

1 **Anthropogenic imprints on nitrogen and oxygen isotopic**  
2 **composition of precipitation nitrate in a nitrogen-polluted**  
3 **city in southern China**

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14  
15 **Appendix**

16 **Appendix**17  **$\delta^{15}\text{N}$  (‰) in  $\text{NO}_x$  sources and atmospheric  $\text{NO}_3^-$ .**

|   | $\text{NO}_x$ | $\text{NO}_3^-$               | Reference                   |
|---|---------------|-------------------------------|-----------------------------|
| Precipitation in Guangzhou, Guangdong, China            |               | -4.9 to +10.1 (+3.6)          | This study                  |
| Precipitation in Dinghushan, Guangdong, China           |               | +0.7 to +11.1 (+5.0)          | Koba et al., under review   |
| Precipitation in Guiyang, China                         |               | -3.8 to +8.4                  | Xiao and Liu, 2002          |
| Precipitation in two suburban sites in Beijing, China   |               | -4.6 to +20.7 (+1.7 and +6.8) | Zhang et al., 2008          |
| Precipitation in two rural sites in Hebei, China        |               | -10.0 to +6.9 (-1.4 and -1.0) | Zhang et al., 2008          |
| Precipitation in one rural site in Beijing, China       |               | -4.5 to +22.0 (+1.4)          | Zhang et al., 2008          |
| Precipitation in Wakayama, Japan                        |               | -7 to +14.5 (+3.2)            | Tobari et al., 2010         |
| Precipitation in Niigata, Japan                         |               | -8 to +2                      | Fukuzaki and Hayasaka, 2009 |
| Precipitation in Toyama, Japan                          |               | -7.8 to +1.6                  | Wu et al., 2008             |
| Precipitation in Tokyo, Japan                           |               | -5.8 to +3.9 (-1.2)           | Kurata, 2002                |
| Precipitation in Rishiri Island, Japan                  |               | -10 to +11                    | Tsunogai et al., 2010       |
| Precipitation across the MW and NE U. S..               |               | -8.1 to +3.2 (-1.5)           | Elliott et al., 2007        |
| Precipitation in Jülich, German                         |               | -10 to +6                     | Freyer, 1991                |
| Precipitation in Hawaii (Pacific Ocean)                 |               | -3.8 to +2.4                  | Carrillo et al., 2002       |
| Precipitation in Bermuda (Atlantic)                     |               | -13.9 to +1.8                 | Hastings et al., 2003       |
| $\text{HNO}_3$ vapor in Jülich, German                  |               | -2 to +2                      | Freyer, 1991                |
| $\text{HNO}_3$ vapor across the MW and NE U. S..        |               | -4.9 to +10.8 (+3.2)          | Elliott et al., 2009        |
| Particulate $\text{NO}_3^-$ across the MW and NE U. S.. |               | -9.5 to +14.1 (+6.8)          | Elliott et al., 2009        |
| Particulate $\text{NO}_3^-$ in Jülich, German           |               | -3 to +14                     | Freyer, 1991                |
| Aerosol in the Gulf of Aqaba, Israel                    |               | -6.9 to +1.9 (-2.6)           | Wankel et al., 2010         |
| Snowpack at Summit, Greenland                           |               | -15.3 to +16.7                | Hasting et al., 2004        |
| Surface snow at Summit, Greenland                       |               | -3.2 to +2.0                  | Hasting et al., 2004        |
| Aerosol over Atlantic Ocean (non-polar areas)           |               | -7.1 to -1.6 (-4)             | Morin et al., 2009          |
| Aerosol in Ny-Ålesund (Arctic)                          |               | -22.8 to -6.0 (-15)           | Morin et al., 2009          |
| Aerosol over Weddell sea (Antarctic)                    |               | -42.8 to +1.8 (-17)           | Morin et al., 2009          |

|  |               |                |                       |
|--|---------------|----------------|-----------------------|
| Aerosol at Alert, Canada (Arctic)                                |               | -42 to +3      | Morin et al., 2008    |
| Aerosol at French Antarctic Station Dumont d'Urville (Antarctic) |               | -46.9 to +10.8 | Savarino et al., 2007 |
| Natural gas combustion   | +2.9 to +15.4 |                | Widory, 2007          |
| Diesel combustion  | +3.9 to +5.4  |                | Widory, 2007          |
| Coal combustion  | +4.8 to +9.6  |                | Kiga et al., 2000     |
| Coal-fired boiler  | +6 to +13     |                | Heaton, 1990          |
| Vehicle exhaust  | +3.9 to +5.4  |                | Widory, 2007          |
| Vehicle exhaust  | +5.7          |                | Ammann et al., 1999   |
| Vehicle exhaust  | +3.7          |                | Moore, 1997           |
| Vehicle exhaust  | +3.8          |                | Pearson et al., 2000  |
| Fuel oil combustion  | -19.4 to +2.9 |                | Widory, 2007          |
| Coal combustion  | -5.3          |                | Widory, 2007          |
| Vehicle exhaust  | -13 to -2     |                | Heaton, 1990          |
| Lightning (Lab. simulation)                                      | -0.5 to +1.4  |                | Hoering, 1957         |
| NO from agriculture soils in Guangzhou                           | -48 to -20    |                | Li and Wang 2008      |

18 Mean values appear in parentheses.

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