benefits to create opportunities to interact with plants in one's neighborhood. Billings, Montana, is one city that's experimenting with this idea^⑦. As part of its waste reduction program, over 120 fruit trees were planted in parks near residents who do not have easy access to supermarkets. Then the trees were listed on Falling Fruit. People pick fruit for themselves or to donate to food banks, reducing food waste and park maintenance. Churches and businesses with fruit trees on their property are encouraged (E) the map.

The complete Falling Fruit map includes over two thousand category tags, mostly for plants, but there are also some mushrooms and the occasional fishing or clam-digging spot. The tags cover a purposely wide range of foraging spots to expose people to foods outside of what's in a supermarket. These include dumpster⁷ locations to bring attention to waste in the food system and also show a relatively fixed location (F) on some reliable schedule. Users like Lily Brown of Boston have added over fifty thousand locations to the map. Brown, who (G) her food through sustainable harvesting, has contributed approximately 20 locations around the city and says Falling Fruit "has been a wonderful way to keep track

of the fruits and herbs I find.” Her most unexpected find was wild mushrooms on a college campus. She also baked a tasty apple bread using some foraged apples and flour she made from acorns⁸. “It’s the community input that really makes an app like this,” says TJ Butler, who adds locations near him in Maryland. He’s found apples, pears, and berries, and hopes the map will indicate harvest seasons in the future.

Doing that is a goal of Welty’s, who appreciates Falling Fruit’s success, though like with many startups⁹, he wishes he had time and money to develop it further. Falling Fruit is a non-profit with a volunteer staff, primarily Welty. He strongly believes (H) urban foragers to find food. He founded and is an advisory board¹⁰ member of Community Fruit Rescue, an organization that harvests and saves excess urban fruit, and he hopes to bring about widespread change. “The kind of data analysis I’d really like to be doing,” he adds, “is looking at where people are going, specifically what they’re interacting with, what kind of species, and when they’re harvesting from them, in order to influence the decisions being made about what to plant next and where. That is the dream.”

Ⓢ
(Adapted from a work by Liz Susman Karp)

(注)

- | | |
|--------------------|--------------------|
| 1. edible | 食べられる |
| 2. forage | 食用として利用できる植物を探し求める |
| 3. inclusive | 誰もが参加できる |
| 4. inception | 始まり |
| 5. activism | 政治的な活動 |
| 6. incorporate | 取り入れる |
| 7. dumpster | 大型ごみ収納器 |
| 8. acorn | どんぐり |
| 9. startup | 新規事業の立ち上げ |
| 10. advisory board | 諮問委員会 |

[1] 本文の (A) ~ (H) それぞれに入れるのにもっとも適当なものを(1)~(4)から一つ選び、その番号を解答欄にマークしなさい。

- (A) (1) as well as (2) despite
(3) rather than (4) without
- (B) (1) For example (2) However
(3) In spite of this (4) Without a doubt
- (C) (1) that can provide (2) that distribute
(3) that sell (4) where everybody gives
- (D) (1) accomplished by paying a fee
(2) considered a delicate issue
(3) impossible to do
(4) similar to foraging on public land

- (E) (1) to add themselves to
(2) to ask for donations for
(3) to design a new version of
(4) to help pay for
- (F) (1) of food industries
(2) of worldwide users
(3) where it is expensive to operate
(4) where there is food available
- (G) (1) doesn't understand how to get
(2) enjoys having a close connection to
(3) hesitates to search for
(4) relies on Welty for
- (H) (1) it should be easy for
(2) major companies must help
(3) neighborhoods often ask
(4) people ought to pay

[2] 下線部 ㉞～㉟ それぞれの意味または内容として、もっとも適当なものを
(1)～(4) から一つ選び、その番号を解答欄にマークしなさい。

- ㉞ this knowledge gained
(1) learning how to create an online map
(2) discovering the different types of food on the map
(3) recognizing the large number of map users worldwide
(4) understanding the multiple languages that the map users speak

Ⓥ this approach

- (1) being interested in activism
- (2) removing trees from the online map
- (3) not removing trees on private property
- (4) letting people make their own decisions

Ⓦ this idea

- (1) adding more parks near supermarkets
- (2) designing places for people to collect food
- (3) planting more vegetables in home gardens
- (4) changing the appearance of downtown buildings

Ⓧ Doing that

- (1) Discovering more plant locations
- (2) Finding all his food with the map
- (3) Adding new information to the map
- (4) Making a new smartphone application

Ⓨ That

- (1) Hiring more staff members
- (2) Creating another startup company
- (3) Eliminating private property in urban areas
- (4) Using insights to guide community development

III

[1] 次の会話の㉔～㉞それぞれの空所に入れるのにもっとも適当な表現を(1)～(10)から一つ選び、その番号を解答欄にマークしなさい。

At a dentist's office

A: Good morning. Sorry to be a little late for my appointment.

B: Not at all. Please have a seat over here. When was the last time you had your teeth cleaned?

A: Oh, I don't recall. About two years ago, maybe? Is that important?

B: (㉔) It's better to have them cleaned every six months.

A: (㉕) I'm a little busy. I thought once a year would be enough.

B: Well, that's up to you. But as you get older, it's harder and harder to keep your teeth in good shape.

A: True. Although I have been trying to cut down on sweets. (㉖)

B: I'm glad to hear that. How many times a day do you brush your teeth?

A: Usually twice. Once in the morning and once after my evening bath. That's good, isn't it?

B: Three times would be better. But the most important thing is how you brush.

A: How to brush my teeth? Really? I learned how to do that when I was five!

B: (㉞) However, I can see now from a quick look that you missed a few spots. Here's a brush — time to practice!

- (1) That often?
- (2) I'm sure you did.
- (3) I would certainly say so!
- (4) They were cleaned last year.
- (5) But I forgot to brush last night.
- (6) How old were you at that time?
- (7) All the appointments are booked.
- (8) You must have had very strong teeth!
- (9) And I don't eat anything late at night.
- (10) I'm sure I cleaned them for you last year.

[2] 次の会話の㉠～㉣それぞれの空所に入れるのにもっとも適切な表現を(1)～(10)から一つ選び、その番号を解答欄にマークしなさい。

At home

A: Hey, honey, I'm in the bathroom, and I think I hear the delivery truck on the street. Do you mind answering the door if the driver knocks? I'm still expecting a parcel to come.

B: Oh, really? Did you order another pair of shoes for the baby? I'm actually busy with her at the moment.

A: Don't worry, the baby'll be fine for a few seconds. (㉠) So, I'm a bit concerned.

B: Well, it might also be the neighbour and I really don't want to see him.

A: Oh, he already left really early this morning. Besides, you're much closer to the front door than I am, and I still have to take a shower and get dressed.

B: You know, it's already 8 a.m.! (㉡)

A: You're right, I do. Except for today because I didn't sleep very well last night. I think I'm really stressed about that parcel. I need it for my meeting today.

B: Yeah, I heard you around midnight watching TV.

A: Oh, did you? Sorry. (㉢) I thought TV might calm me down. Oh, I just heard someone knock on the front door, and I really need that parcel before I leave the house this morning.

B: OK, let me check. (㉣) But you were right, it wasn't the neighbour. Fortunately, they left a delivery notice!

A: Oh, no! What am I going to do now?

- (1) You're in luck.
- (2) That wasn't me.
- (3) I tried to be quiet.
- (4) You're going to be late.
- (5) I didn't hear a thing either.
- (6) You're usually at work by now.
- (7) That's the time you usually leave.
- (8) It was supposed to arrive yesterday.
- (9) Sorry, it seems they've already gone.
- (10) The ones I ordered were the wrong size.

IV 次の(A)～(H)それぞれの文を完成させるのに、下線部の語法としてもっとも適当なものを(1)～(4)から一つ選び、その番号を解答欄にマークしなさい。

(A) The new smartphone can _____ applications faster than last year's model.

- (1) download (2) downloaded
(3) downloading (4) downloads

(B) Neither my cats nor the dog _____ the food I provide for them.

- (1) be liking (2) like
(3) likes (4) liking

(C) _____ the situation change, I will move to Tokyo.

- (1) If (2) Should
(3) Unless (4) Would

(D) The students, _____ after class, met their friends in the hall.

- (1) have waited patiently (2) to wait patiently
(3) waited patiently (4) waiting patiently

(E) The manager saw that the towels in the hotel room _____ by the guests.

- (1) had been taken (2) had taken
(3) to be taken (4) was taken

(F) The couple had their bags _____ while they were travelling.

- (1) being stolen (2) stealing
(3) stolen (4) to steal

(G) Given our budget, one hundred and fifty dollars _____ too much to spend on our one-night hotel stay.

(1) are

(2) be

(3) is

(4) to be

(H) _____ students who want to attend the conference should register by the end of the month.

(1) All

(2) Almost

(3) Each

(4) Every

V

〔1〕 次の(A)～(E)それぞれの文を完成させるのに、下線部に入れる語としてもっとも適当なものを(1)～(4)から一つ選び、その番号を解答欄にマークしなさい。

- (A) The weather was perfect, adding to the _____ of the day.
(1) brass (2) enjoyment
(3) sheriff (4) vinegar
- (B) That was the loudest _____ I've ever heard!
(1) earache (2) nail
(3) saucepan (4) sneeze
- (C) _____ between the companies were complicated.
(1) Bracelets (2) Encyclopedias
(3) Knickers (4) Negotiations
- (D) In the forest, some animals rely on _____ trees to make their homes.
(1) economical (2) hollow
(3) numerical (4) witty
- (E) I was just about to _____ the magazine rack.
(1) betray (2) browse
(3) evacuate (4) startle

[2] 次の(A)～(E)の文において、下線部の語にもっとも近い意味になる語を(1)～(4)から一つ選び、その番号を解答欄にマークしなさい。

(A) They discovered several bird species.

- | | |
|-----------------|---------------|
| (1) habits | (2) nests |
| (3) sanctuaries | (4) varieties |

(B) The scientist had to substitute equipment parts to make the experiment work.

- | | |
|-------------|---------------|
| (1) blend | (2) eliminate |
| (3) harness | (4) switch |

(C) We received some worthwhile feedback.

- | | |
|--------------|-------------|
| (1) honest | (2) vague |
| (3) valuable | (4) written |

(D) They yearn for freedom.

- | | |
|------------|------------|
| (1) battle | (2) bid |
| (3) hunger | (4) scheme |

(E) The show was quite breathtaking.

- | | |
|------------------|----------------|
| (1) entertaining | (2) exhausting |
| (3) satisfactory | (4) stunning |