Status report

Brief summary of potential eutrophic zones in Korea

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Output

- Collection and analysis of COD data:
  Long term time series COD data (1998-2013)

  * excel template with COD data (submitted)
  Analysis/detection trend by Mann-Kendall test

- Collection of data of red tide and hypoxia:
  Redtide and hypoxia occurrences (2009-2014)

  *excel spreadsheets with redtide & hypoxia data (submitted)

Output

- Satellite Chlorophyll-a:

  Level of satellite Chl-a in 2013 to 2015

  Trend of satellite Chl-a from 1998 to 2015

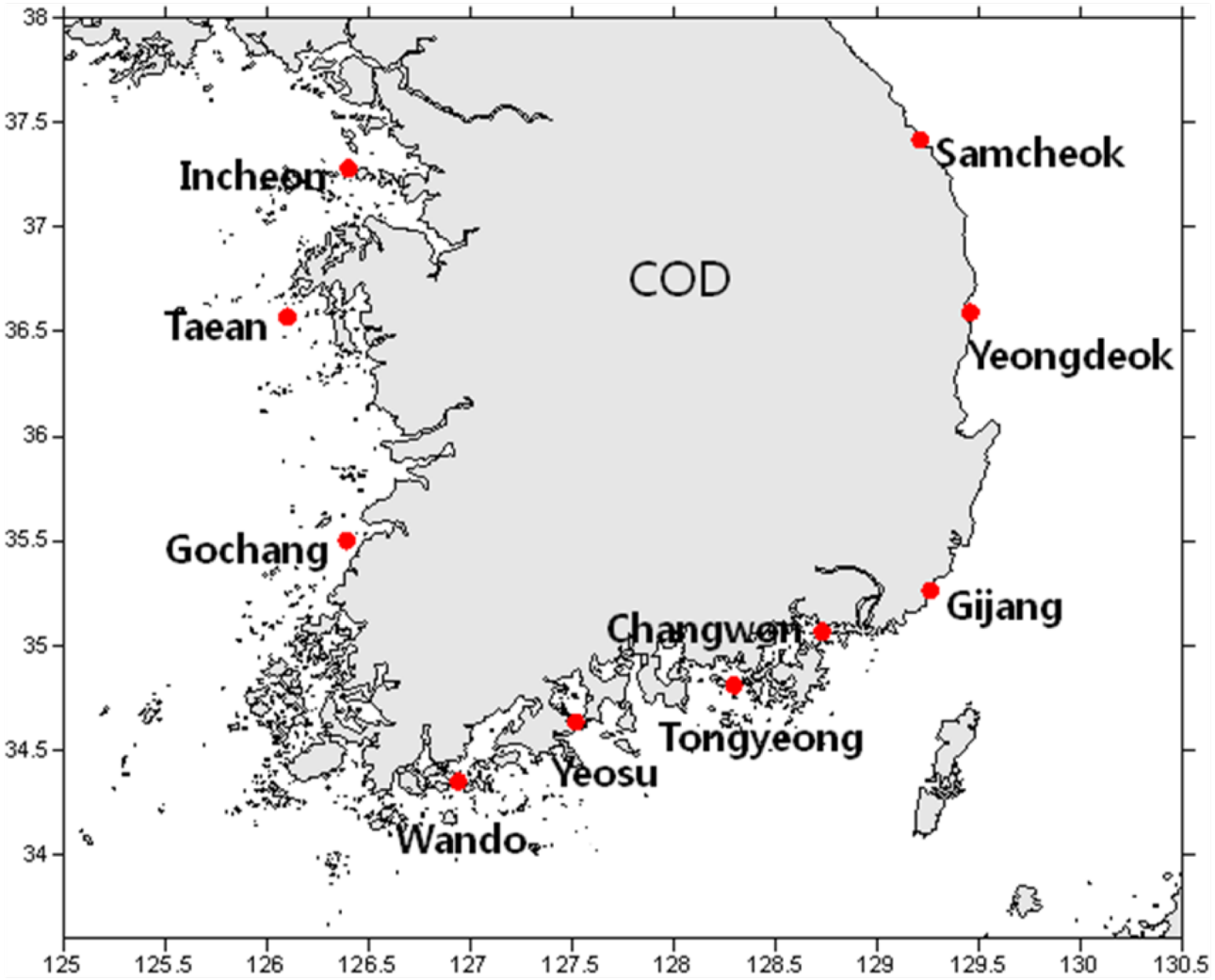
- Brief summary of obtained assessment results

  * Analysis of obtained data

  *Description on potential eutrophic zones (submitted)

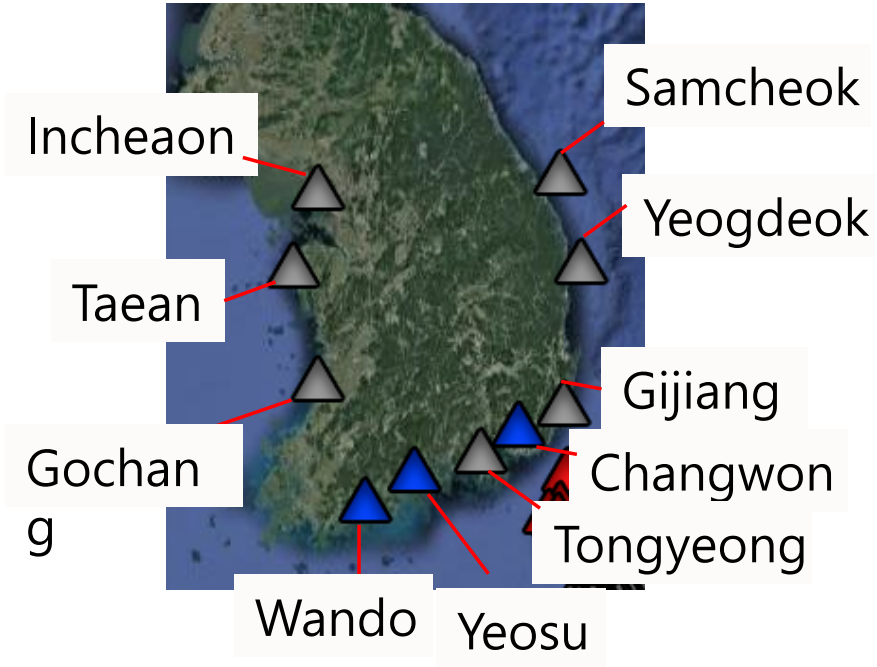
Result

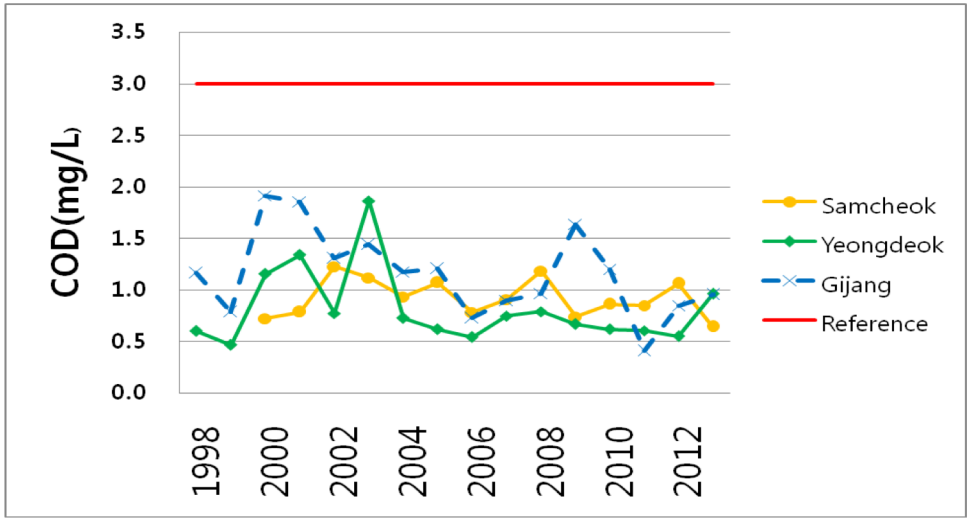
Geographical location for COD data (10 stations)

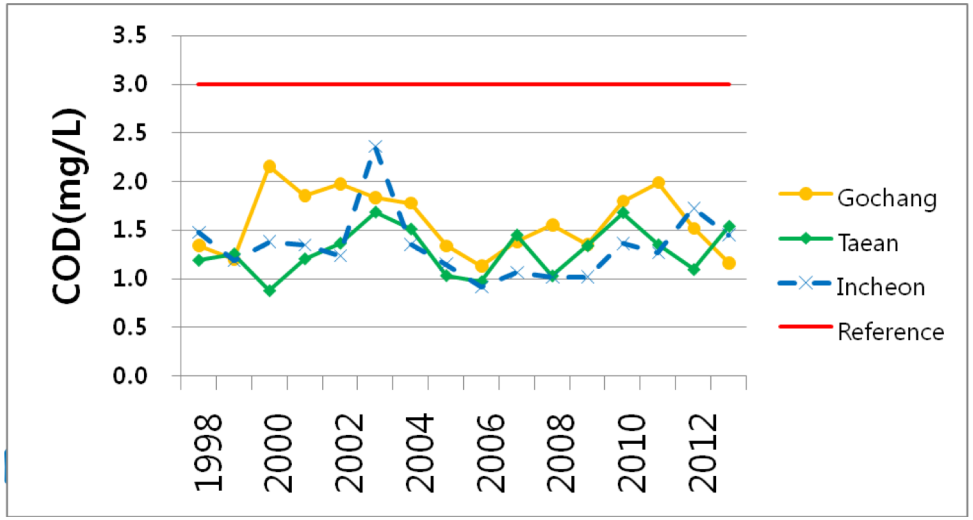


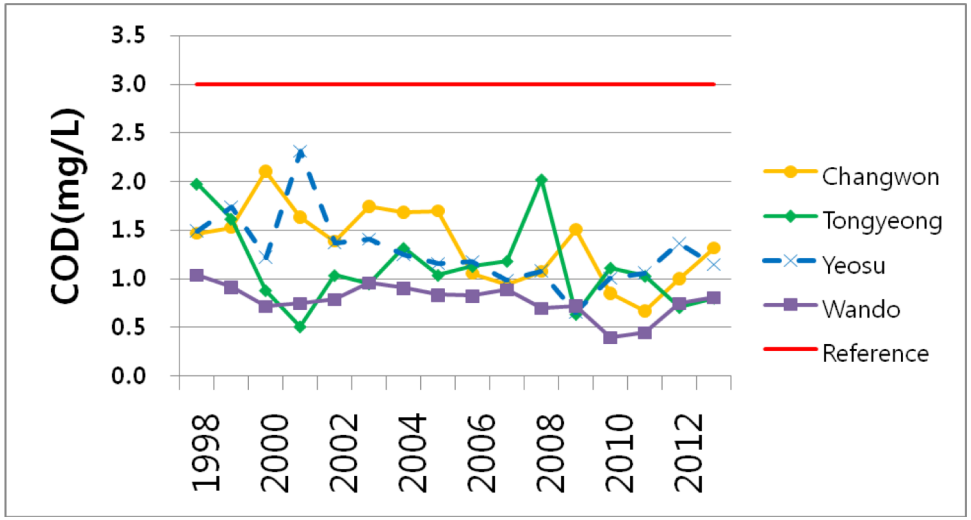
Result

Long-term trend of annual mean COD for each station (98-13)









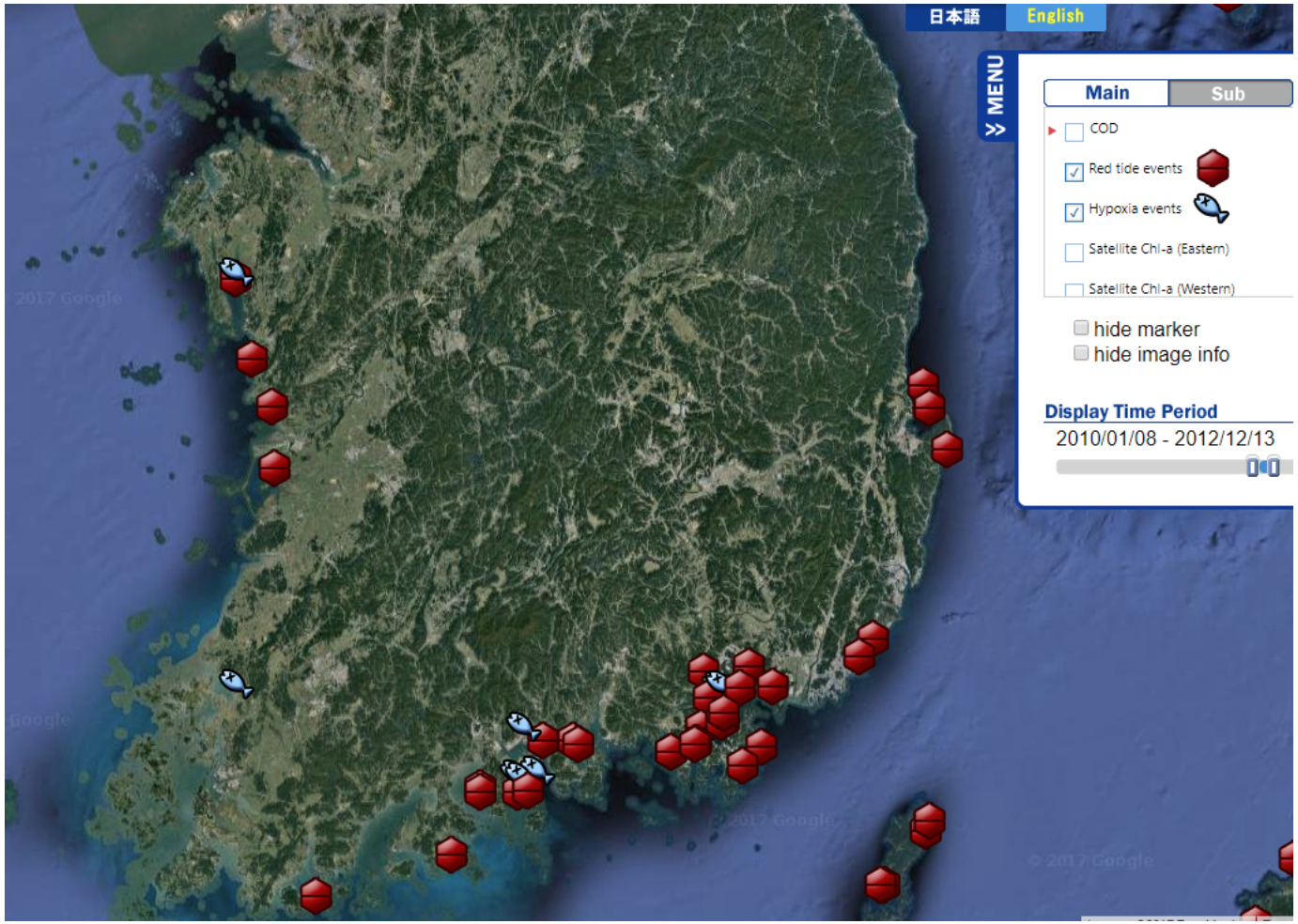
Results of non-parametric Mann-Kendall test for COD

Station	Z value	p value	Overall trend	Symptom of eutrophication
Samcheok	-0.77	>0.1	No trend	No
Yeongdeok	-0.50	>0.1	No trend	No
Gijang	-1.58	>0.1	Decreasing trend	No
Changwon	-2.30	>0.05	Decreasing trend	No
Tongyeong	-0.95	>0.1	No trend	No
Yeosu	-2.75	>0.01	Decreasing trend	No
Wando	-2.03	>0.05	Decreasing trend	No
Gochang	-0.68	>0.1	No trend	No
Taean	0.95	>0.1	No trend	No
Incheon	-0.32	>0.1	No trend	No

Result

Occurrence of red tide and hypoxia

Information on red tide and hypoxia from ‘10 to ‘12 were used for assessment.



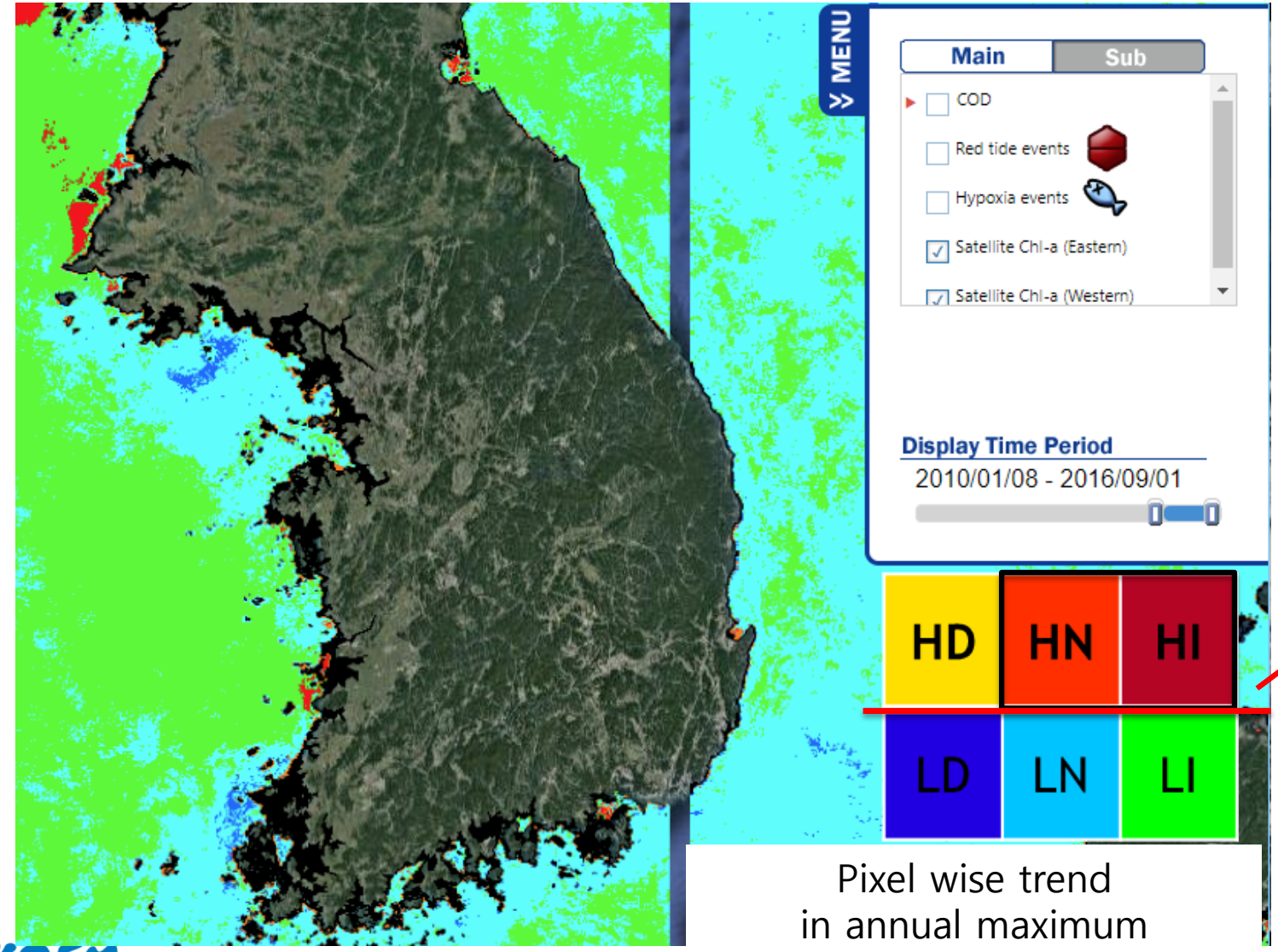
Result

Occurrence of red tide and hypoxia in recent 3 years (‘10 – ’ 12)

Area	Red tide	Hypoxia	Symptom of eutrophication
Samcheok	No incident	No incident	No
Yeongdeok	5 incidents	No incident	Yes
Gijang	1 incident	No incidents	Yes
Changwon	4 incidents	3 incidents	Yes
Tongyeong	5 incidents	No incident	Yes
Yeosu	4 incidents	3 incidents	Yes
Wando	1 incident	No incident	Yes
Gochang	No incident	No incident	No
Taean	No incident	No incident	No
Incheon	No incident	No incident	No

Red tide and hypoxia occurred near the COD sampling stations were only used for eutrophication assessment

Preliminary assessment of eutrophication by satellite Chl-a



Pixel wise trend
in annual maximum
From 1998 to 2015

HD: High but decreasing
HN: High but no decreasing
HI: High but increasing
LD: Low but decreasing
LN: Low but no decreasing
LI: Low but increasing

5 mg m^{-3} against
three years mean
(2013 to 2015)

Preliminary assessment of eutrophication by satellite Chl-a

Area	Assessment results	Symptom of eturophication
Samcheok	HD	No
Yeongdeok	LN	No
Gijang	LN	No
Changwon	LN	No
Tongyeong	LN	No
Yeosu	Not available	Not available
Wando	LN	No
Gochang	LN	No
Taean	LI	No
Incheon	LN	No

Result

Assessment criterias to detect potential eutrophic zones

Four categories of the assessment results of the eutrophication status
Defined by the screening procedure of the NOWPAP Common Procedure

	Eutrophic area All parameters among COD, frequencies of red tides and hypoxia events and satellite chlorophyll-*a* indicate symptoms of eutrophication.
	Potential eutrophic area More than two parameters among COD, frequencies of red tides and hypoxia events and satellite chlorophyll-*a* indicate symptoms of eutrophication.
	Non eutrophic area Only one parameter among COD, frequencies of red tides and hypoxia events or satellite chlorophyll-*a* indicates symptoms of eutrophication. Or, neither of these parameters indicates symptoms of eutrophication.
	Improved area COD or frequencies of red tide and hypoxia events indicate the eutrophic status has improved.

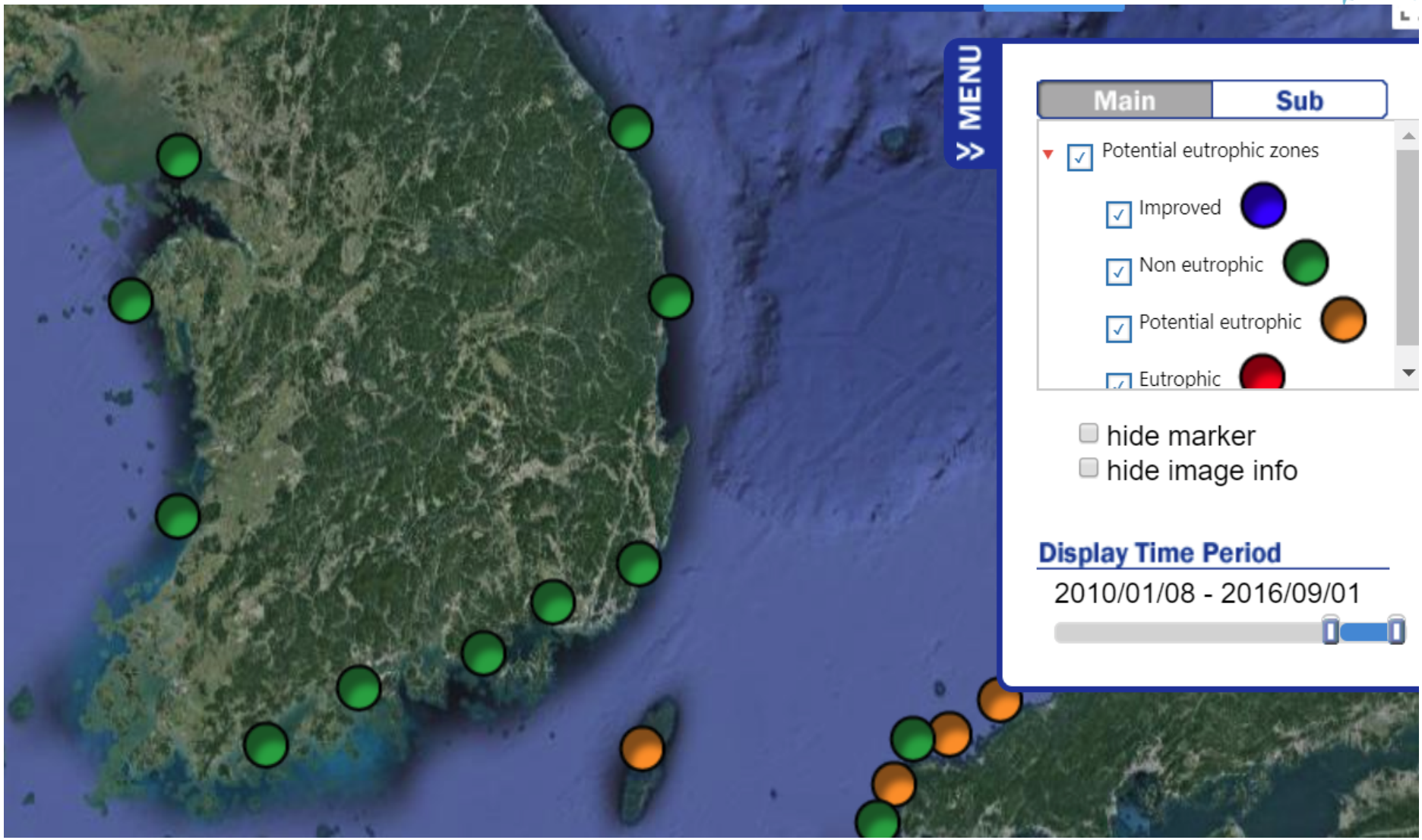
Result

Detection of potential eutrophic zones

Area name	Symptom of eutrophication			Assessment results
	COD Trend	Red tide /hypoxia in recent 3 years	Satellite Chl-*a*	
Samcheok	No	No	No	Non eutrophic
Yeongdeok	No	No	No	Non eutrophic
Gijang	No	Yes	No	Non eutrophic
Changwon	No	Yes	No	Non eutrophic
Tongyeong	No	Yes	No	Non eutrophic
Yeosu	No	Yes	Not available	Not available
Wando	No	Yes	No	Non eutrophic
Gochang	No	No	No	Non eutrophic
Taean	No	No	No	Non eutrophic
Incheon	No	No	No	Non eutrophic

Result

Assessment results on WebGIS



http://ocean.nowpap3.go.jp/WebGIS/

Summary

Brief summary of potential eutrophic zones in Korea

- Screening procedure of the NOWPAP Common Procedure f or eutrophication assessment was applied in Korean coastal zones

- All Korean coastal zones were defined not eutrophic

- However revision of assessment criteria may be necessary as red tide and hypoxia keeps occurring in some part of Korean coastal zones such as Jinhae Bay and Yeosu areas


KOEM
THANK YOU
FOR YOUR ATTENTION