Mexico City’s Geological Setting and Soil Conditions

Yolanda Alberto-Hernandez, Ph.D.

Neo-volcanic axis and Mexico City’s basin

Mexico’s Basin (2004). Mexican Arqueology (in Spanish), 68

Mexico’s basin

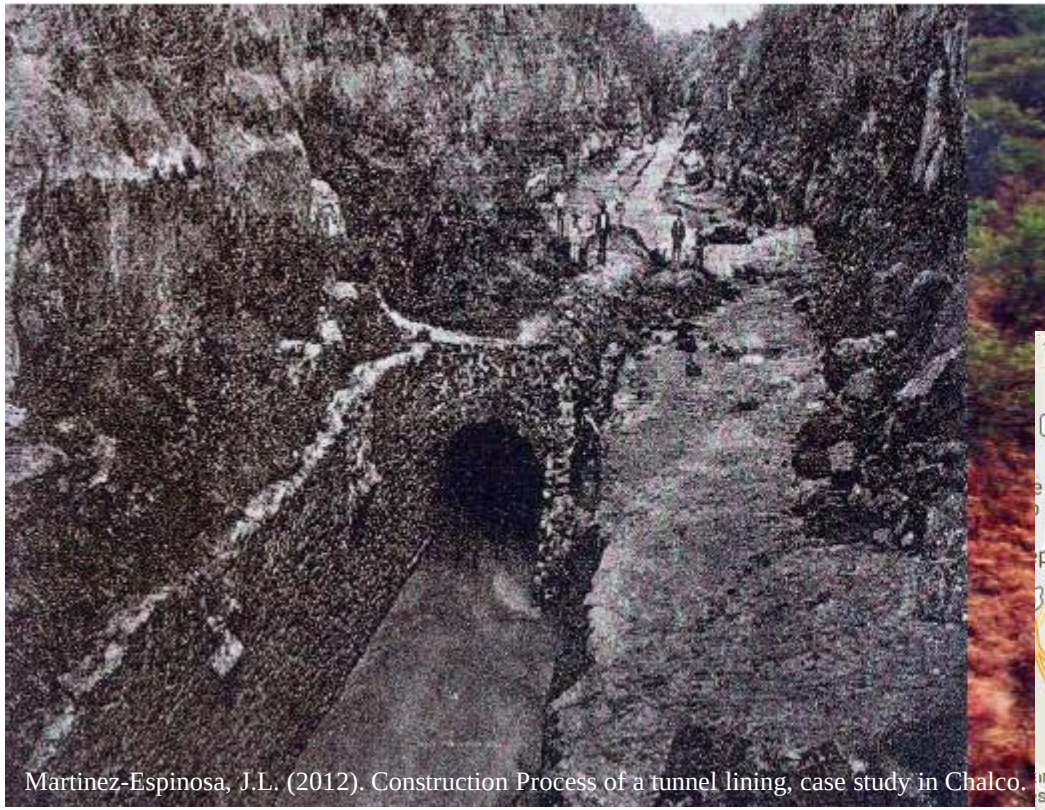
Mexico’s Basin (2004). Mexican Arqueology (in Spanish), 68

Lakes

- After the Spanish conquest of the Aztec Empire, efforts to control flooding by the Spanish led to most of the lake being drained.

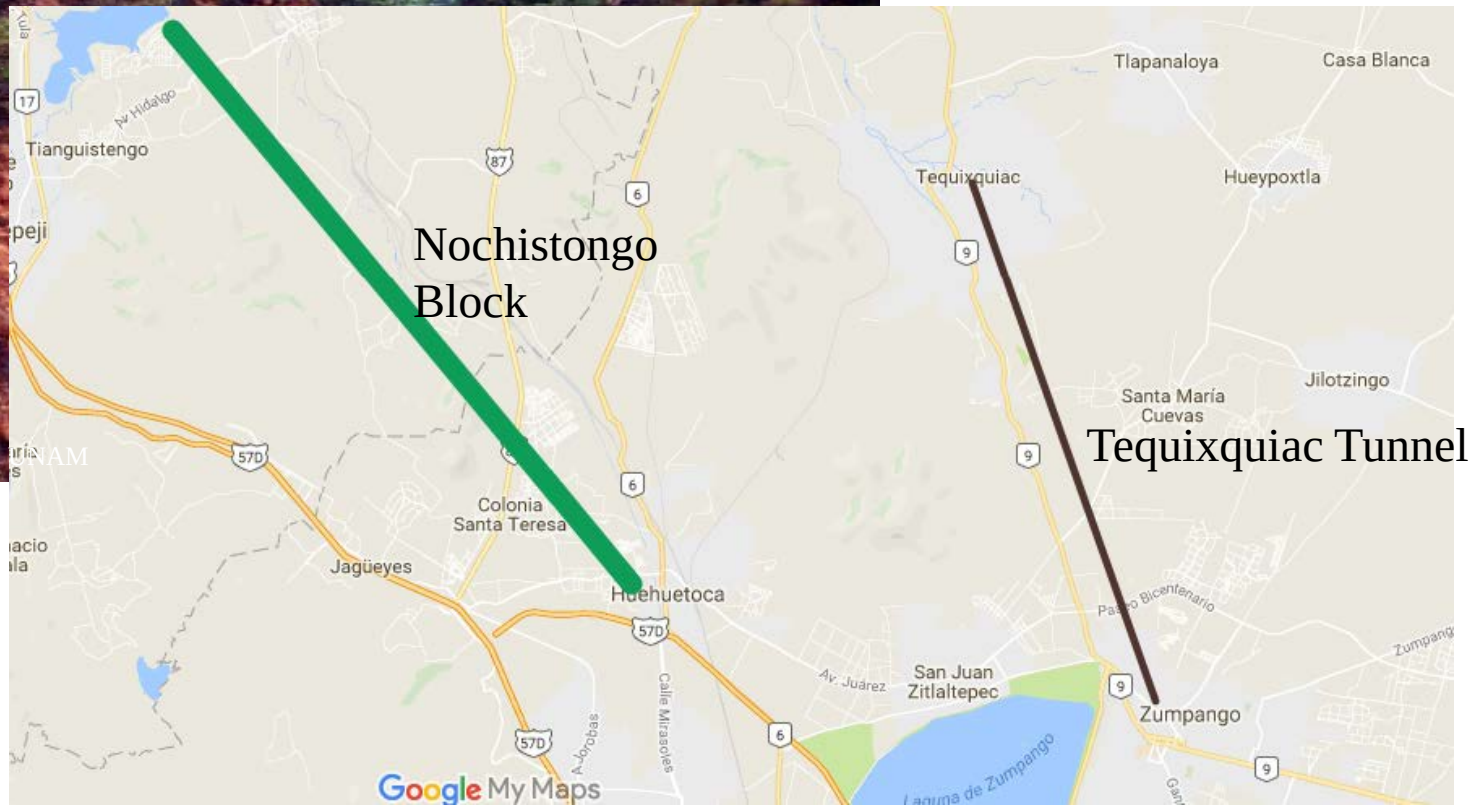
https://alchetron.com/Lake-Texcoco-3192600-W

Drainage



Martinez-Espinosa, J.L. (2012). Construction Process of a tunnel lining, case study in Chalco.

Nochistongo



1866 - Grand Canal

Martinez

Geology of Mexico City

Report of water leaks in Mexico City after the September 19, 2017 Morelos Earthquake
1 view

All changes saved in Drive

Add layer | Share | Preview

Previous channels and drainage

Individual styles

Tequixquiac Tunnel

Nochistongo Block

Grand Canal

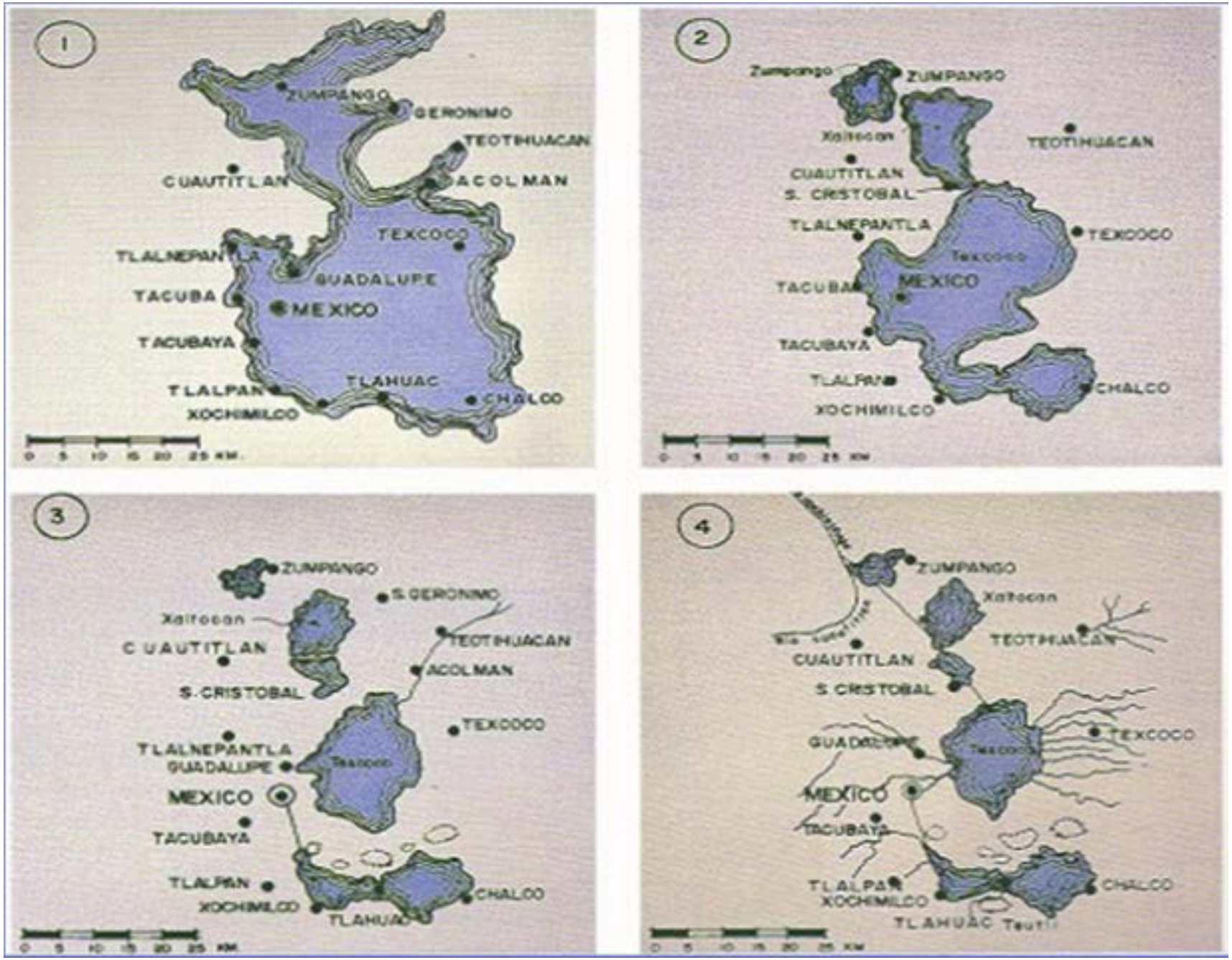
Base map

Tepeji
Tequixquiac
Jilotepec de Molina Enríquez
Timilpan
San Felipe Coamango
San Luis Taxhimay
Chapa de Mota
San Bartolo Morelos
Tepotzotlán
Cuautitlán Izcalli
Pueblo Nuevo
San Lorenzo Malacota
Nicolás Romero
Coacalco
Tezontepec
Tizayuca
Teotihuacan
Axapusco
Otompan
Acolman
Tepexpan
Chiconcuac de Juárez
Texcoco
Tlalnepantla de Baz
Naucalpan
Mexico City
Ciudad Nezahualcóyotl
La Paz
Monte Tláloc
Santa María Ajoloapan
Epazoyucan
Nichi
Ixtlahuaca de Rayón
San Jerónimo Ixtapantongo
Jiquipilco
Santa Ana Jilotzingo
Temoaya
Loma de Juárez
Villa Victoria
Xonacatlán
Huixquilucan de Degollado
San Francisco
Lerma de
Google My Maps

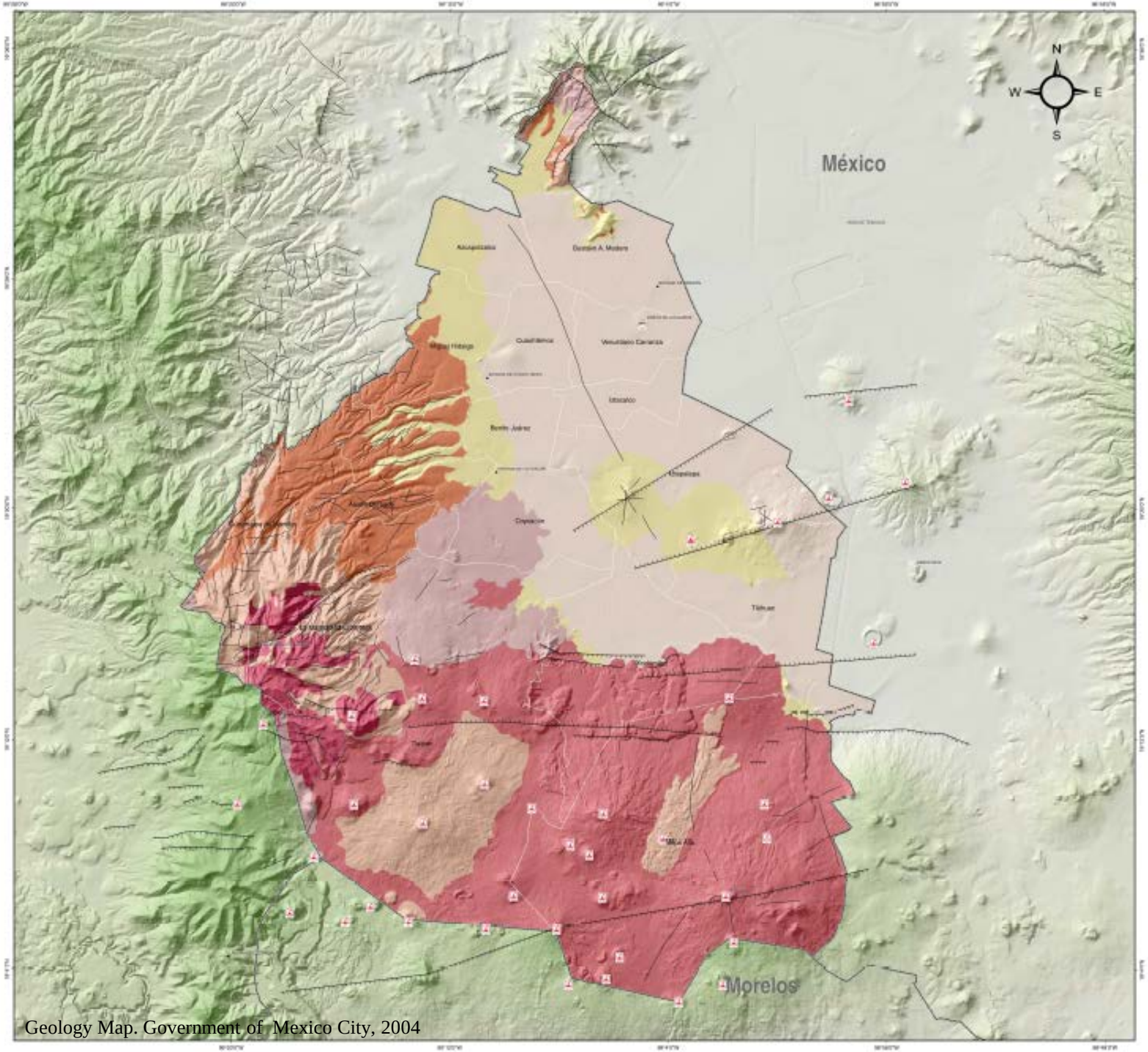
Drainage system

Domínguez-Mora, R. (2004). Mexico City's Flooding (in Spanish). IIUNAM

Evolution of Mexico City's Lakes



Domínguez-Mora, R. (2004). Mexico City's Flooding (in Spanish). IIUNAM



Geology Map. Government of Mexico City, 2004

Geology

Normal Fault

Crack

Hill

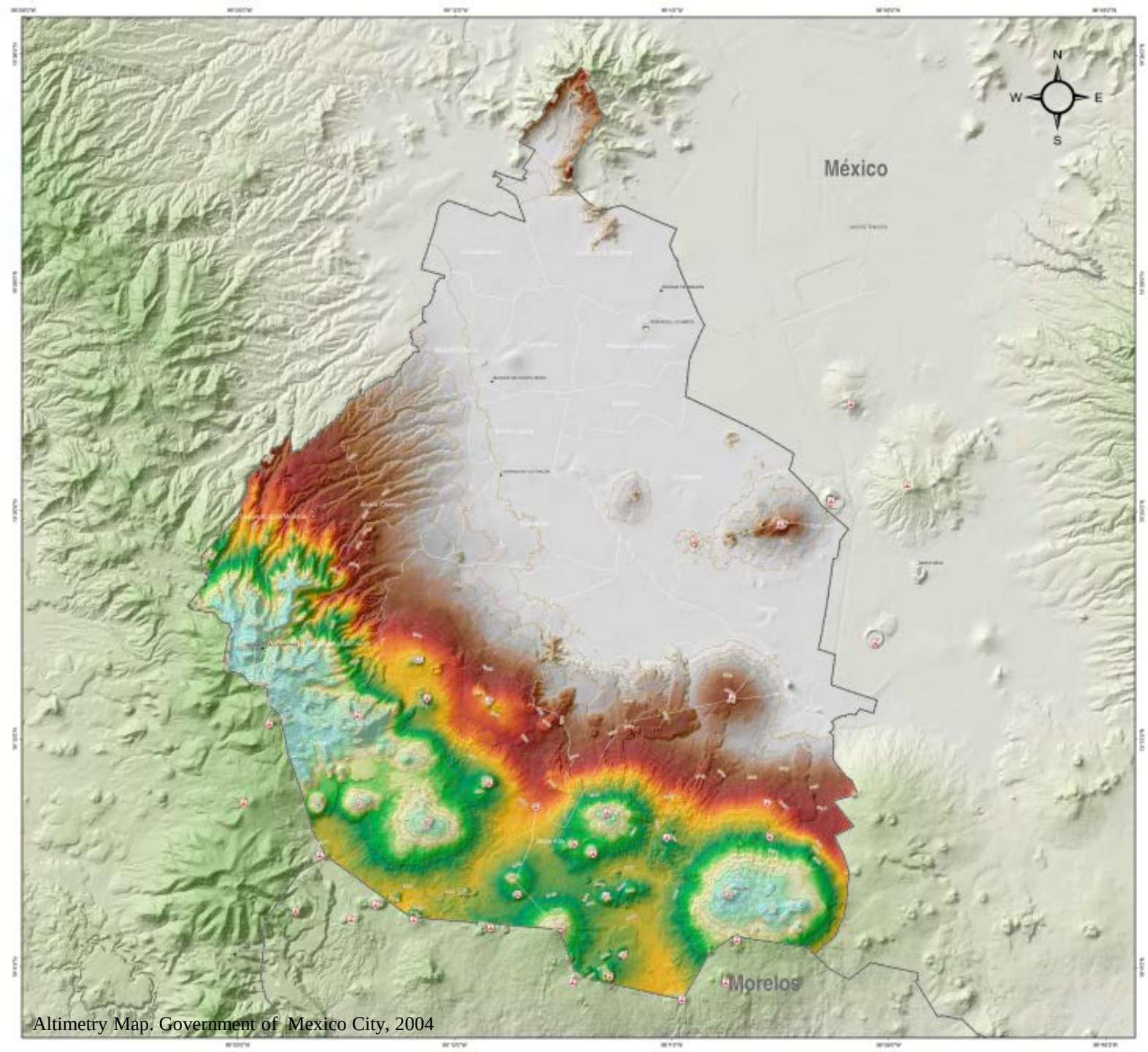
Volcan

Soil

- Alluvial
- Lacustrine

Igneous rocks

- Andesite
- Basaltic Andesite
- Basalt
- Dacite
- Volcanoclastics



Altimetry Map. Government of Mexico City, 2004

Altimetry

Meters over the sea level

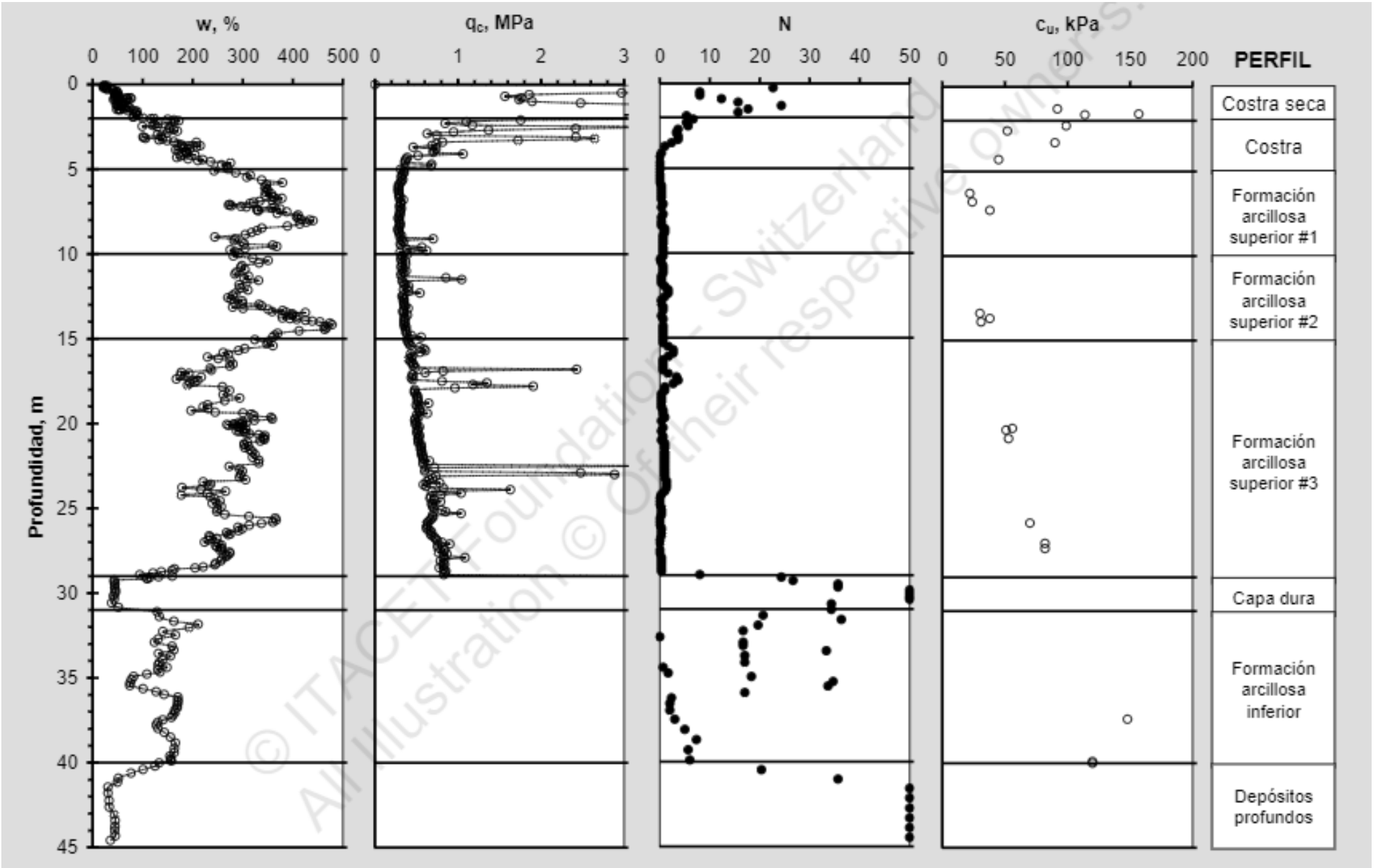
Max 3932

Min 2212

Mexico City’s Clay

Typical properties

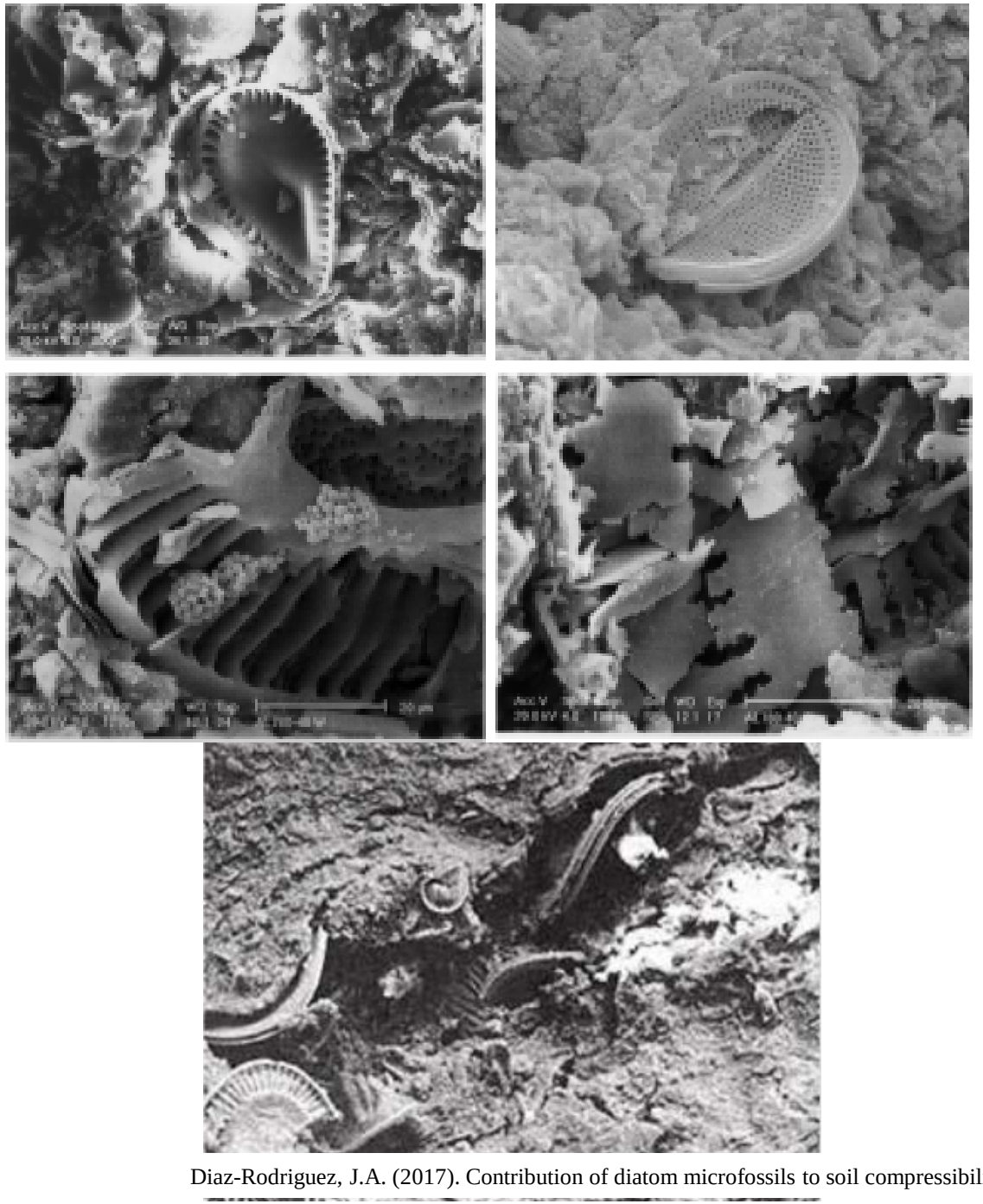
Void ratio (e): 5-10
Porosity (n): 0.83-0.90
Water content (*w*): 220-420%
Liquid limit (w_L): 110-485%
Plastic limit (w_P): 37-116%
Plasticity index (I_P): 73-342%
Permeability (*k*): 1x10-7 cm/s
Compressibility index (C_c): 3-8
Undrained shear resistance (c_u): 15-35 kPa
Internal friction angle: 34-41
Shear wave velocity (V_s): <100 m/s



Auvinet, G. (2016). Challenges of the Mexico City Clay (in Spanish). AMITOS

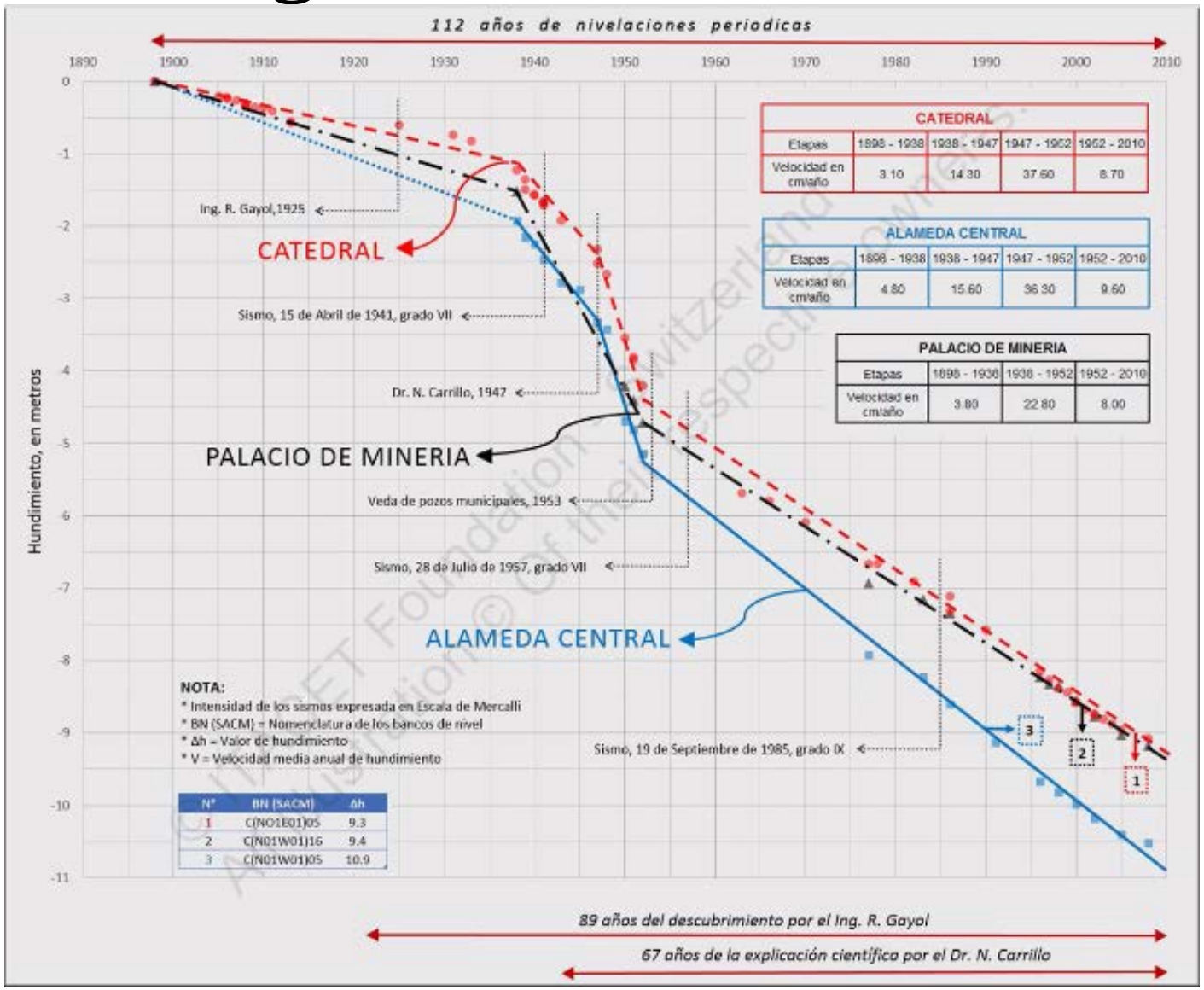
Microfossils

Presence of highly amorphous minerals and microfossils with large internal pores



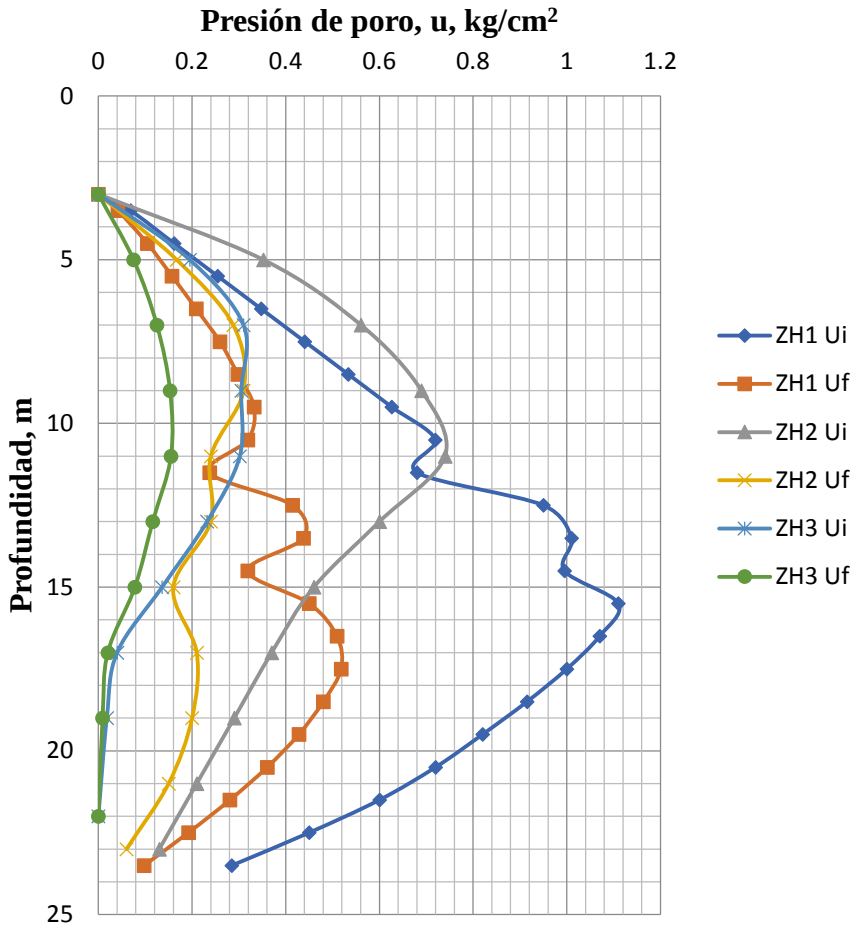
Diaz-Rodriguez, J.A. (2017). Contribution of diatom microfossils to soil compressibility. ICSMGE, Seoul

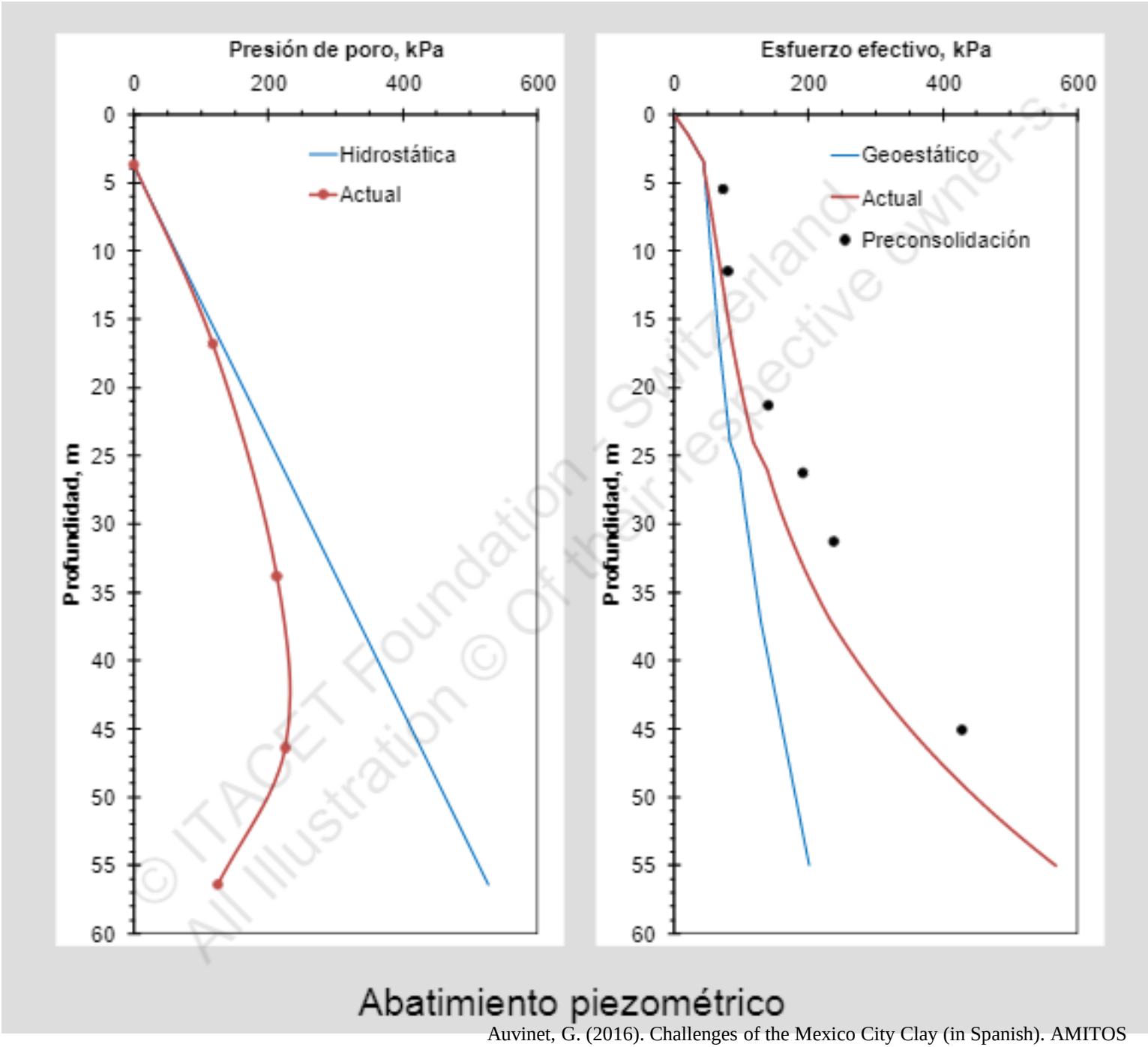
Regional sinking



Auvinet, G. (2016). Challenges of the Mexico City Clay (in Spanish). AMITOS

Change in pore pressure





Auvinet, G. (2016). Challenges of the Mexico City Clay (in Spanish). AMITOS

Seismic zonation of Mexico City

Zona	c	a_o	T_a [1]	T_b [1]	r
I	0.16	0.04	0.2	1.35	1.0
II	0.32	0.08	0.2	1.35	1.33
III_a	0.40	0.10	0.53	1.8	2.0
III_b	0.45	0.11	0.85	3.0	2.0
III_c	0.40	0.10	1.25	4.2	2.0
III_d	0.30	0.10	0.85	4.2	2.0