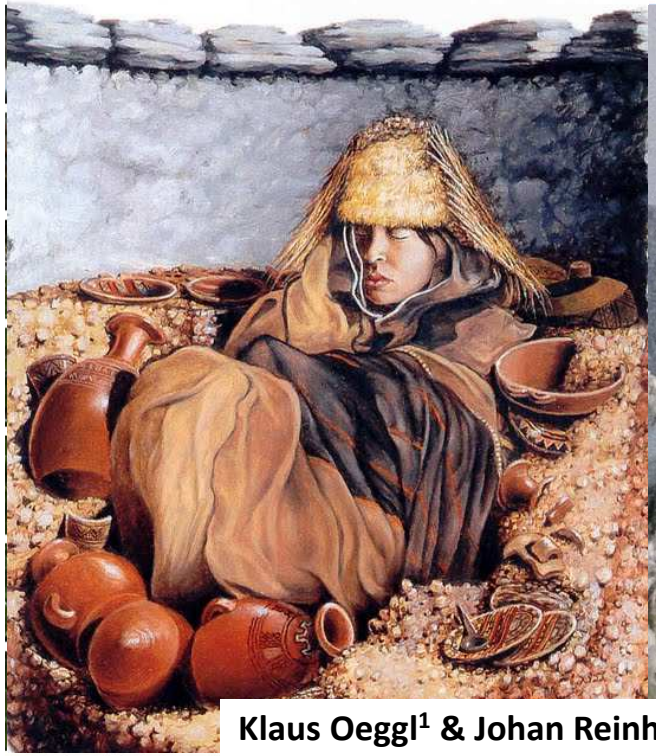
University of Innsbruck - Faculty of Biology

Institute of Botany

The Plant Remains of the „Ice-Maiden“, the Inca Mummy from Mt. Ampato, Peru



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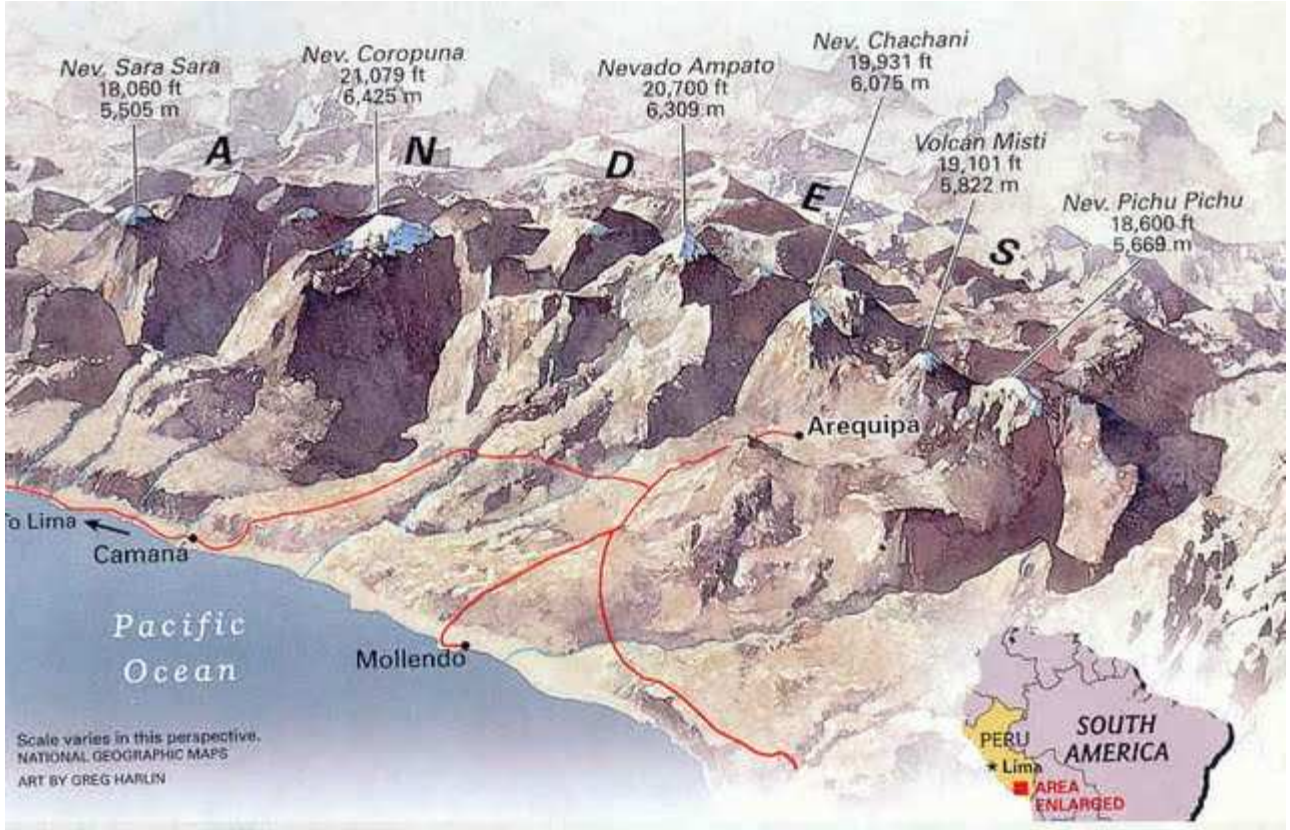
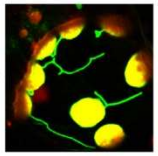
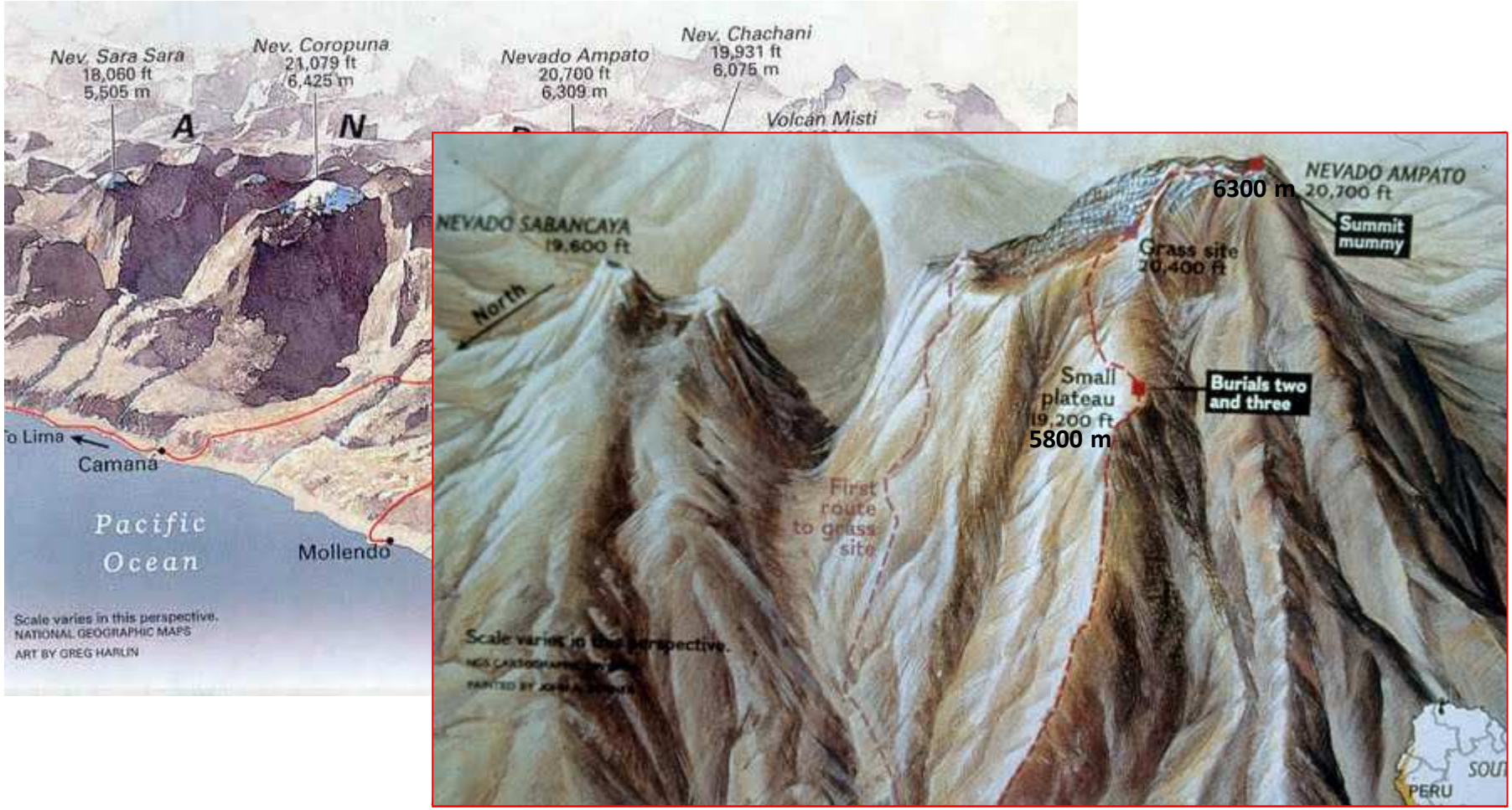
Introduction





Introduction



Introduction

Ampato Mummy – capacocha complex involving children immolation
a girl, age 12 – 15 yrs, interred between 1450 – 1470 AD, together with female figurines, food items and pottery

Objectives:

- plant remains
- rite
- social status

Results - Plant remains

Cereals & Pseudocereals

Corn, Zea mays

cone 7cm

corn: LxBxH = 10,5x7,4x4,3mm

dent form cf. „*Zea mays* ssp. *umbilicata* (Wittmark 1888)“

Quinoa, *Chenopodium quinoa.*

L x B x H = 1,9 x 1,7 x 1 mm

others: *C. pallidicaule* smaller

Results - Plant remains

Tubers

potato, *Solanum* cf. *tuberosum*
L x B x H = 1,9x1,4x1 cm
Solanum x *juzepczukii, Solanum* x *curtilobum (4200m); o*thers, but longitudinally: *S. stenotomum, S. goniocalyx, S. phureja, S. andigenum*

starch grains corroded, excentric hilum; excentric extinction cross

Cassava, *Manihot esculenta*

Starch grains compound (2-3), granules rounded, cup-shaped, ovate to sub-triangular (~15 µ in diameter (5 – 35µ), often with fissures at the central hilum)

Sweet potato, *Ipomoea batatas*

Grains compound (2-6), typically ovate to sub-triangular (~18µ in diameter (5 – 38µ, with a small vacuole at the central hilum), granules coniform - bellshaped

Results – Plant remains

Rhizome

Achira, *Canna* cf. *edulis* rhizome

Canna cf. *edulis* starch obovate

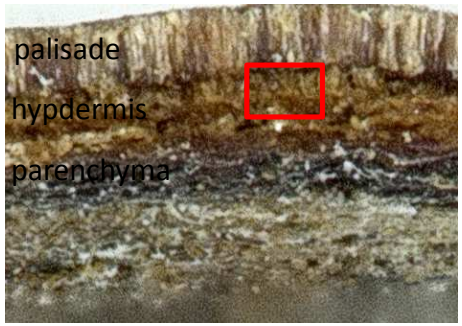
Spices

American pepper, cf. *Schinus molle*, Anacardiaceae: tree, 15 m, drupes 5 – 7 mm, pepper surrogate up to 2500m

Results – Plant remains

Legumes

Lima bean, *Phaseolus lunatus*



Testa: conoid hypodermis cells

Common bean, *Phaseolus vulgaris*

Results – Plant remains

Fruits

Lúcuma, *Pouteria lucuma*: Sapotaceae
tree, subtropical drupe, up to 2700 – 3000m
flavor: maple, sweet potato and toffee
carbohydrate resource for the poor

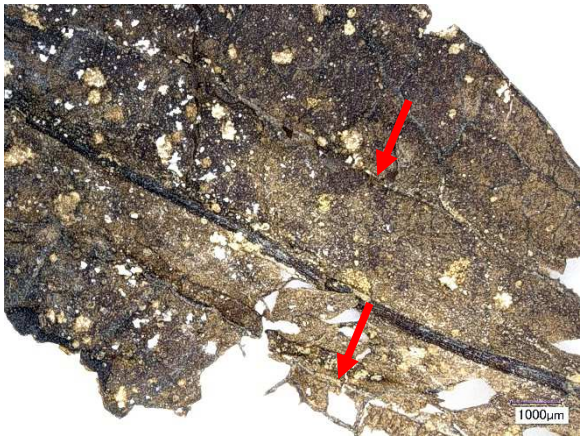
Ice-cream beans, *Inga* sp.,
Fabaceae: tree, tropical – subtropical, up to 17 m, pods up to 2m long, with a returned rim, sweet sarcotesta, Peru up to 1600 m
Others: *I. edulis, I. vera, I. adenophylla,* and *I. densiflora*

Guajava, Psidium pyriferum,
Myrtaceae: tree, tropical – subtropical; up to 2000 m, fruits pear shaped, diameter about 2,5 cm

Results – Plant remains

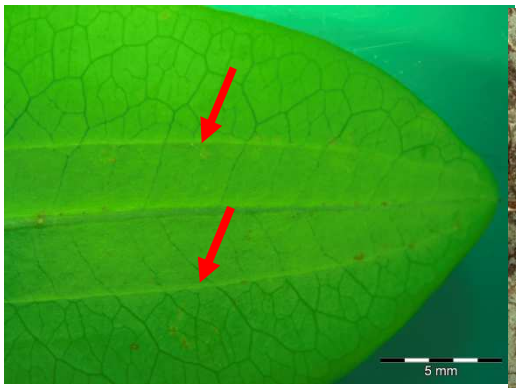
Analeptic

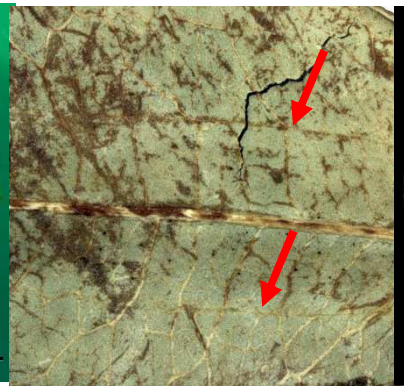
Erythroxylum coca,
Erythroxylacae
shrub, leaves areolate with 2 longitudinal curved lines parallel to the midrib; cultivated up to 2000m

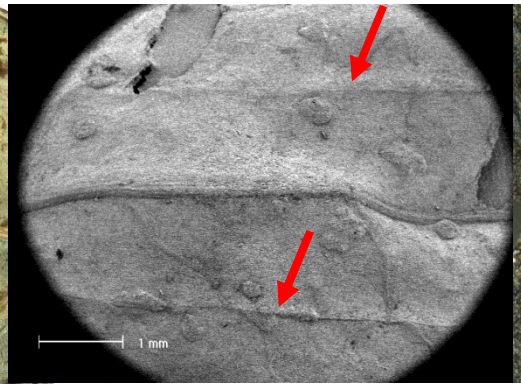


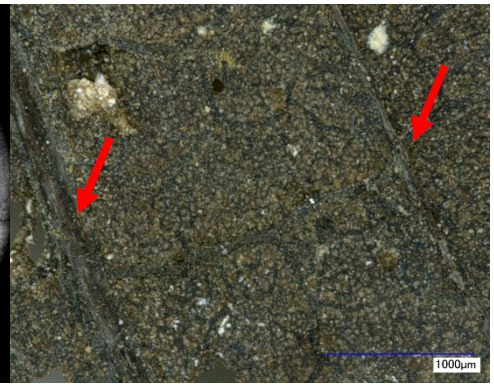
recent

subfossile



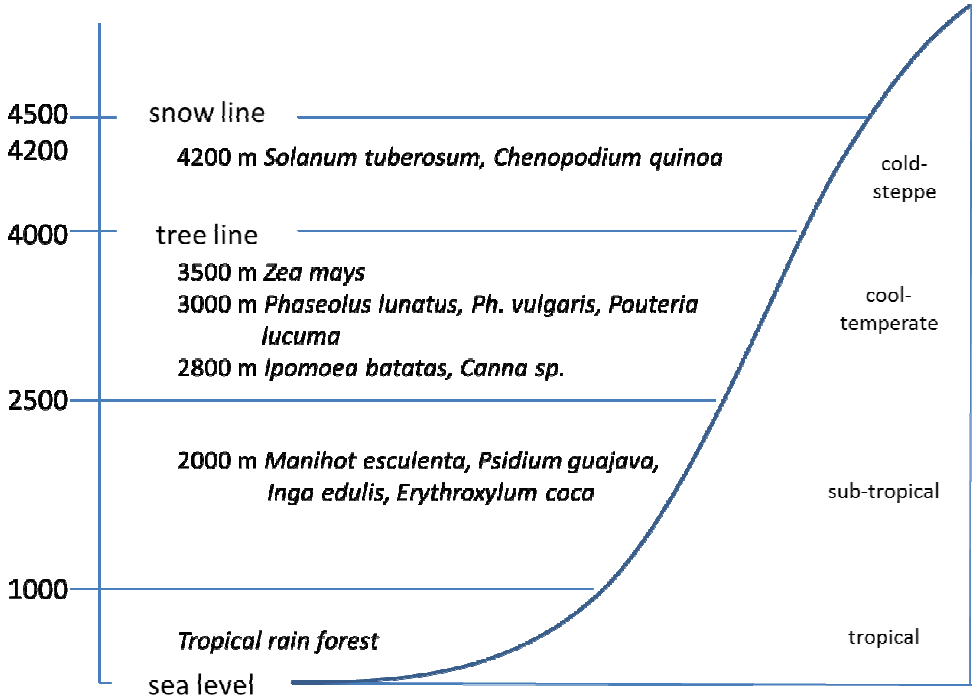






Discussion

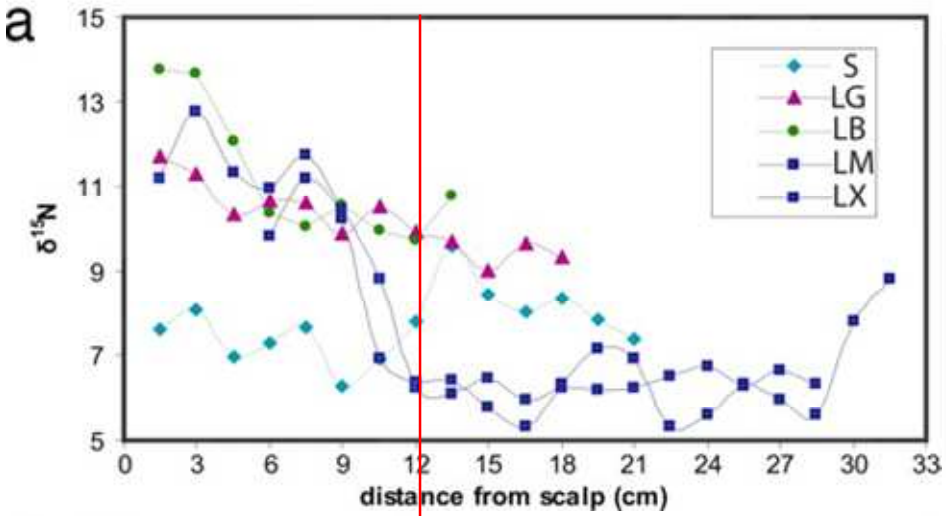
Crops – altitudinal ranges



ALTITUDINAL ZONATION

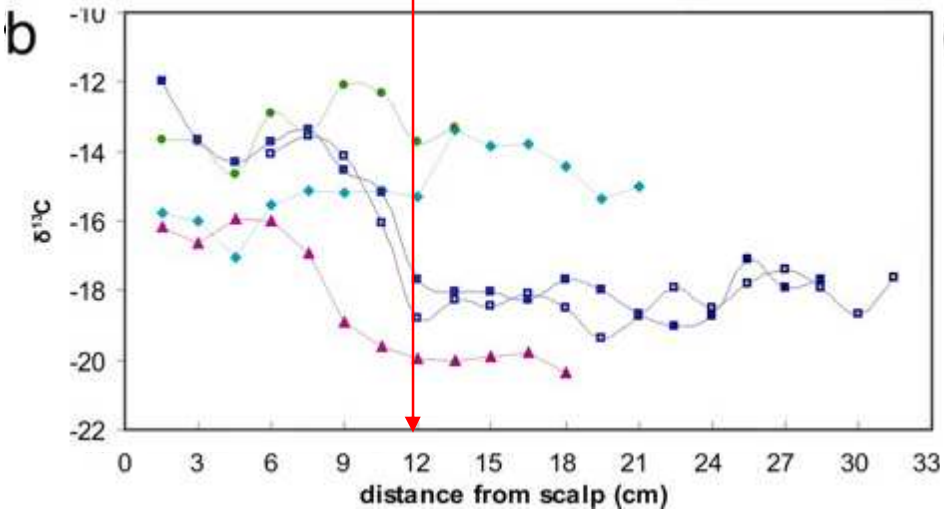
- plants recovered derive from different altitudes
- a representative section of plants cultivated by the Incas
  missing: *Ullucus tuberosus, Oxalis tuberosa, Tropaeolum tuberosum, Lycopersicum* spec., *Cucurbita* spec., *Persea americana*
- all crops/ edible plants - provisions

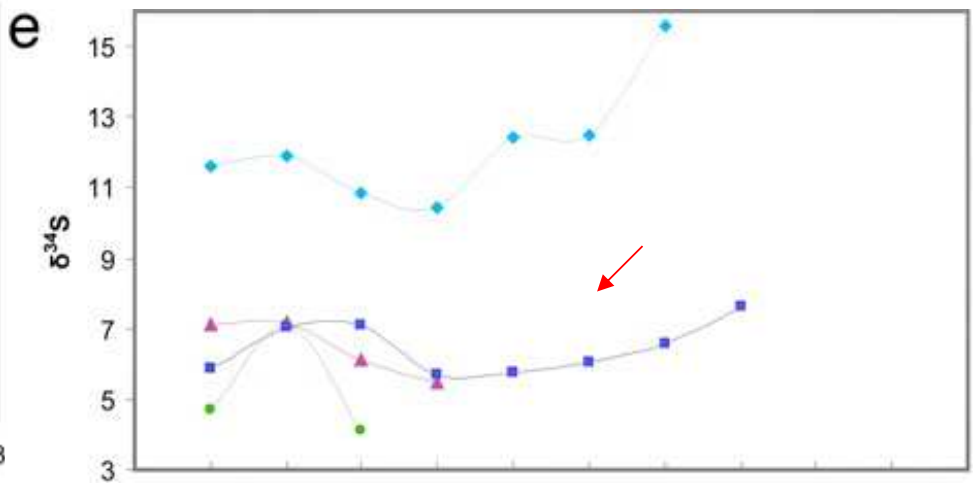
Discussion



Serial isotopic data from scalp hair taken from each child mummy AD 1430 - 1520.

S, Sara Sara Sarita; LG, Llullaillaco Lightning Girl; LB, Llullaillaco Boy; LM, Llullaillaco Maiden; LX, cut hair found with the Llullaillaco Maiden. (a) δ-$^{15}N_{AIR}$. (b) δ-$^{13}C_{V\text{-}PDB}$. δ-^{15}N and δ-^{13}C change in diet about 1 year before the death; diet rich in animal protein and C_4 plants (*Zea mays*) (e) δ-$^{34}S_{V\text{-}CDT}$. no major changes, no evidence for marine diet





Wilson et al. PNAS 2007;104:16456-16461

Conclusions

- plants represent a subset of crops cultivated by the Incas
- Provisions – crops from subtropical to cold-steppe regions
- no picture for highland diet (absence of marine diet according Wilson et al. 2007)
- dietary change – probably a change in social status
- provisions for the nobility

- oblation for fertility

Acknowledgements

Johan Reinhard at Ampato summit site