

2021 APMMN meeting (October 6, 2021)

# Wet deposition of mercury in South Korea

Seunghee Han and Jisook Yang  
Gwangju Institute of Science and Technology (GIST)  
Gwangju, Republic of Korea

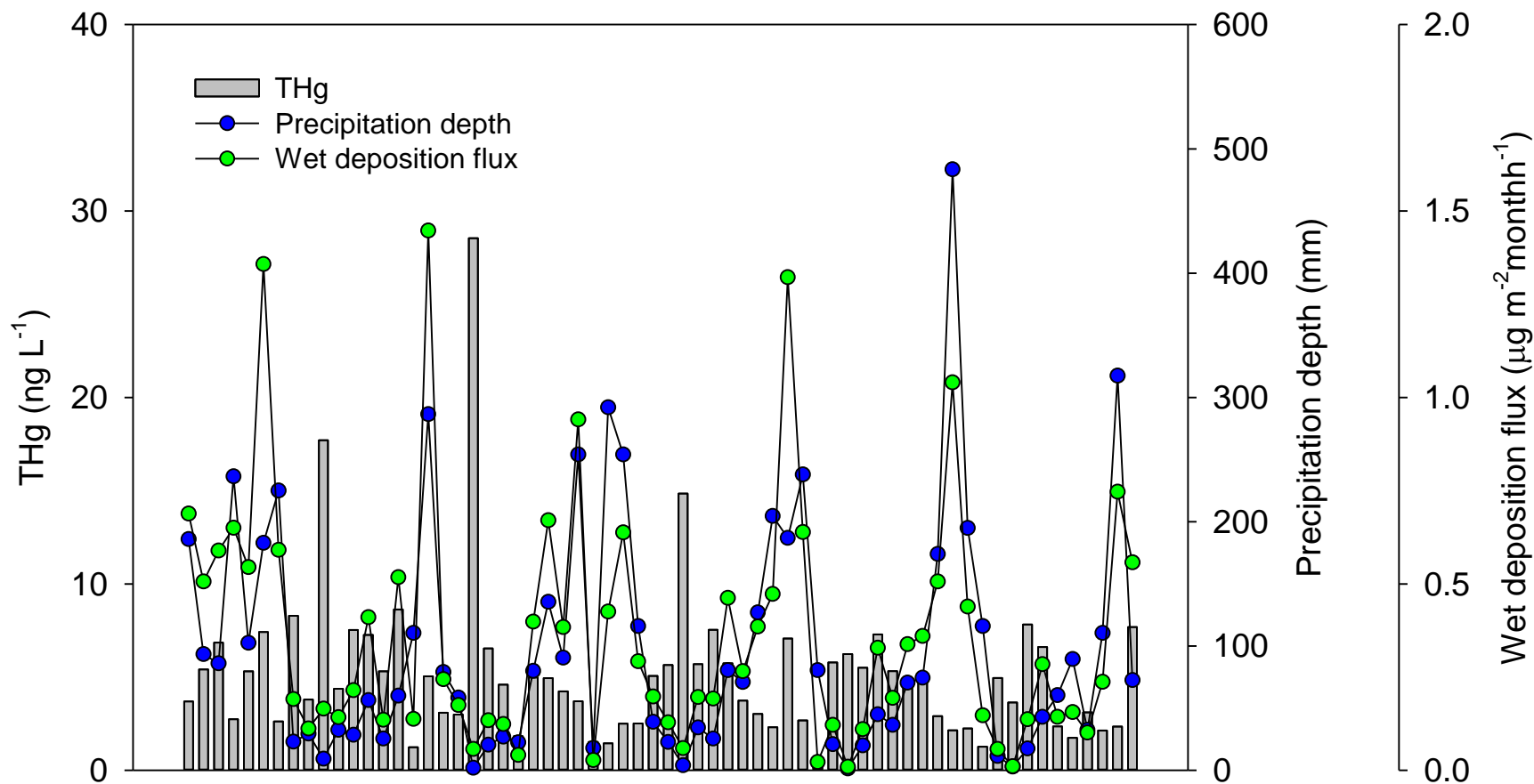
# 1. Sampling sites and periods

- Gwangju: APMMN-affiliated site (2016-present)
- Juju, Incheon, Seoul: NIER Hg monitoring sites (2015-present)



	Site	Population
Rural	Jeju	669,771
	Gwangju	1,459,024
Urban	Incheon	2,957,024
	Seoul	9,757,144

## 2. Total mercury (THg) in Gwangju rainwater



Site	Rainfall	VWM THg	Wet deposition of THg
	mm yr <sup>-1</sup>	ng L <sup>-1</sup>	μg m <sup>-2</sup> yr <sup>-1</sup>
Gwangju	1089	6.6	3.8

## 2. Total mercury (THg) in Gwangju rainwater

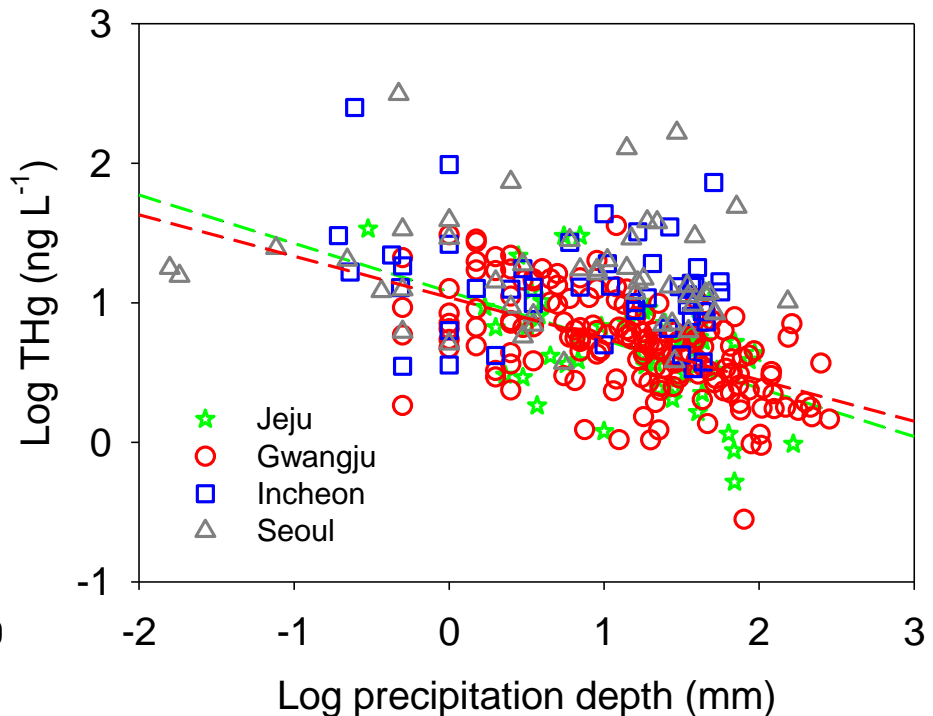
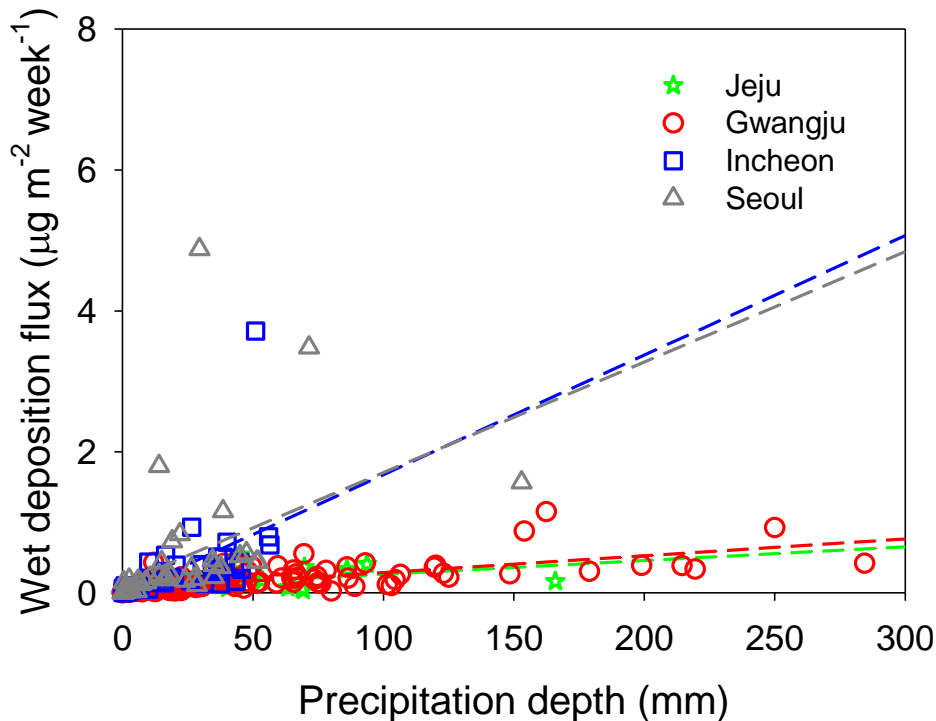
*Incheon*  $y = 0.017x - 0.024$  ( $p < 0.0001$ )

*Seoul*  $y = 0.016x + 0.14$  ( $p = 0.0007$ )

*Gwangju*  $y = 0.0024x + 0.047$  ( $p < 0.0001$ )

*Jeju*  $y = 0.0020x + 0.064$  ( $p = 0.0001$ )

- ✓ Seoul and Incheon: 2015.04 - 2016.05
- ✓ Jeju: 2015.10 - 2016.11
- ✓ Gwangju: 2016.04 - 2021.07



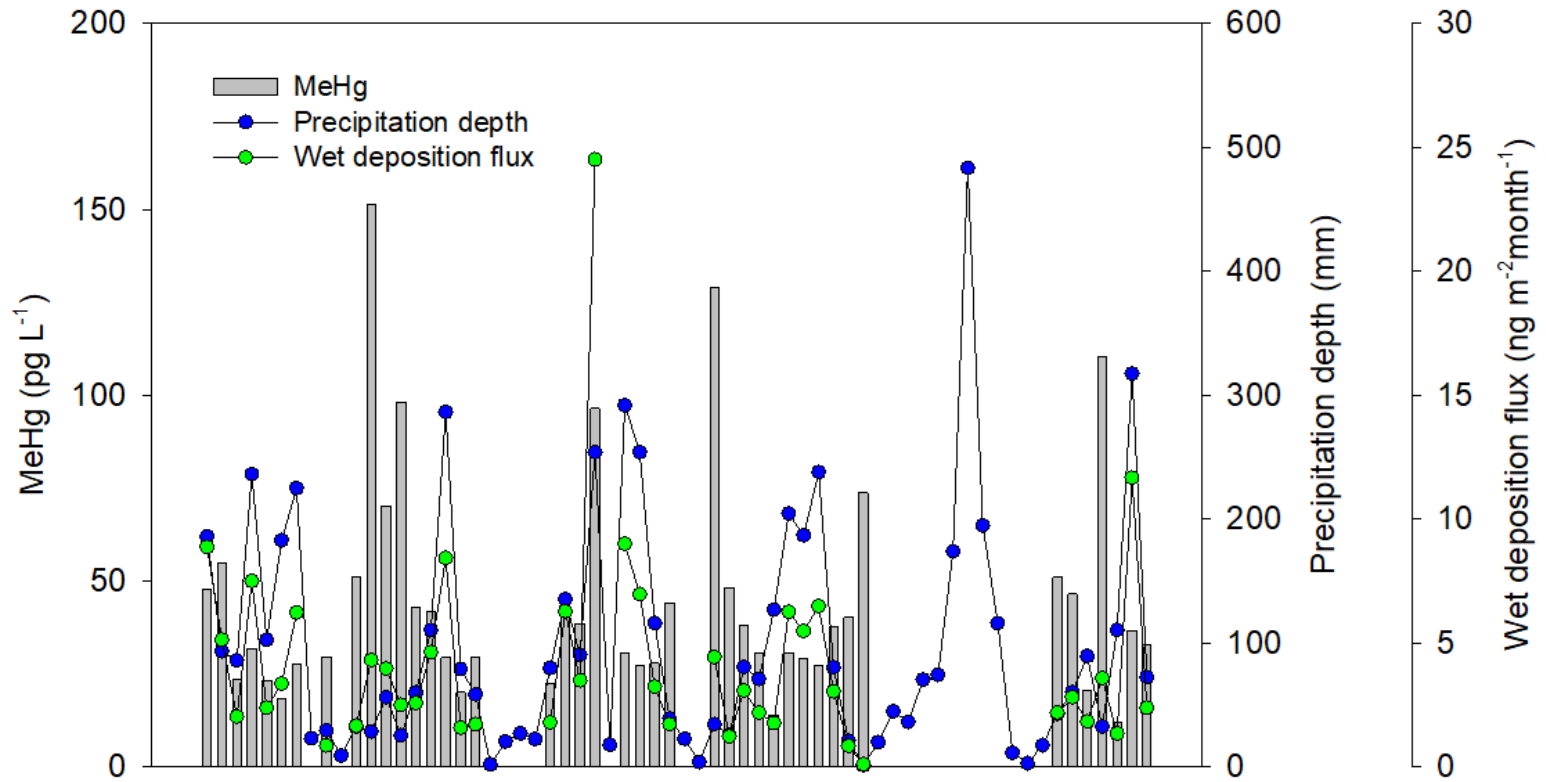
*Incheon*  $p > 0.01$

*Seoul*  $p > 0.1$

*Gwangju*  $y = -0.30x + 1.0$  ( $p < 0.0001$ )

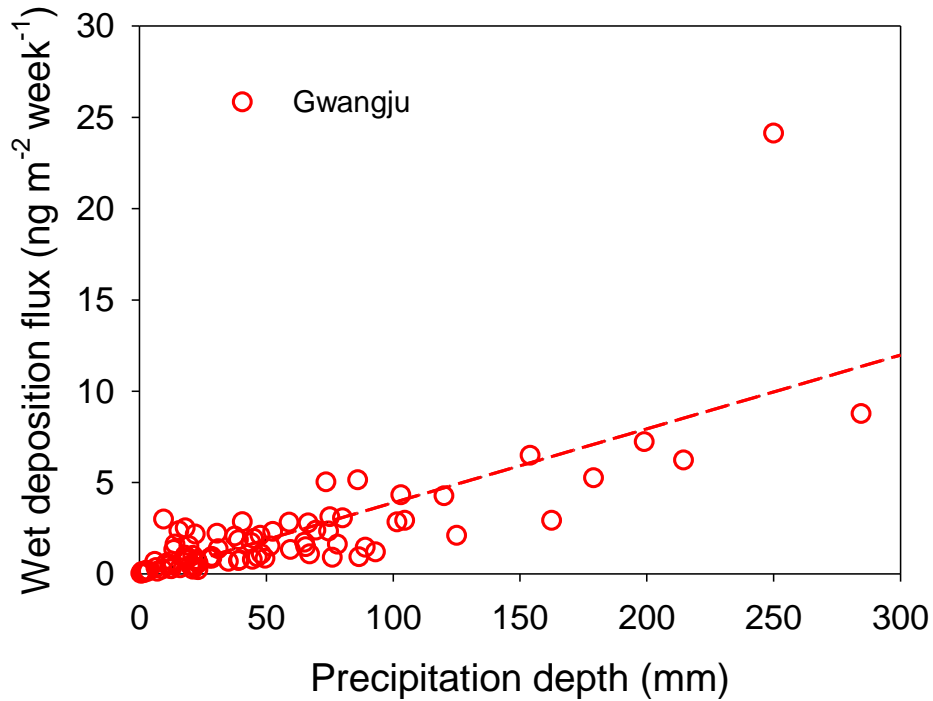
*Jeju*  $y = -0.35x + 1.1$  ( $p = 0.0001$ )

### 3. Methylmercury (MeHg) in Gwangju rainwater

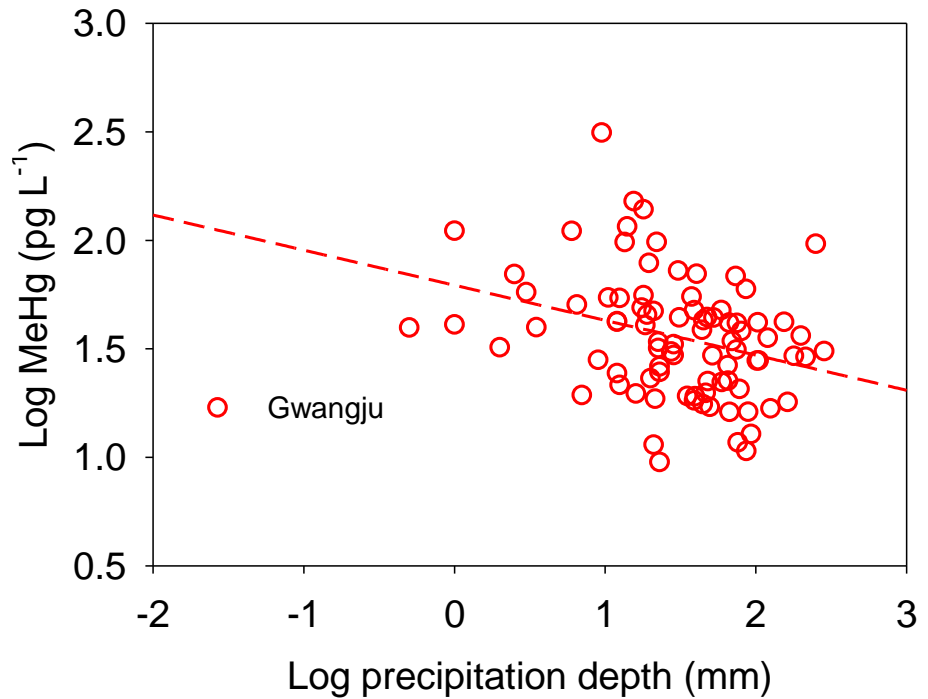


Site	Rainfall	VWM MeHg	MeHg/THg	Wet deposition flux of MeHg
	mm yr <sup>-1</sup>	pg L <sup>-1</sup>	%	ng m <sup>-2</sup> yr <sup>-1</sup>
Gwangju	1089	44	0.67	35

### 3. Methylmercury (MeHg) in Gwangju rainwater

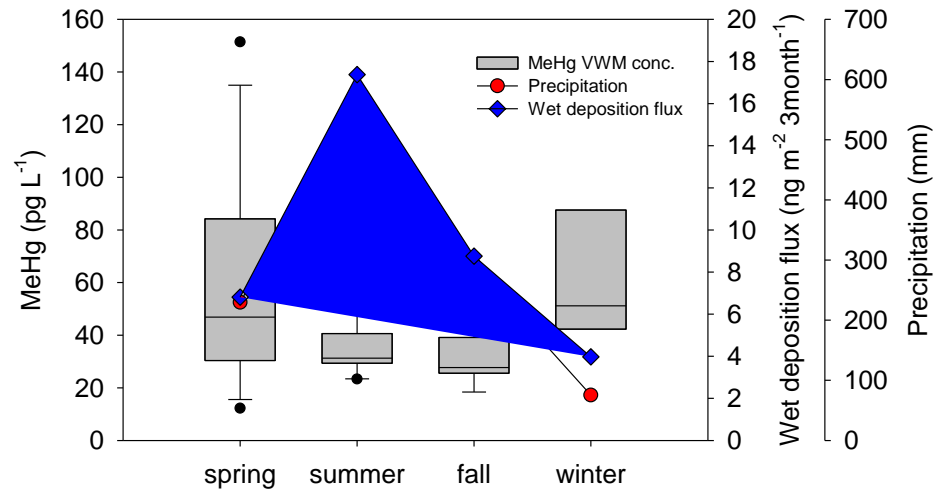
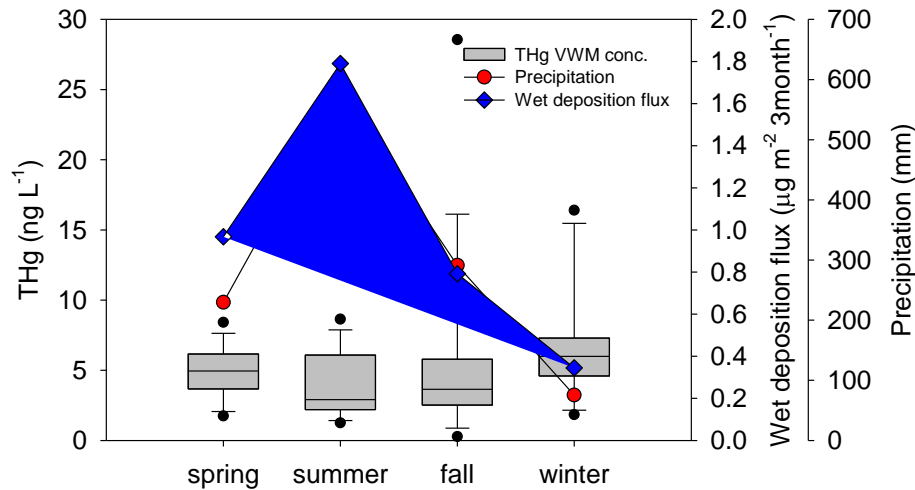


*Gwangju  $y = 0.040x - 0.15$  ( $p < 0.0001$ )*



*$y = -0.16x + 1.8$  ( $p = 0.0031$ )*

# 4. Seasonal comparisons



The highest Hg wet deposition flux is found in summer due to the higher precipitation in the summer.

The VWM THg and MeHg conc in precipitation increased in winter. This can be anthropogenic influences.

# 5. Summary

Locations	Time	Type	Conc (ng L <sup>-1</sup> )		Flux (μg m <sup>-2</sup> yr <sup>-1</sup> )		Reference
			THg	MMHg	THg	MMHg	
Xiamen, China	Jun 2012 - May 2013	Suburban /rural	12.3	0.053	14.0	0.058	Xu et al., 2014
Wujiang River, China	2006	Rural	36.0	0.19	34.7	0.18	Guo et al., 2008
Chuncheon, Korea	Aug 2006 - Jul 2008	Rural	8.8		9.4		Ahn et al., 2011
New Hampshire, USA	2007 - 2008	Rural	8.0		10.4		Lombard et al., 2011
Ten sites in UK	Feb 2005 - Jun 2009	Rural	0.96 - 8.8		1.4 - 6.4		Rowland et al., 2010
Minamata Bay, Japan	Sep 2009 - Aug 2010	Rural	5.9	0.061	13.7	0.14	Marumoto and Matsuyama, 2014
Nam Co, Tibetan, China	Jul 2009 - 2011; Jul - Aug 2009	Remote	4.8	0.031	1.8	0.011	Huang et al., 2012
Mt. Leigong, Guizhou, China	May 2008 - May 2009	Remote	4.0	0.040	6.1	0.060	Fu et al., 2010
Pengjiayu, Taiwan	2009	Remote	8.9		10.0		Sheu and Lin, 2013
Monterey Bay, California, USA	Mar - Jun 2011	Coastal	1.8	0.10			Weiss-Penzias et al., 2012
Gwangju, Korea	Apr 2016 - Aug 2022	Suburban	6.6	0.044	3.8	0.035	This study



## 5. Summary

---

1. The volume weighted mean (VWM) concentrations of THg and MeHg were 6.6 and 0.044 ng L<sup>-1</sup>, and the annual wet deposition flux of THg and MeHg were 3.8 and 0.035 ng m<sup>-2</sup>, respectively.
2. The VWM concentrations of THg and MeHg in Gwangju were highest in winter and there was a dilution effect by rain amount.
3. The wet deposition fluxes of THg and MeHg in Gwangju were highest in summer and the lowest in winter following the seasonal trends of the wet precipitation.



국립환경과학원



환경부



Asia-Pacific Mercury  
Monitoring Network