

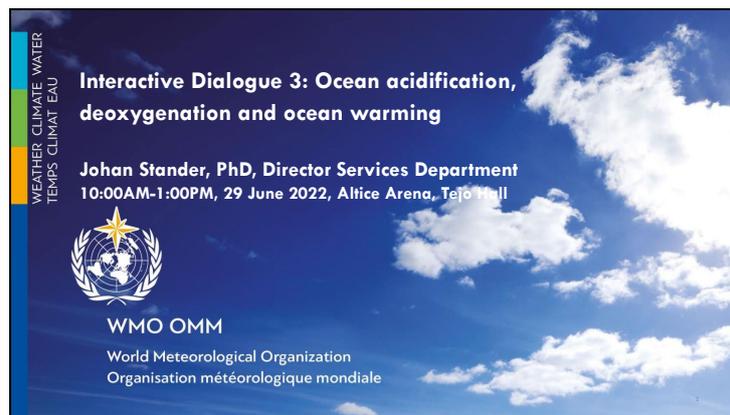
## SDG target

14.3 Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all

## Interactive dialogue

[Interactive dialogue 3: Minimizing and addressing ocean acidification, deoxygenation and ocean warming](#)

Slide 1: First words



**Excellencies, distinguished delegates and colleagues, ladies and gentlemen.**

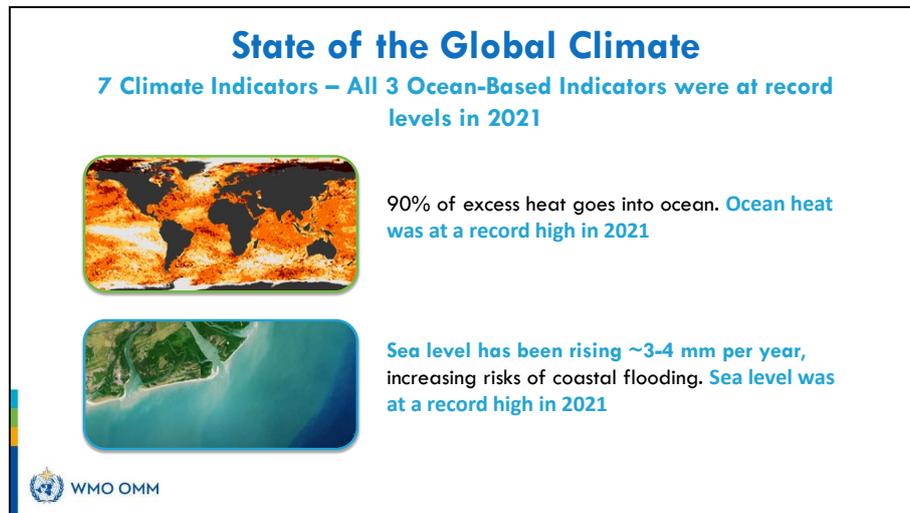
**Or “all protocols/courtesies considered”.**

### **1. Introduction Part A**

Understanding how the increase of atmospheric carbon dioxide is absorbed by the ocean, and the consequences it has in terms of acidification, warming and deoxygenation is vital to develop an efficient response that enables to counteract the effects of those processes in marine ecosystems, an ultimately in humans’ well-being.

The World Meteorological Organization (WMO), with the Intergovernmental Oceanographic Commission and the International Science Council, through its World Climate Research Programme, coordinates ocean research activities to improve our understanding of the distribution and trends of greenhouse gases in the atmosphere to better understand ocean acidification, ocean warming and deoxygenation. WMO also coordinates global observations of greenhouse gases in the atmosphere through the Global Atmospheric Watch (GAW) programme. WMO, through its Global Climate Observing System Programme (GCOS, co-sponsored by IOC, UNEP and ISC) is preparing an Implementation Plan with Actions to improve the climate observing system specifically targeting carbon monitoring both in the atmosphere and in the ocean.

## 2. What do we know already - → KEY MESSAGE: OCEAN INDICATORS



### SLIDES with graphs

In the latest State of the Global Climate Report, **4 out of 7 the climate indicators** recorded highest values ever including the ocean ones: ocean warming, sea level and ocean acidification.

**Ocean heat** was record high. The upper 2000m of the ocean continued to warm in 2021 and it is expected that it will continue to warm in the future – a change which is irreversible on centennial to millennial time scales. All data sets agree that ocean warming rates show a particularly strong increase in the past two decades. The warmth is penetrating to ever deeper levels. Much of the ocean experienced at least one ‘strong’ marine heatwave at some point in 2021, which affects marine life, and ecosystems

**Global mean sea level** reached a new record high in 2021, after increasing at an average 4.5 mm per year over the period 2013 -2021. This is more than double the rate of between 1993 and 2002 and is mainly due to the accelerated loss of ice mass from the ice sheets. This has major implications for hundreds of millions of coastal dwellers and increases vulnerability to tropical cyclones.

## State of the Global Climate

7 Climate Indicators – All 3 Ocean Based Indicators were at record levels in 2021



Oceans absorb 23% of emissions, leading to **ocean acidification**, with high ecological cost. **Oceans are now more acidic than they have been for 26,000 years**



**Greenhouse gases at record levels and rising.** Effect of COVID-19 lockdowns too small to be distinguishable from natural variability

WMO OMM

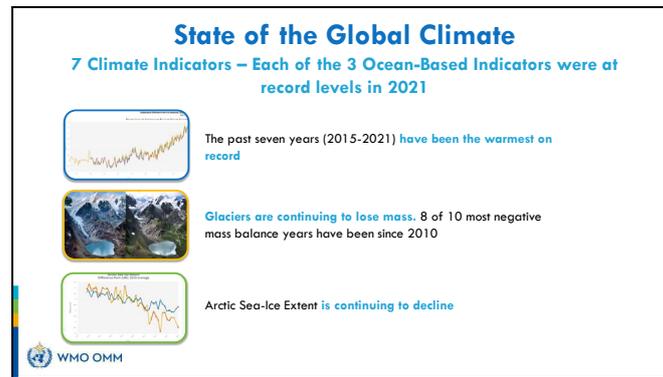
**Ocean acidification.** The ocean absorbs around 23% of the annual emissions of anthropogenic CO<sub>2</sub> to the atmosphere. This reacts with seawater and leads to ocean acidification, which threatens organisms and ecosystem services, and hence food security, tourism and coastal protection. As the pH of the ocean decreases, its capacity to absorb CO<sub>2</sub> from the atmosphere also declines. The IPCC concluded that *“there is very high confidence that open ocean surface pH is now the lowest it has been for at least 26,000 years and current rates of pH change are unprecedented since at least that time.”*

**IOC is the custodian agency for SDG on Ocean Acidification on 14.3.**

**WMO is not doing this in its own. I relies on a community of ocean experts and in particular. IOC contribution here**

**This is obviously related to the Greenhouse gas concentrations, which** reached a new global high in 2020, when the concentration of carbon dioxide reached 413.2 parts per million (ppm) globally, or 149% of the pre-industrial level. Data from specific locations indicate that they continued to increase in 2021 and early 2022, with monthly average CO<sub>2</sub> at Mona Loa in Hawaii reaching 416.45 ppm in April 2020, 419.05 ppm in April 2021, and 420.23 ppm in April 2022.

Go relatively quickly through the non-ocean related ones--→ I THINK WE DON'T HAVE FOR THIS

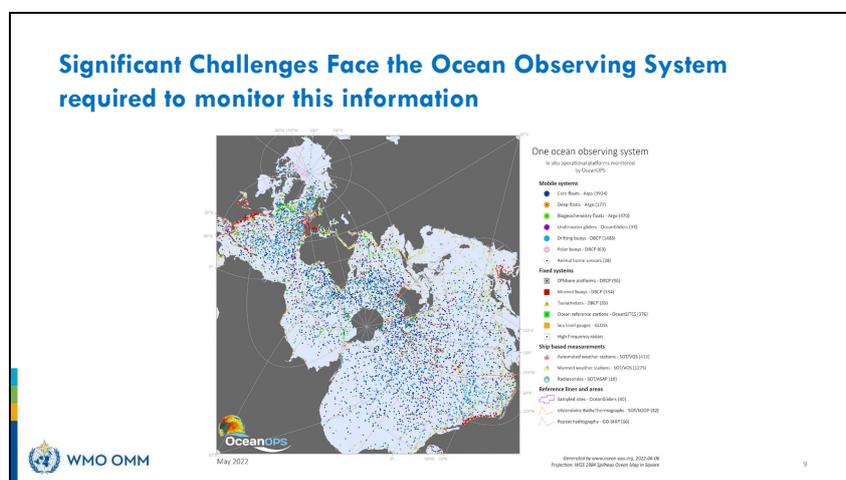


The global annual mean temperature in 2021 was around  $1.11 \pm 0.13$  °C above the 1850-1900 pre-industrial average, less warm than some recent years owing to cooling La Niña conditions at the start and end of the year. The most recent seven years, 2015 to 2021, are the seven warmest years on record.

**Cryosphere:** Although the glaciological year 2020-2021 saw less melting than in recent years, there is a clear trend towards an acceleration of mass loss on multi-decadal timescales. On average, the world's reference glaciers have thinned by 33.5 meters (ice-equivalent) since 1950, with 76% of this thinning since 1980. 2021 was a particularly punishing year for glaciers in Canada and the US Northwest with record ice mass loss as a result of heatwaves and fires in June and July. Greenland experienced an exceptional mid-August melt event and the first-ever recorded rainfall at Summit Station, the highest point on the ice sheet at an altitude of 3 216 m.

## Part B: WMO action and call

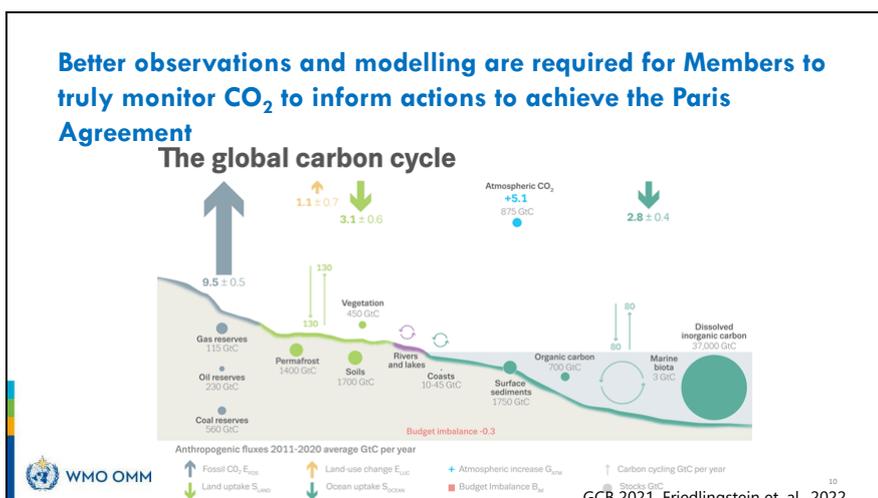
### ***What can we do?***



First of all: we need more data. WMO is working hard on improving the availability and accessibility of data that are needed to improve our understanding of the complex processes. We cannot take action if we do not understand the problem. We cannot understand what we cannot measure.

### ***KEY MESSAGE*** → ***The urgent need for enhancing and sustaining ocean observations***

WMO recognizes the **urgent need for enhancing and sustaining ocean observations**. There are significant global coverage gaps in the observing network, with many under-sampled areas, in particular the coastal ocean, regions with narrow shelves and the Southern Ocean. The availability of resources for sustained ocean observations in combination with experimental studies is often subject to short-term funding. This is particularly important for certain observing networks, particularly impacted by the COVID-19 pandemic. This has to change.



**KEY MESSAGE** → *Better observations and modelling are required for Members to truly monitor CO<sub>2</sub> to inform actions to achieve the Paris Agreement.*

WMO Executive Council EC-75 has just approved a proposal for WMO to further develop the concept for an **integrated operational global greenhouse gas monitoring infrastructure**, to be submitted for approval by the 19<sup>th</sup> World Meteorological Congress in May 2023.

The data provided under this framework will strengthen the scientific basis for mitigation action taken by the Parties to the Paris Agreement. Global modelling and data assimilation will be used to ingest all available greenhouse gas observations into a common framework, and the resulting data will enable improved estimation of the relevant fluxes between atmosphere, land, and oceans. The infrastructure will be implemented in international collaboration, involving a large number of existing greenhouse gas monitoring activities both on the observing and modelling/data assimilation side; **WMO will play a coordinating role**, alongside several other international organizations, and collaboration mechanism.

**WMO acknowledges the invaluable work conducted through many different ocean carbon initiatives**, also referred to in the concept note of this interactive dialogue and stresses the need to increase the support for these networks and to make them sustainable. Indeed, **the facility could and should be extended to include ocean measurements, modelling, and data assimilation infrastructure to track oceanic carbon.**

**We need enhanced data policies to support data exchange  
(including political support in EEZs)**



**KEY MESSAGE → We need enhanced ocean data policies to support effective operational data exchange (including EEZs)**

Very importantly, too **WMO stresses the importance of making data available**. The WMO Meteorological Congress in 2021 has adopted a WMO Unified Data Policy for the exchange of core and recommended data of the Earth system. For the first time, ocean data are explicitly included in the policy. WMO asks its members to exchange in situ and remotely sensed observational data both in and above the ocean and at the sea-surface, from the open ocean to the coast.

In 2019, the World Meteorological Congress, through Resolution 45 (Cg-18), had called for enhancing ocean observations and research, **including in exclusive economic zones (EEZ)**, and the free exchange of data, to foster operational services for the safety of life and property. Indeed, inhibiting the access of scientific teams and ocean observing networks to EEZ result in major gaps in our ability to mitigate climate change. WMO welcomes the [Workshop Report](#) recently published by UNESCO's Intergovernmental Oceanographic Commission, the result of a multi-agency workshop where WMO was involved. The Report proposes a number of potential and practical solutions within UNCLOS, to be implemented through collaborative action across UNESCO, WMO and the United Nations Office of Legal Affairs through its Division for Ocean Affairs and the Law of the Sea (DOALOS).

## Call from UNSG -EARLY WARNING SYSTEMS????



*“Early warnings and action save lives. To that end, today I announce the United Nations will spearhead new action [led by WMO] to ensure every person on Earth is protected by early warning systems within five years.”*

**António Guterres**

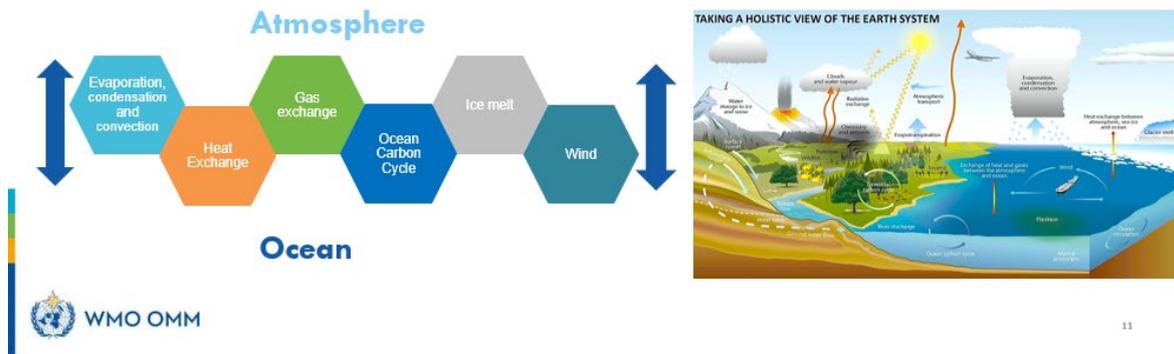
Secretary-General of the United Nations  
23 March 2022, World Meteorological Day



## Partnerships and an Earth System Approach are essential for both effective Climate and Ocean action

*"The ocean and the atmosphere are two titans of the Earth system. Carefully balanced and inextricably connected, the relationship between air and sea dictates weather and climate around the globe."*

UN Secretary-General, António Guterres, 23 March 2021



### → KEY MESSAGE: EARTH SYSTEM APPROACH and YOU'LL NEVER WALK ALONE

The 2019 World Meteorological Organization's ruling congress backed a strategic shift to a more integrated **"Earth system" approach**, which looks at the planet as a whole, linking the atmosphere, the ocean and hydrosphere, the terrestrial realm, the cryosphere and even the biosphere.

Such integration is essential given the challenges posed by climate change, as well as the ever-increasing depth and breadth of scientific data made available thanks to rapid technological change.

Through this process, WMO elevated the ocean as an essential component of the Earth System. Members welcomed this and agreed for WMO to move forward with a strategic approach ensuring that the work across a broad spectrum of ocean-related activities are connected within WMO and reach across essential partnerships. **Embracing an integrated, Earth System approach also means that the ocean and atmosphere communities need to work closer together and collaborate.**

**Ocean Action is Climate Action and Climate Action is Ocean Action.**