2024 DRAGON SYMPOSIUM

DRAGON 5 FINAL RESULTS REPORTING

24-26 JUNE 2024

<<CLIMATE CHANGE>>

Results Highlights
<<*Climate Change*>>

Monitoring extreme weather and climate events over China and Europe using newly developed Chinese and European remote sensing data

Presenter: JINLONG FAN

Pacific modulation of the Sea level variability of the Beaufort Gyre System in the Arctic Ocean

Presenter: ROSHIN. P. RAJ

Monitoring and Modelling Climate Change in Water, Energy and Carbon Cycles in the Pan-Third Pole Environment

Presenter: YIJIAN ZENG & YAOMING MA

Co-chair: Ma Yaoming & Roshin. P. Raj

Results Highlights
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1. Satellite monitoring of the dust storm over northern China on 15 March 2021.

Day-and-night continuous monitoring to the path of dust moving Multi-spectral data from the **Chinese FY-4A** satellite combined with the **Japanese Himawary-8** from visible, near-infrared, mid-infrared, thermal-infrared bands

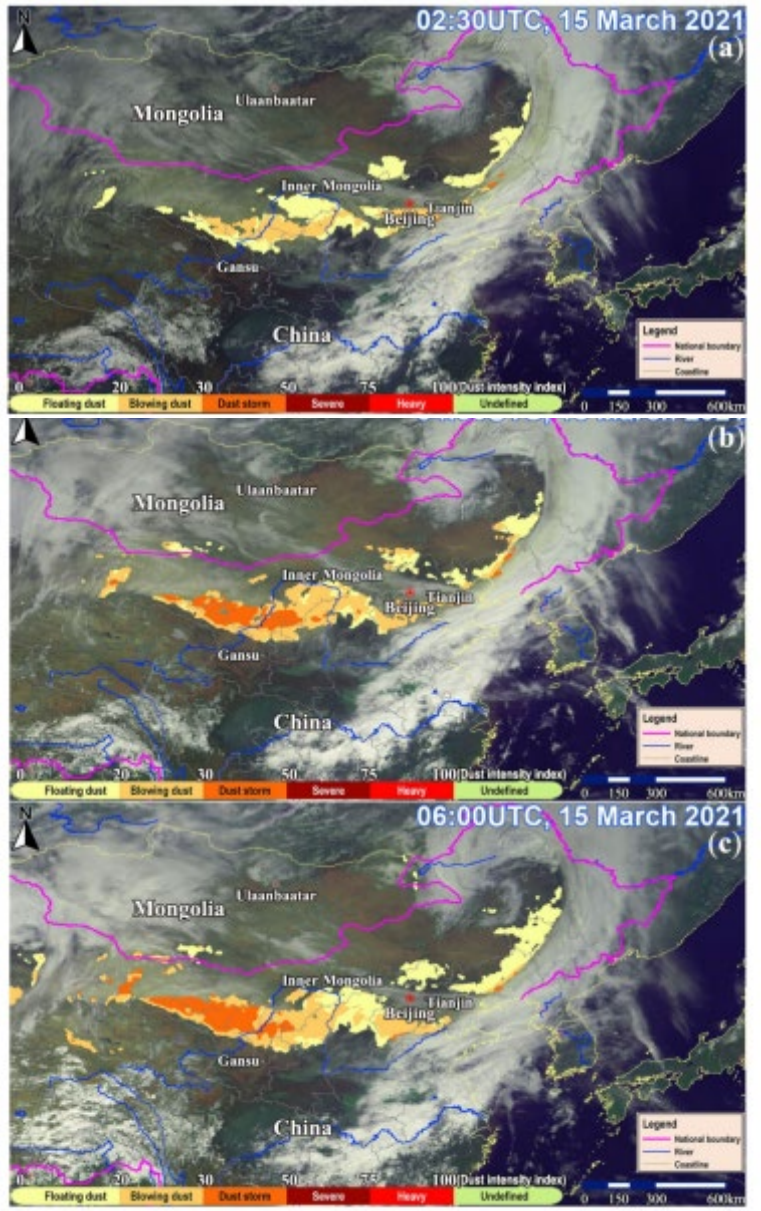

Fig shows the processes of floating dust developed in the dust storm in north China.

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- The “3.15 dust storm” in north China lasted more than **40 hours**, with a transport distance over **3900 km**, causing severe consequence, was the most severe dust storm in last 20 years over east Asia.

- Backward trajectory tracking showed that there are two sources of dust which contributed the dust storm: one is from northwest Mongolia and the other is from west China.

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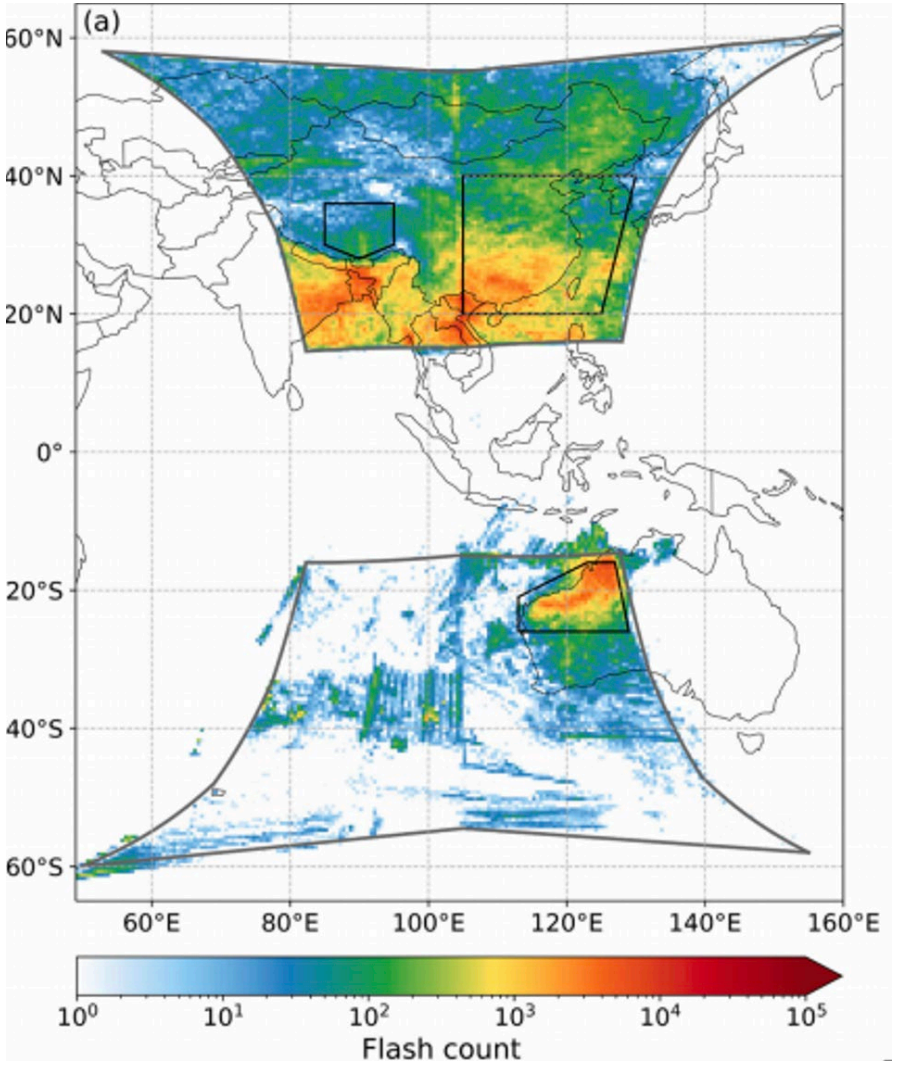
2. Lightning duration and area from Geostationary Lightning Mapping Imager based on a modified lightning cluster algorithm.

Lightning event data is from the FY-4A Lightning Mapping Imager (LMI).

Reprocessed the data to generate flash products using the modified clustering algorithm in the research.



Results Highlights
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- The results showed significant regional differences in flash count, events per flash, flash duration, and flash area, with distinct contrasts between land and ocean.

- The flash counts is lower on the Tibetan Plateau than in eastern China and western Australia due to the unique climatic conditions. Moreover, the events per flash, flash duration, and flash area are also lower than those in the other two regions.

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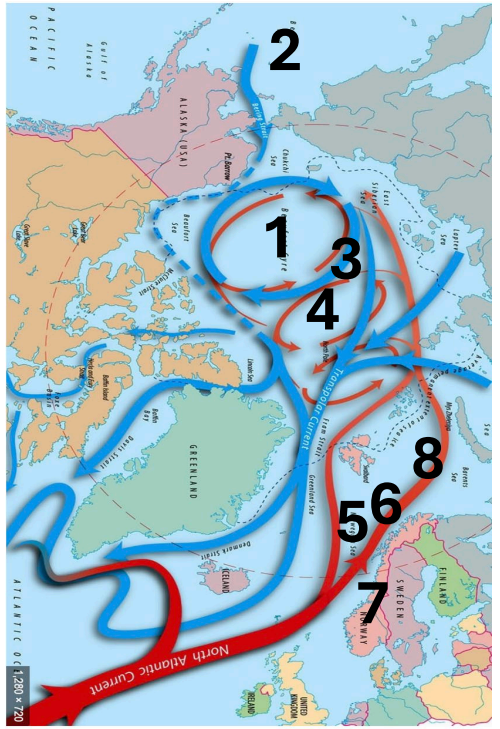
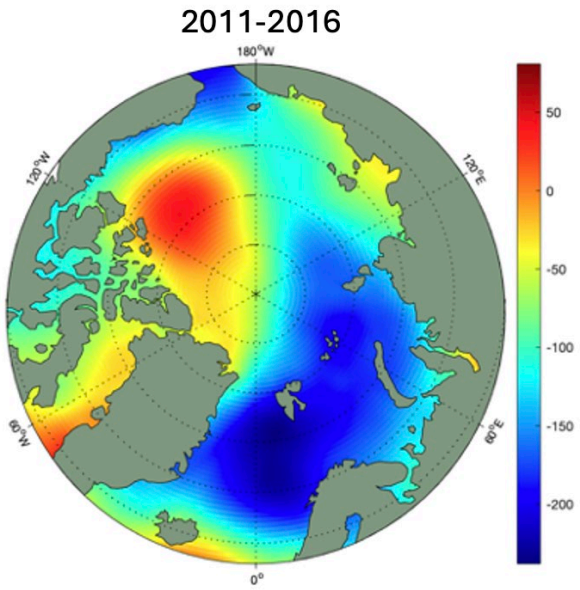
Pacific modulation of the Sea level variability of the Beaufort Gyre System in the Arctic Ocean

1. **Raj. R. P** et al. (**2024a**, in prep). The variability of the Beaufort Gyre during the past decade
2. **Liu et al.** (**2024**, in prep). The role of North Pacific teleconnection in the Beaufort Sea level change.
3. **Bonaduce** et al. (**2024**, in prep). Exploitation of high-resolution datasets for sea level studies in the Nordic Seas and Arctic Ocean
4. Chatterjee, S. **Raj, R. P** et al. (**2022**). Arctic Sea-Level Change in Remote Sensing and New Generation Climate Models. I: Advances in Remote Sensing Technology and the Three Poles, https://doi.org/10.1002/9781119787754.ch28.
5. **R. P. Raj et** al. (2024b, in prep). Recent Great salinity anomaly event and the freshening of the Lofoten Basin eddies.
6. **Moner et al.** (2024, in prep) Exploring Two Decades of Mesoscale Eddy Variability in the Lofoten Basin.
7. **Mangini et al. (2023)** Detection and attribution of intra-annual mass component of sea-level variations along the Norwegian coast
8. **Raj. R. P** (2024c, in prep). Sea level variability in the Barents Sea and its link to warming in the Fram Strait

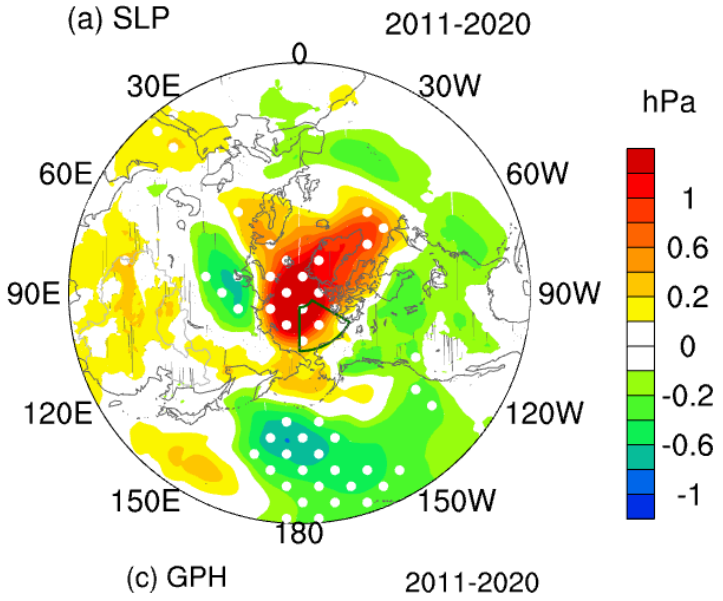


Pacific modulation of the Sea level variability of the Beaufort Gyre System in the Arctic Ocean

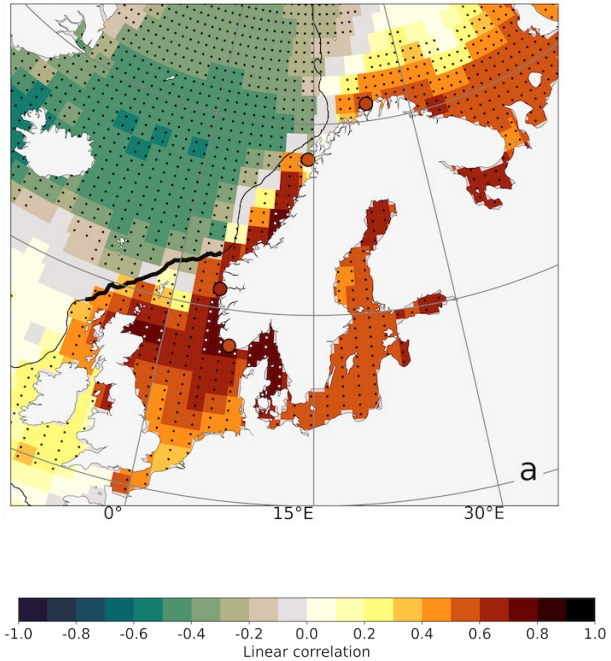
Advanced understanding of the dynamics of the Beaufort Gyre



New knowledge regarding the teleconnection between Pacific and the Arctic



GRACE mission capable of monitoring the sea level mass contribution along the Norwegian coast



Results Highlights
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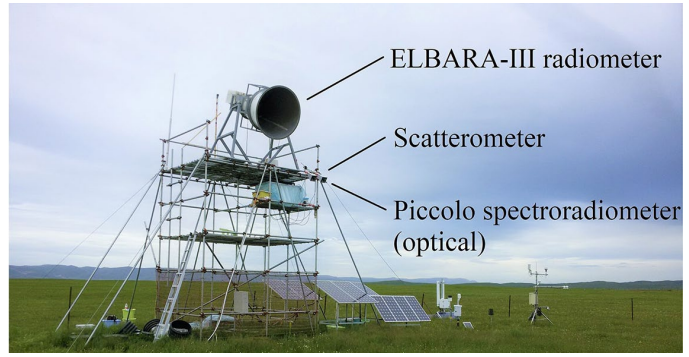
Monitoring and Modelling Climate Change in Water, Energy and Carbon Cycles in the Pan-Third Pole Environment

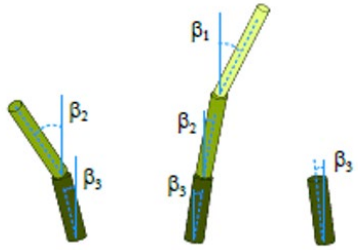
Advancement of process understanding

In-situ L-band microwave TB data set for process understanding of microwave emission under complex terrains with freeze – thaw conditions

Broad-band microwave backscatter observation with a ground-based scatterometer for process understanding of microwave scattering under freeze-thaw conditions.



Microwave scattering modeling (at L-, S-, C- and X-band) considering vegetation properties



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Advancement of process understanding

- Active and Passive Microwave Signatures of Diurnal Soil Freeze-Thaw Transitions on the Tibetan Plateau
- Sampling depth of L-band radiometer measurements of soil moisture and freeze-thaw dynamics on the Tibetan Plateau
- An Air-to-Soil Transition Model for Discrete Scattering-Emission Modelling at L-Band
- The Simulation of L-Band Microwave Emission of Frozen Soil during the Thawing Period with the Community Microwave Emission Model (CMEM).

Science & Application
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What are the remaining issues concerning the exploitation of current mission data?

- Monitoring of surface Diurnal Soil Freeze-Thaw processes.
- Ongoing work on better retrieval of satellite altimeter data (CryoTEMPO), salinity data (SSS CCI+)

What is the general performance and what are the limitations of geophysical parameters retrieval?

- It varies. In general it is good. Consistency of products is needed

EO data synergy: is there scope for data synergy and if so which EO missions/sensors are required?

- Elliptical orbits, Frequent observations in the poles

Validation : Have the necessary validation data been collected and shared?

- More in-situ observations needed for validated

Seed questions: New EO Mission Exploitation
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What are the new domains where further research is needed?

Process level---Application---policy level (Transdisciplinary)

Digital Twin approach

What are the synergy between Europe and China new missions to be exploited?

Joint mission. Active Collaboration at different levels (calibration, pre-lauch, postlaunch and science cases)

What complementarity in the operational use of the current / future missions (planning, observations, etc.) could be improved to allow better data exploitation?

Better planning process and support for securing consistent long-term in-situ observations