Identifying sources of nitrate in an irrigated rice paddy watershed, Tsukuba, Japan

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Topic

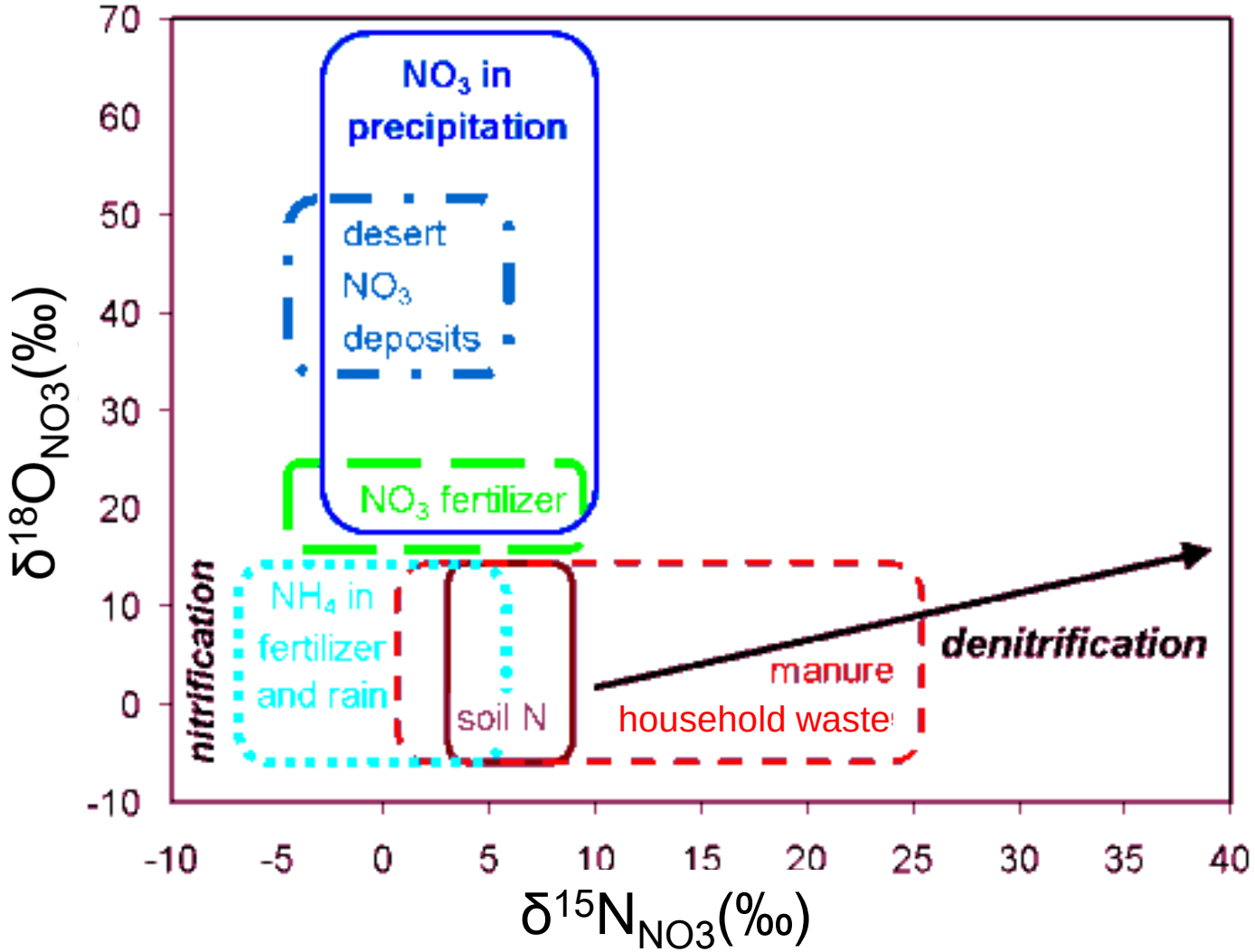
First comprehensive research using nitrate (NO_3^-) isotopes ($\delta^{15}N_{NO3}$ and $\delta^{18}O_{NO3}$) of river water in an irrigated or non-irrigated rice paddy watershed.

Contents

- Background and objectives
- Method
- Results and discussion
- Conclusion

Background and object

Identifying NO_3^- sources for lake water conservation



http://wwwrcamnl.wr.usgs.gov/isoig/isopubs/Fig16-9c.gif

Transboundary irrigation

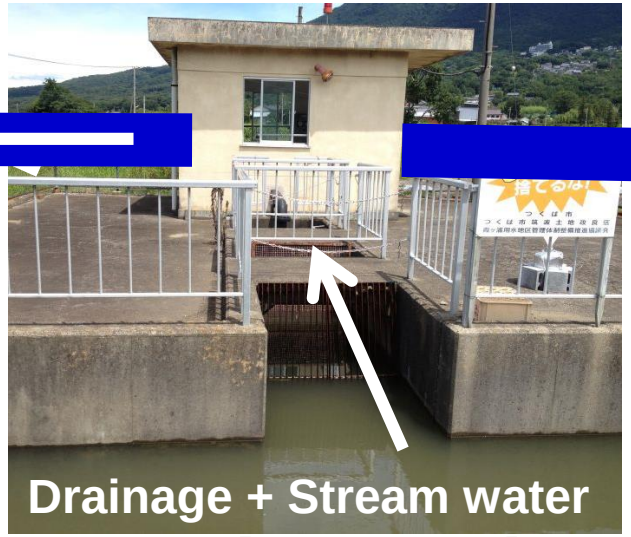
Kasumigaura water conveyance

Lake intake

Pipe line

http://suido-ishizue.jp/kokuei/kanto/ibaragi/kasumigaura/0201.html

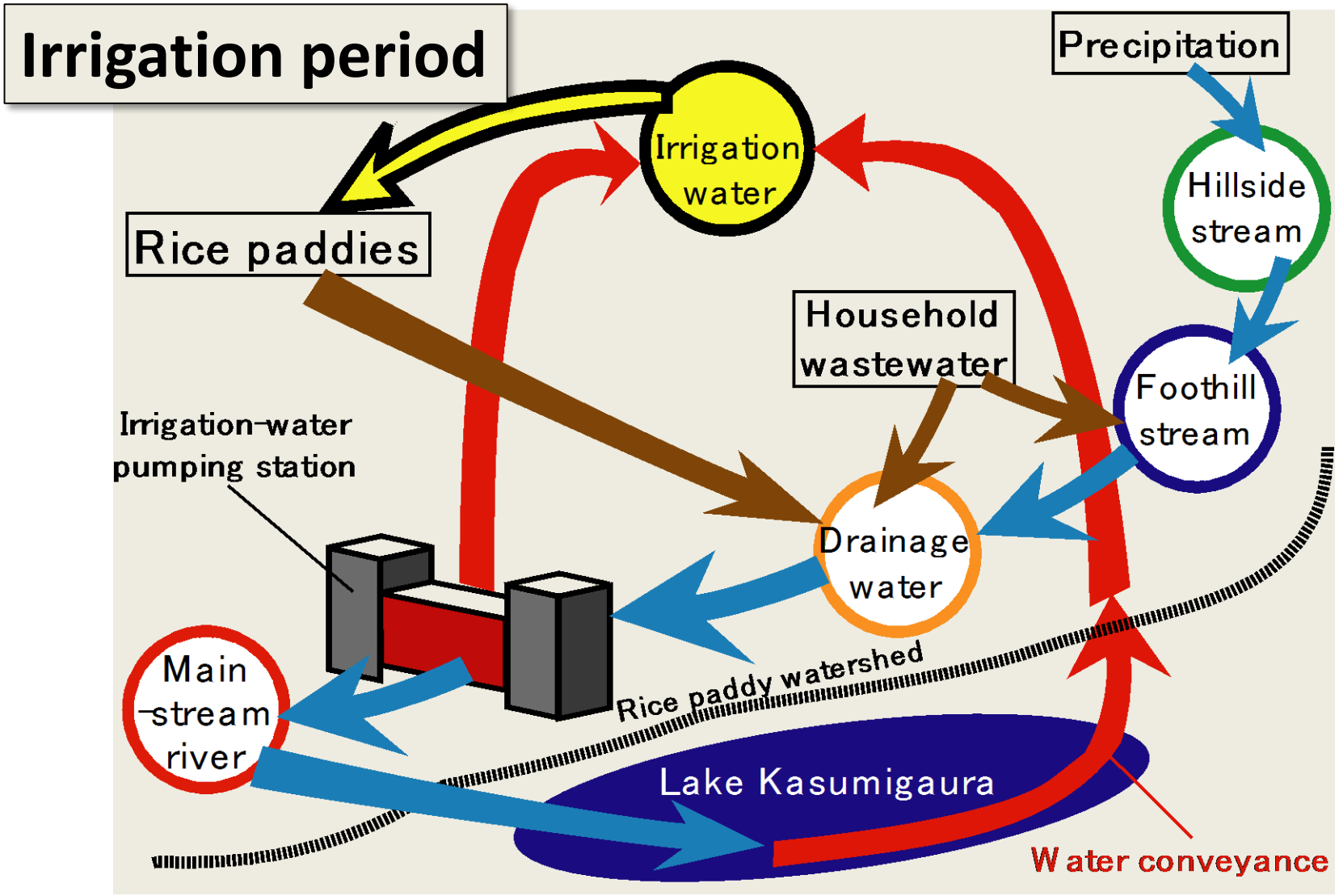
Irrigation tap



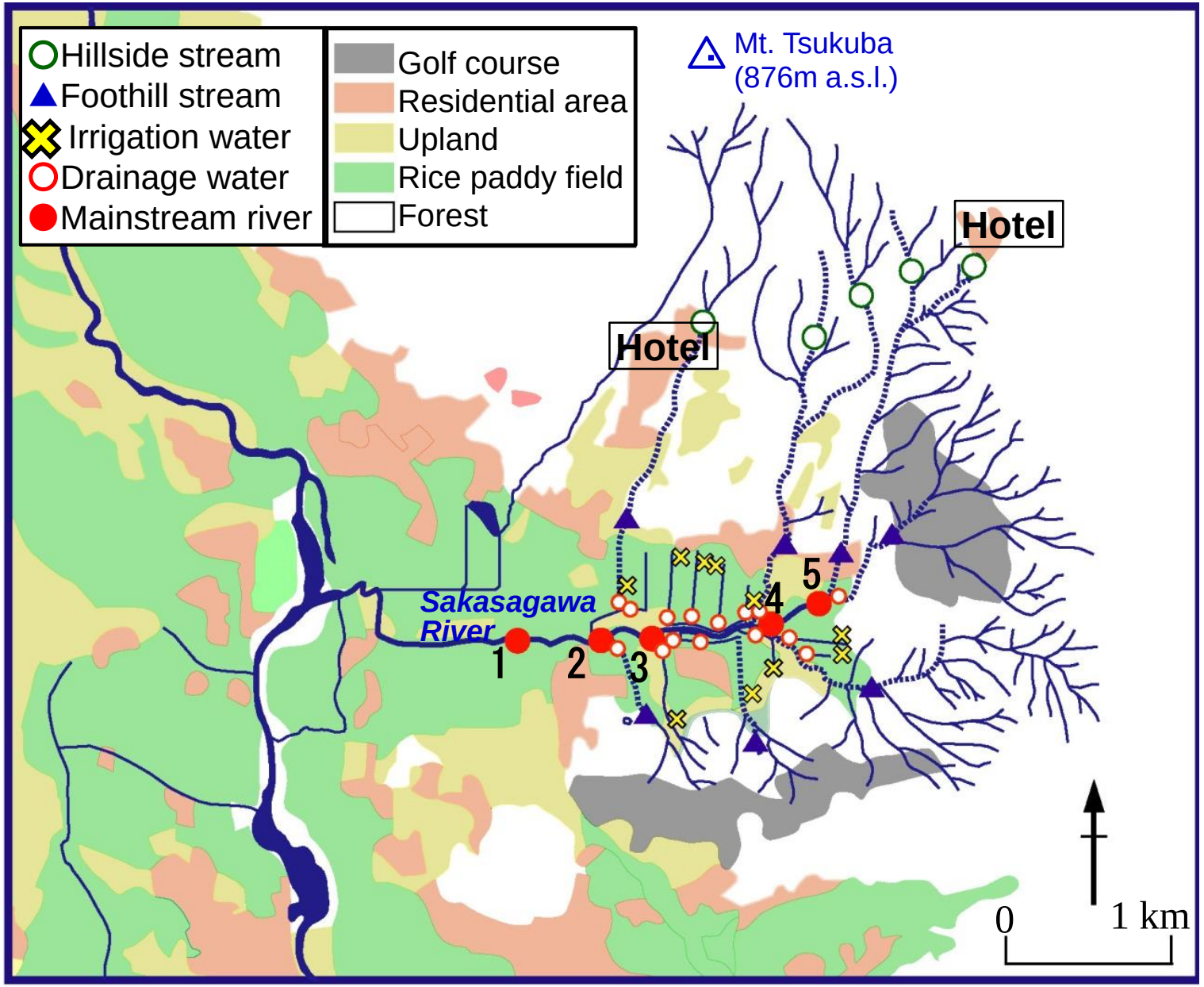
Pumping station

Rice paddy watershed

Scheme of the water circulation

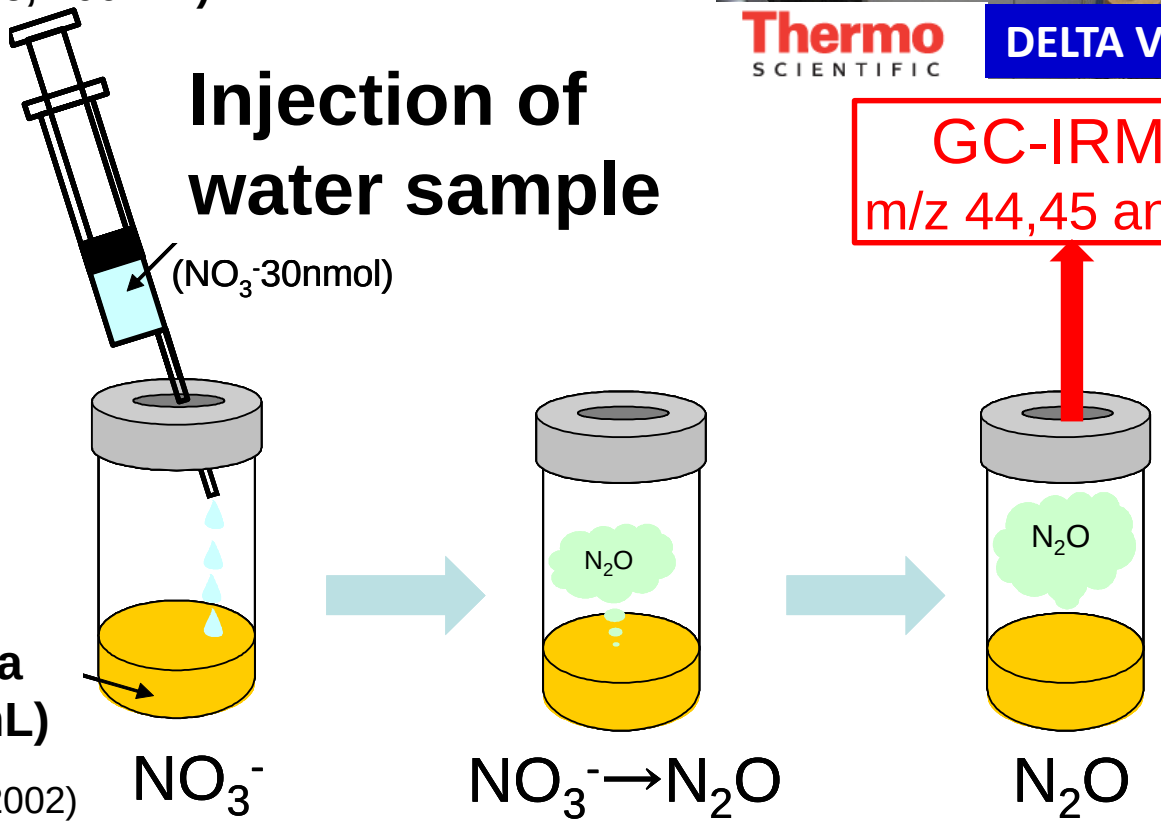


Study area


Hillside stream
Foothill stream
Irrigation water
Drainage water
Mainstream river
Golf course
Residential area
Upland
Rice paddy field
Forest
Mt. Tsukuba
(876m a.s.l.)
Hotel
Hotel
Sakasagawa
River
1
2
3
4
5
0
1 km

Nitrate isotope determination by IRMS

Denitrifying bacteria culture
(lack in N_2O reductase, 200 mL)

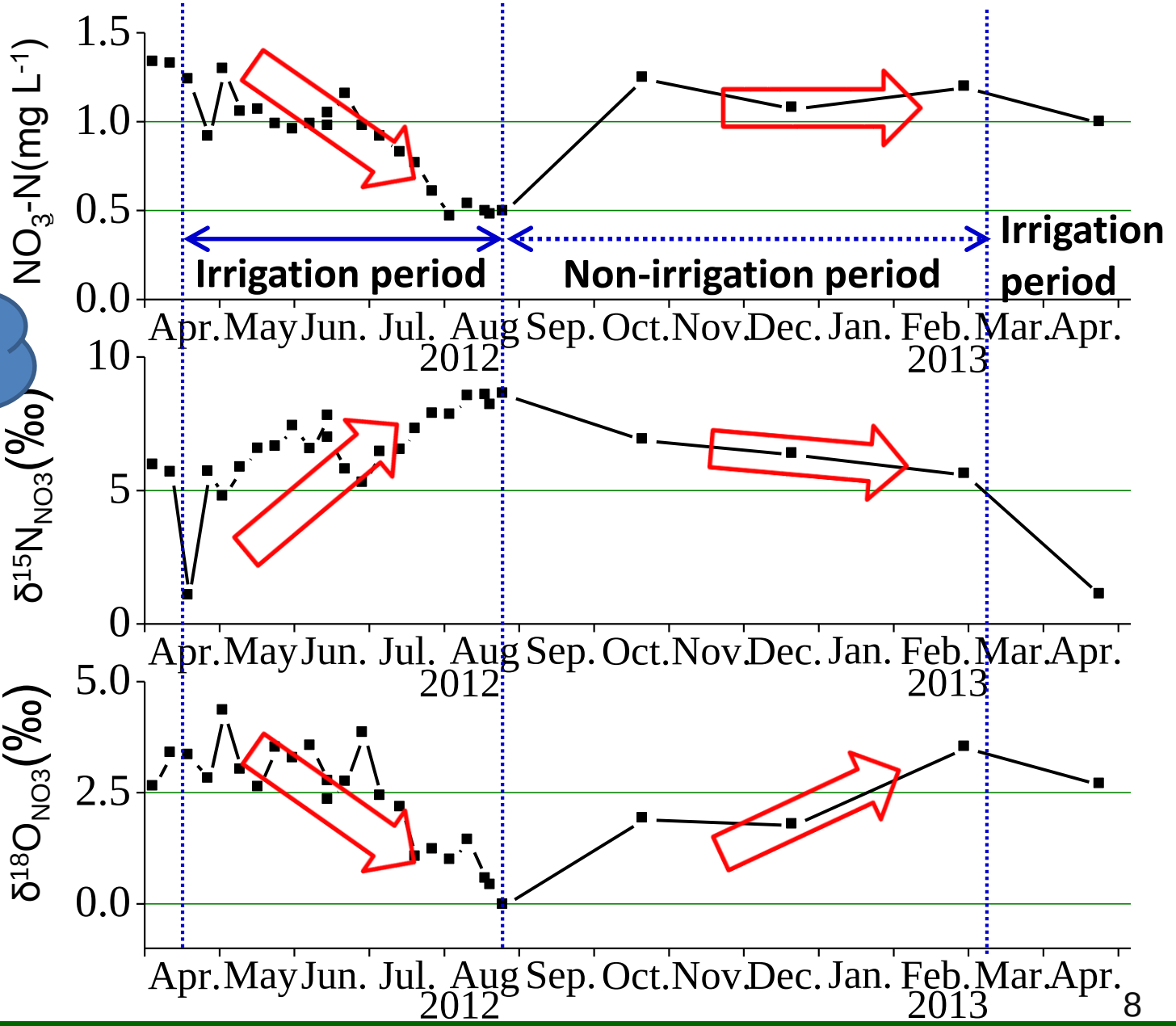


Denitrifier method (Casciotti 2002)

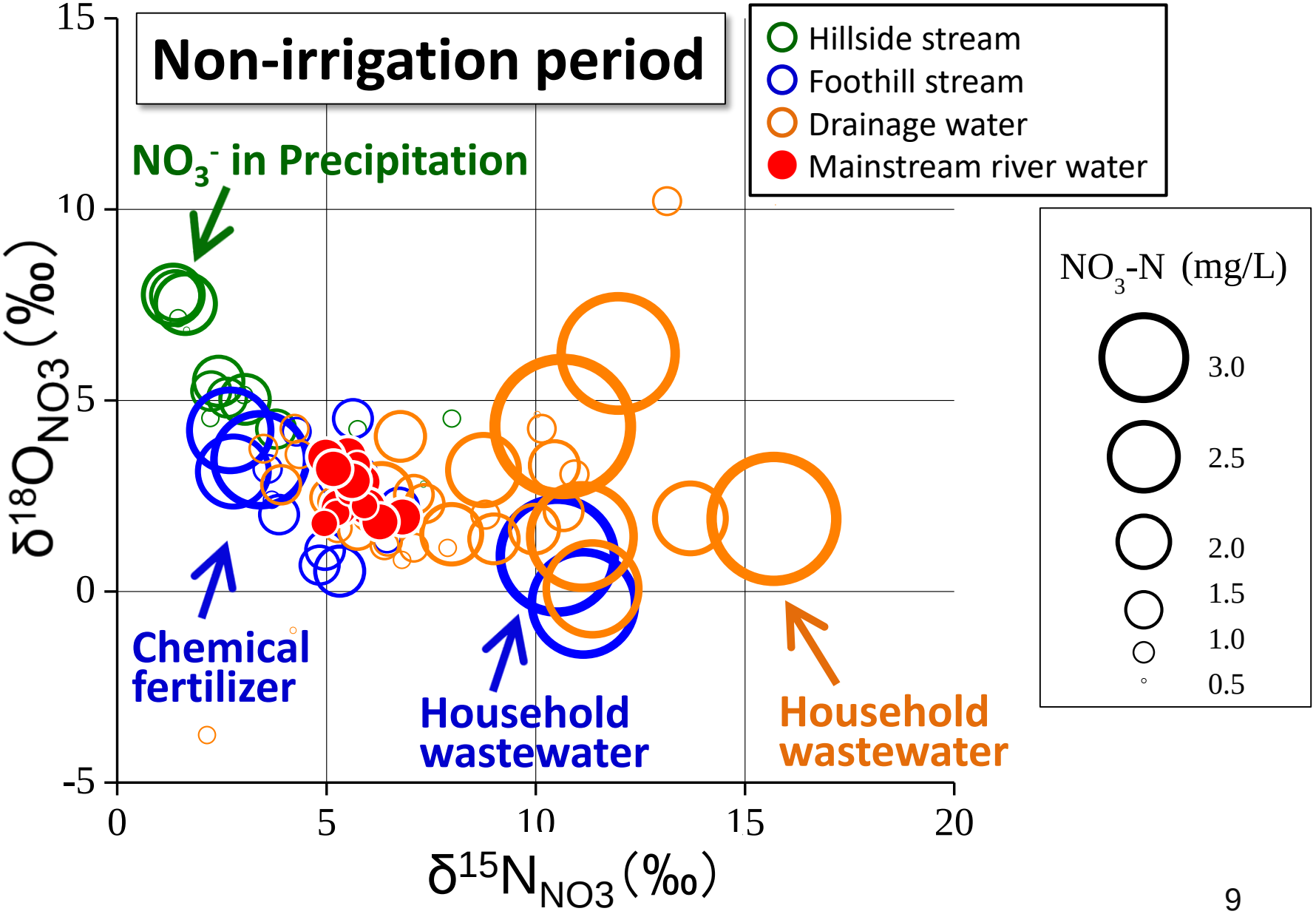
Seasonal patterns of isotopic composition of nitrate

Outlet of watershed (Site1)

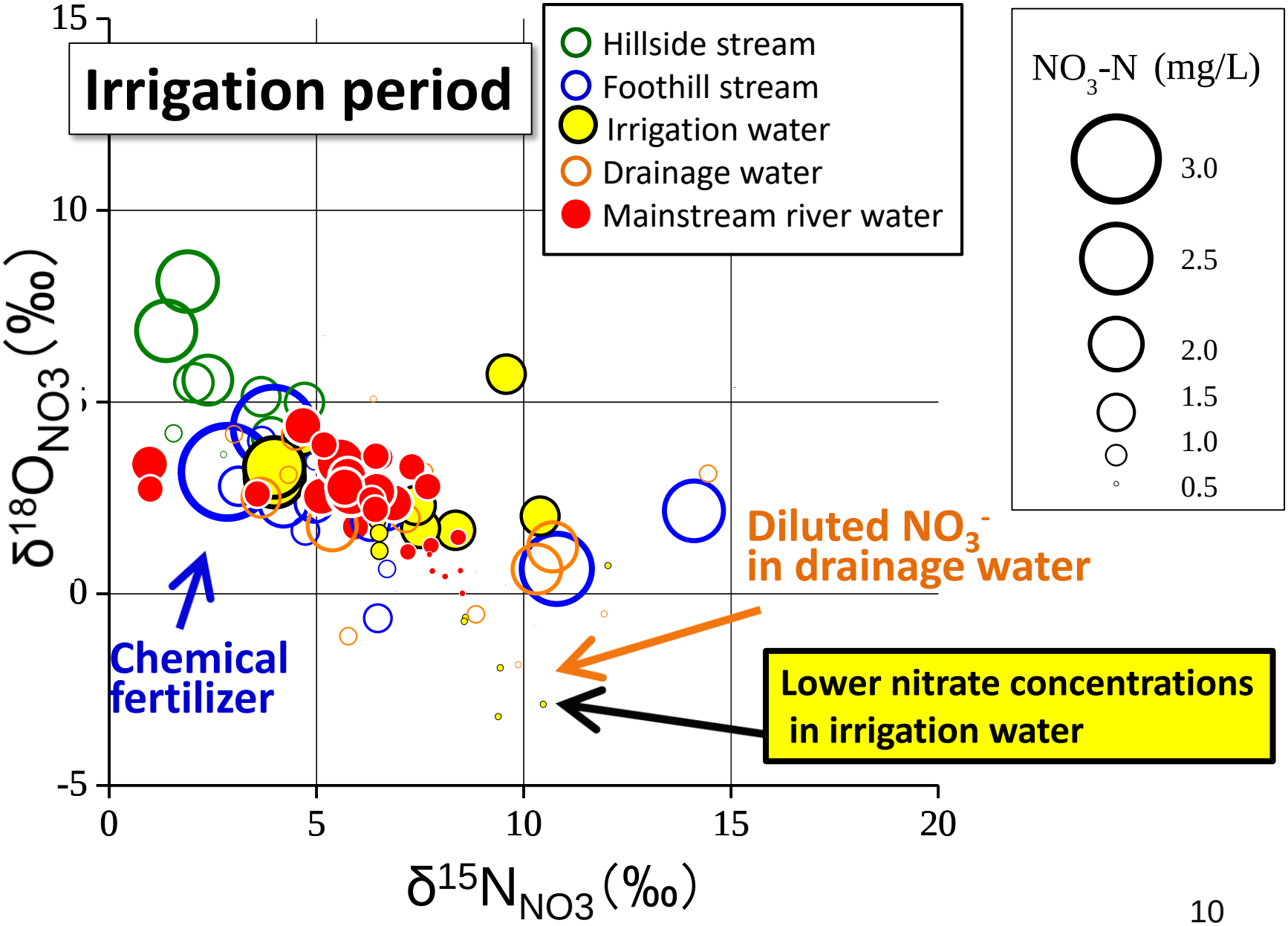
No distinct evidence of denitrification



Identifying sources of river water nitrate



Identifying sources of river water nitrate



Conclusion

Nitrogen (N) and oxygen (O) isotopes of nitrate ($\delta^{15}N_{NO3}$ and $\delta^{18}O_{NO3}$) in river water can be used as a powerful tool to identify sources in a rice paddy watershed

=>The major sources of NO_3^- were;
household wastewater and chemical fertilizer

=>The drainage water had a significant effect on NO_3^- dilution of the river water during irrigation period

Thank you for your attention

Lake Kasumigaura

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See you Ibaraki in 2018 !!

http://d3e8ogs60q6bjk.cloudfront.net/image/production/acp/3000007727/pln3000019555/8a44eb4e-1d0e-47a9-b5eb-909a71f9b178.jpg
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http://www.tsukubapress.com/imgtsclab/niaes.jpg