

Machu Picchu

Lost city of the Incas

Carlo Laj

ECOLE NORMALE SUPÉRIEURE

PARIS, FRANCE

GIFT Workshop 2022

HOMENAJE
A
HIRAM BINGHAM
EN EL
50º ANIVERSARIO
DEL DESCUBRIMIENTO
DE
MACHU-PICCHU
1911 - 24 JULIO - 1961

— 24 DE JULIO 1911

HACIA LAS 10:07 A.M.,

LA COMITIVA PARTIÓ

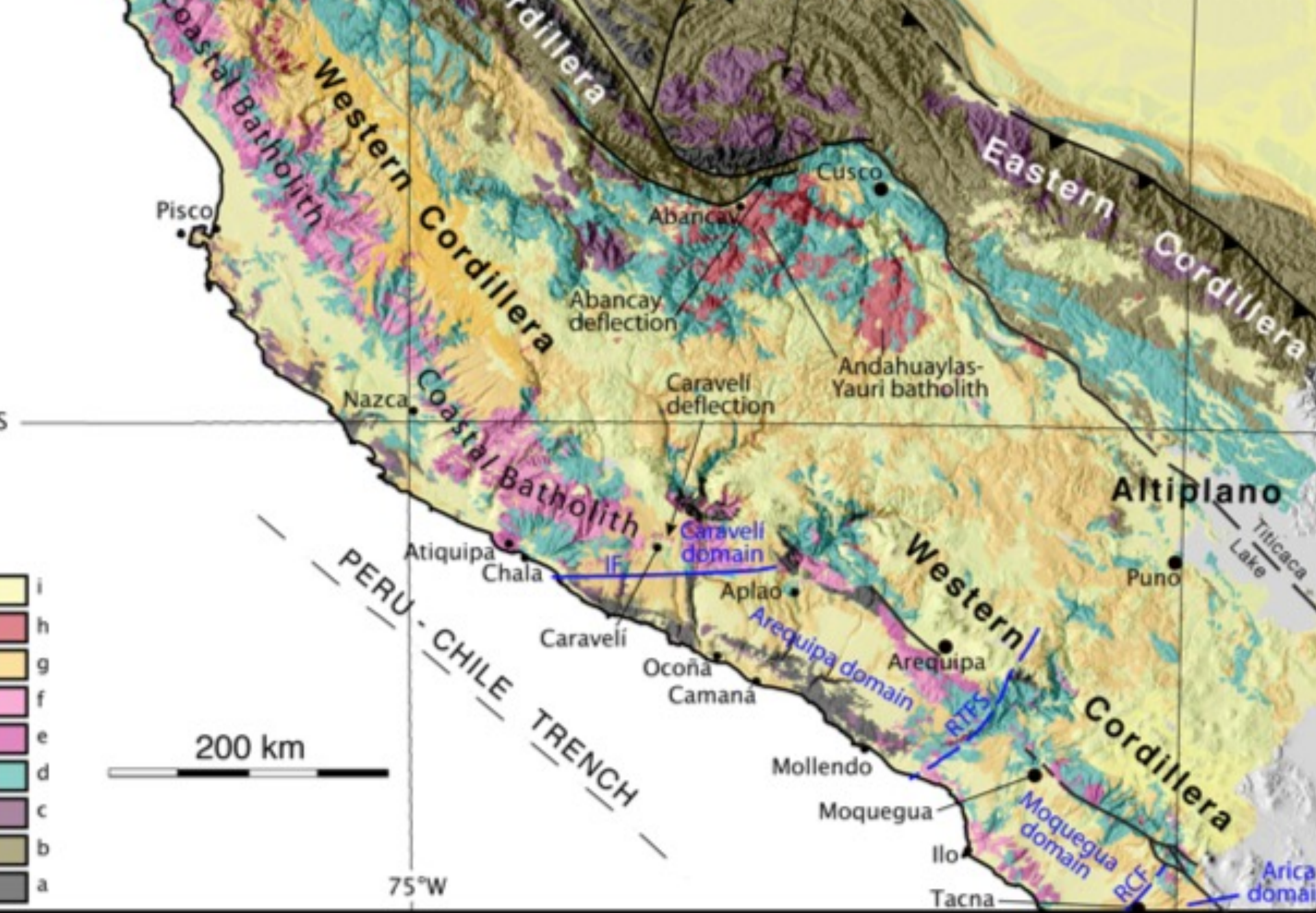
HACIA MACHU PICCHU



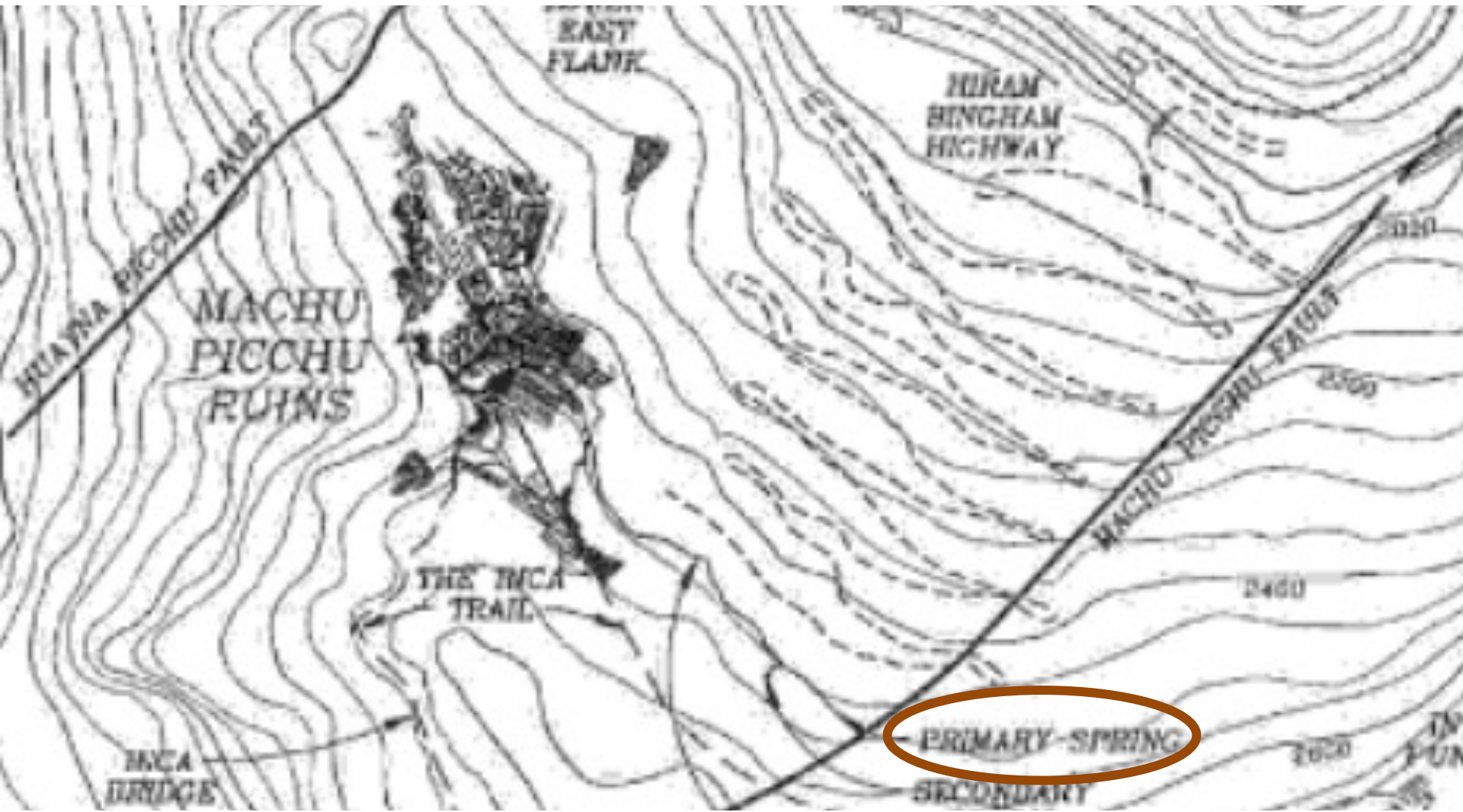
Question: Why did
the Incas build Machu
Picchu in such a
remote and
unaccessible place?

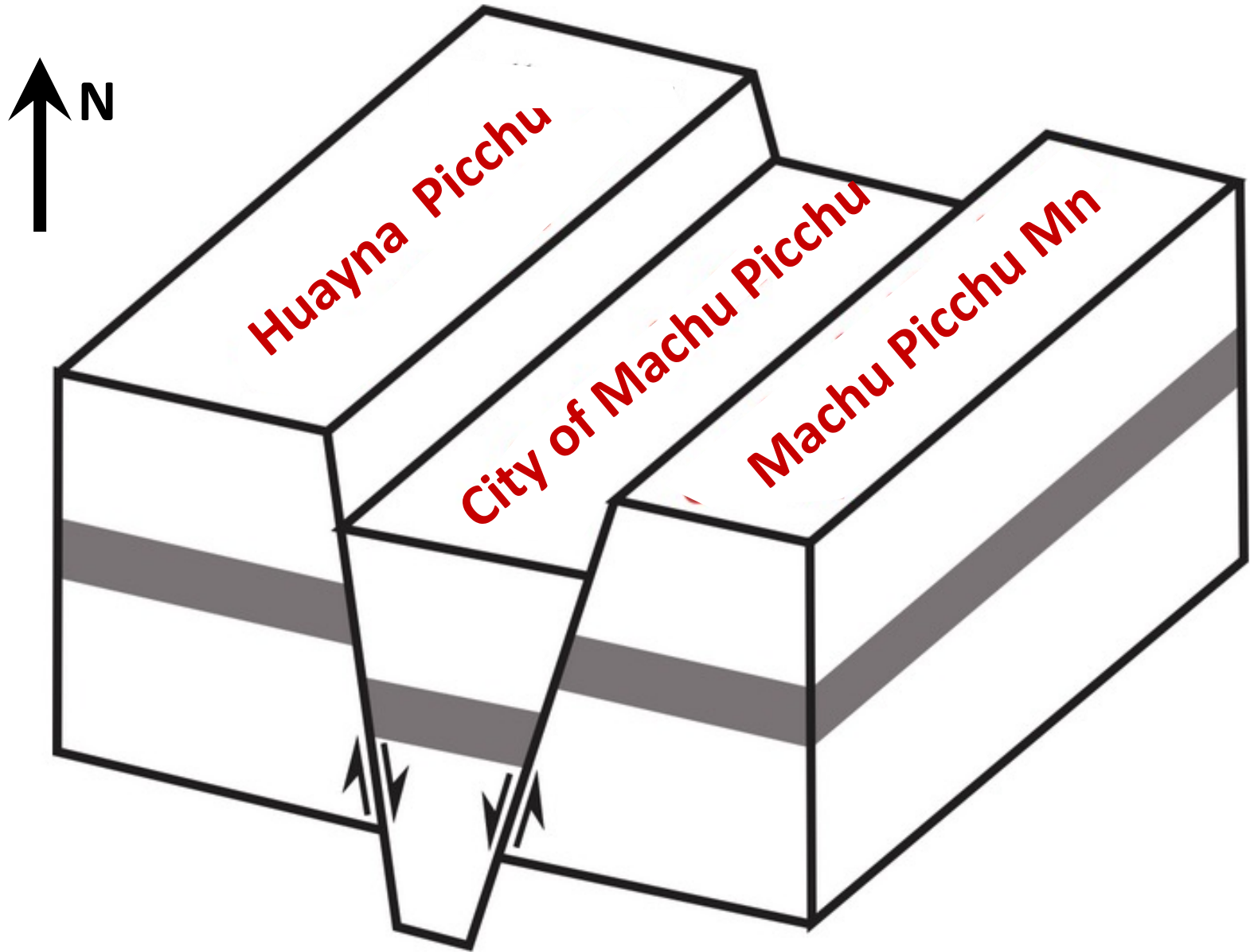
Its isolated location is most probably linked to the religious status of Machu Picchu, whose construction was ordered by the Inca ruler Pachacuti.

But geological reasons were the determining factor for the precise choice of the location...



Roperch et al., 2006 Tectonics





from Reinaldo Escada Chohfi
Remote sensing of the Machu Picchu region , 1987
Fig 11 fractures and faults



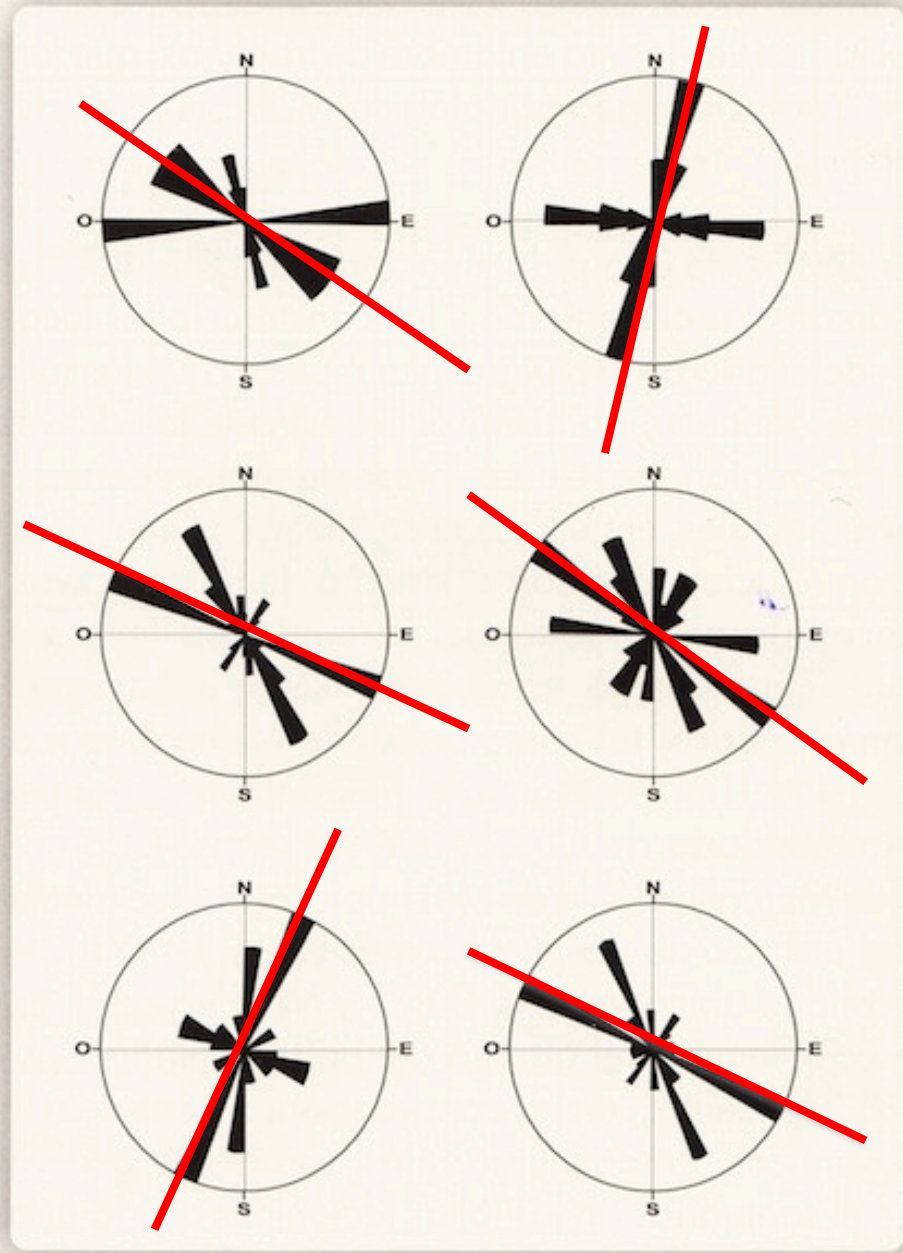


Fig. 9. Diagramas que muestran las direcciones de las diaclasas medidas entre Aguas Calientes y la ciudad inca de Machupicchu (Carlotto et al., 1999).

Rualdo Menegat

**Federal University of Rio Grande do Sul
Bresil**

Very extensive study based on satellite imagery
coupled with field studies (2019)

Intensive network of faults of different orientation
causing intensive fracturation of the granitic
batholite, providing blocks of « manageable »
sizes at the surface in « natural quarries »









Wall at Ollantayambo



The 12 corners rock at Cusco



The 12 corners rock at Cusco





This is how the Incas took advantage of the local structural geology to choose the locality for Machu Picchu!

So, can we think that the Incas had a knowledge of the structural geology of the Machu Picchu area?

Most certainly NOT in the modern meaning of the term yet they were aware of the faults: linguists have identified a word « **quijlo** » in their original language, which means « fracture »

They most probably also knew that faults were most often linked to water seeps, and this is the way most scientists believe that they located fracture zones by following these seeps from down in the valley and up to Machu Picchu location

**And here we get to the second
(hydro)-geological and also
essential reason of the
construction of Machu Picchu at
its precise location:**

WATER!

The spring in the Machu Picchu Mountain was enhanced by a well-engineered collection system

Series of long canals and an impressive sequence of 16 stone-lined fountains

Sufficient for ceremonial and domestic waters cascading through the city

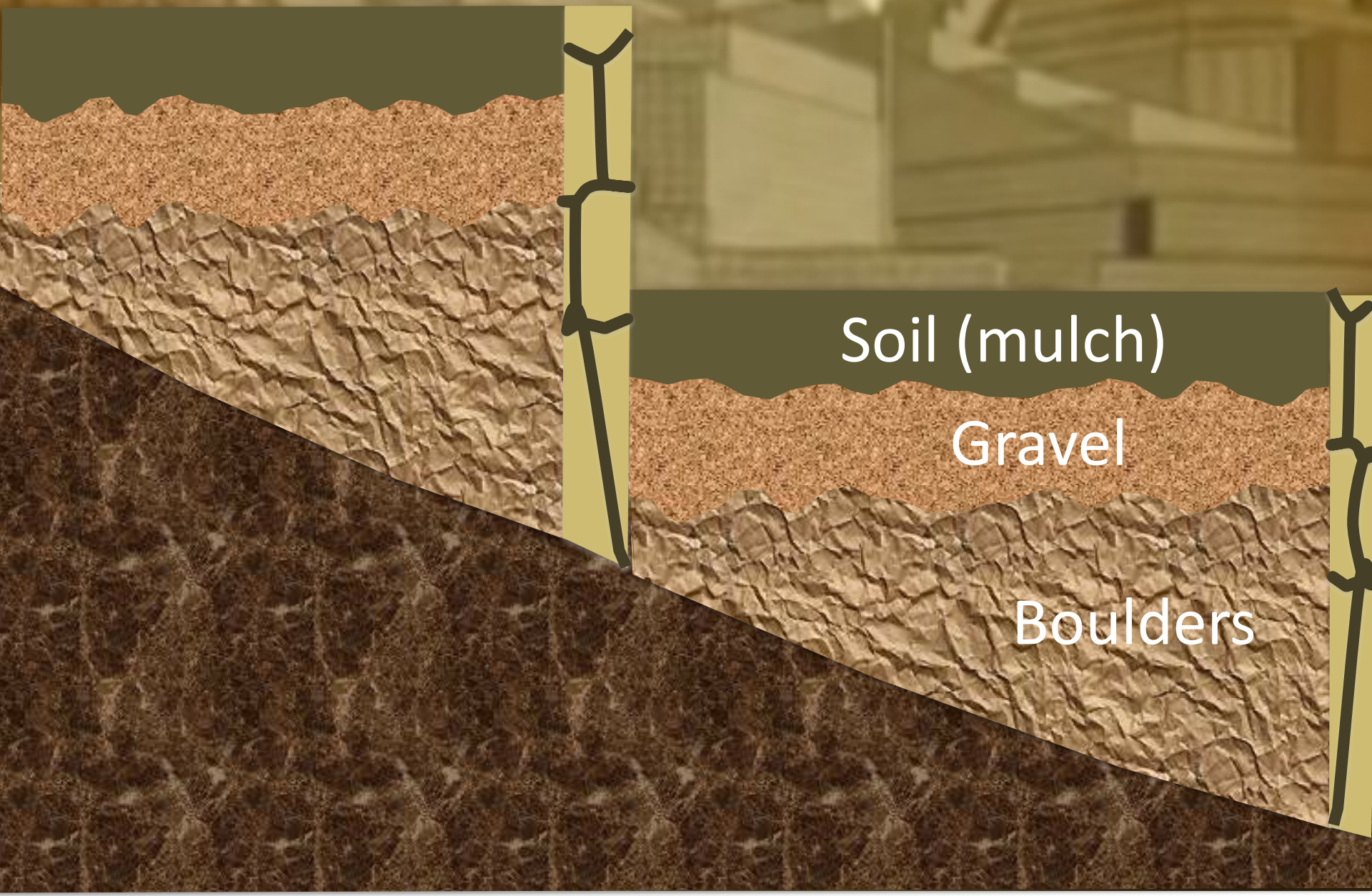


But how to deal with
seasonable precipitations?
(150 to 220 cm /year)

The Incas had to build an
efficient drainage system

2/3 of the city are Underground!

First step: construction of
stabilizing terraces



Soil (mulch)

Gravel

Boulders



The Incas were not only builders of cities

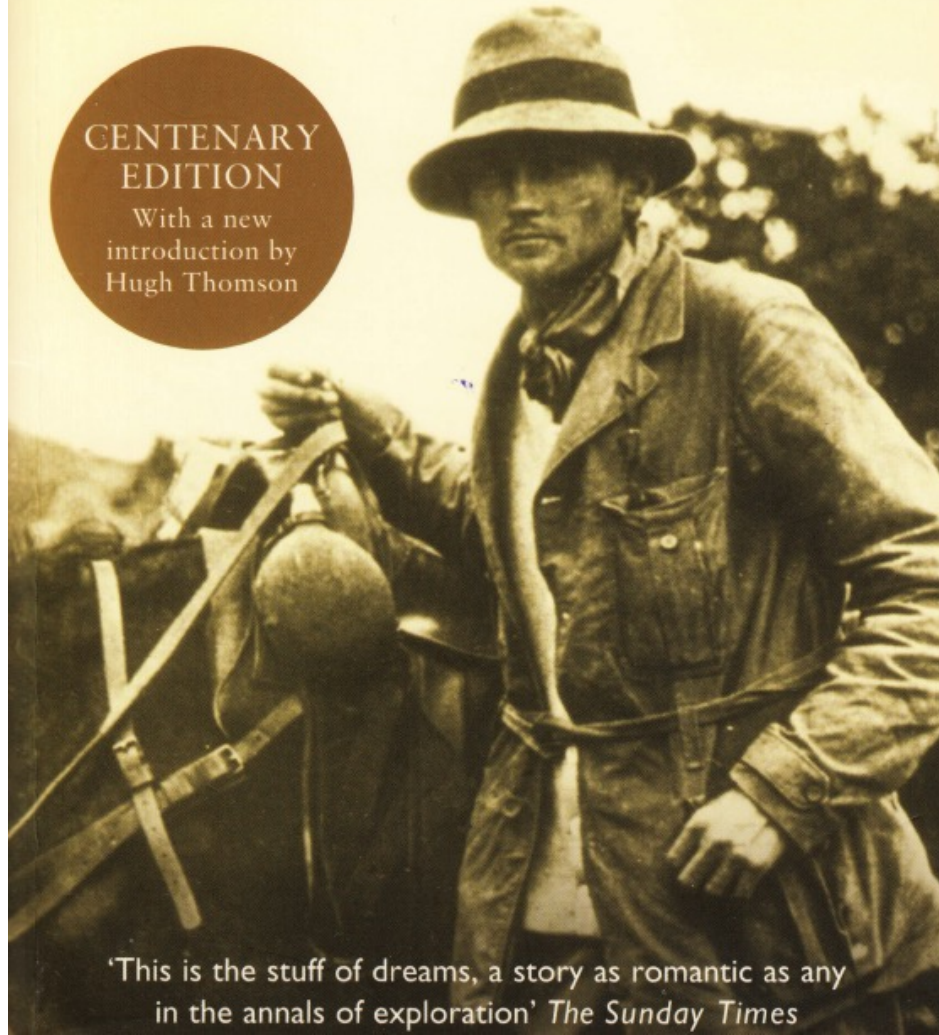
They were also astronomers!

Lost City of the Incas

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EDITION

With a new
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Hugh Thomson



'This is the stuff of dreams, a story as romantic as any
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