

**Greenhouse gases monitoring activities
in Korea Global Atmosphere Watch Center (KGAWC)
and Future Plans**

**October 21, 2010
KMA/KGAWC**

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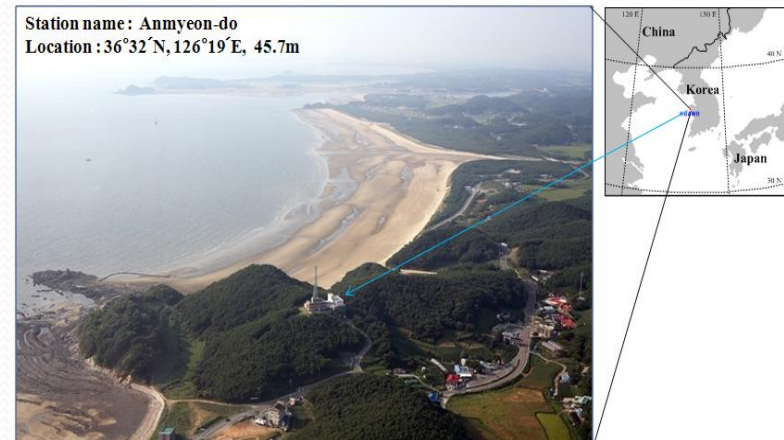
Introduction about KGAWC

Organization :

Ministry of Environment(MOE)/
Korea Meteorological Administration (KMA)/
Climate Science Bureau/
Climate Policy Division
Climate Prediction Division
Korean Peninsula Weather and Climate Division
Korea Global Atmosphere Watch Center

WMO/GAW regional station (station name : Anmyeon-do)

Geographical Location :
KGAWC is located at
the center of the west coast of Korean Peninsula
(Latitude : 36 N, Longitude : 126E)
Height of station baseline is 45.7 m



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Introduction about KGAWC

Meteorological Location :

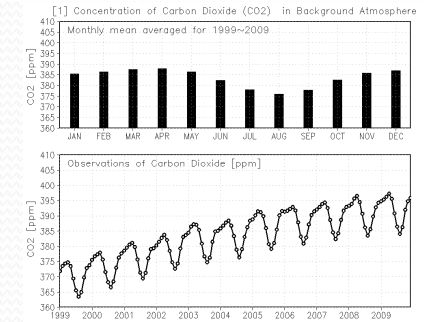
There are three dominant winds over the Korean Peninsula

Winter : **northwest** wind

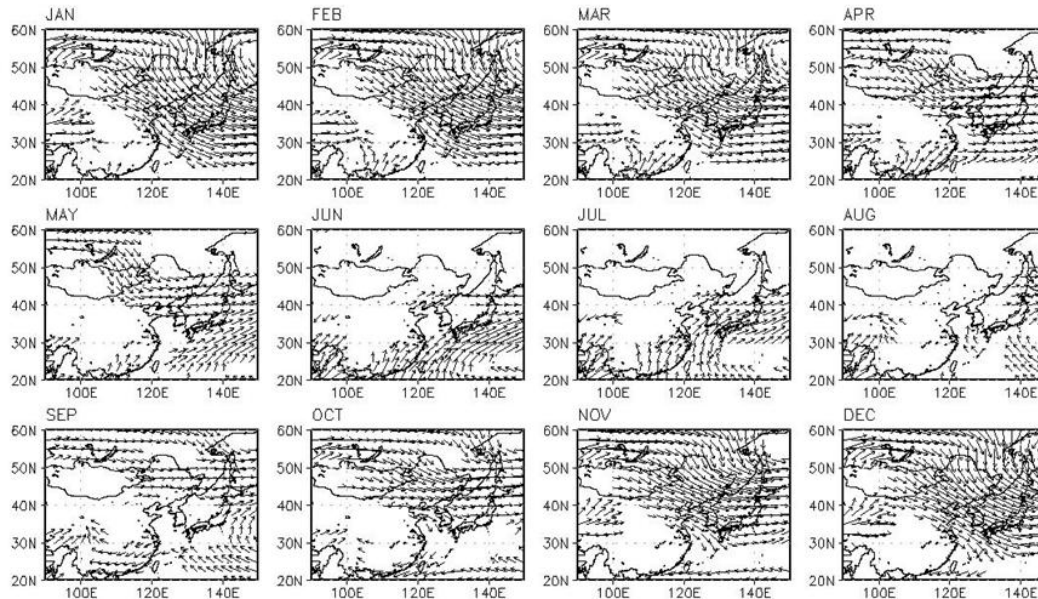
Summer : **southwest** wind

Spring : **west** wind

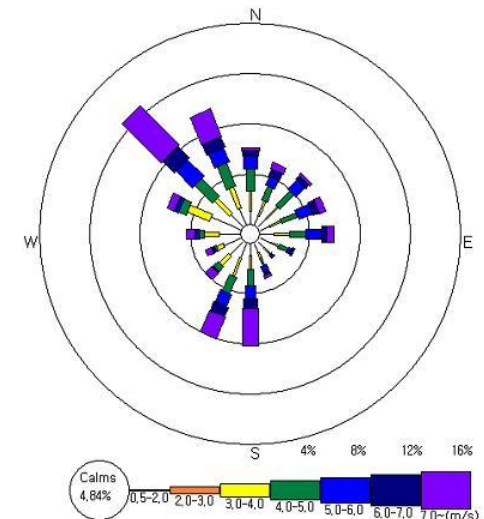
Easterlies occasionally occur, but it is depended on synoptic weather pattern



Monthly mean wind over the Korean Peninsula for 1999-2009



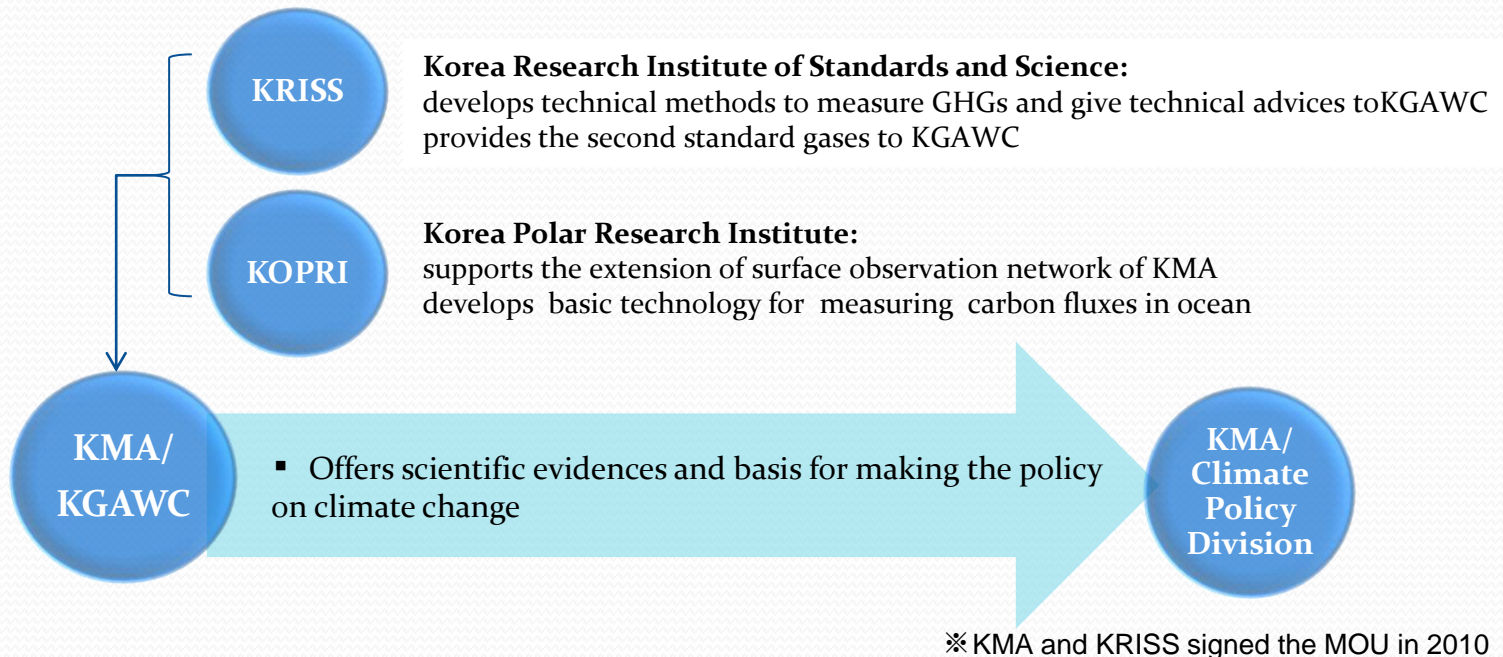
Wind Rose of mean wind of Anmeoyon-do station in 2009



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Introduction about KGAWC

Relationships with Partners



Missions

KGAWC

- measures 36 parameters, including greenhouse gases, aerosols, ultraviolet radiation, ozone, and precipitation chemistry.
- contributes to the various WMO/GAW program.

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Introduction about KGAWC

Importance of KGAWC tasks

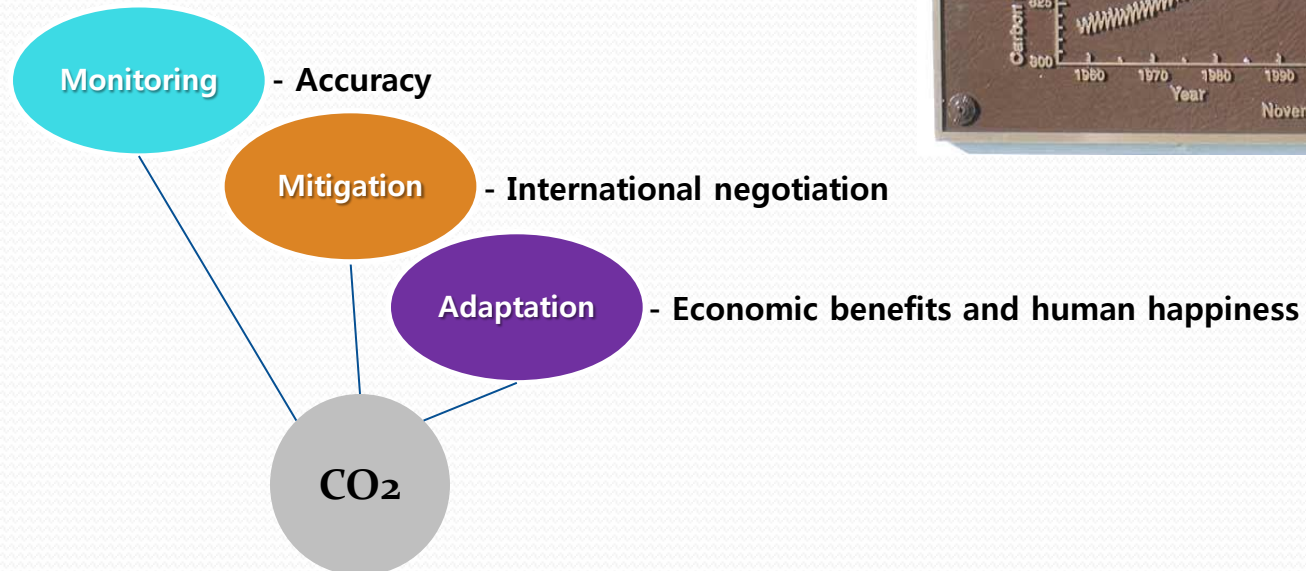
The importance of our tasks for atmosphere watch is on 'Keeling Curve'

Past:

Everybody knows a lot of causes of climate change.
But nobody confirm the reason of abrupt climate change,
because there is no the scientific evidence.

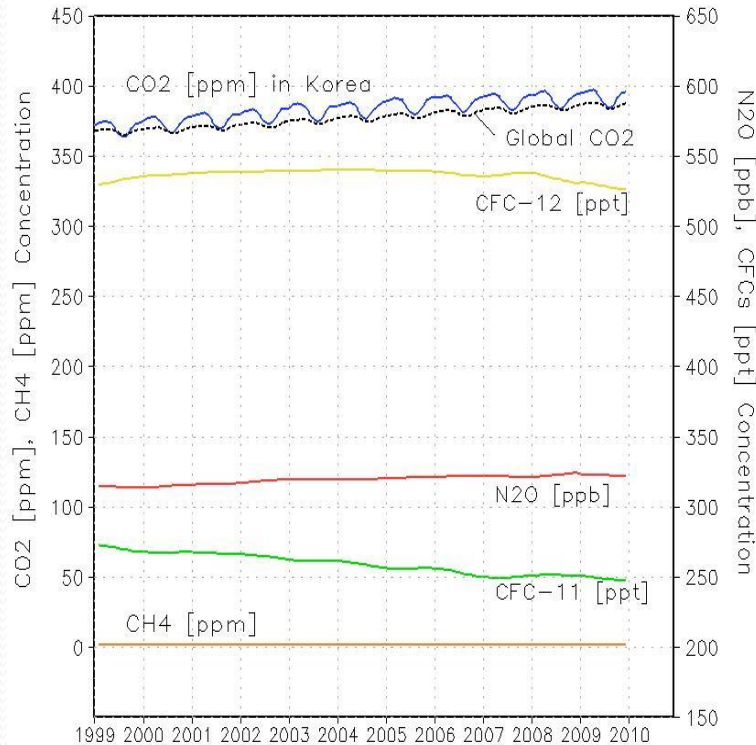


Now:



Summary of concentration changes of Greenhouse Gases

Concentration Change of Greenhouse Gases over the Korean peninsula:



- Changes of GHGs (CO₂, CH₄, N₂O, CFCs) concentrations for 1999-2009.

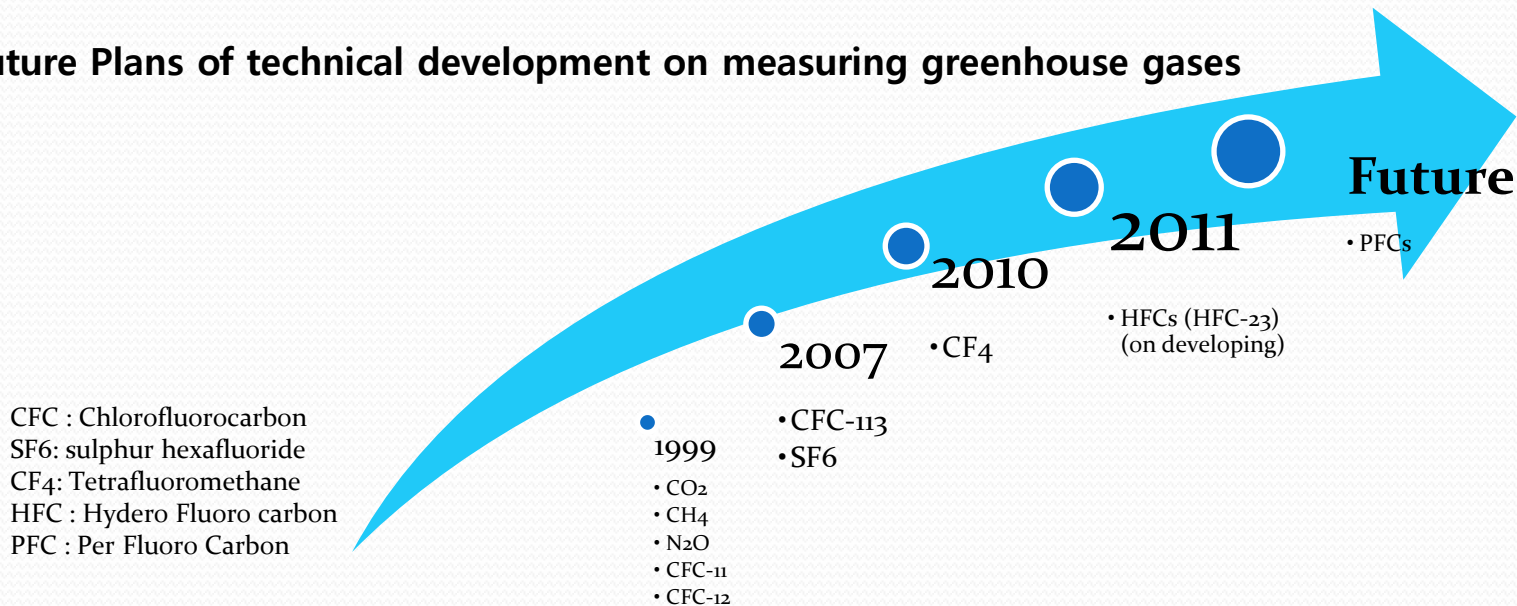
CO₂ has continuously increased from 370.7 ppm in 1999 to 392.5 ppm in 2009

GHGs	CO ₂	CH ₄	N ₂ O	CFC-11	CFC-12
Average concentrations in 2009	392.5 (ppm)	1.906 (ppm)	323.9 (ppb)	249.3 (ppt)	528.9 (ppt)
11-year avg. growth rates	+2.15 (ppm/year)	+0.00246 (ppm/year)	+0.97 (ppb/year)	-2.26 (ppt/year)	-0.43 (ppt/year)

- mean concentration for 2009 and annual mean growth rate averaged for 1999-2009.

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Future Plans of technical development on measuring greenhouse gases



Extension of observation networks

A., Surface observation :

- CRDS remote monitoring system in Ulleongdo was constructed by KRISS in 2010
- Flask observation by canister sampling in Heuksando
- We are endeavoring to register King Sejong station in South Pole to one of the GAW global stations



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Greenhouse Gases monitoring Activities and Future Plans

B. Ship observation :

- Flask observation in the Western Sea using KMA's weather observing ship in 2010
- "Araon", observing ship of KOPRI, was also used for flask observation along the route to the DASAN station of North Pole in this summer



C. Aircraft observation :

- We are monitoring the vertical distributions of GHGs concentration by aircraft cooperated with Hanseo University.



Future Plan for extension of observation networks

There are a lot of difficulties in regular collection of GHGs data around the Korea Peninsula.

So, we should go to an integrated earth monitoring system by satellite, such as GOSAT project in Japan and OCO (Orbiting Carbon Observing) project in the United States

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Data applications and Future Plans

Publication in 2010

- A. 'Report of Global Atmosphere Watch 2009'
- B. 'Summary of Korea Global Atmosphere Watch 2009 Report'

Another way of data application is data sharing through WDCGG

Future Plan

Our concerns are focusing on

- How to assess greenhouse gases concentration in background atmosphere
- How to develop and provide a practical information about background atmosphere



KMA/KGAWC

- Will construct **global earth monitoring system**

KMA/KGAWC

- Should **assess a background atmosphere**
- Extracts necessary **practical information**
- Should offer the practical information to the public

The public

- can get practical information from an **Integrated Information System for Earth Monitoring**

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Data applications and Future Plans

(on developing)

Assessment technology and practical information on background atmosphere

A. Assessment Method

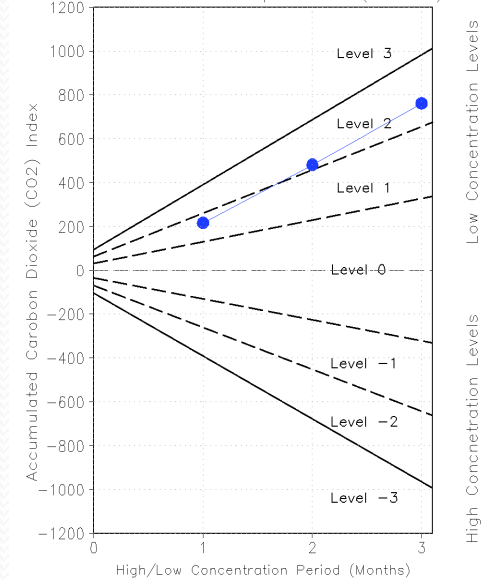
procedure

- assume the Carbon dioxide Index using monthly data
- In here, we assume the carbon dioxide index is annual deviation * (mean of annual deviation/annual mean)
- calculate accumulated Carbon dioxide Index during an assessing period
- extract extreme value of accumulated index for total period
- get Linear line from least mean square method (solid line)
- can calculate other lines by modulating coefficients of general equation (dashed lines)

※Reference :

Statistic method of Drought Area Index based on Balrme and Moorly (1980) was applied for this assessment method of carbon dioxide concentration

[2] Classification of Accumulated Carbon Dioxide (CO₂) Index Assessment for the first quarter 2009 (Blue dots)



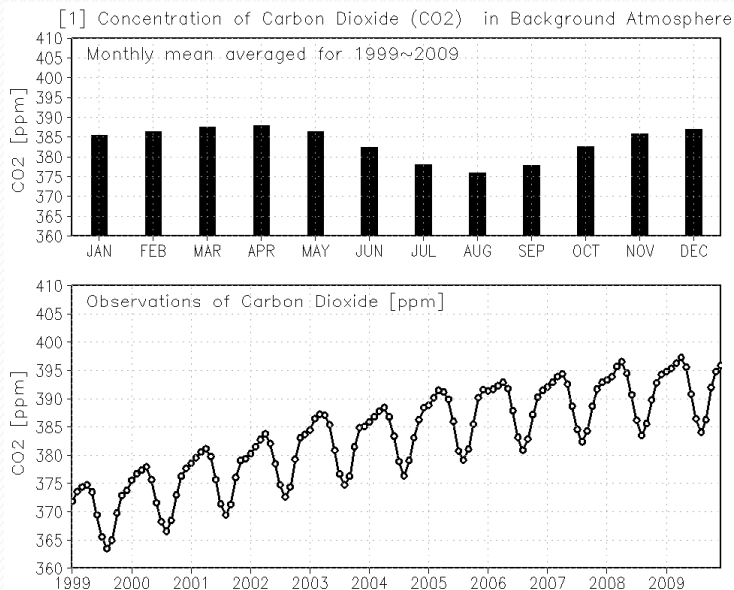
Classification of CO ₂ concentration in background atmosphere		
Assessment	Level Color	Practical Information of CO ₂ concentration
Level +3	Orange	Very High
Level +2	Yellow	Dirty
Level +1	Light Yellow	a Little High
Level 0	Green	Normal
Level -1	Cyan	a Little Low
Level -2	Light Blue	Low
Level -3	Dark Blue	Very Low

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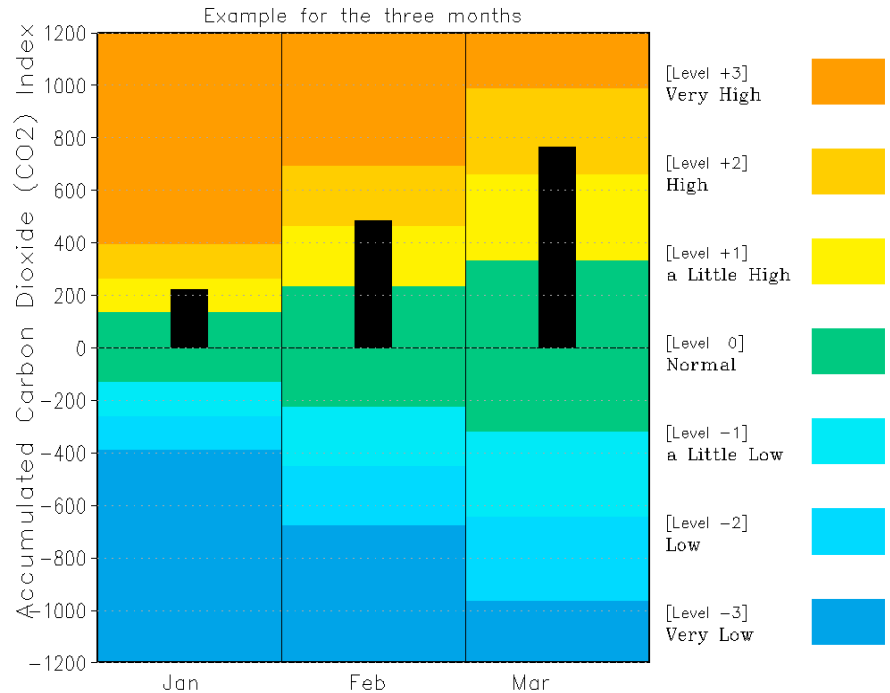
Data applications and Future Plans

B. Practical Information

If practical information are serviced to the republic, all people easily know whether CO₂ to increase or to decrease in the background atmosphere



Assessment of Carbon Dioxide (CO₂) Concentration in Background Atmosphere



example	Assess	Level Color	Practical Information
First month	Level +1	Yellow	a Little High
Second month	Level +2	Yellow-Orange	High
Third month	Level +2	Yellow-Orange	High

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Thanks to all participants

