

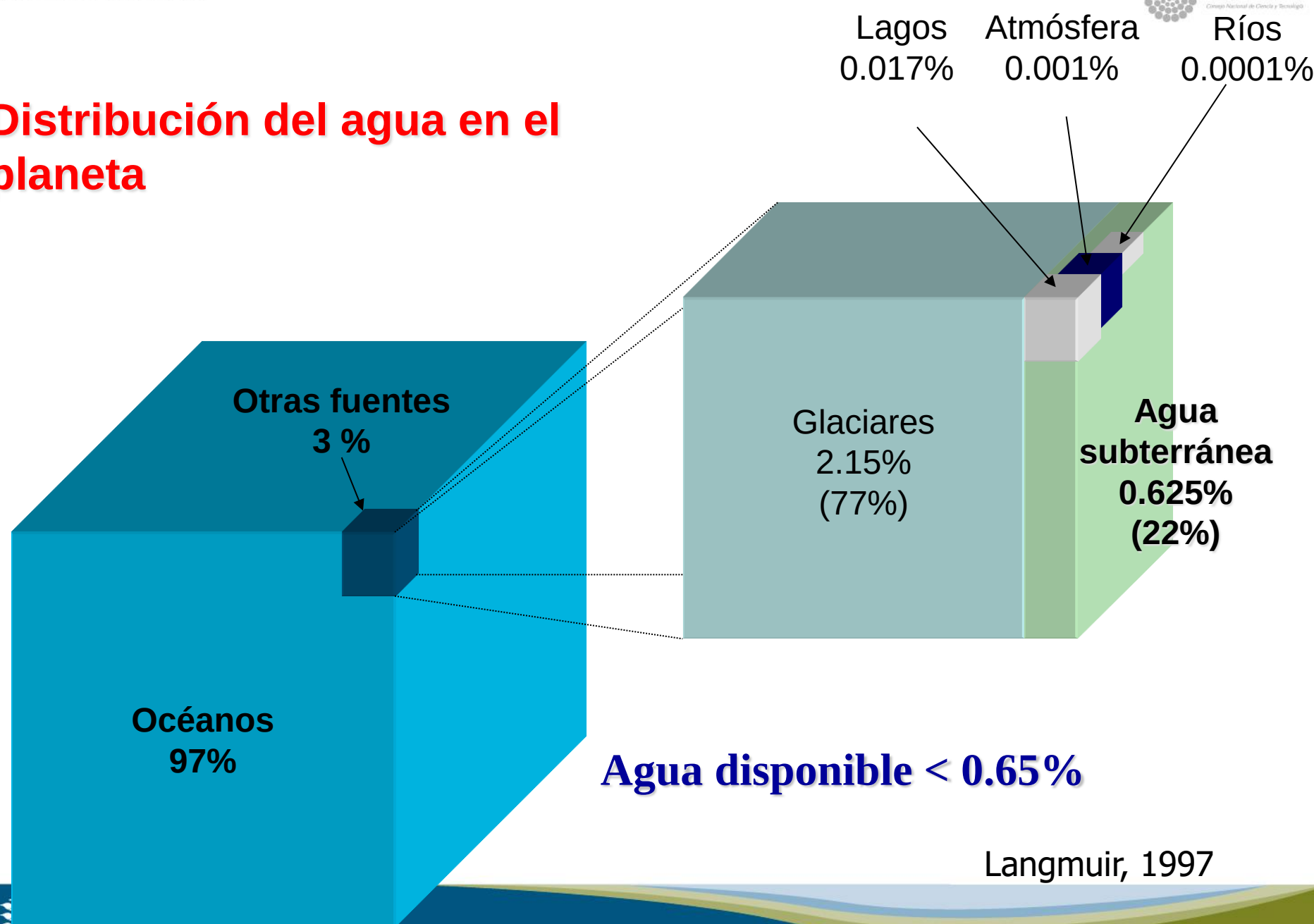
Vulnerabilidad de acuíferos kársticos

Mario Rebolledo Vieyra
Unidad de Ciencias del Agua

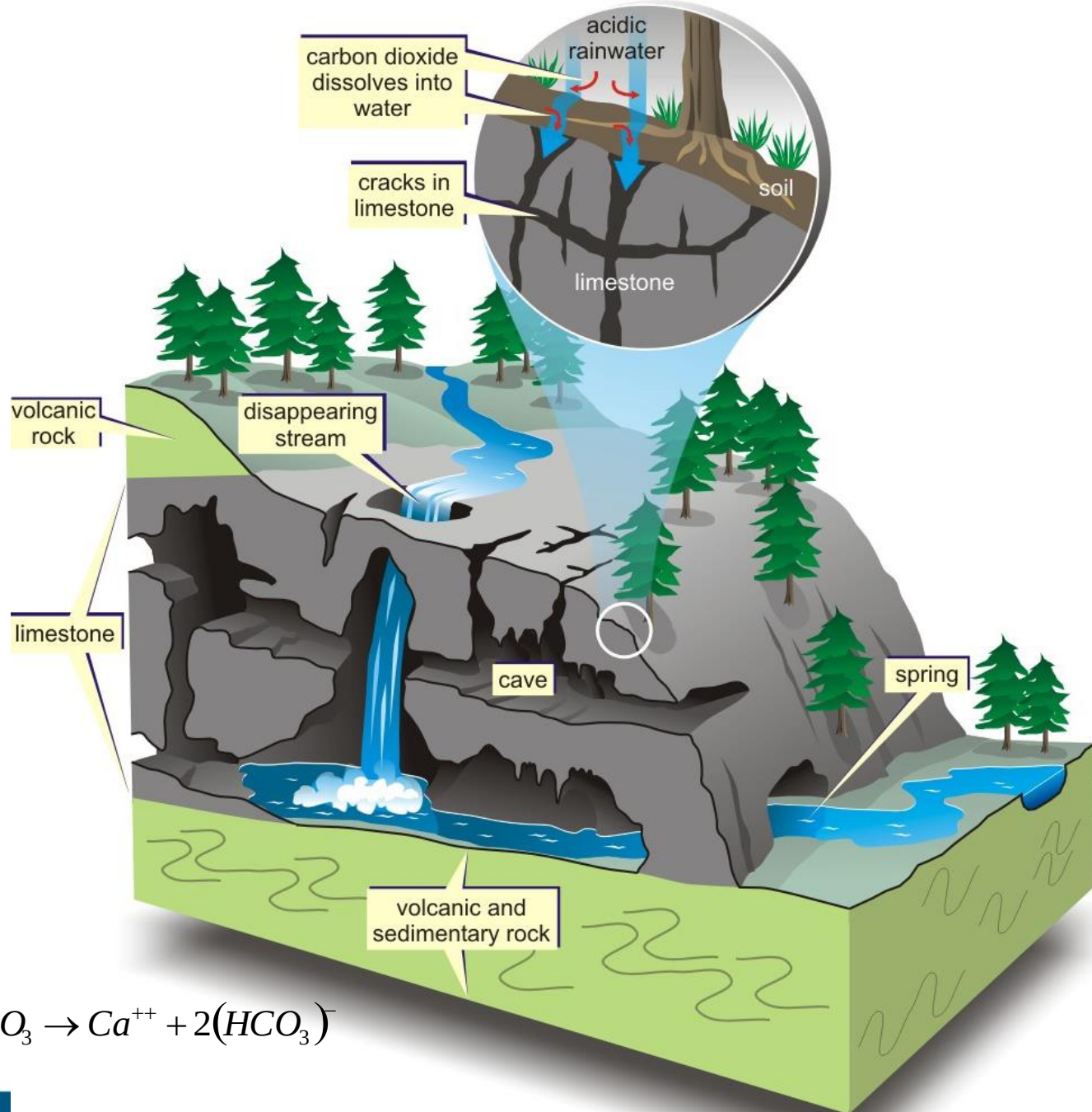
GIFT Workshop, Mérida, 2016
AMC-UGM-EGU-SEGEY

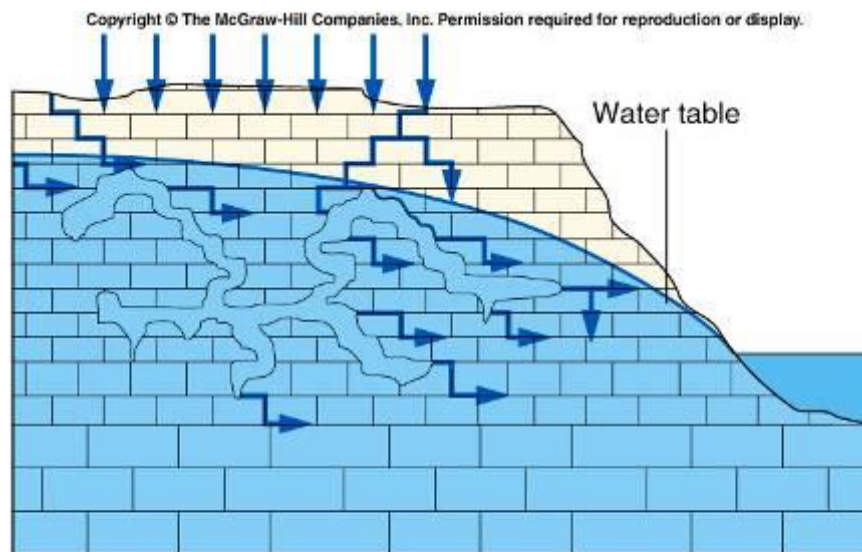


Distribución del agua en el planeta



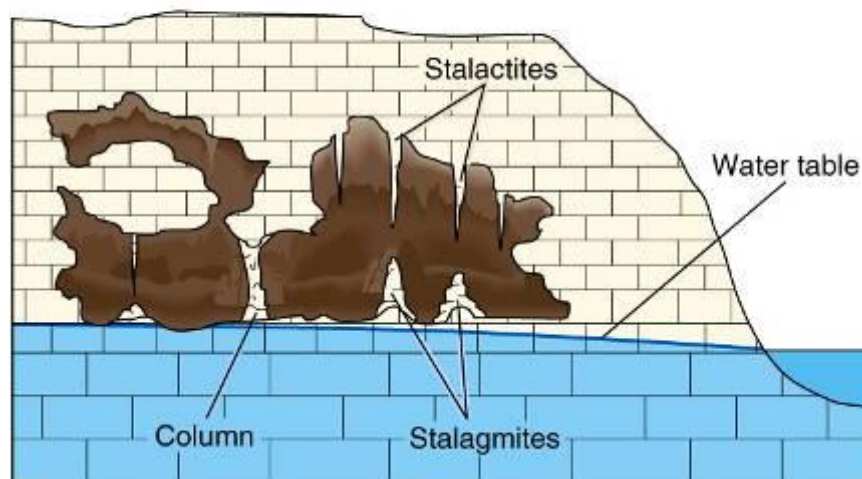
Langmuir, 1997





A

Plummer et al., 2005

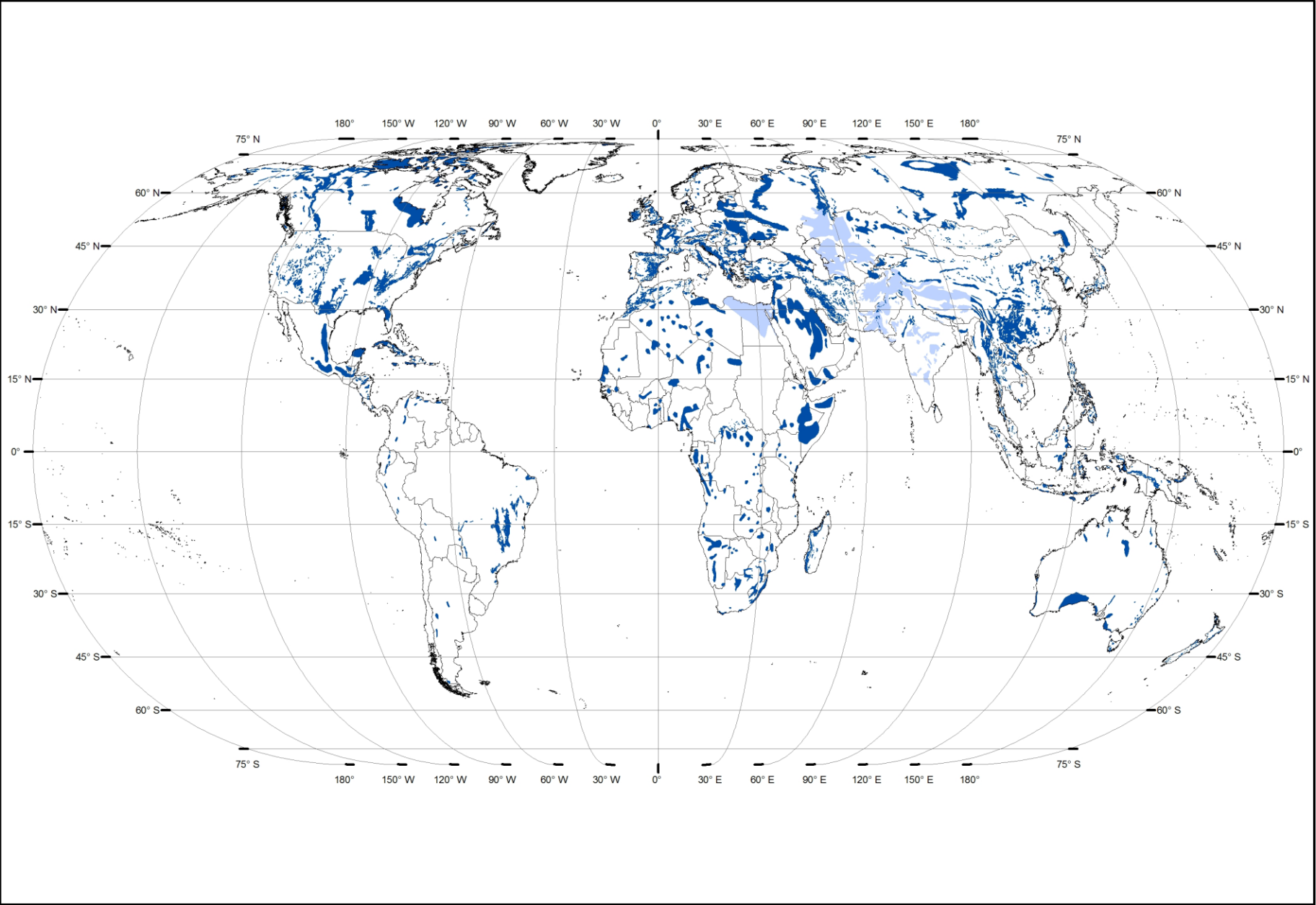


B





©2001, Encyclopædia Britannica, Inc.



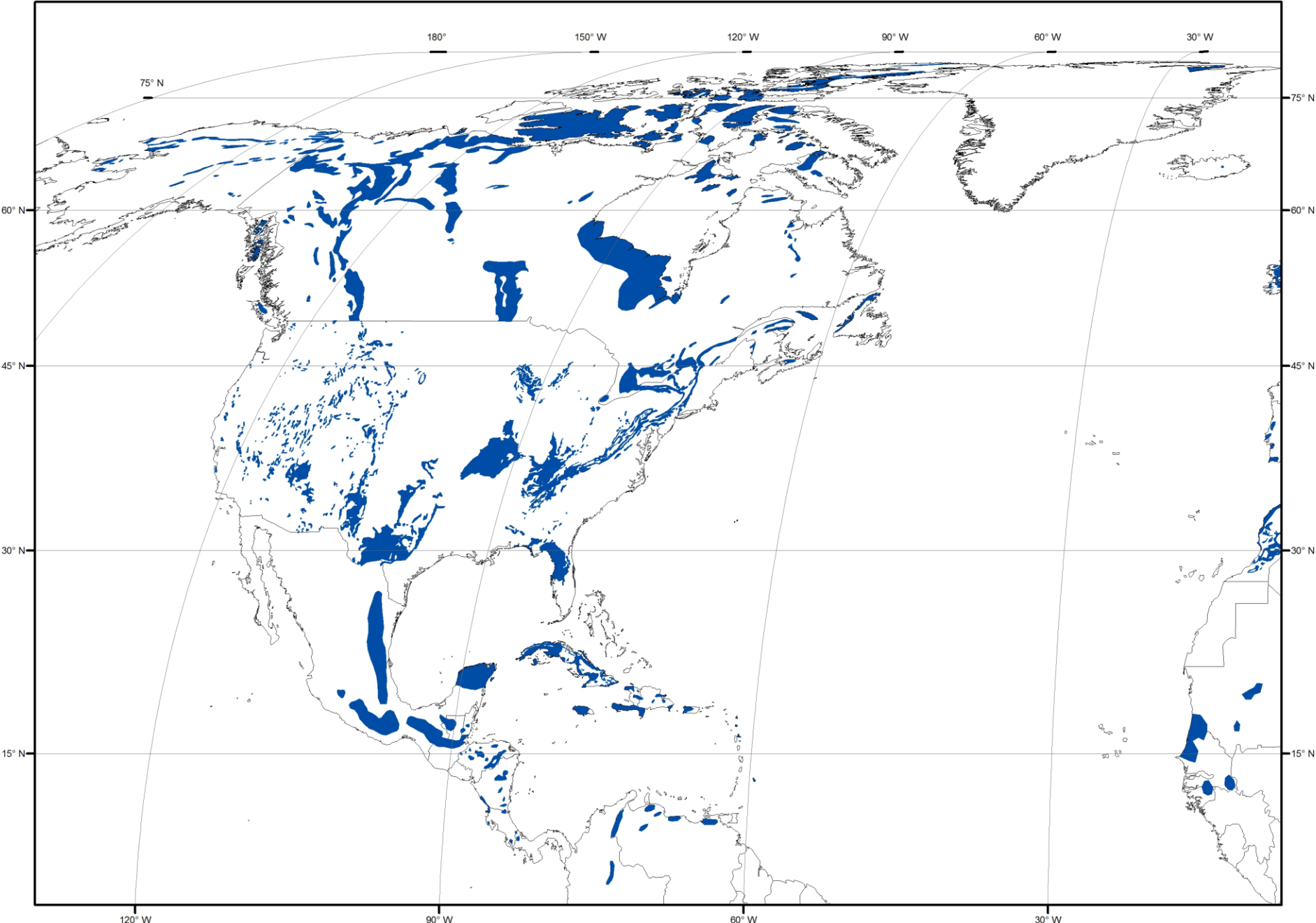
Madagascar



Karst in China



Zonas kársticas en Norteamérica

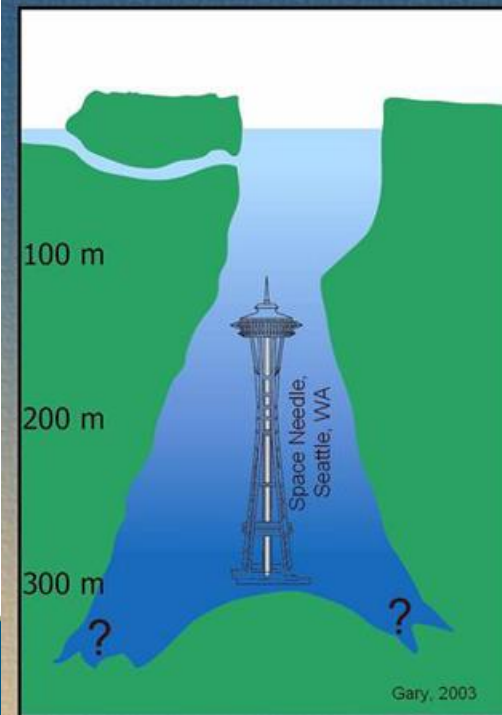


**Selva Ocote, oeste de Tuxtla
Gutierrez, Chiapas. Foto: Peter
Sprouse, 2001.**

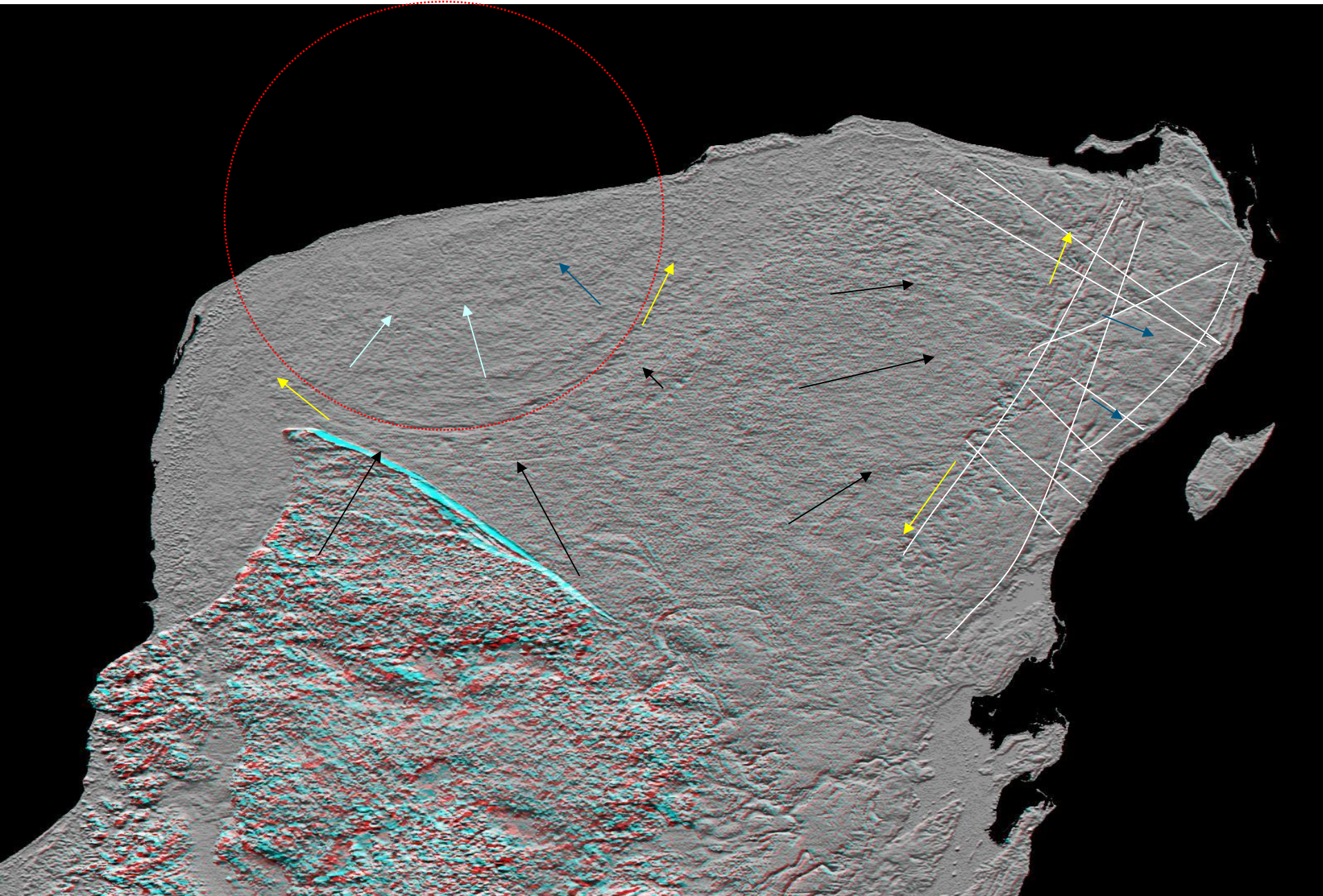


Cenote El Zacatón, Tamps.

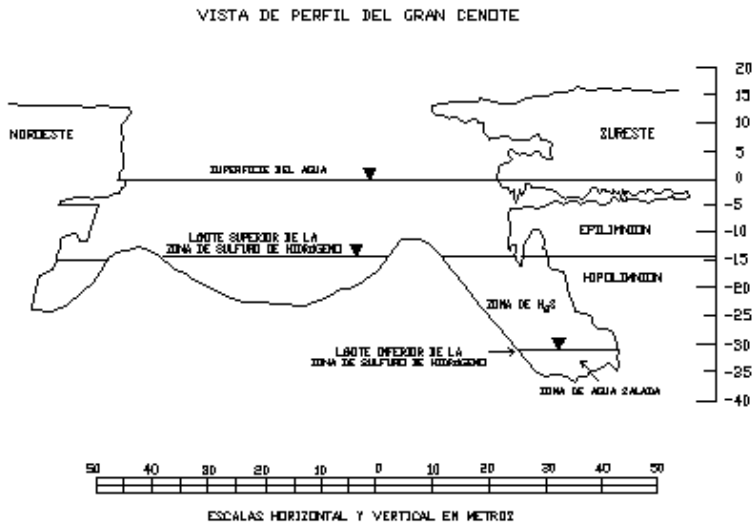
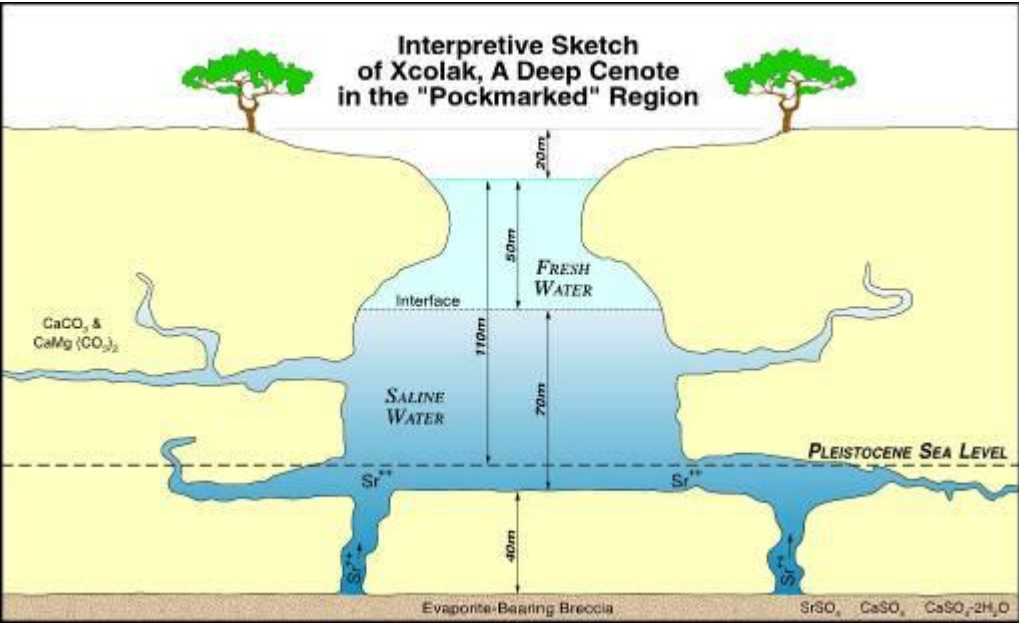
Karst

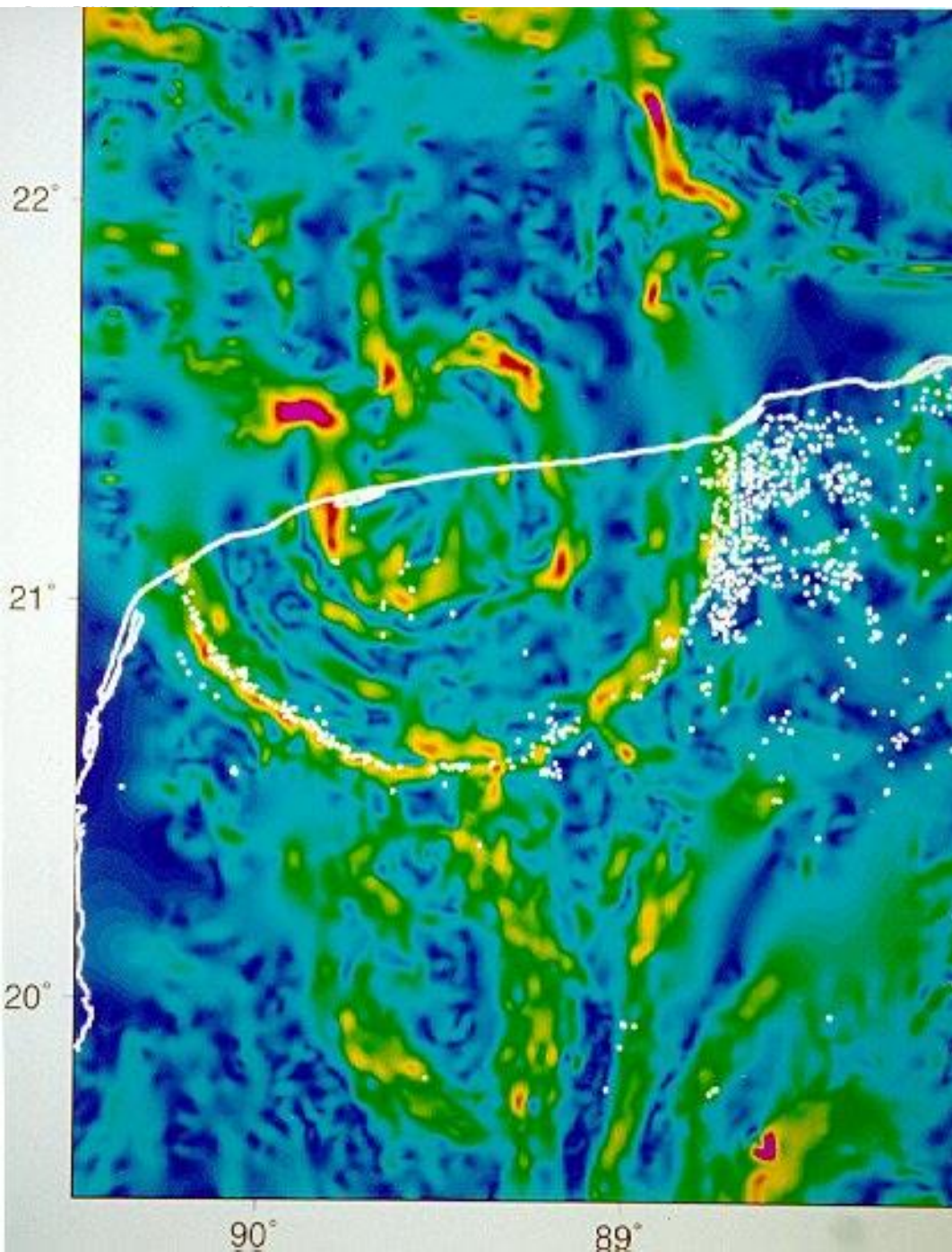


Hypothesized Profile
based on limited spatial data
(wire drop sounding)



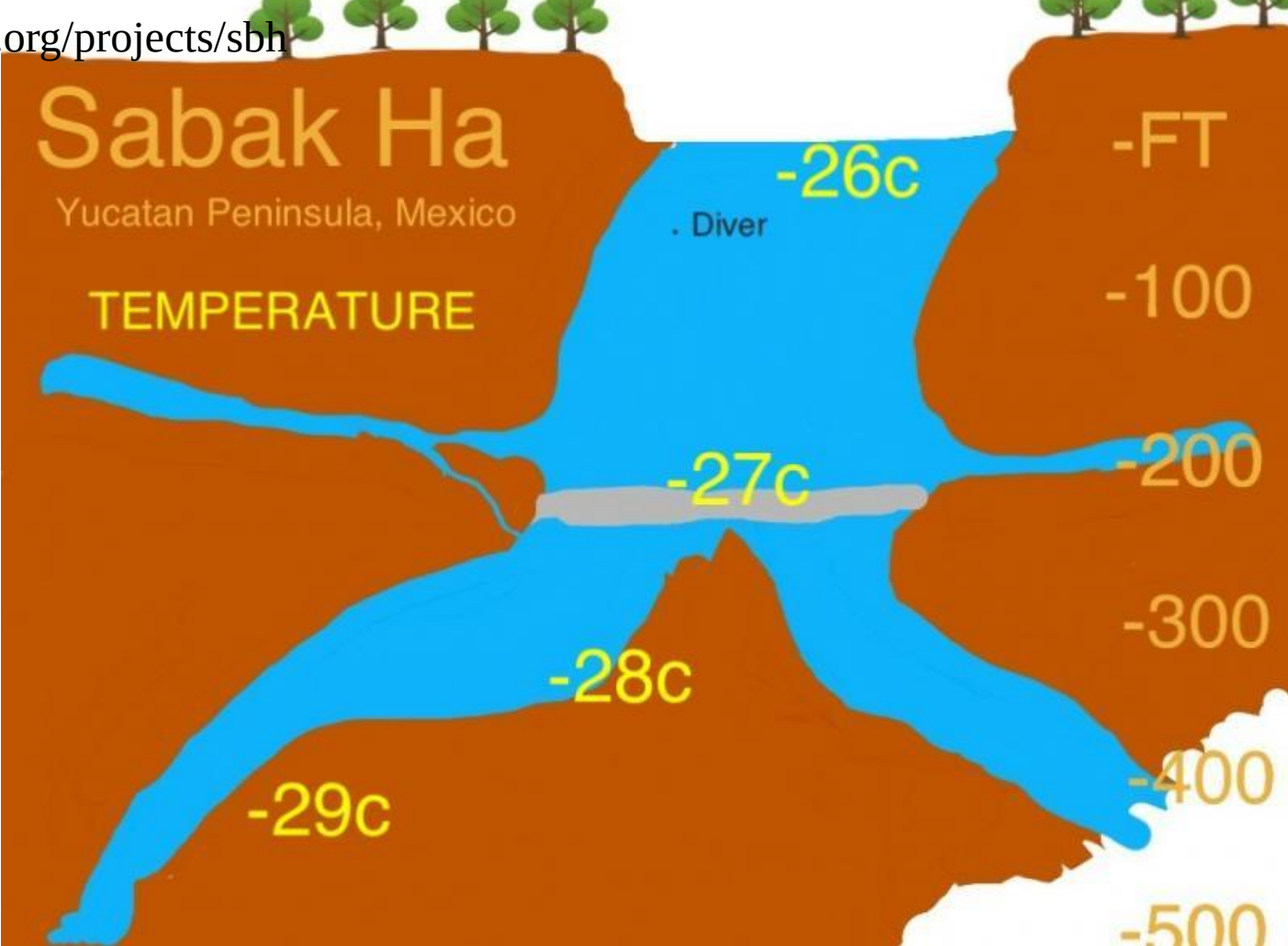
Cenotes





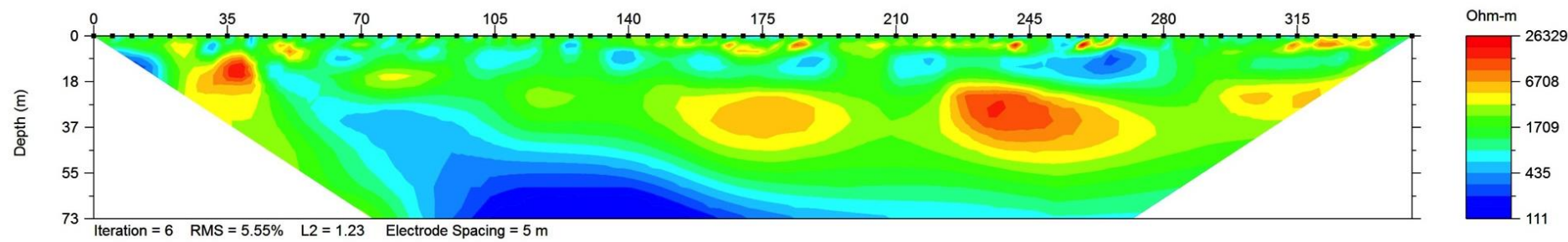
Anillo de cenotes ~270 km

Hildebrand et al. (1991)

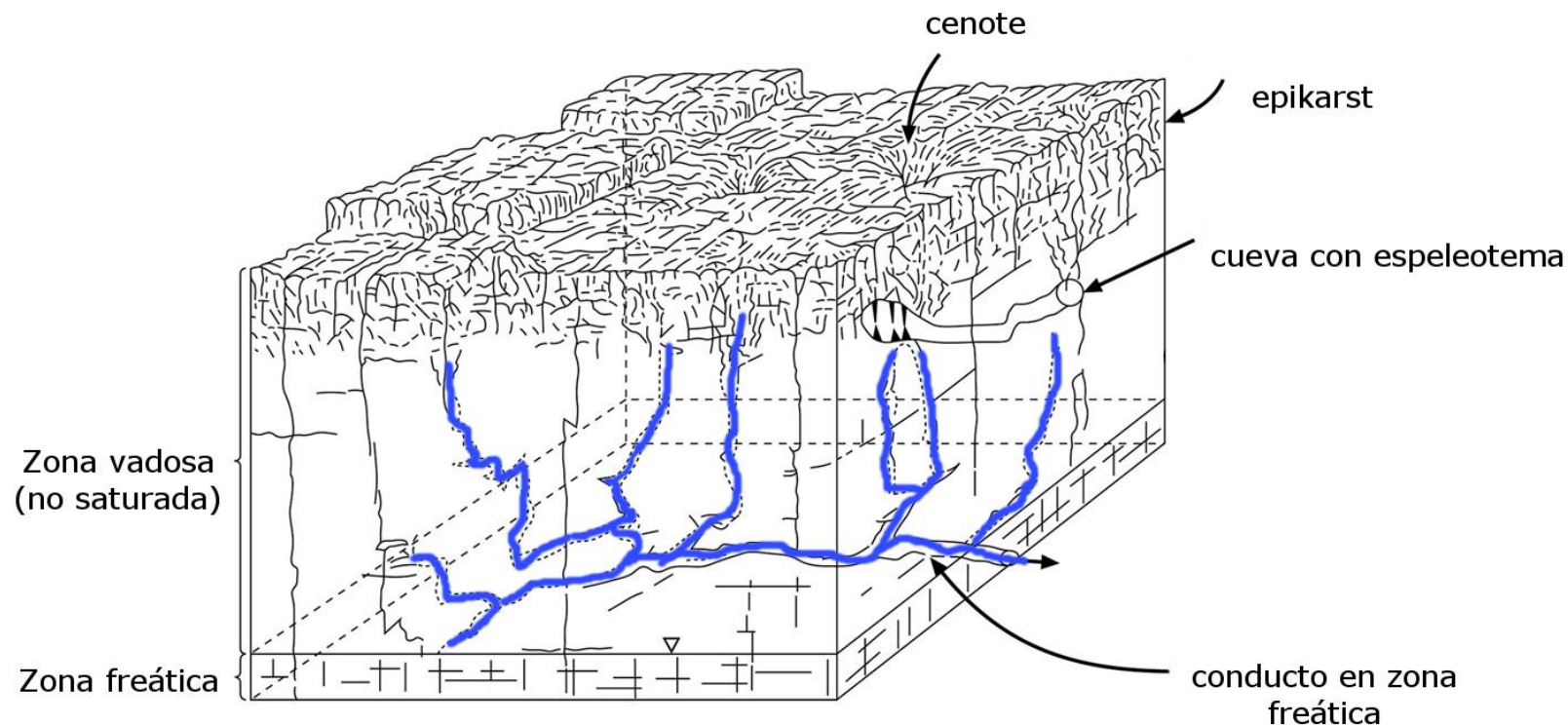


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Cenote Profundo



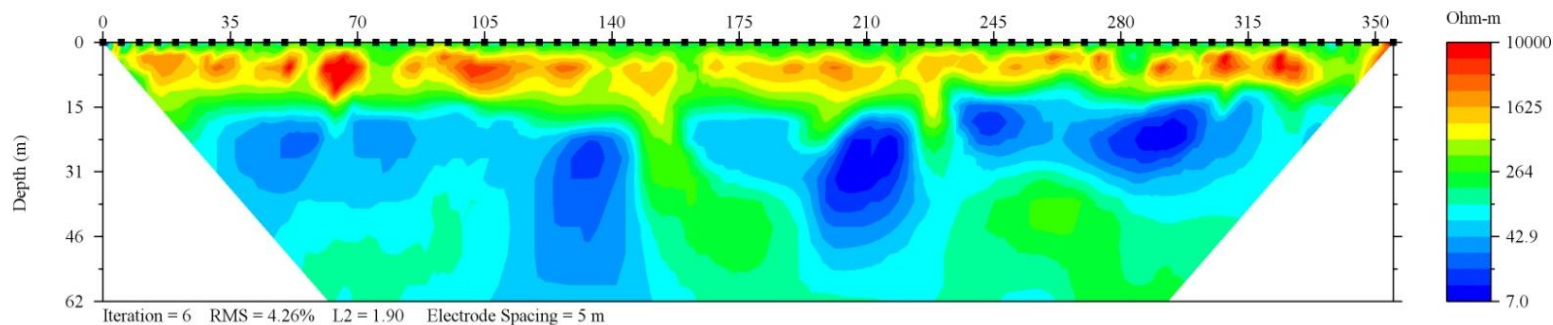
Estructura de un acuífero kárstico



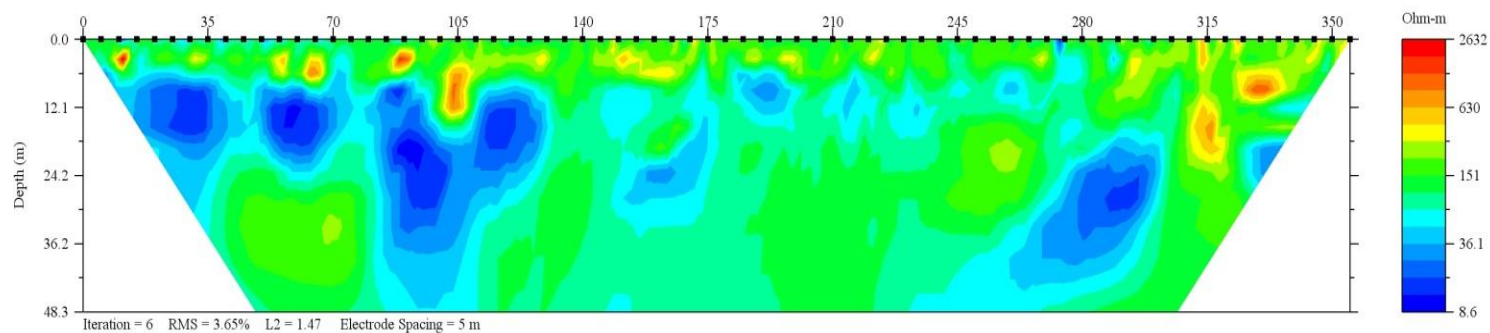
Adaptado de Fairchild y Baker (2012)

Anillo de cenotes

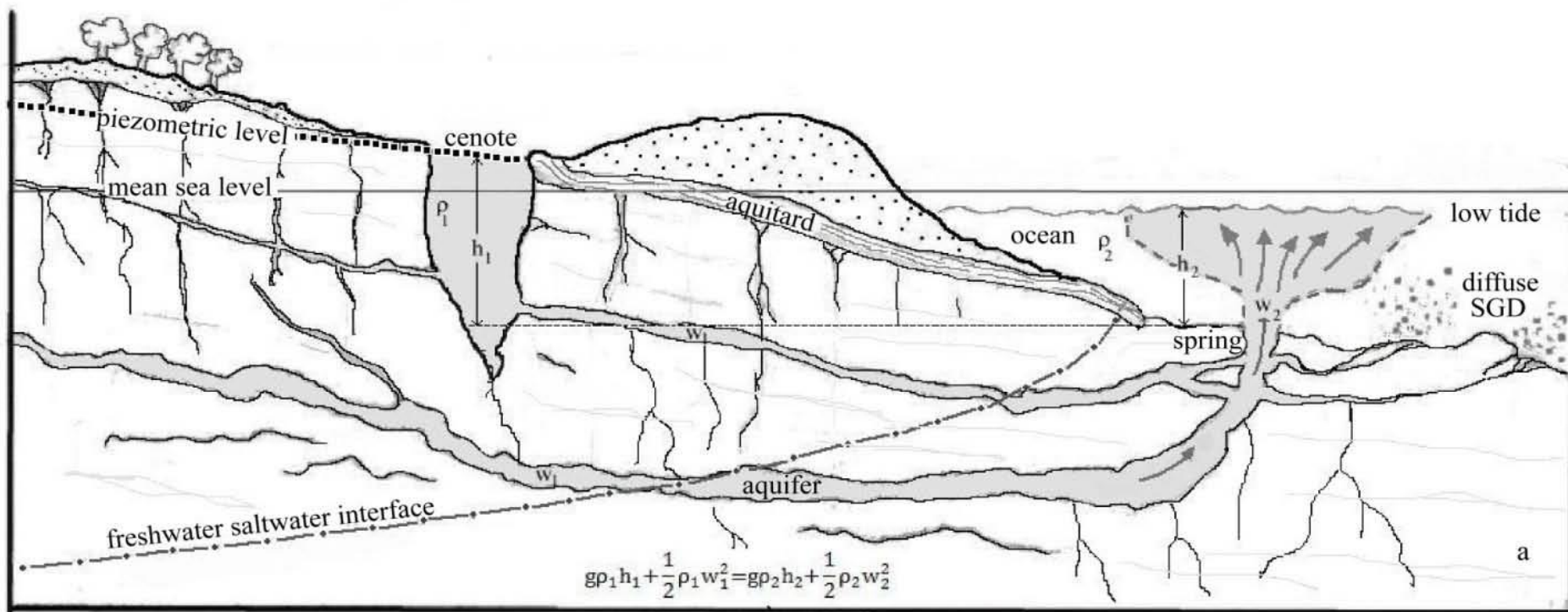
Inverted Resistivity Section



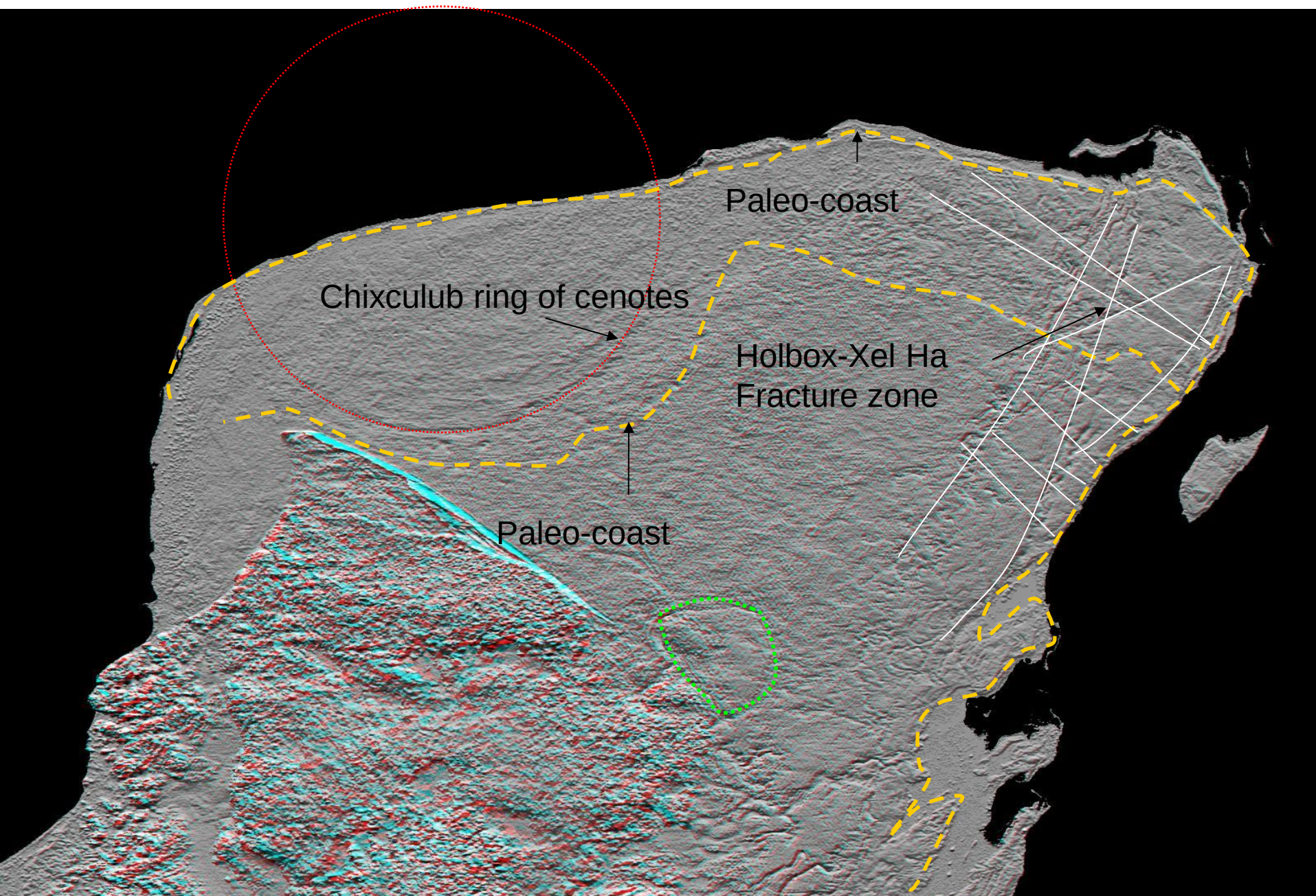
Inverted Resistivity Section Xlabon Zubin

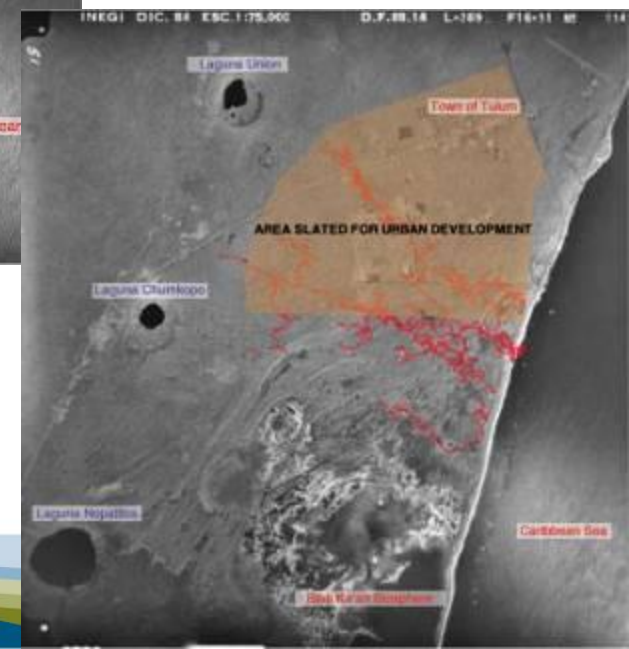
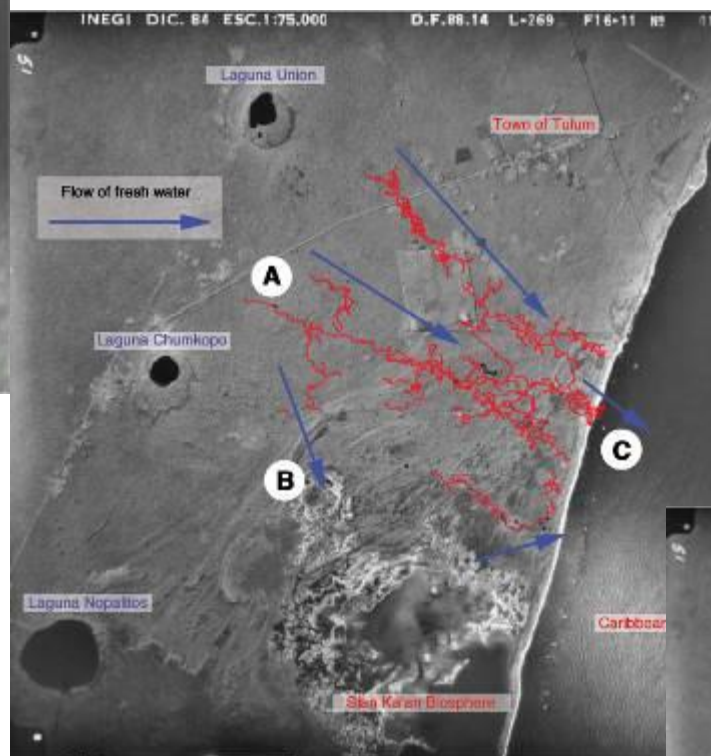
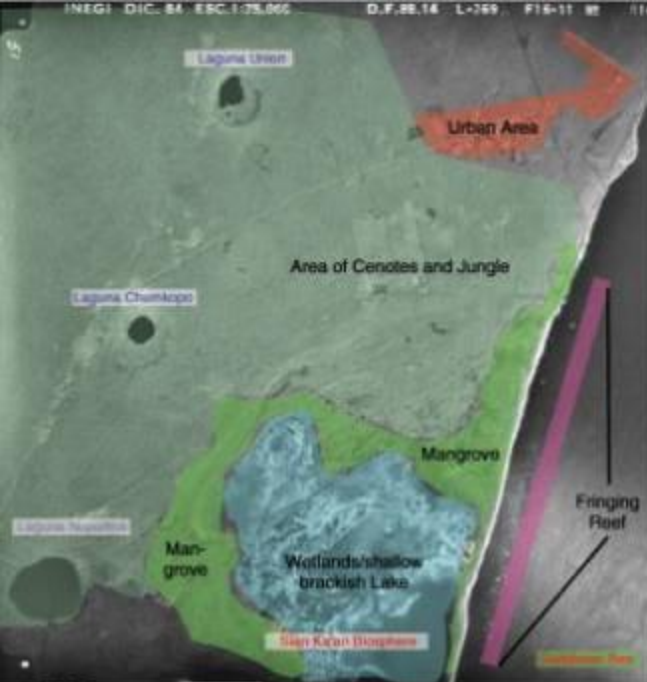


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(Cortesía de Valle-Levinson et al., 2013)





Cortesía CINDAQ.

Akumal



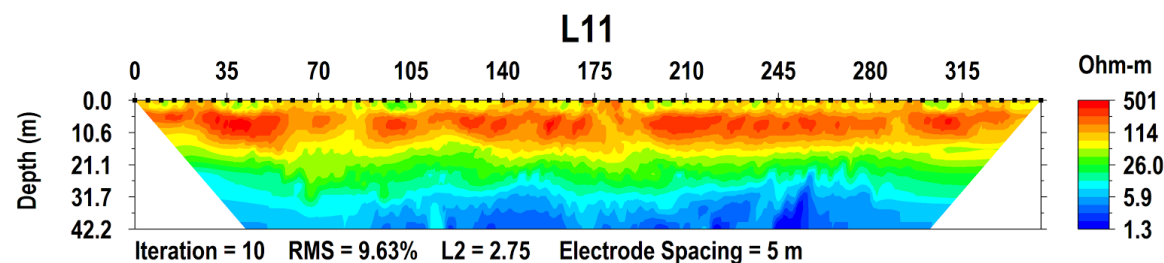
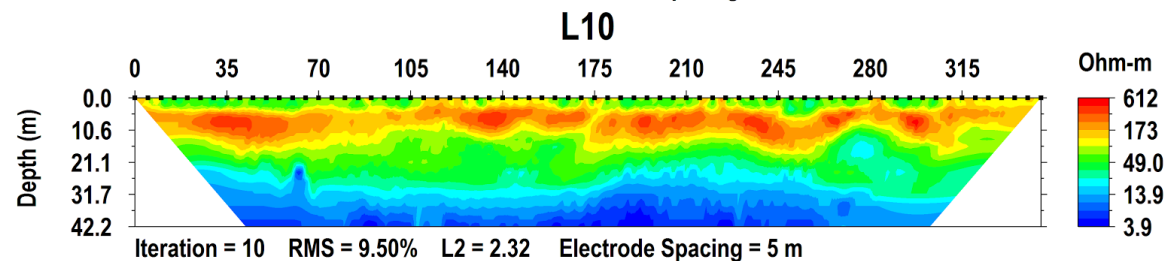
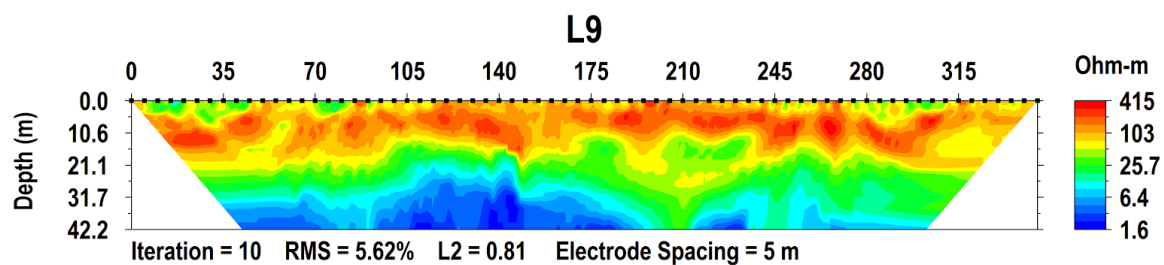
Xel-Ha

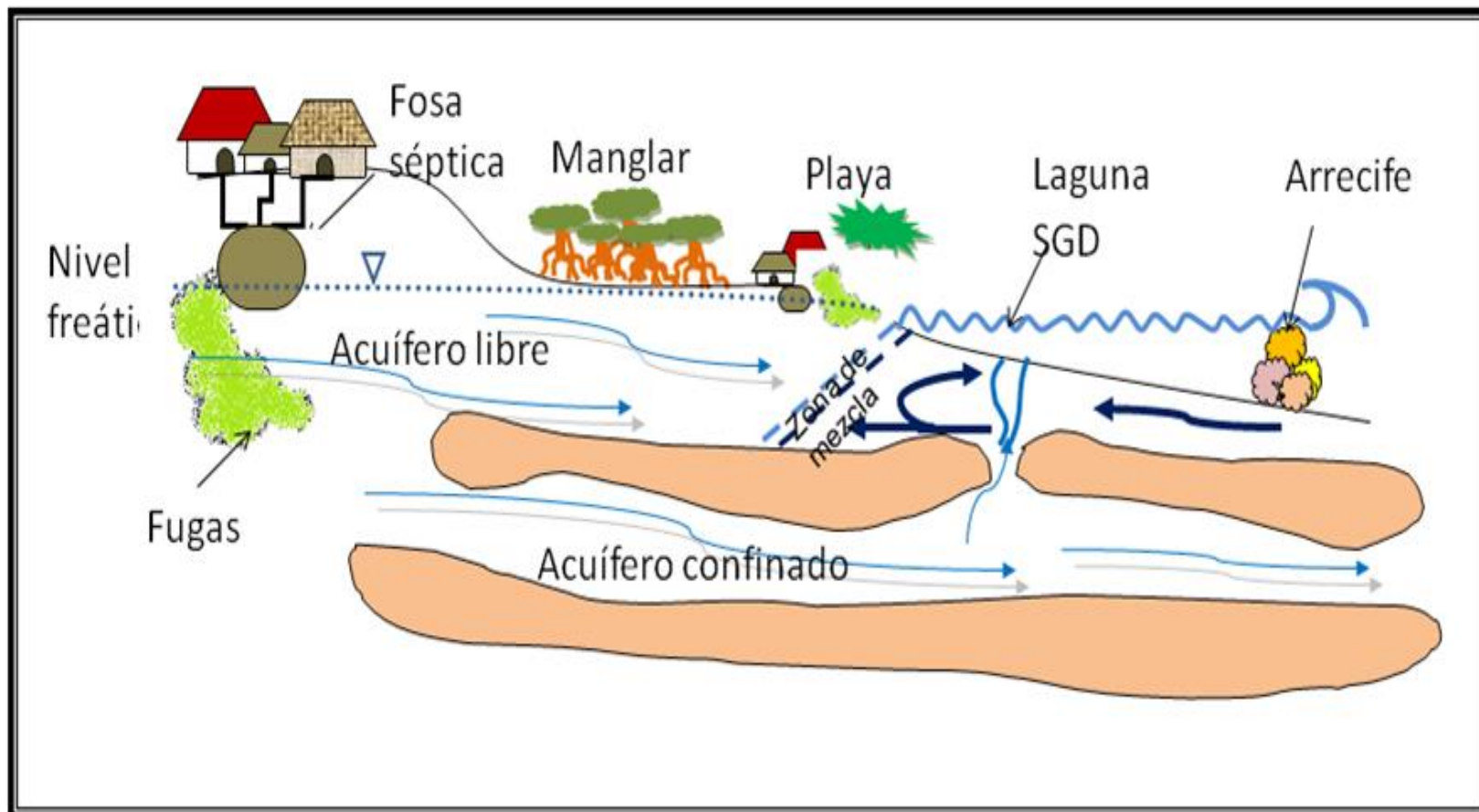


Image © 2006 DigitalGlobe

© 2005 Google

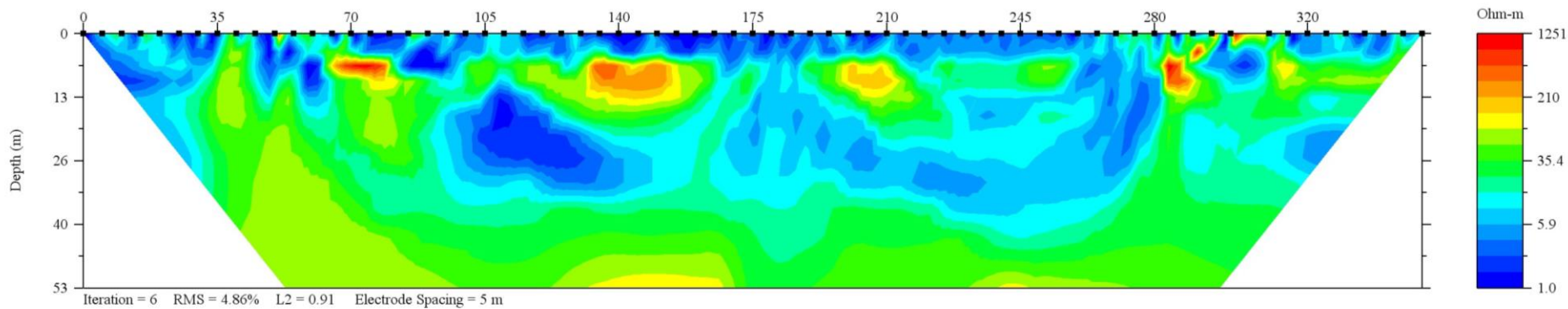




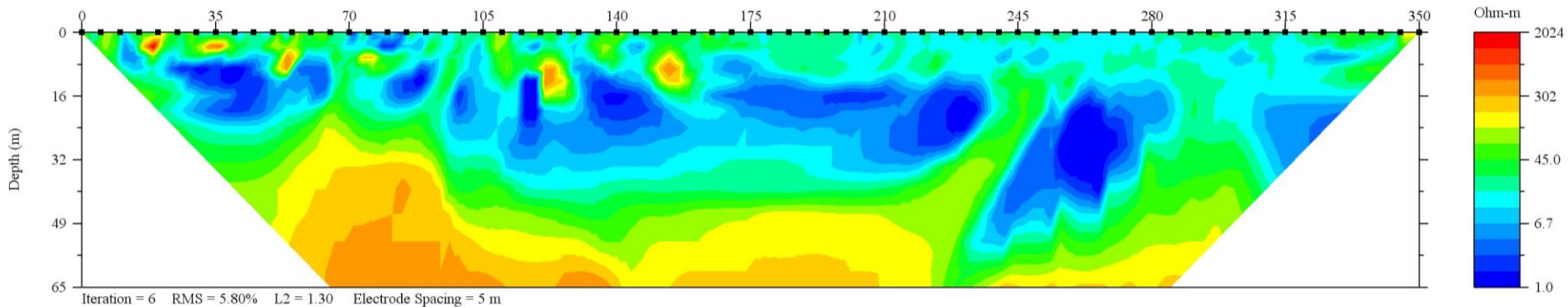


(Hernández-Terrones et al., 2011)

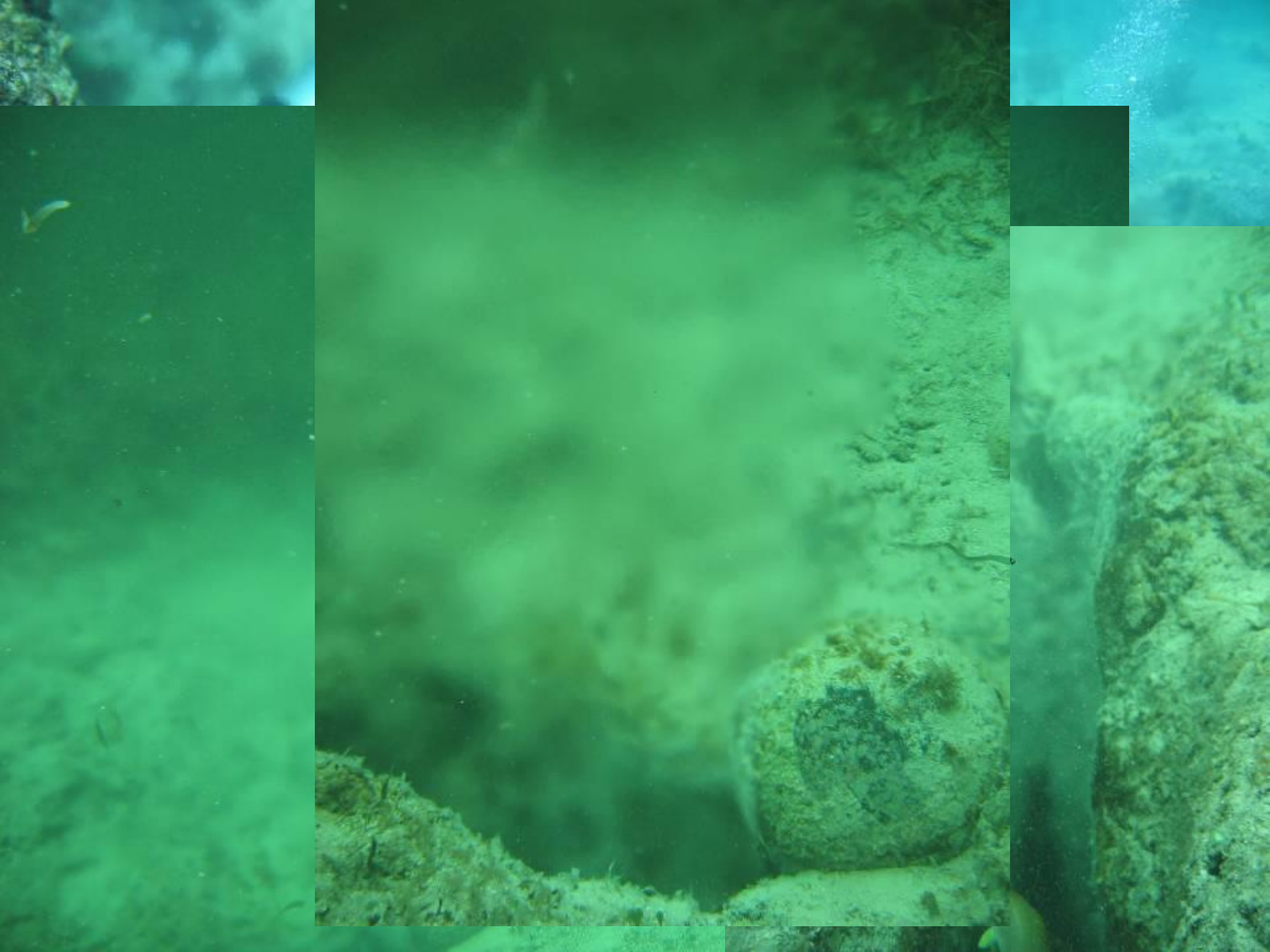
Acceso de Crococun



Sección Playa frente a Ojo Pargos

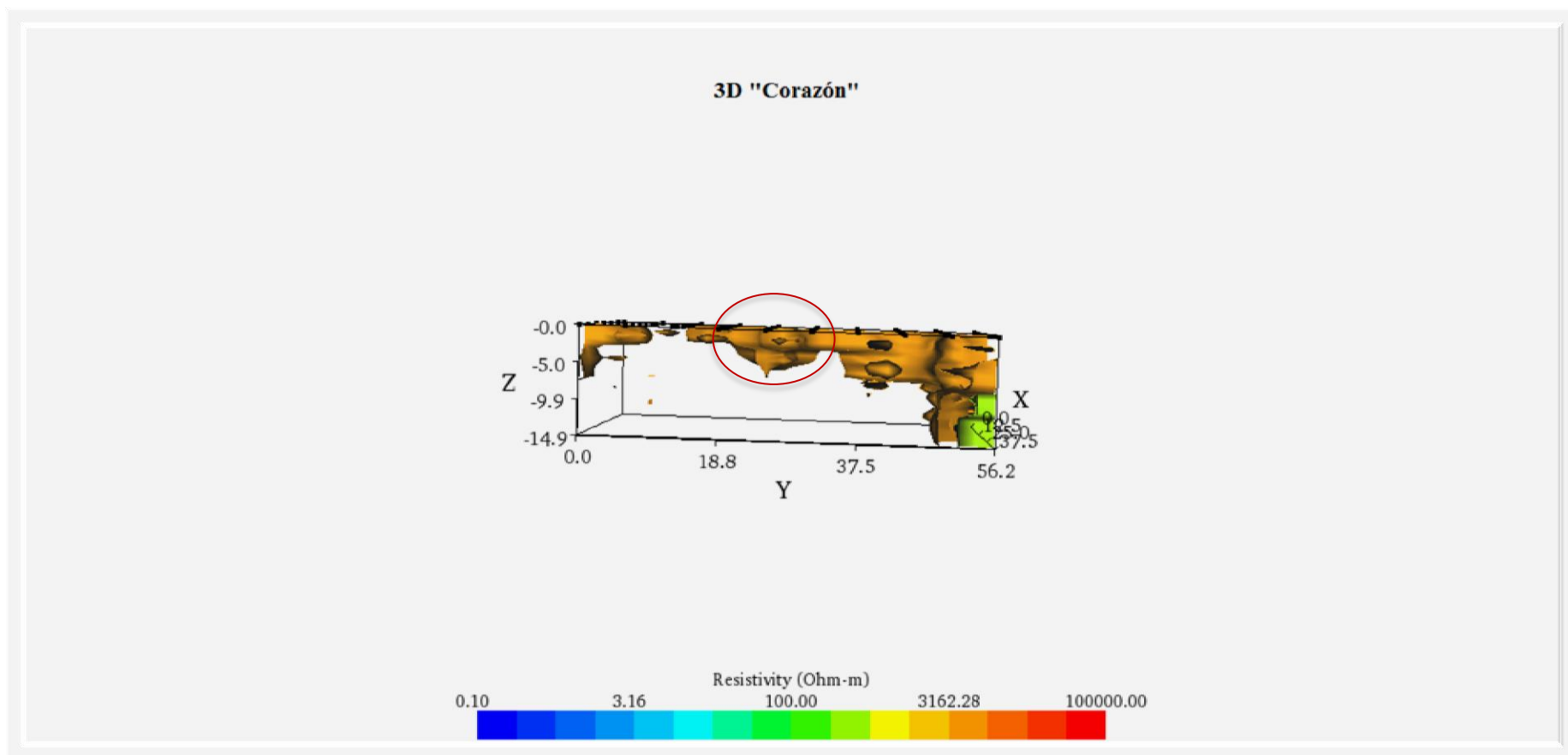


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Prospección geofísica

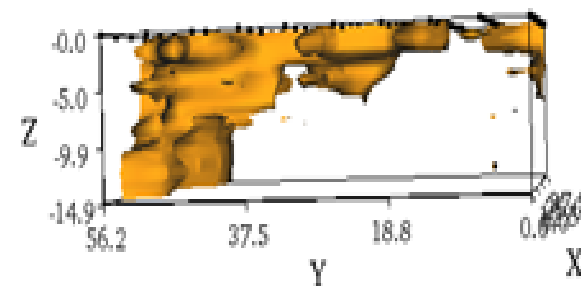
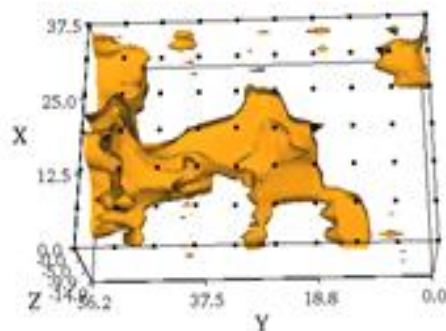
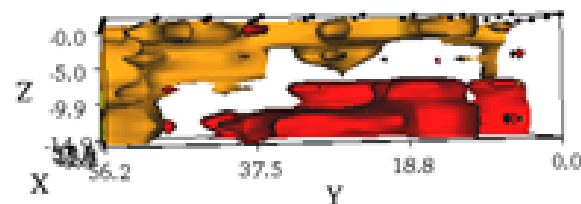
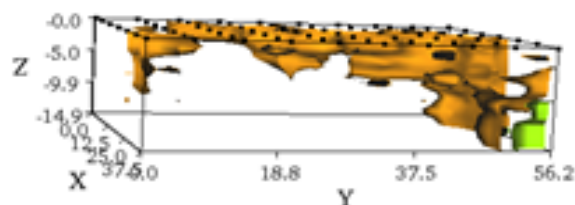
- Tomografía geoelectrica en caverna “Corazón” 3D



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Prospección geofísica

- Tomografía geoelectrica en caverna “Corazón” 3D



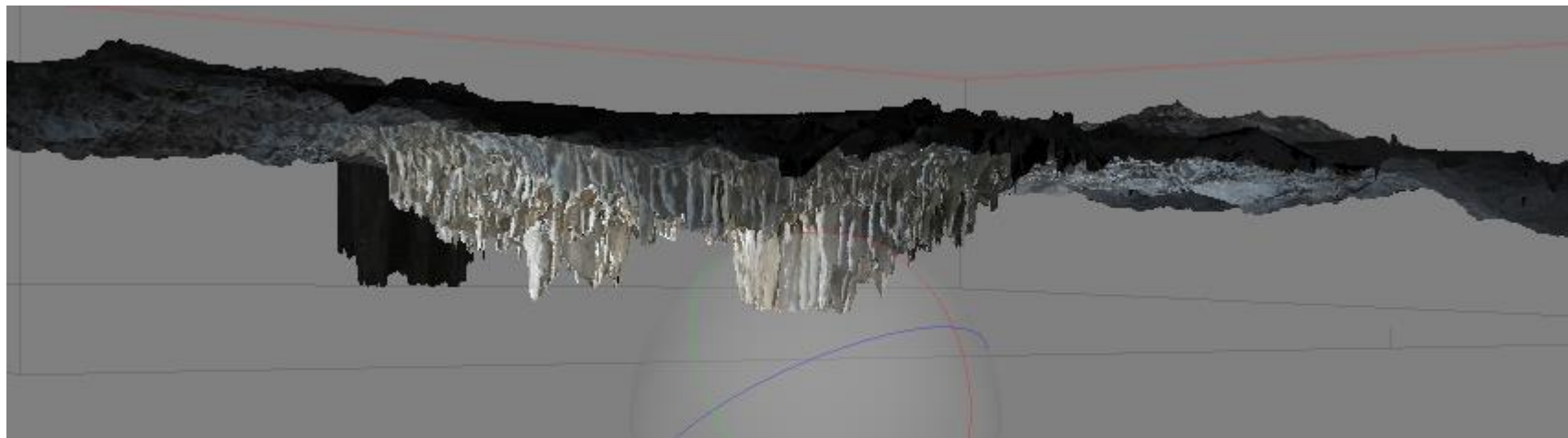
UCIA, CICY ©

Fotogrametría



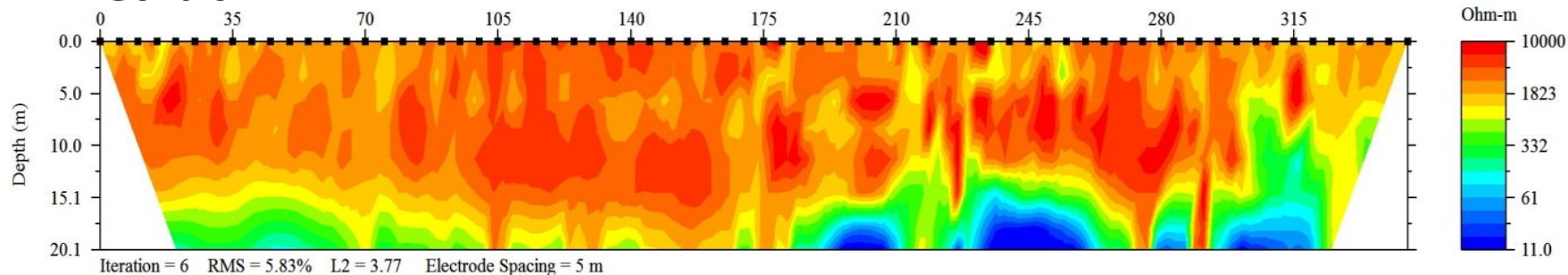
UCIA, CICY ©

Fotogrametría

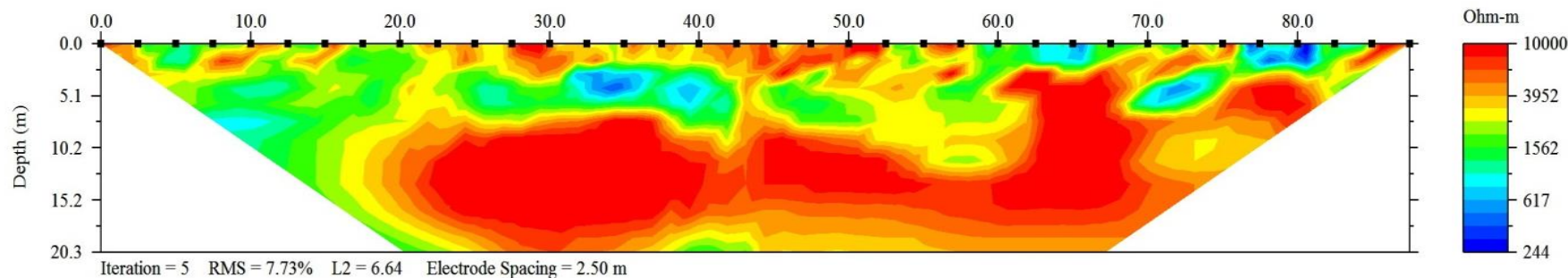


Prospección geofísica (2D)

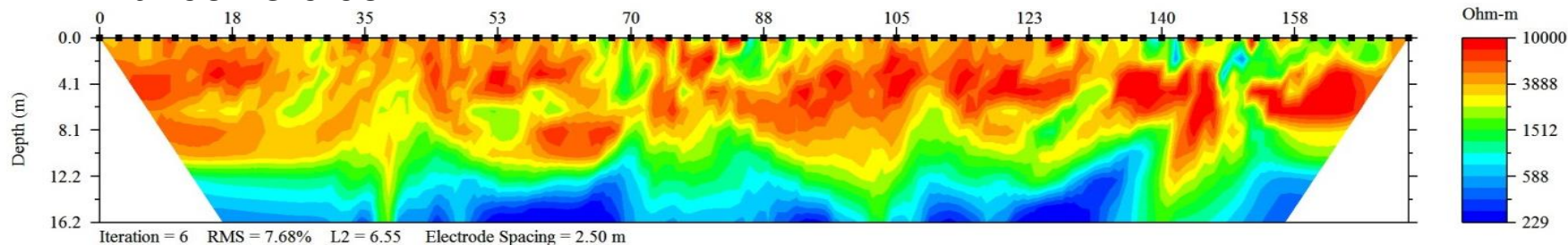
• Control



• Corazón



• Mundo Perdido



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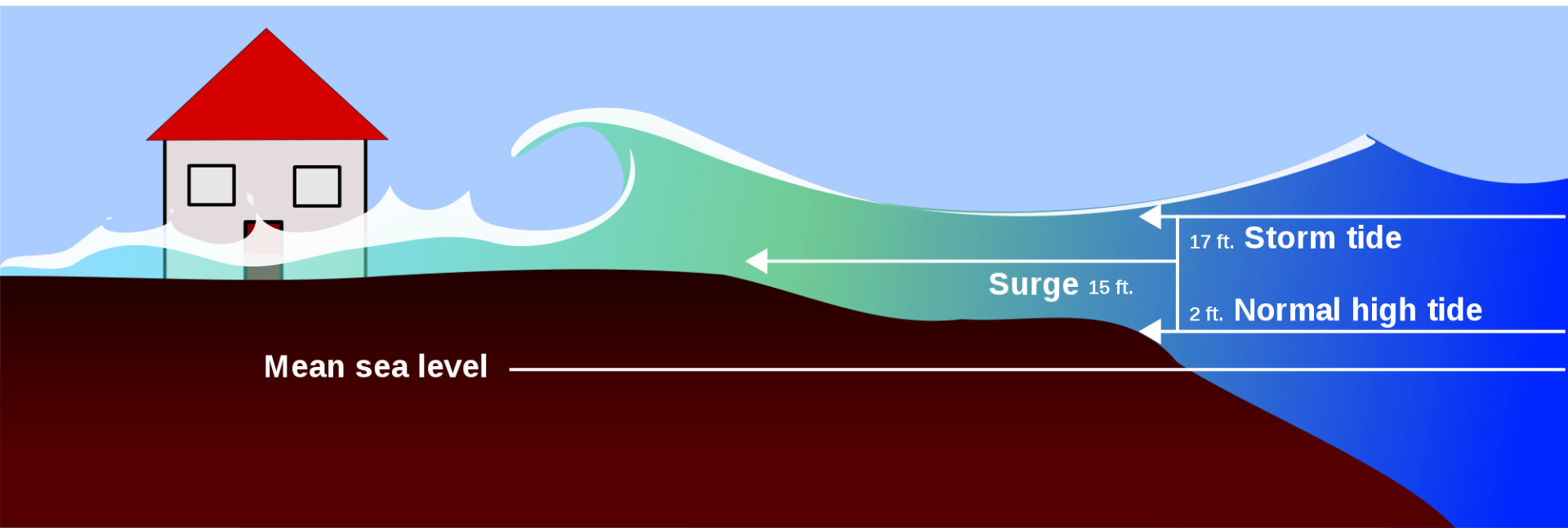


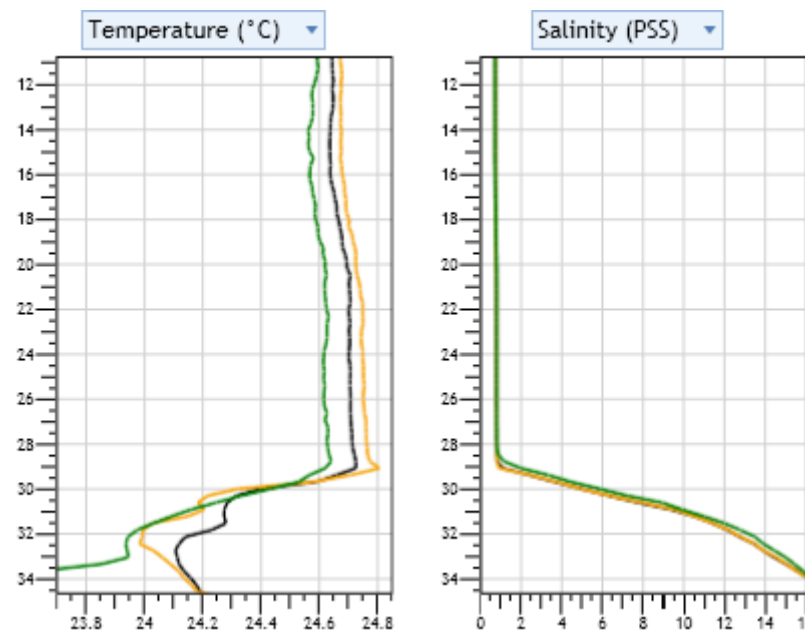
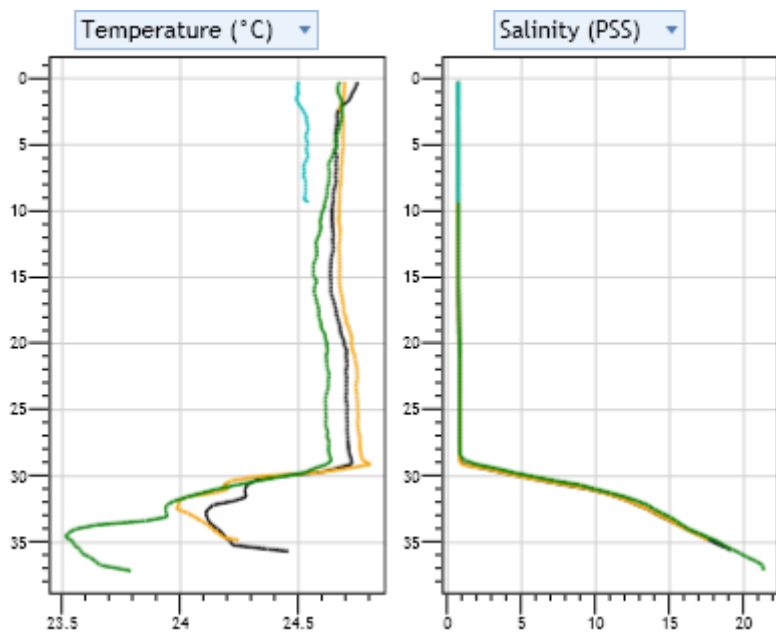
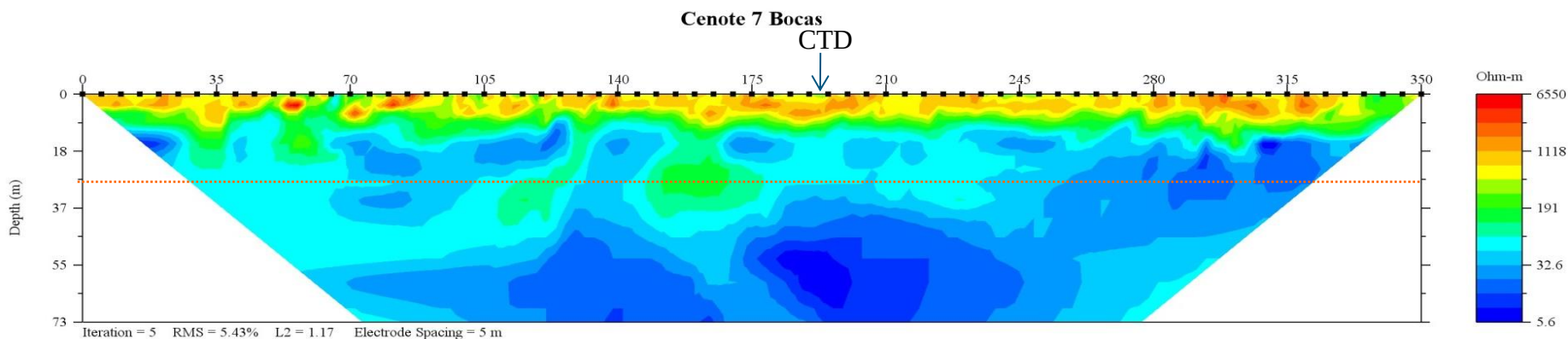




Radar Image from Cancun, Mexico as Wilma made Landfall
Courtesy of the Mexican Weather Service

10/22/05 06:25:10



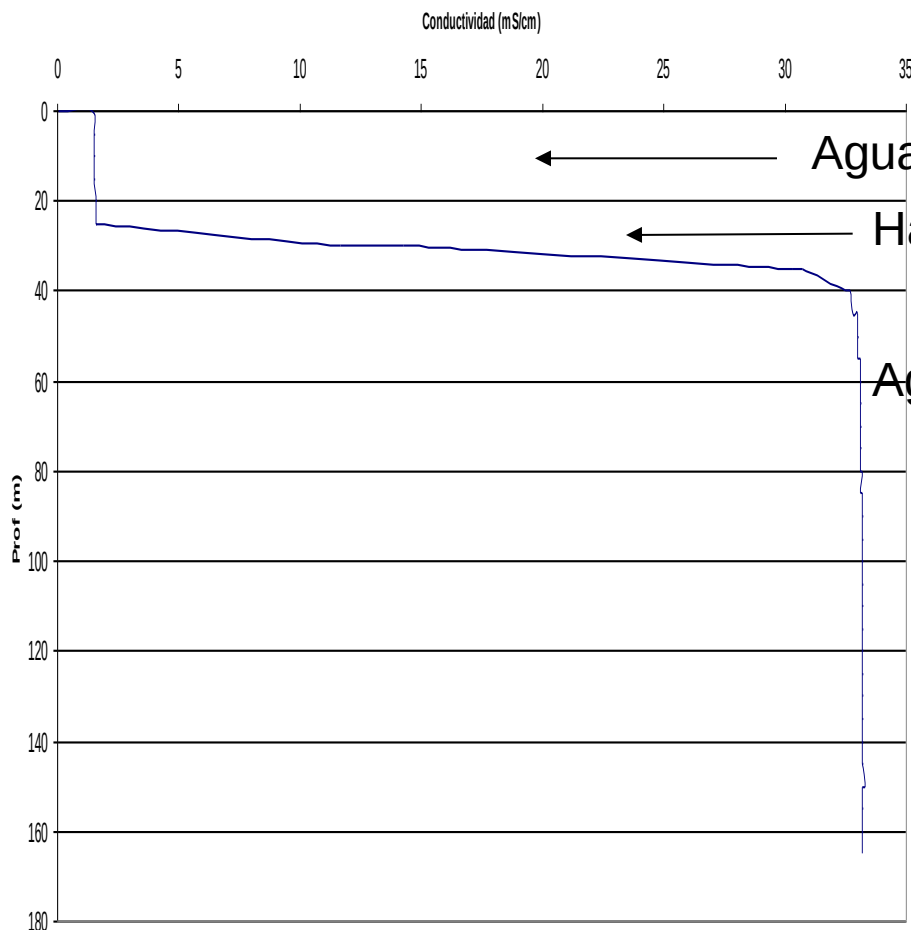


UCIA, CICY ©

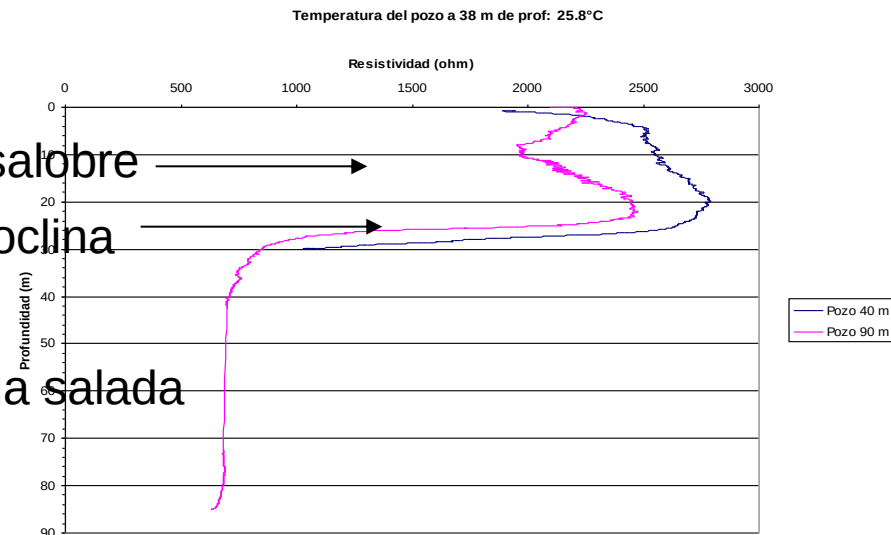
Distribución de la salinidad a lo largo del pozo

A partir de sondeos eléctricos en dos pozos a 100 m de la costa y en un cenote a 20 km de la costa

20 km de la costa



100 m de la costa

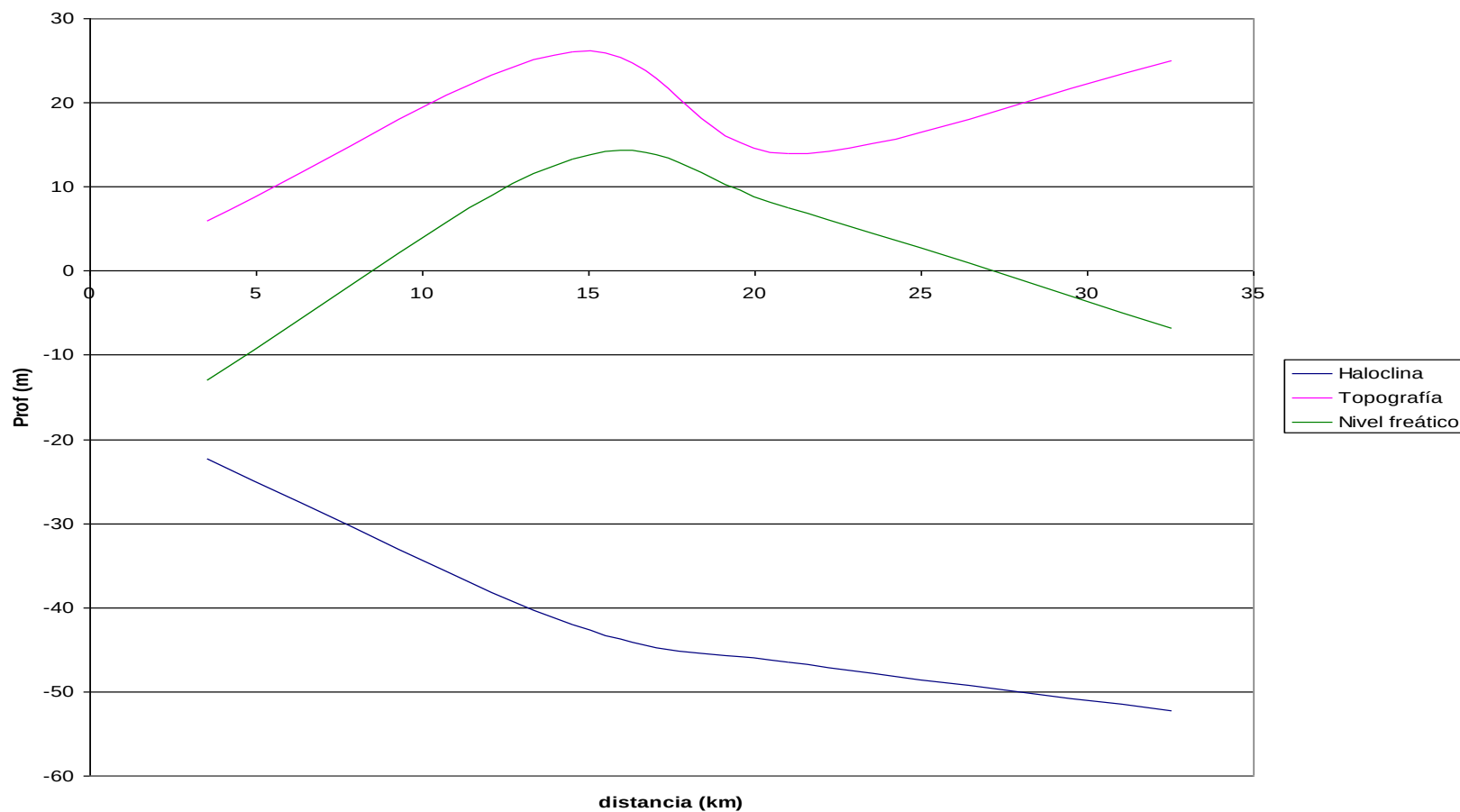


UCIA, CICY ©

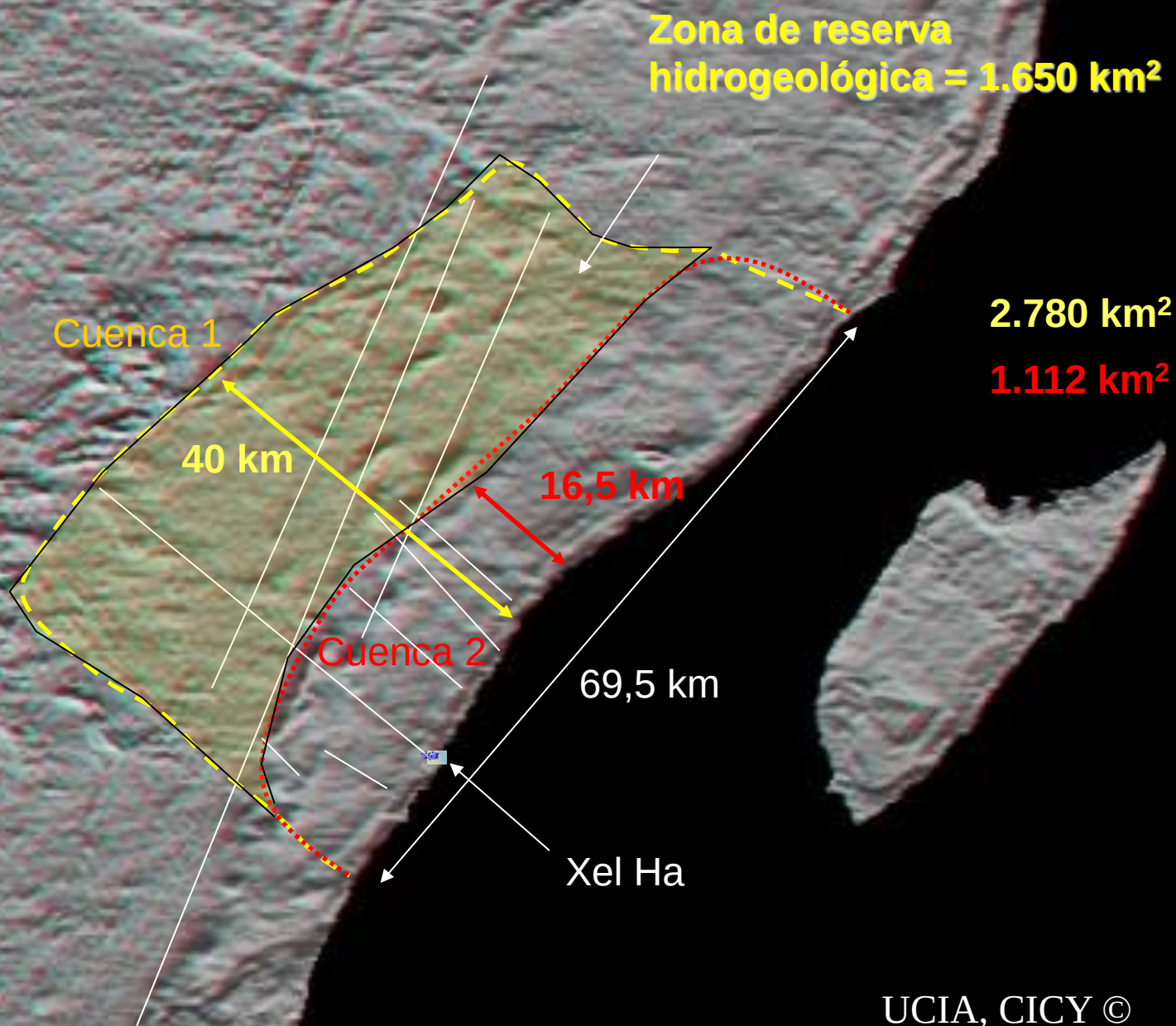
Intrusión Salina Cobá-Tulum

Tulum

Cobá



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Agua contenida en la zona de reserva hidrogeológica de la Riviera Maya

- Volumen Total Cuenca
 - 695 hm³ de agua
 - ❖ 69,5 x 10¹⁰ litros de agua
- Cuenca 1*
- 412,5 hm³ de agua
 - ❖ **41,2 x 10¹⁰ litros de agua**
 - ❖ **2,9 x 10¹⁰ litros/año (consumo turismo)**
- Cuenca 2
 - 278 hm³ de agua
 - ❖ 27,8 x 10¹⁰ litros de agua

UCIA, CICY ©

1 hm³=1.000.000.000,00 litros



¡Gracias!

marior@cicy.mx