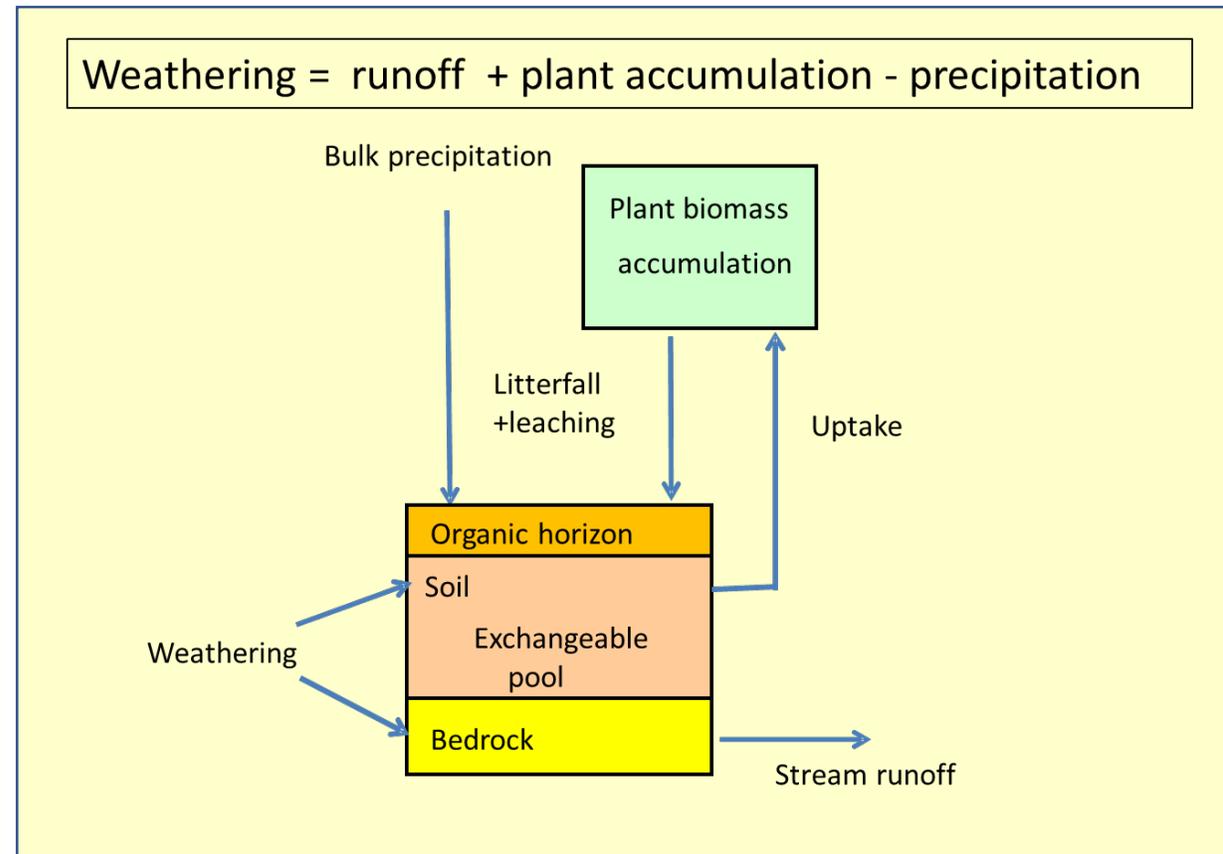


# Nutrient sources in four forest watersheds in Japan: the contribution of precipitation, weathering and litter fall

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## Introduction

Base cation such as calcium and potassium is important nutrient for tree growth in forest ecosystems. Major sources of basic cation to forest soil are precipitation, weathering of parent material and litter fall. Weathering rate of basic cation is estimated from the input from precipitation, runoff from stream and uptake by vegetation. This study compared three nutrient sources in four forest watersheds in Japan.



## Study sites

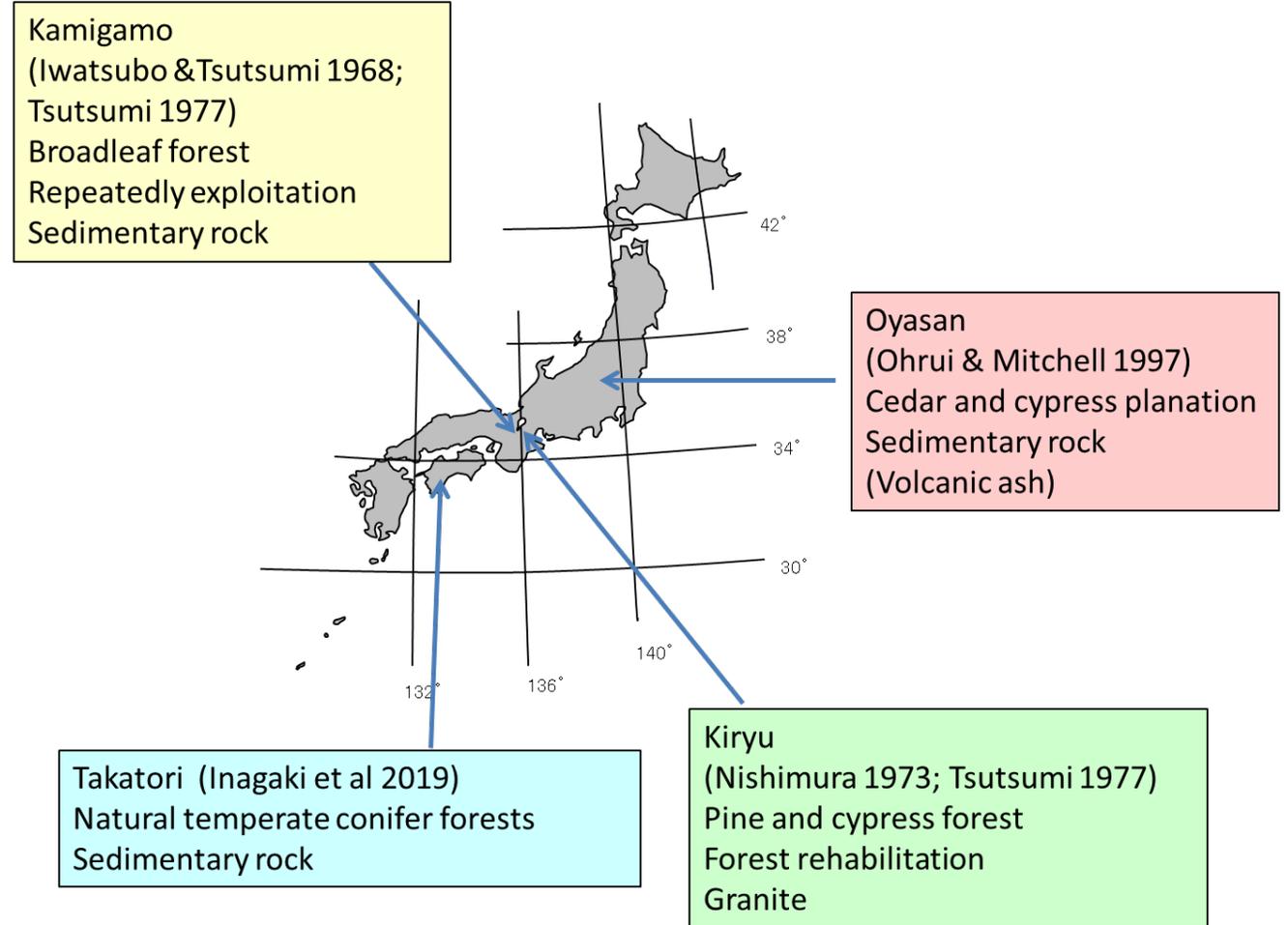
Four forest ecosystems are selected from diverse climate and geological conditions.

Takatori is a warm-temperate natural coniferous forest (*Abies firma*) on **nutrient-rich sedimentary rocks** receiving **high precipitation** (>2500mm).

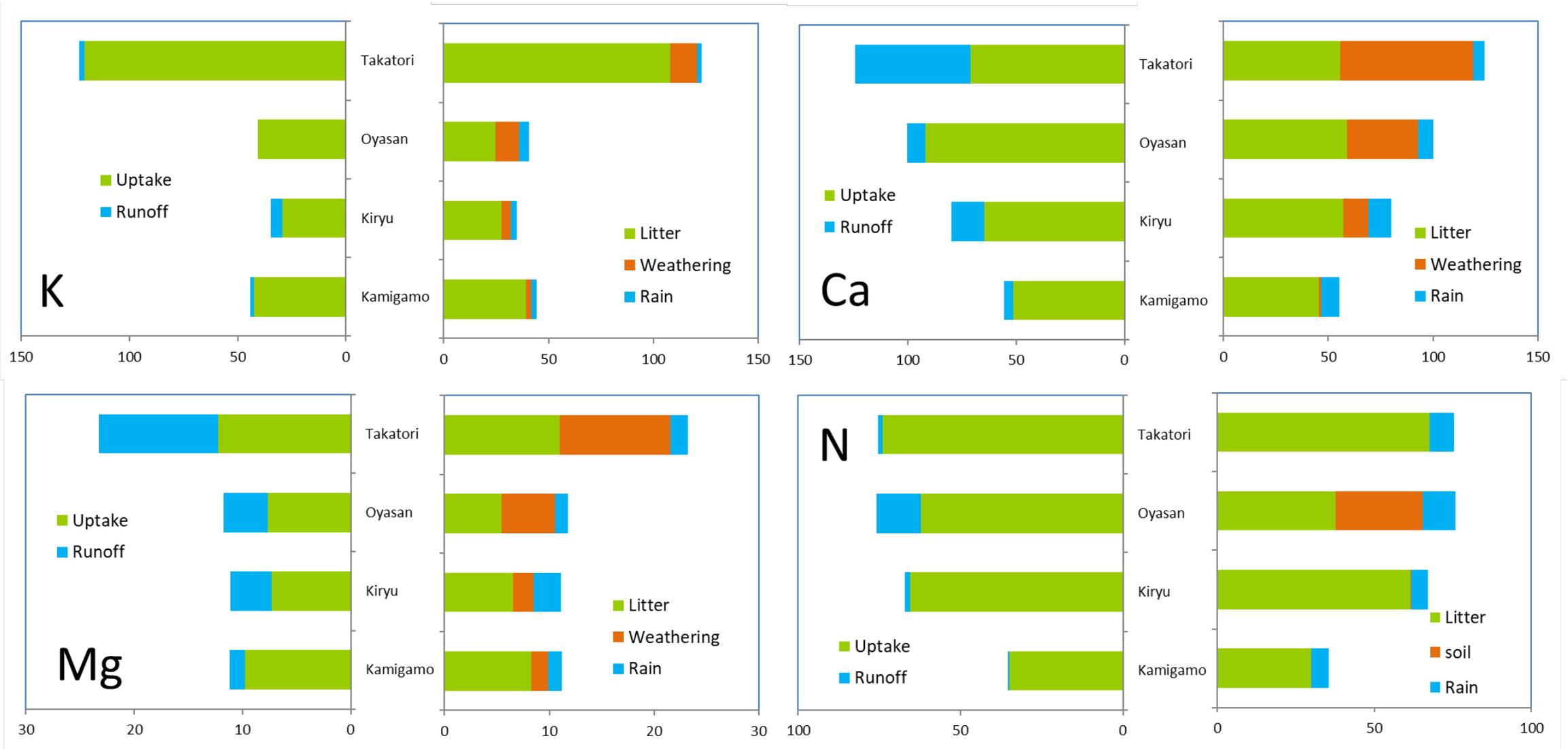
Oyasan is a coniferous plantation on **volcanic ash** receiving **high N deposition**

Kiryu is a **rehabilitation forest** from degraded land on **granite rocks**

Kamikamo is a secondary forest on **nutrient-poor sedimentary rocks** near city areas of Kyoto (former capital of Japan)



(kg ha<sup>-1</sup> yr<sup>-1</sup>)



Sources and sinks of nitrogen and base cation in four forest ecosystems in Japan

## Results

The rate of rock weathering of base cation increased in the order of Kamigamo < Kiryu < Oyasan < Takatori. In potassium cycling, the contribution of litter fall was greater than that of weathering or precipitation. The runoff of calcium and magnesium from soil was greater in Takatori, where the rate of weathering was high. Although the rate of weathering varied substantially among forest watersheds, the annual flux of litter fall was relatively constant.

For nitrogen cycling, the source from soil was treated as that from nitrogen accumulated during the past pedogenesis. Nitrogen input from the accumulated soil source was 36 % in Oyasan whereas that in other three watersheds was 0%. Oyasan was considered as a nitrogen-saturated forest and the result of the study suggest the ecosystem relies on different nitrogen source.

## Summary

Weathering of base cation varies greatly.

Internal cycling of base cation is relatively constant.

N is tightly cycled except Oyasan (N saturated)



Takatori watershed



Waterflow measurement