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SCIENCE
CONFERENCE
15-19 July 2019
Qingdao, PR China

Atmospheric deposition of inorganic nitrogen to East Asian marginal seas

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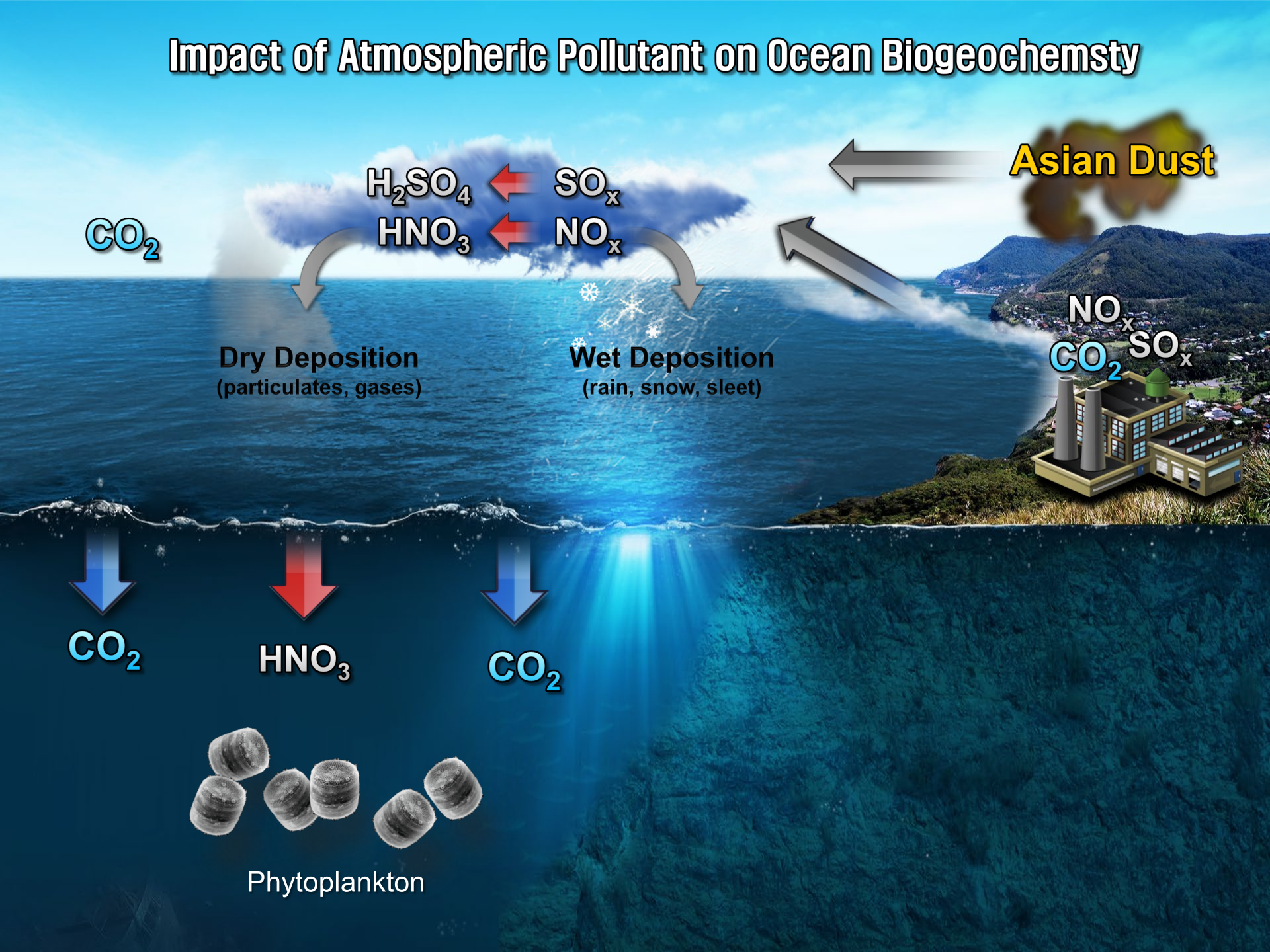
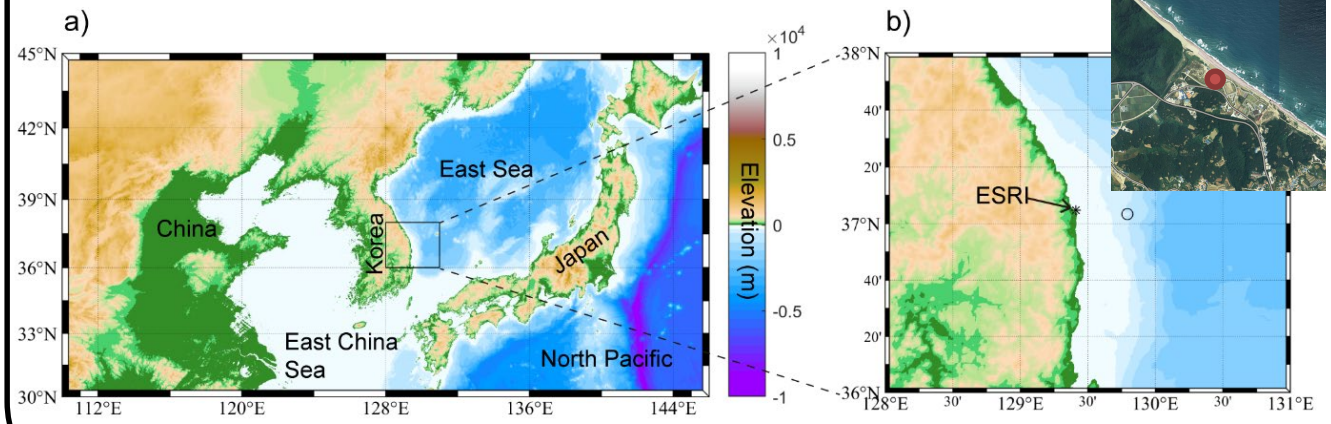

Impact of Atmospheric Pollutant on Ocean Biogeochemsty
Asian Dust
H_2SO_4
SO_x
HNO_3
NO_x
CO_2
Dry Deposition
(particulates, gases)
Wet Deposition
(rain, snow, sleet)
NO_x
CO_2
SO_x
CO_2
HNO_3
CO_2
Phytoplankton

Study Sites

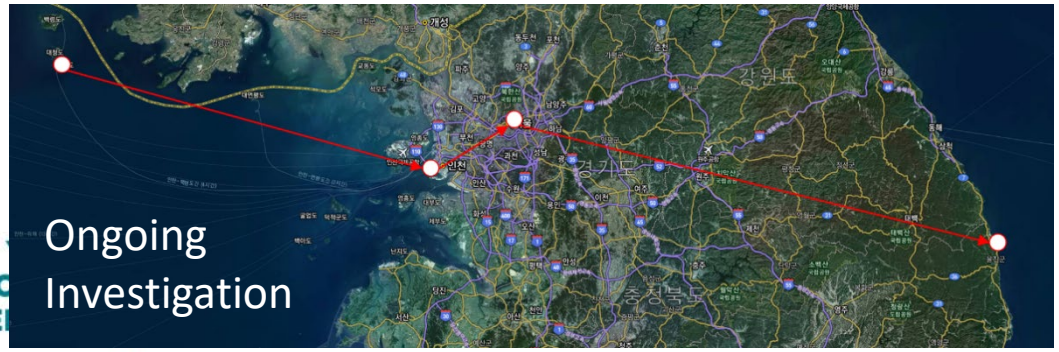
I) East Sea Research Institute, Uljin, South Korea: Eastern coast

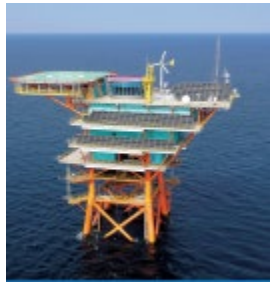


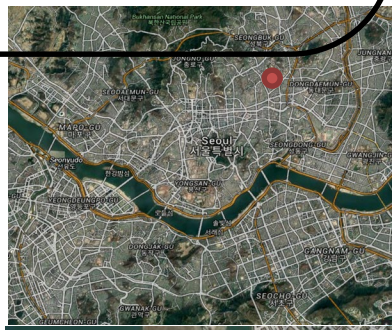
G.-H. Park et al., 2019, STOTEN, 681, 400-412, H. Kim et al., Submitted

II) Incheon National University, Songdo, South Korea: Western coast

+ Sochong Ocean Site, Yellow Sea + Korea University, Seoul







Air Mass Backward Trajectory Analysis

March 2014 to February 2016, Starting location – Uljin, NOAA HYSPLIT

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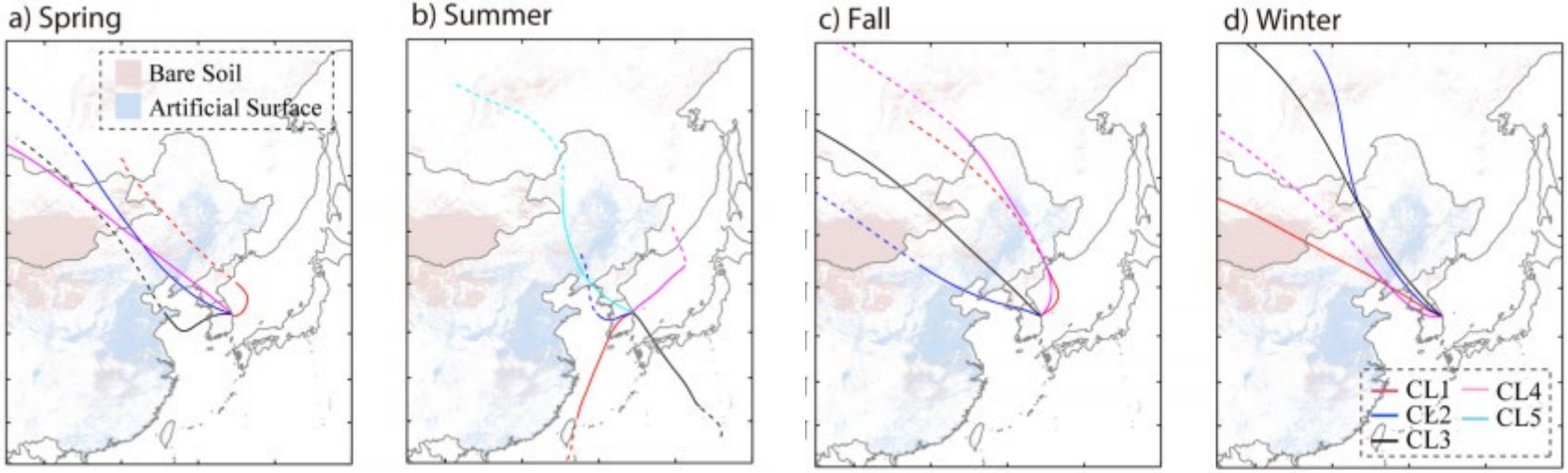
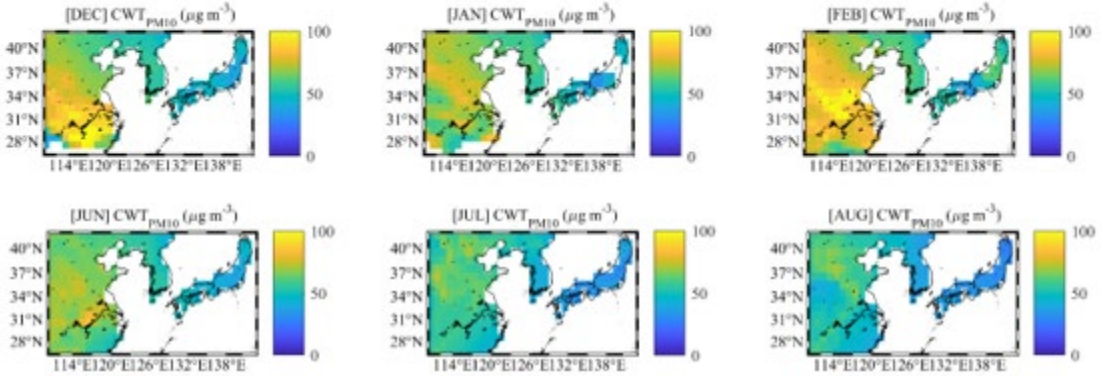


Entire South Korea

Concentration-Weighted Trajectory Receptor Model

2001 to 2017 with PM10



T.-W. Kim et al., Submitted

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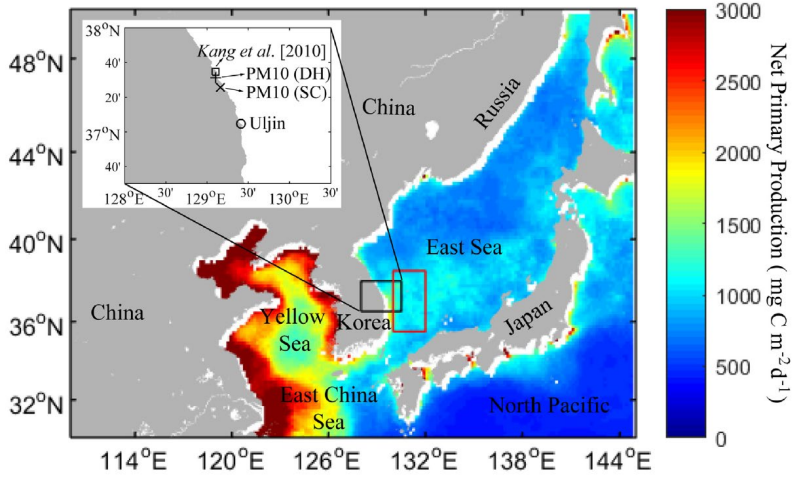
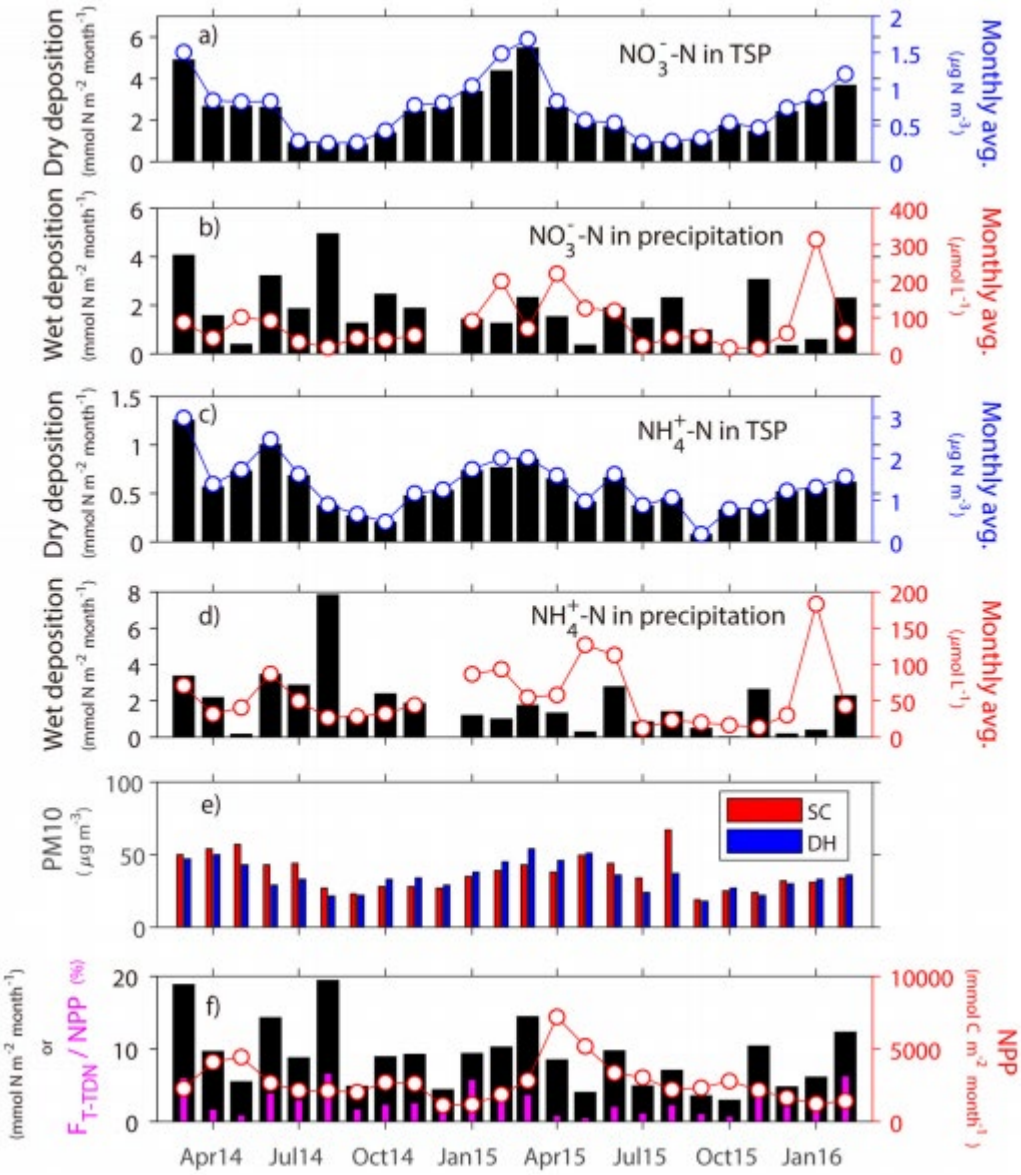
Seasonal trends of inorganic nitrogen in TSP and Rain
+
Impact on marine productivity





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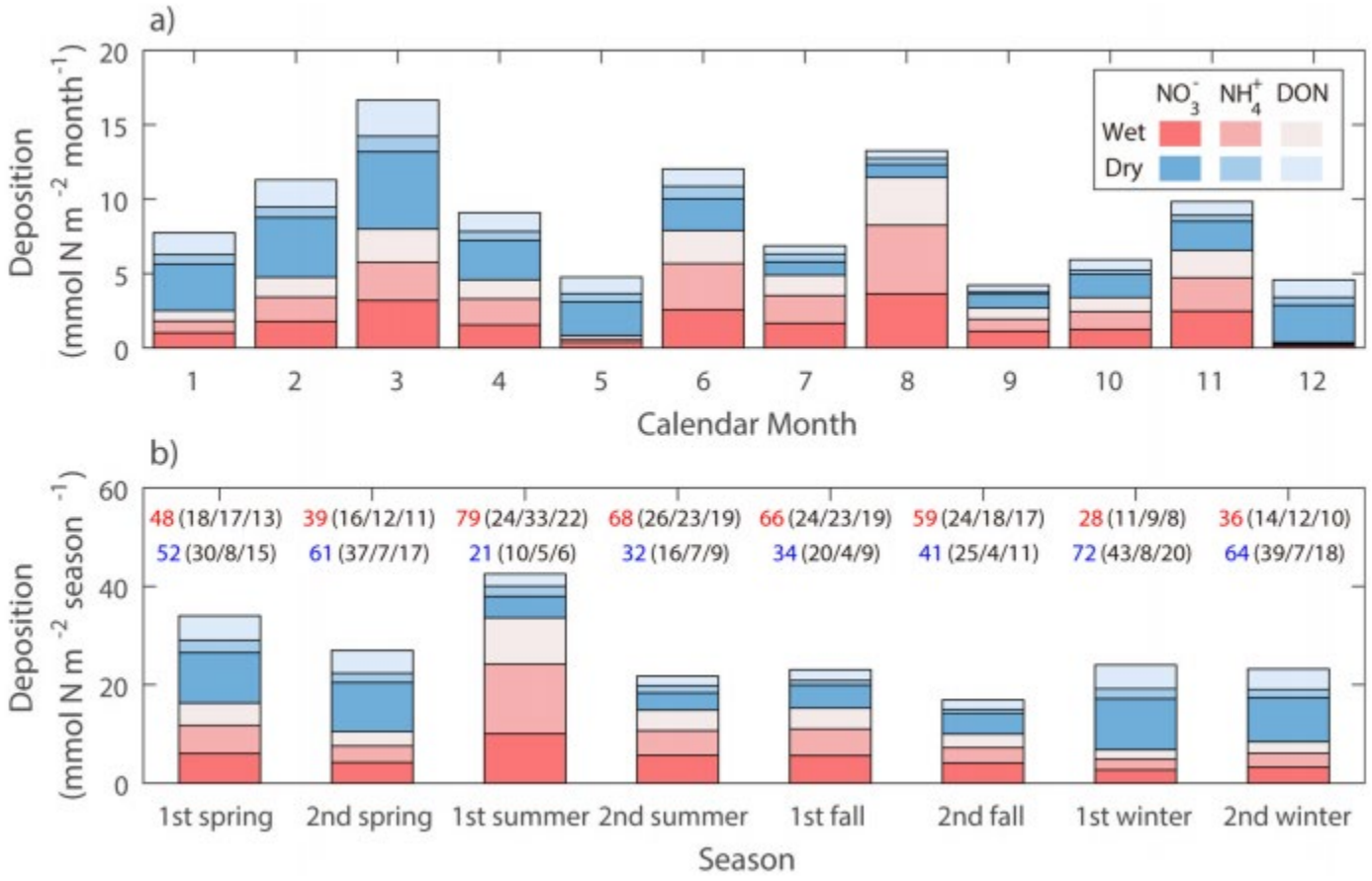
Total Dissolved Nitrogen Deposition (TSP and Rain)

March 2014 to February 2015: first year, March 2015 to February 2016: Second year,



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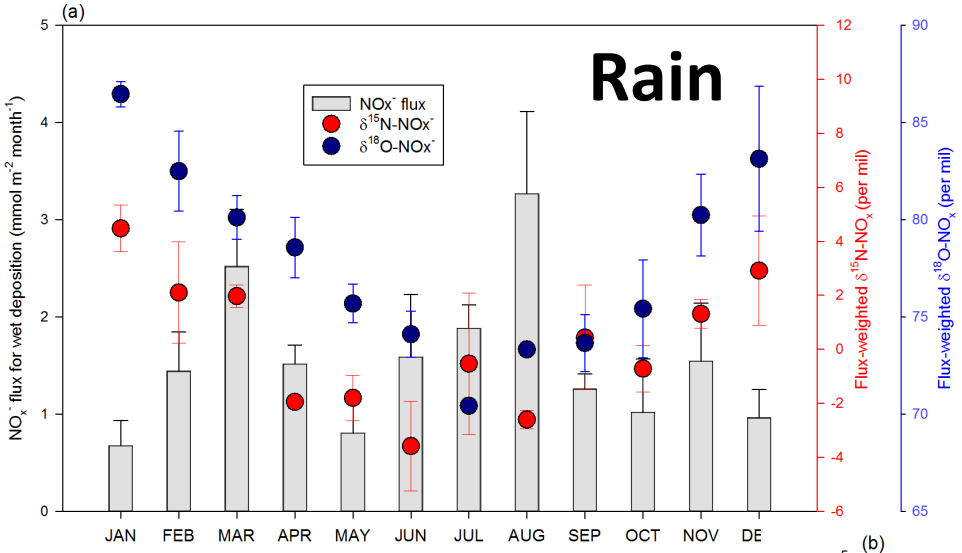
Factors affecting deposition

Factor Analysis

	Total suspended particle			Precipitation		
	$FAC1_{TSP}$	$FAC2_{TSP}$	$FAC3_{TSP}$	$FAC1_{PRCP}$	$FAC2_{PRCP}$	$FAC3_{PRCP}$
NO_3^-	**0.69**	0.18	0.16	**0.67**	0.29	0.49
NH_4^+	0.42	**0.71**	−0.01	0.33	0.01	**0.88**
Cl^-	0.03	−0.10	**0.99**	**0.91**	0.16	0.15
nss-SO_4^{2-}	0.30	**0.85**	−0.13	0.05	0.30	**0.90**
ss-Na^+	0.03	−0.07	**0.99**	**0.92**	0.13	0.15
nss-K^+	**0.75**	0.17	−0.01	**0.68**	−0.50	0.35
nss-Ca^{2+}	**0.90**	0.15	−0.05	**0.65**	0.33	0.08
nss-Mg^{2+}	**0.82**	0.24	0.01	**0.84**	0.34	0.13
Fe	0.00	**0.90**	−0.07	–	–	–
Al	0.28	**0.88**	−0.03	0.46	**0.76**	0.31
Mn	**0.87**	0.29	0.00	**0.70**	0.50	0.28
Cu	0.22	**0.76**	−0.10	0.20	**0.91**	0.16
Zn	**0.62**	0.28	−0.03	–	–	–
As	0.22	0.44	0.03	**0.75**	0.09	0.21
%variance	43.45	16.51	11.68	56.63	13.72	10.86

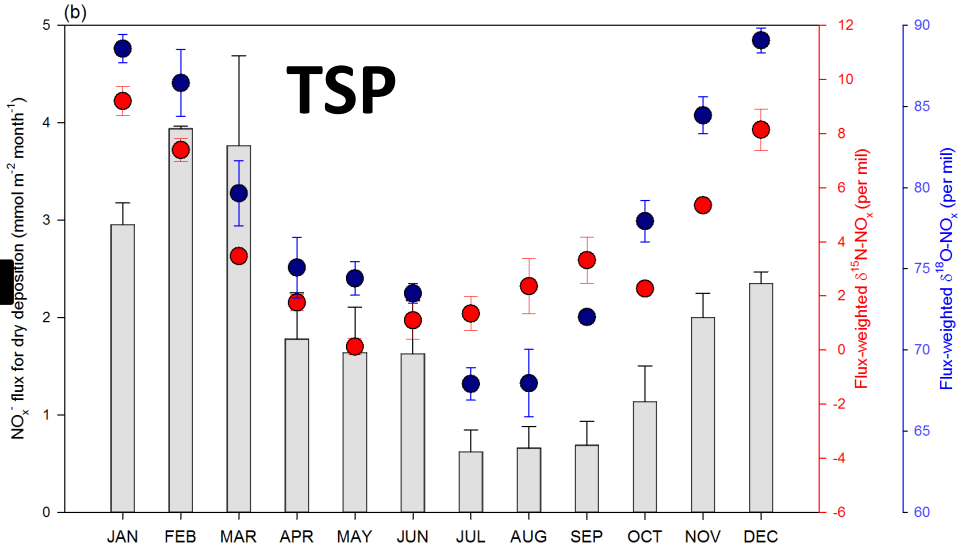
Production Source Determination using isotope data

Atmospheric Data (Rain and TSP)



‰	Flux weighted $\delta^{15}N\text{-}NO_3^-$	Flux weighted $\delta^{18}O\text{-}NO_3^-$
Winter	3.2	84.1
Spring	–0.2	78.6
Summer	–2.4	72.8
Fall	0.6	75.8

‰	Flux weighted $\delta^{15}N\text{-}NO_3^-$	Flux weighted $\delta^{18}O\text{-}NO_3^-$
Winter	8.2	88.0
Spring	1.8	76.4
Summer	1.6	69.8
Fall	3.6	78.1



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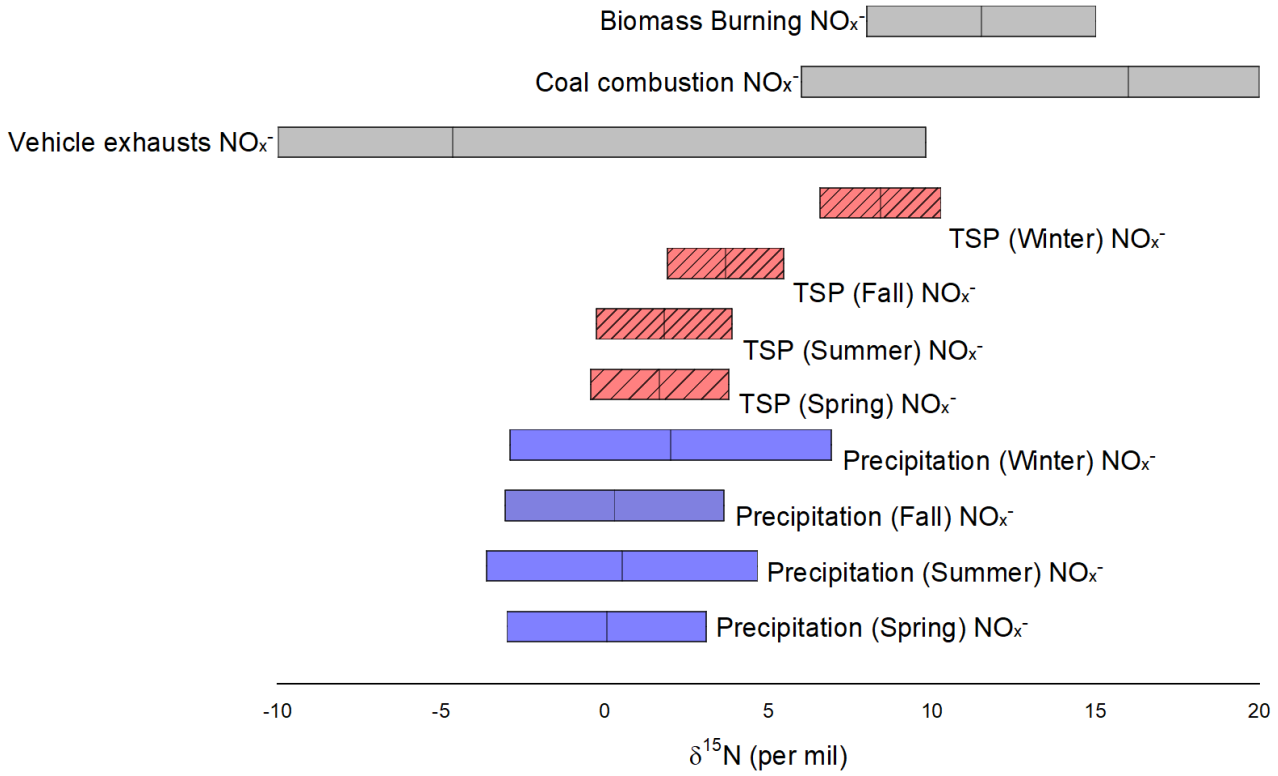
Production Source Determination using isotope data



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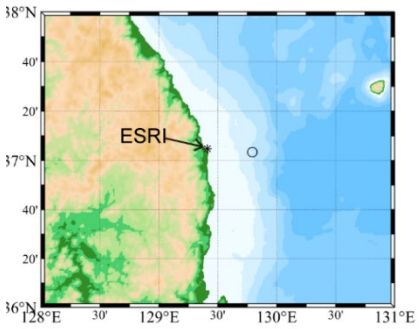
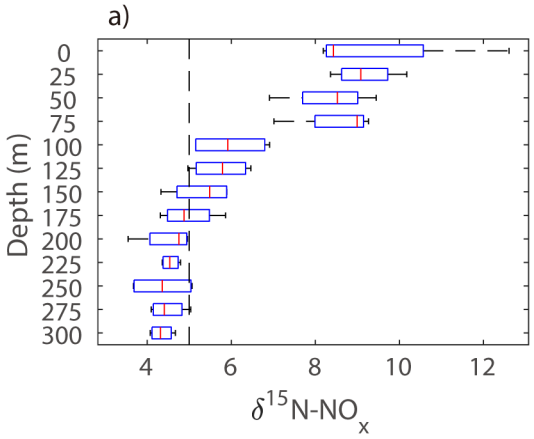
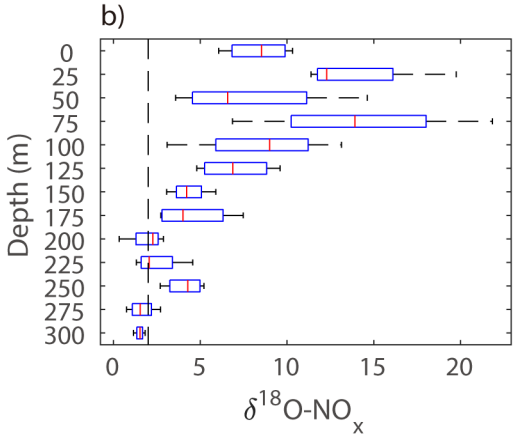
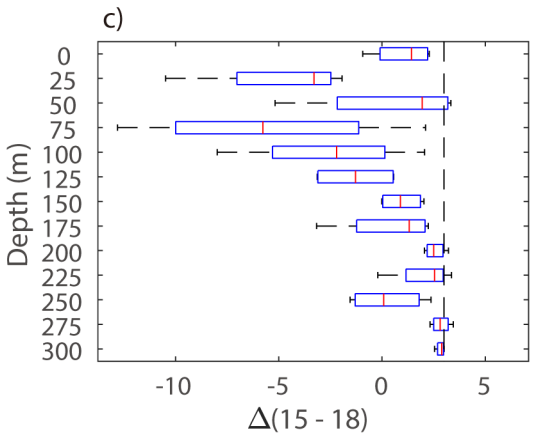
Production Source Determination using isotope data

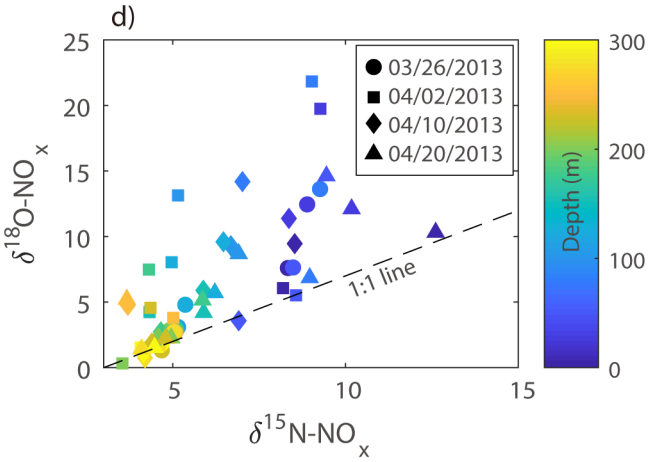
Seawater Data











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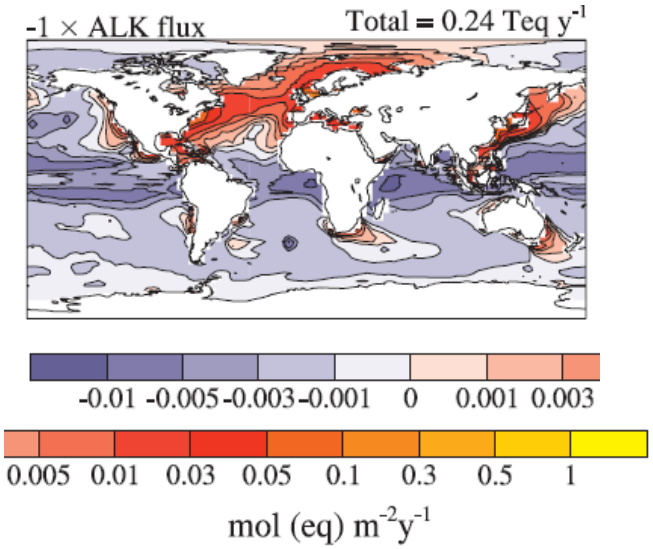
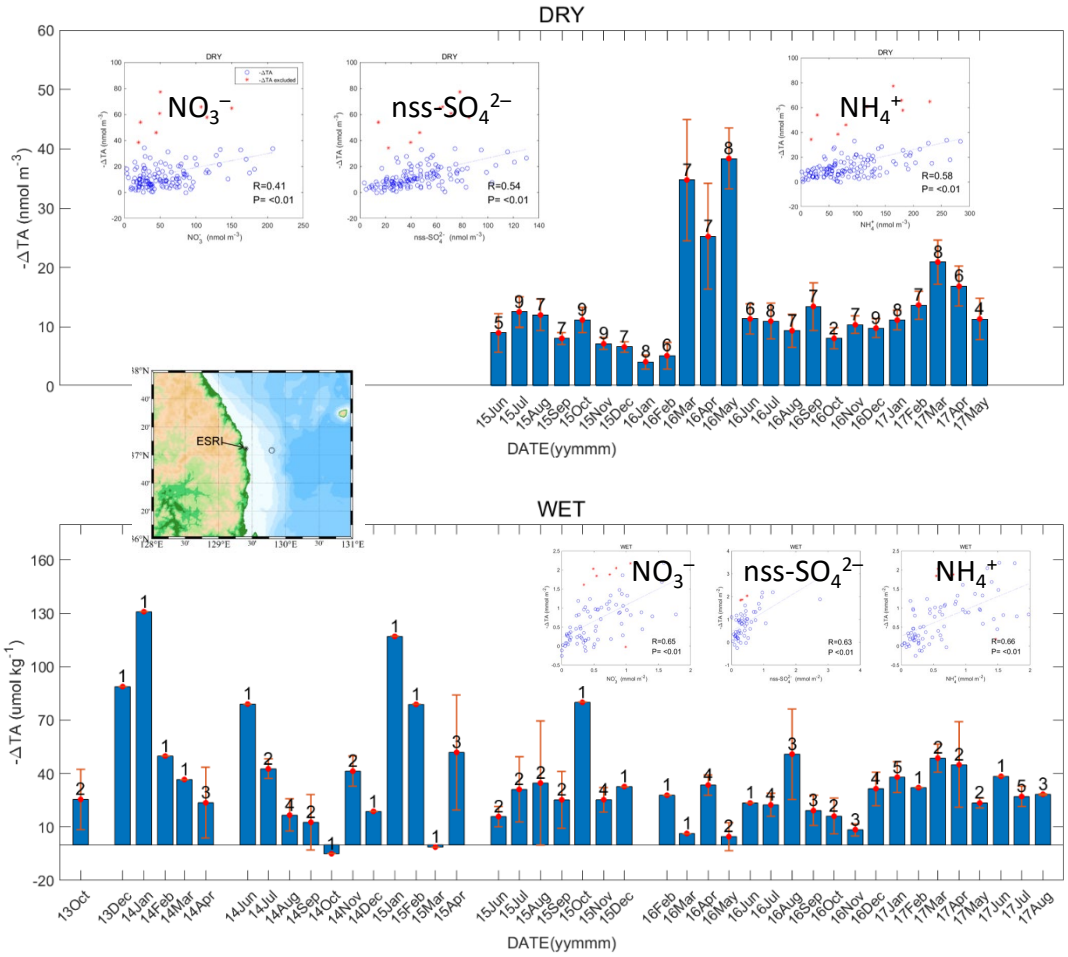
Impacts on Seawater Alkalinity

Seawater + Rainwater, **Seawater + TSP extracts**



Doney et al., 2007, PNAS



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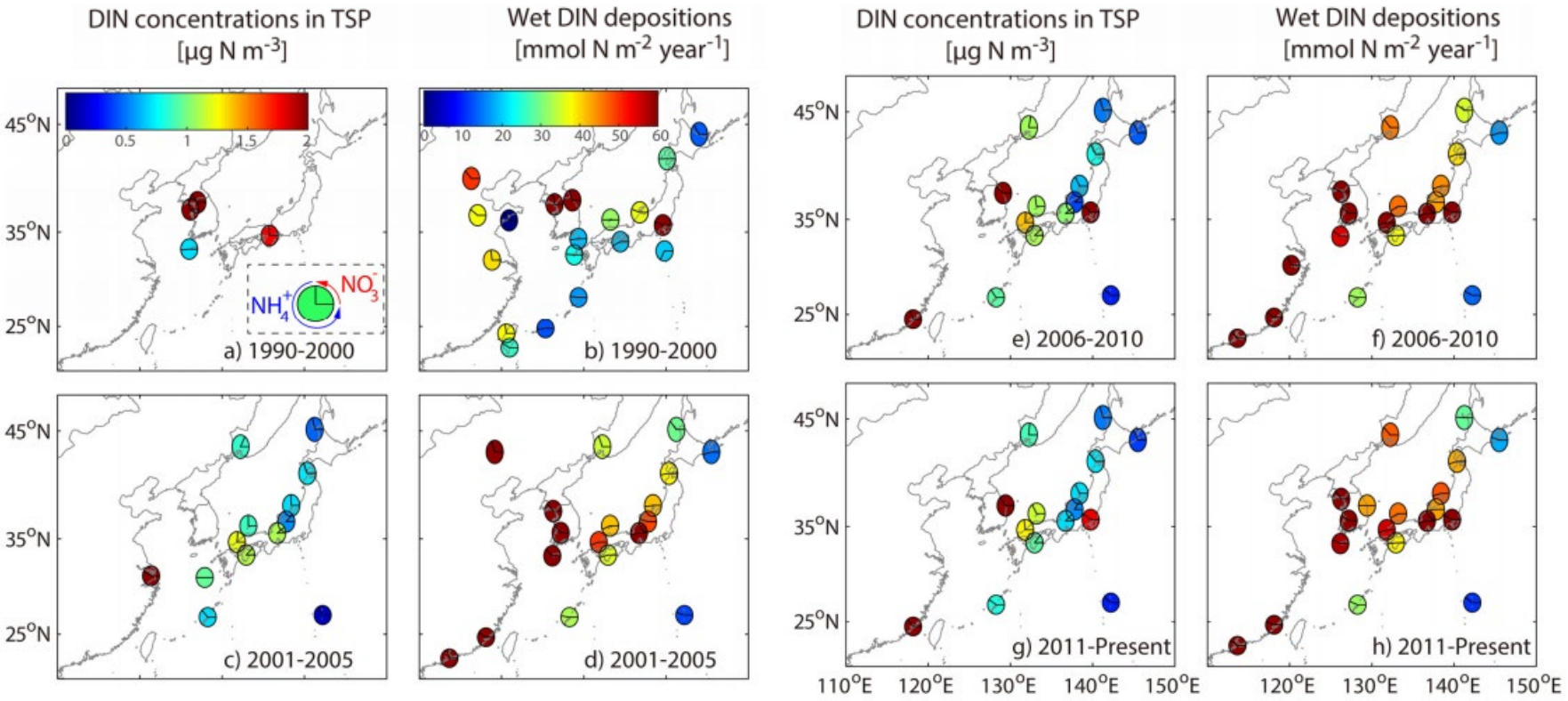
Comparison between the eastern and western coasts

In Preparation

Comparison among three countries

text



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Data: EANET


Thank you!