

Status report on O₂ research activities at NIPR & TU

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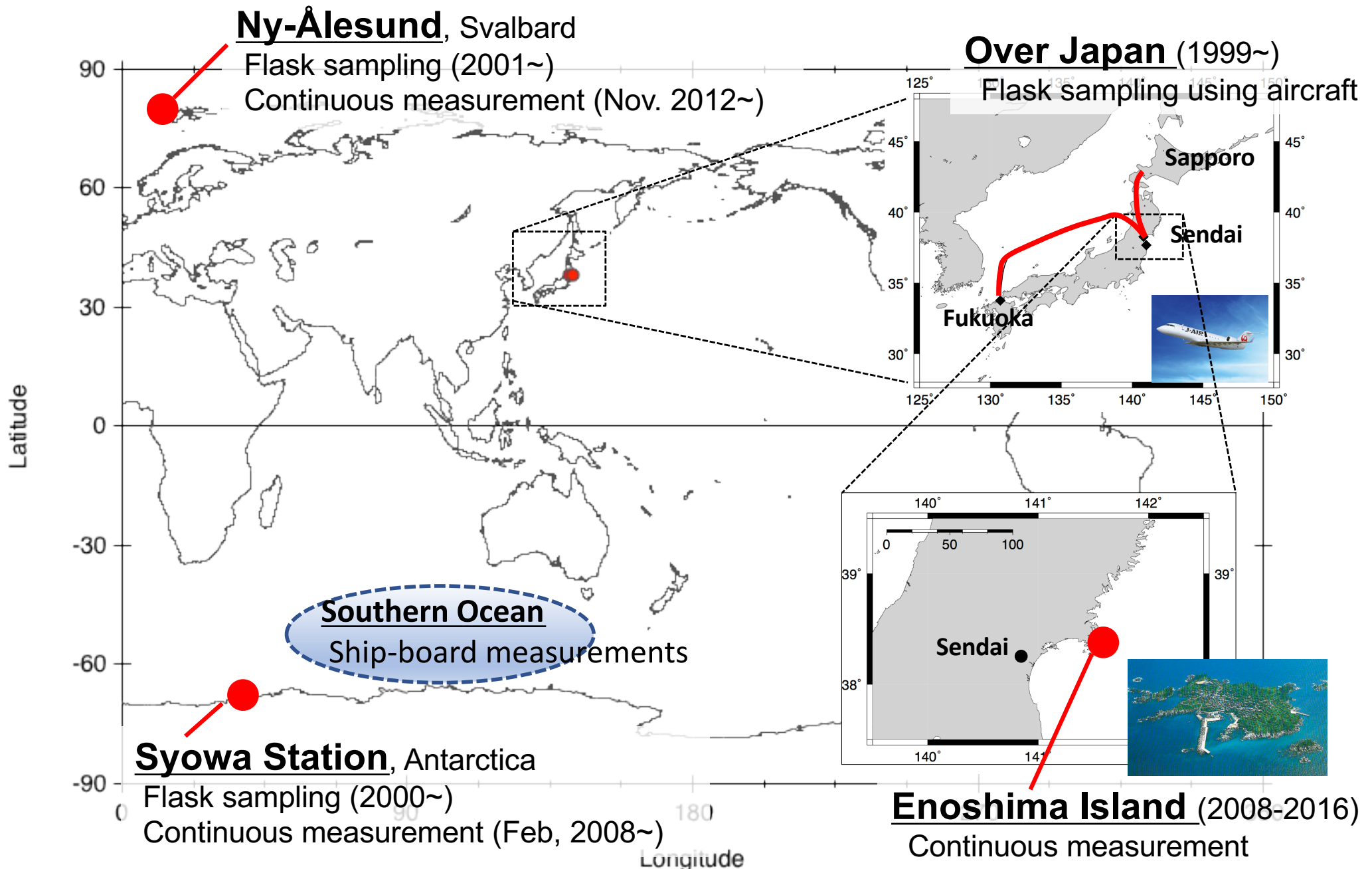
and

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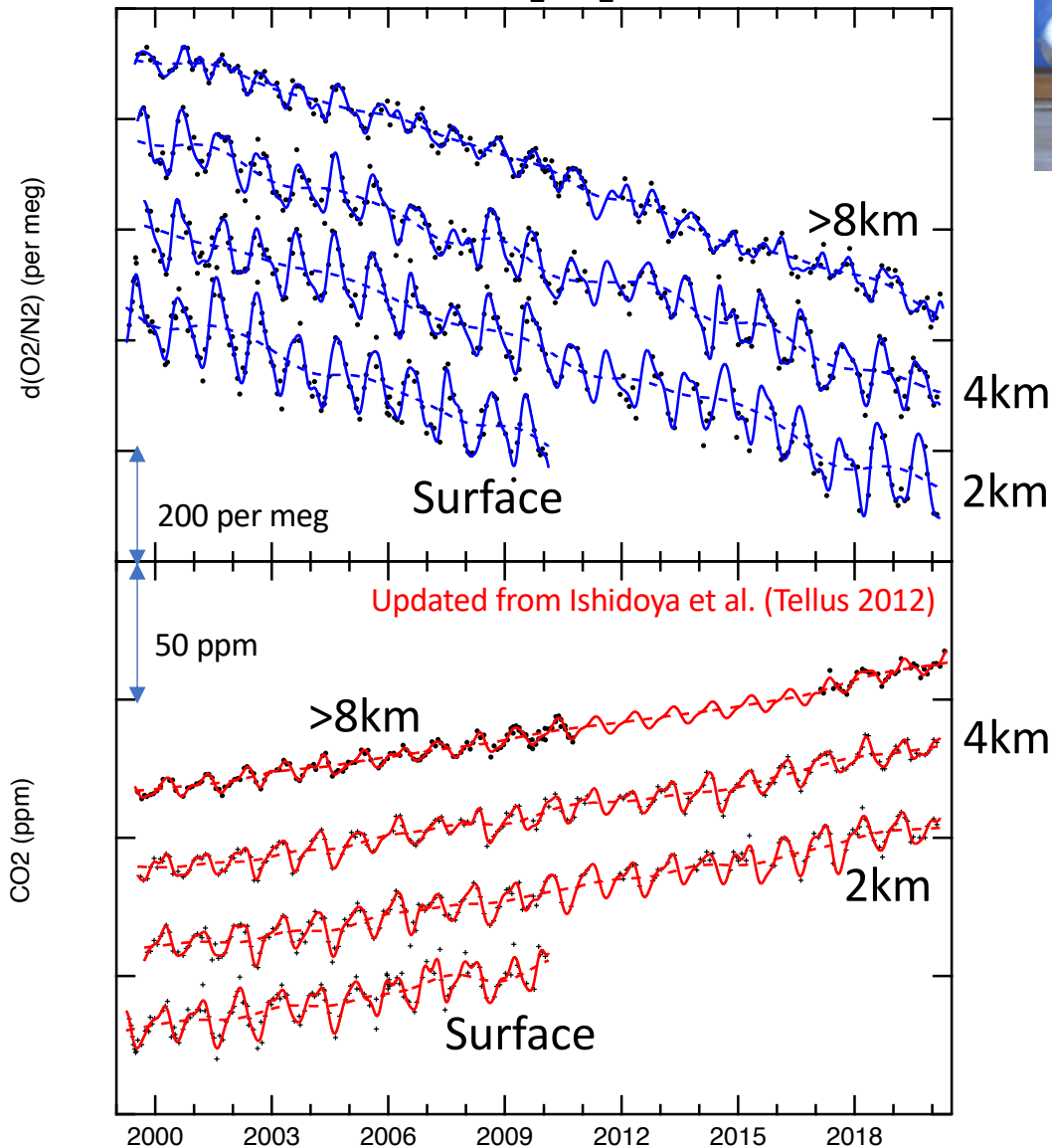
In this presentation, we would like to introduce ongoing observation activities for O₂/N₂ conducted by NIPR & TU.

O₂ observation sites of TU & NIPR



Aircraft Observation Over Japan

Flask observation of O_2/N_2



Monthly air sampling have been conducted since 1999

<https://www.jal.com/ja/outline/history/aircraft/jas.html#cont01>

MD-90



https://www.jal.com/ja/outline/history/aircraft/index_1991s.html#cont01



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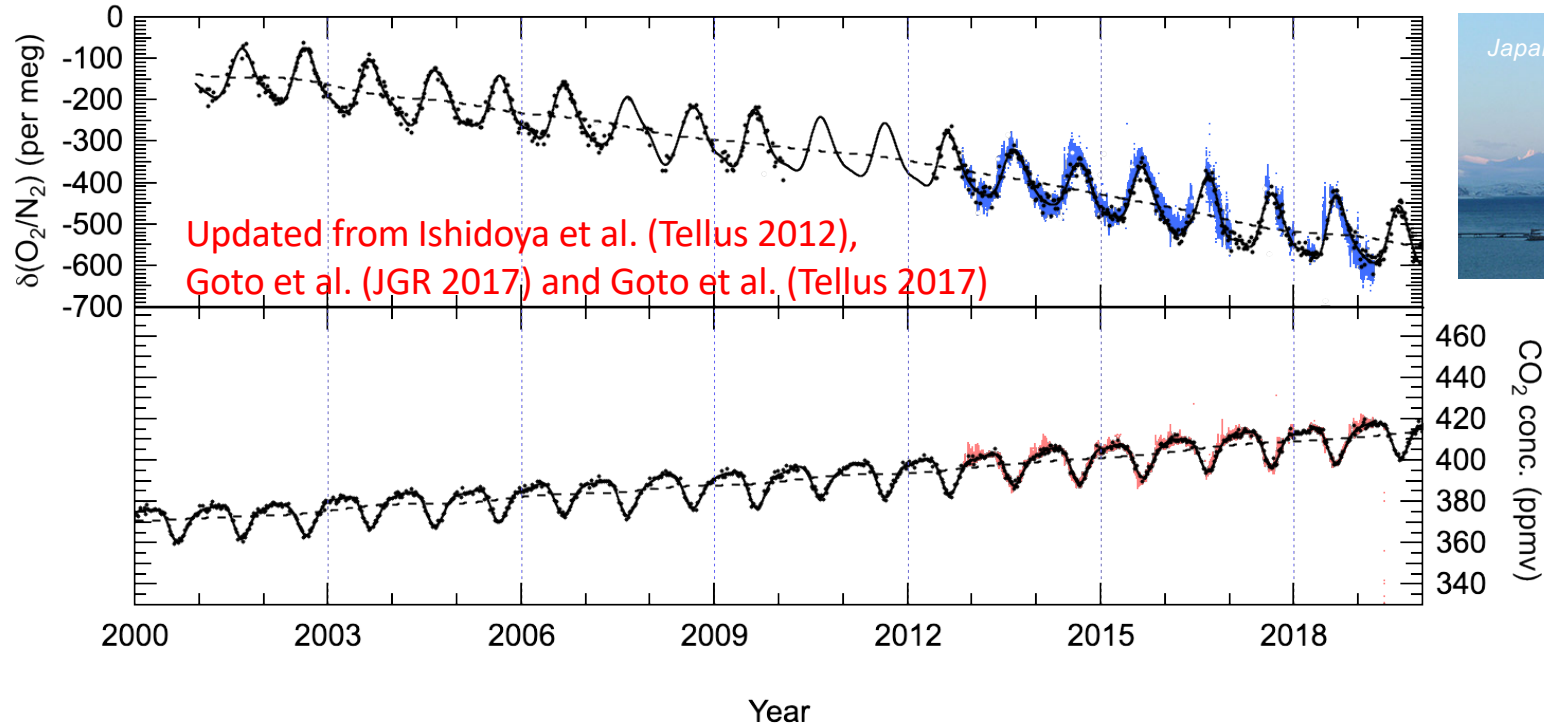
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Ground Based Observations

Ny-Ålesund

Flask & in-situ observations of O_2/N_2

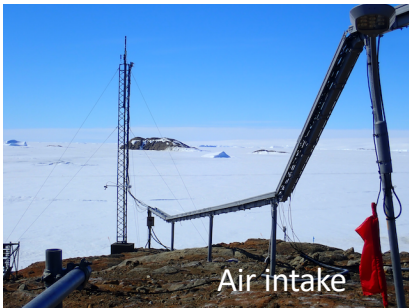
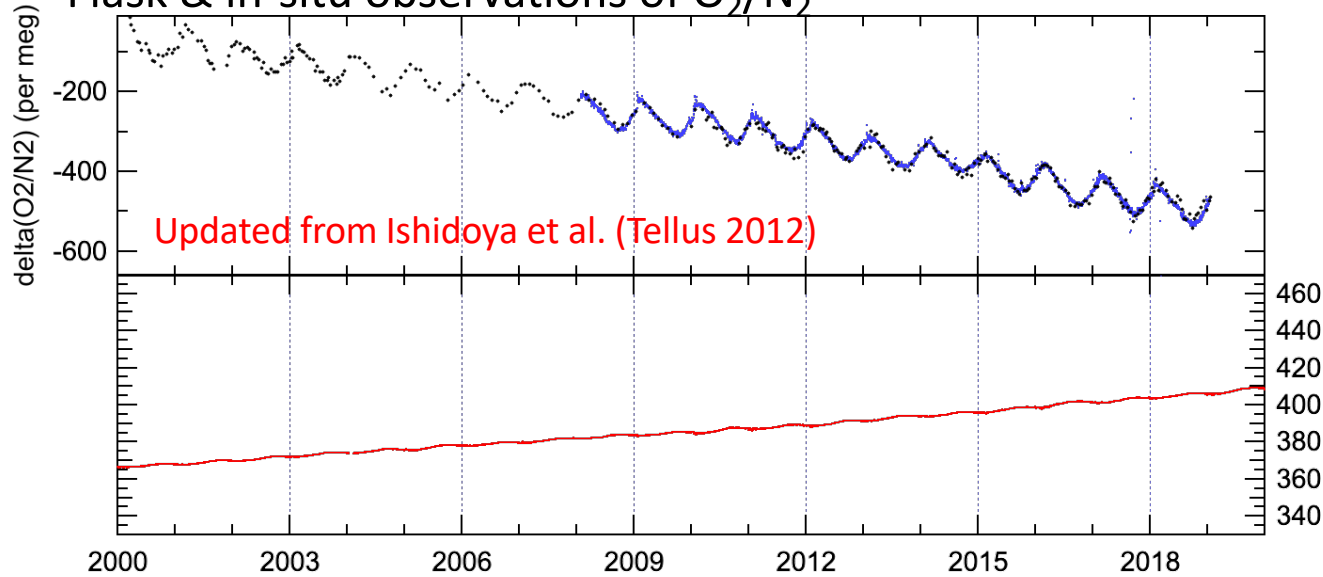


- Weekly flask sampling have been conducted at Ny-Ålesund since 2001.
- Continuous observation was started in Nov. 2012, but it has been interrupted since May 2020 due to COVID-19 situation.
- Short-term variations related to the marine biological activity were well captured from continuous APO data [Goto et al., Tellus, 2017]
- We estimated the global carbon budget using flask data [Goto et al., JGR, 2017]

Ground Based Observations

Syowa Station

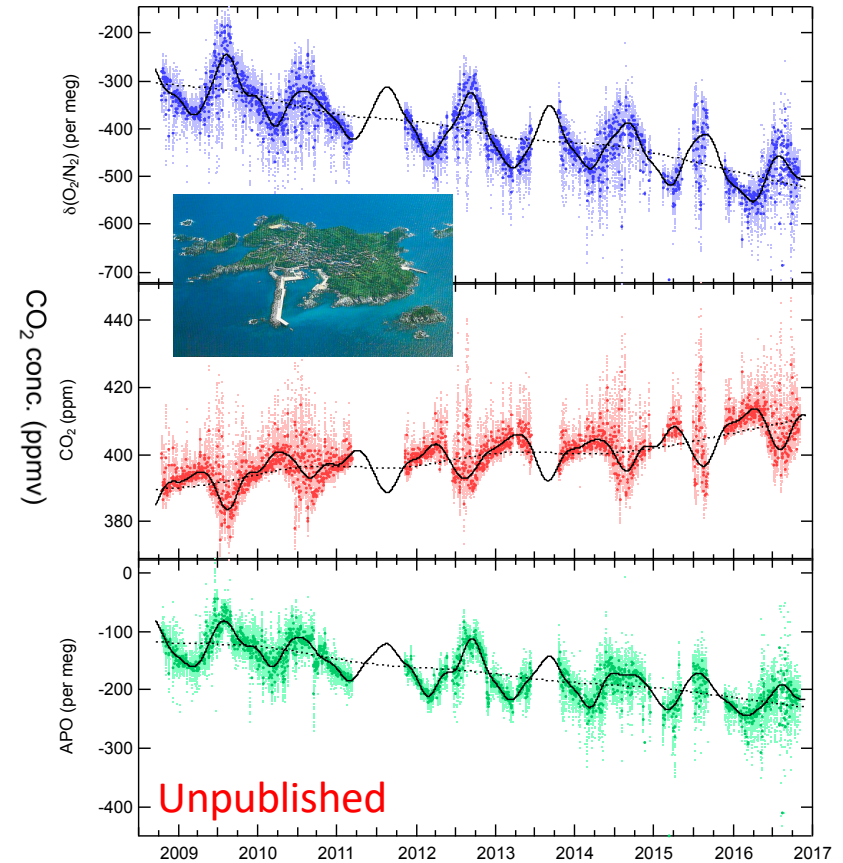
Flask & in-situ observations of O_2/N_2



- Flask sampling have been conducted at Syowa Station since 2000.
- Continuous measurement was started in 2008.
- Monitoring background O_2/N_2 variations in the southern polar region.

Enoshima Island

In-situ observation of O_2/N_2

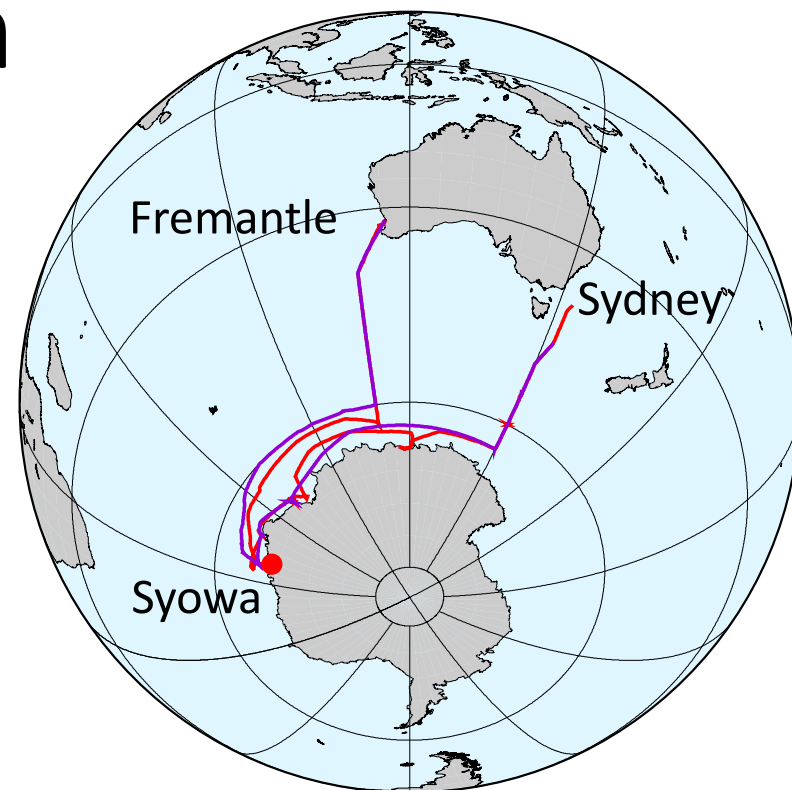
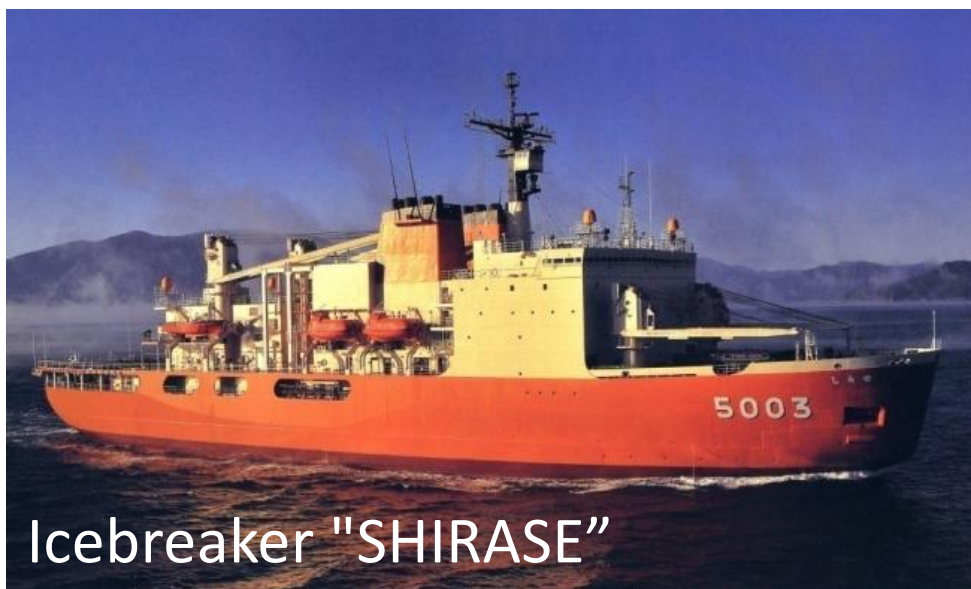


- Continuous measurements were conducted between 2008-2016 at the remote island located at the north-eastern part of the main island of Japan.

NEW

Ship-board observation

We conducted continuous measurements of CO₂ and O₂/N₂ on-board a Japanese ice-breaker “SHIRASE” in the Indian Ocean sector of Southern Ocean in the austral summer in 2017/18, 2018/19 and 2019/20 (JARE59-61).



Cruise tracks

JARE59: Dec. 2017 – Mar. 2018 (red)

JARE60: Dec. 2018 – Mar. 2019 (purple)

JARE61: Dec. 2019 – Mar. 2020 (not shown)

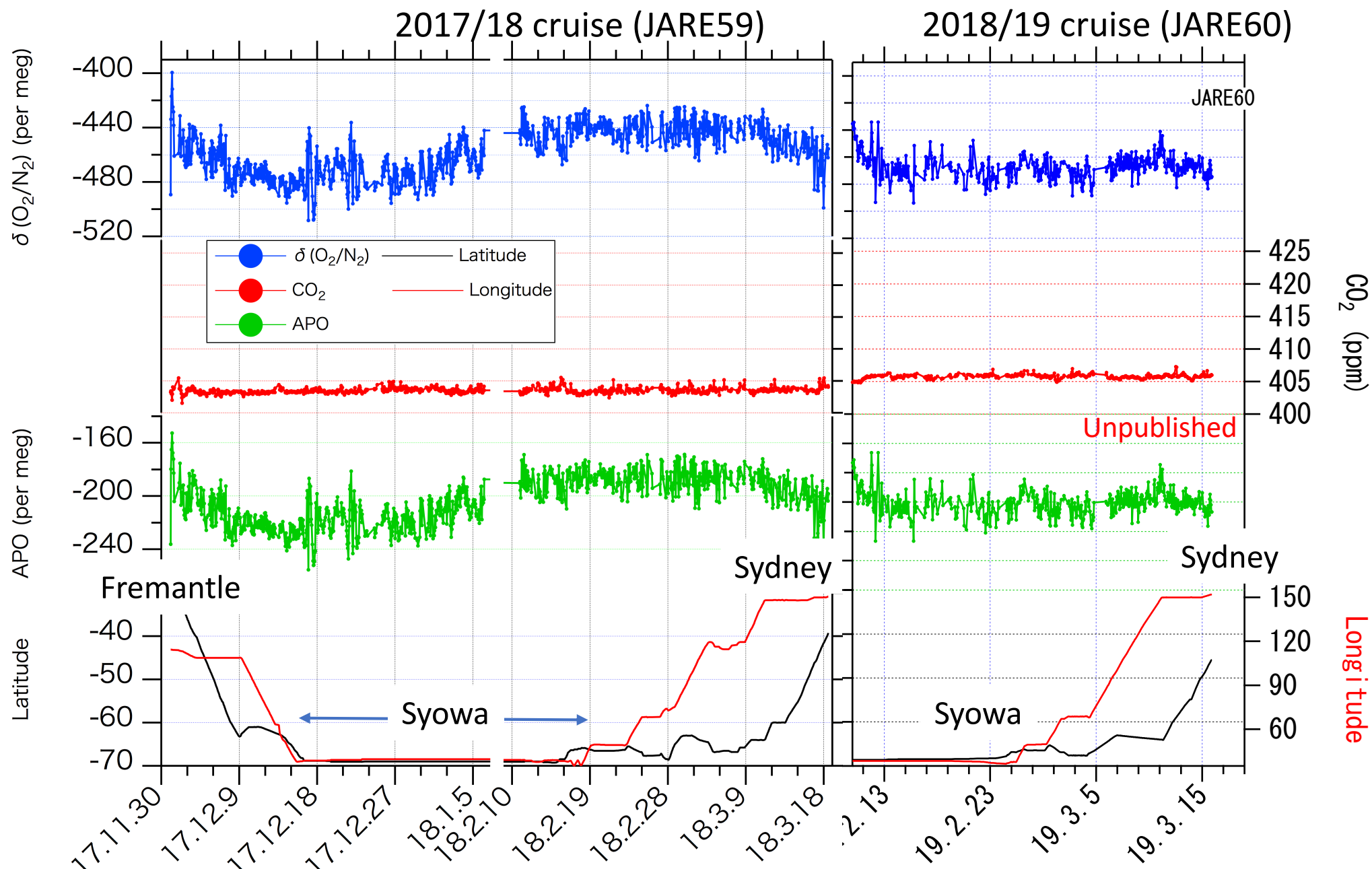
JARE62 (This year): Canceled due to COVID-19

We will continue the observation after JARE63

*JARE: Japanese Antarctic Research Expedition

NEW

Ship-board observation



Results in 2019/2020 cruise are not shown

Summary

- The O₂/N₂ observations at polar regions and around Japan using aircraft and ground station are conducted by TU and NIPR, although the continuous observations at Ny-Ålesund and on-board the ice-breaker at Southern Ocean are interrupted.
- The continuous measurement at Ny-Ålesund will be re-started as soon as possible if the COVID-19 situation improves.
- The ship-board observation will also be re-started from next year depending on the situation.
- We (TU) participated in the round-robin experiments using gravimetric standard air (Next presentation by Dr. Nobuyuki Aoki).
- Some of our observational data are opened at our databases.
 - NIPR's Science database: https://scidbase.nipr.ac.jp/?ml_lang=en
 - TU's data base: <http://caos.sakura.ne.jp/tgr/data>

Please contact us for more detail.

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