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西安交通大学
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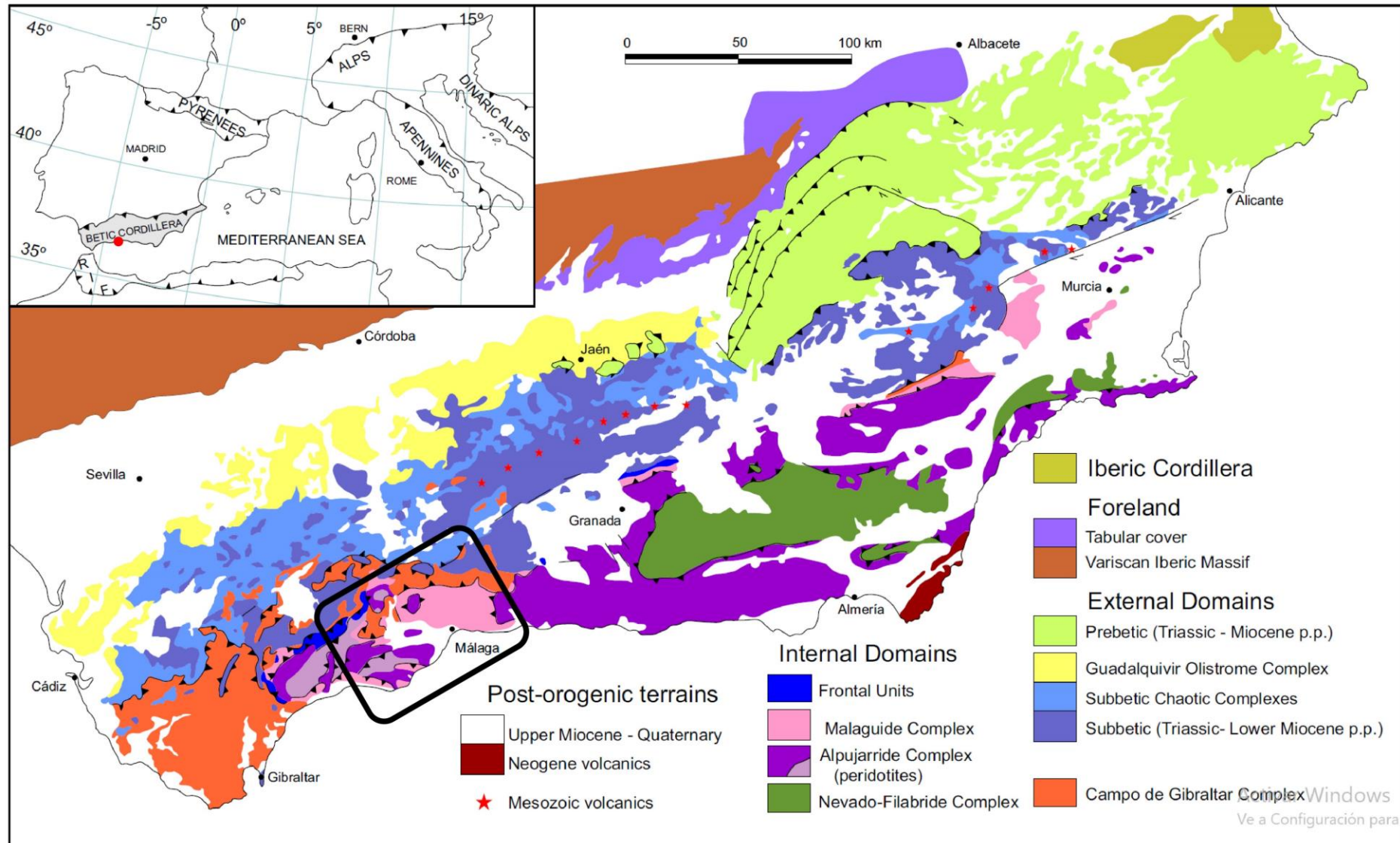
Knickpoints and faulted alluvial fans: evidence of orogen parallel active extension related to delamination in the Western Betics.

Marcos Moreno-Sánchez (1), Daniel Ballesteros (1), Guillermo Booth-Rea (1), José Vicente Pérez-Peña (1), Carlos Pérez-Mejías (2), Cristina Reyes-Carmona (1), José Miguel Azañón (1), Jorge P. Galve (1), and Patricia Ruano (1)

(1) University of Granada, Granada, Spain (marcosms@ugr.es)

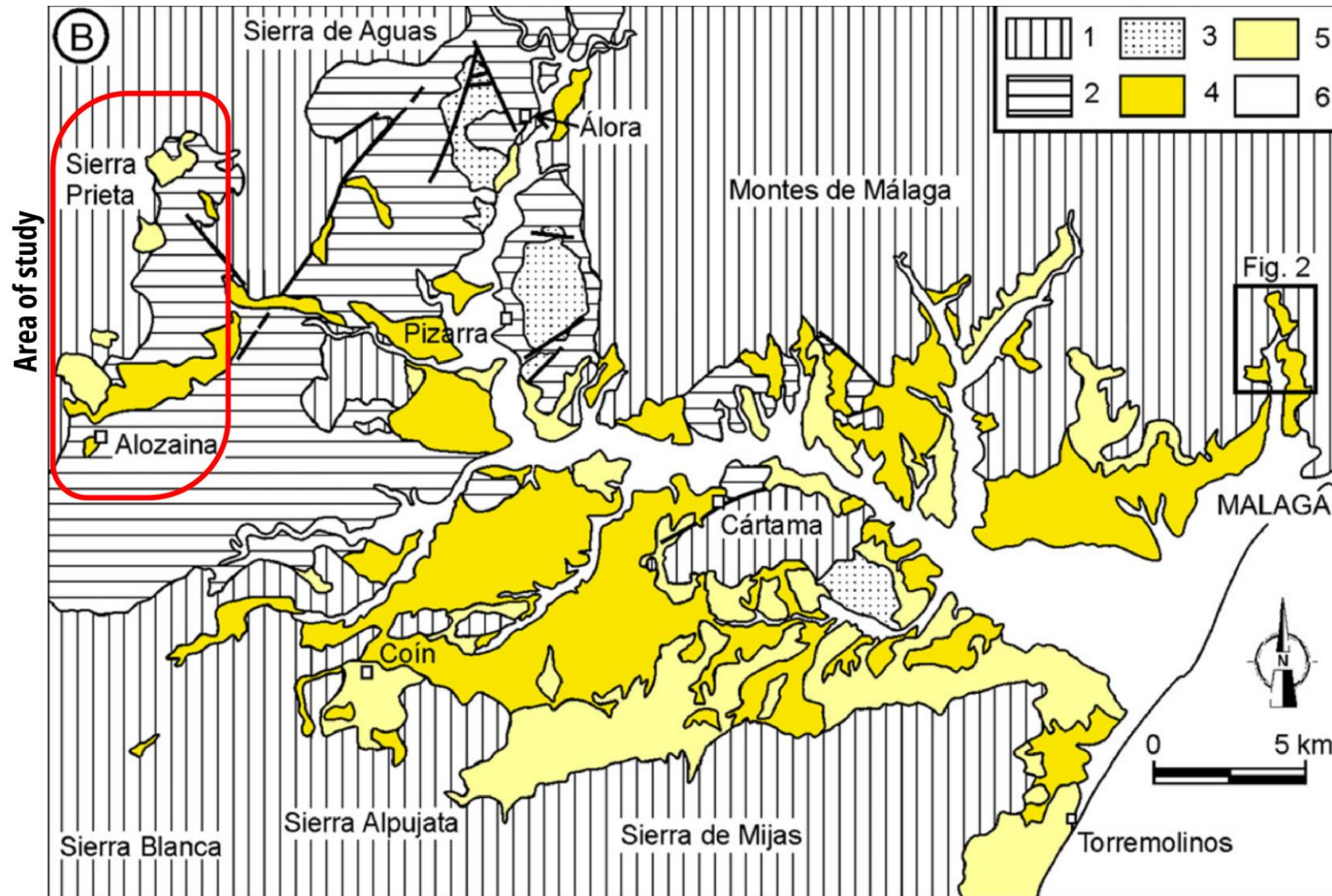
(2) Xi'an Jiaotong University, Xi'an, China

Introduction



(Modified from Vera *et al.*, 2004)

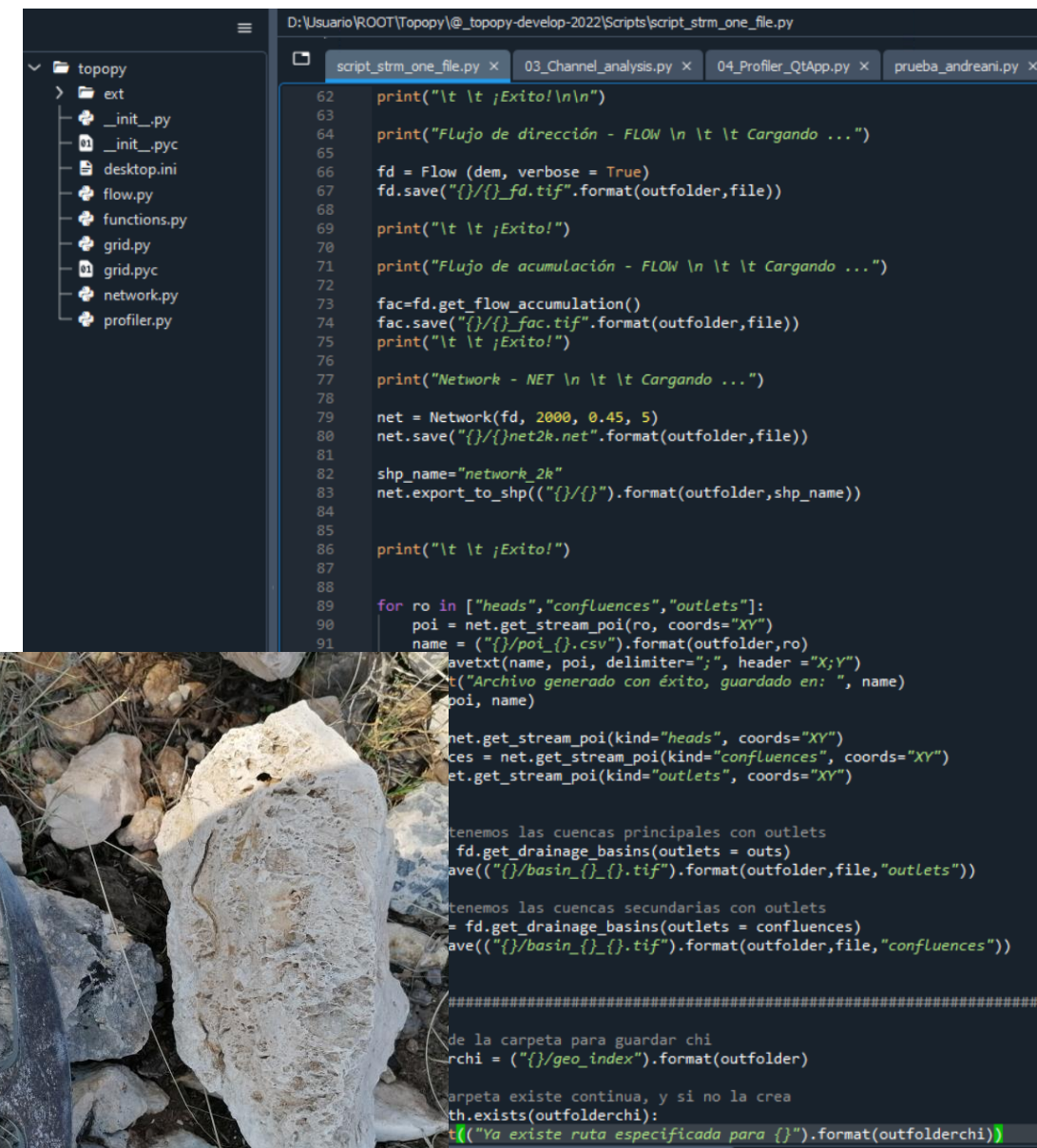
Geology and tectonic setting of Málaga basin



(Modified from Guerra-Merchán *et al.*, 2010)

Methods

- **Morphometric study** with a new Python library (TopoPy) developed by Pérez-Peña, J.V., (ongoing).
- **Fieldwork** with geological mapping.
- **Geochronology** working with previous data (Delannoy, 1997; Durán, 1996) and with new samples.

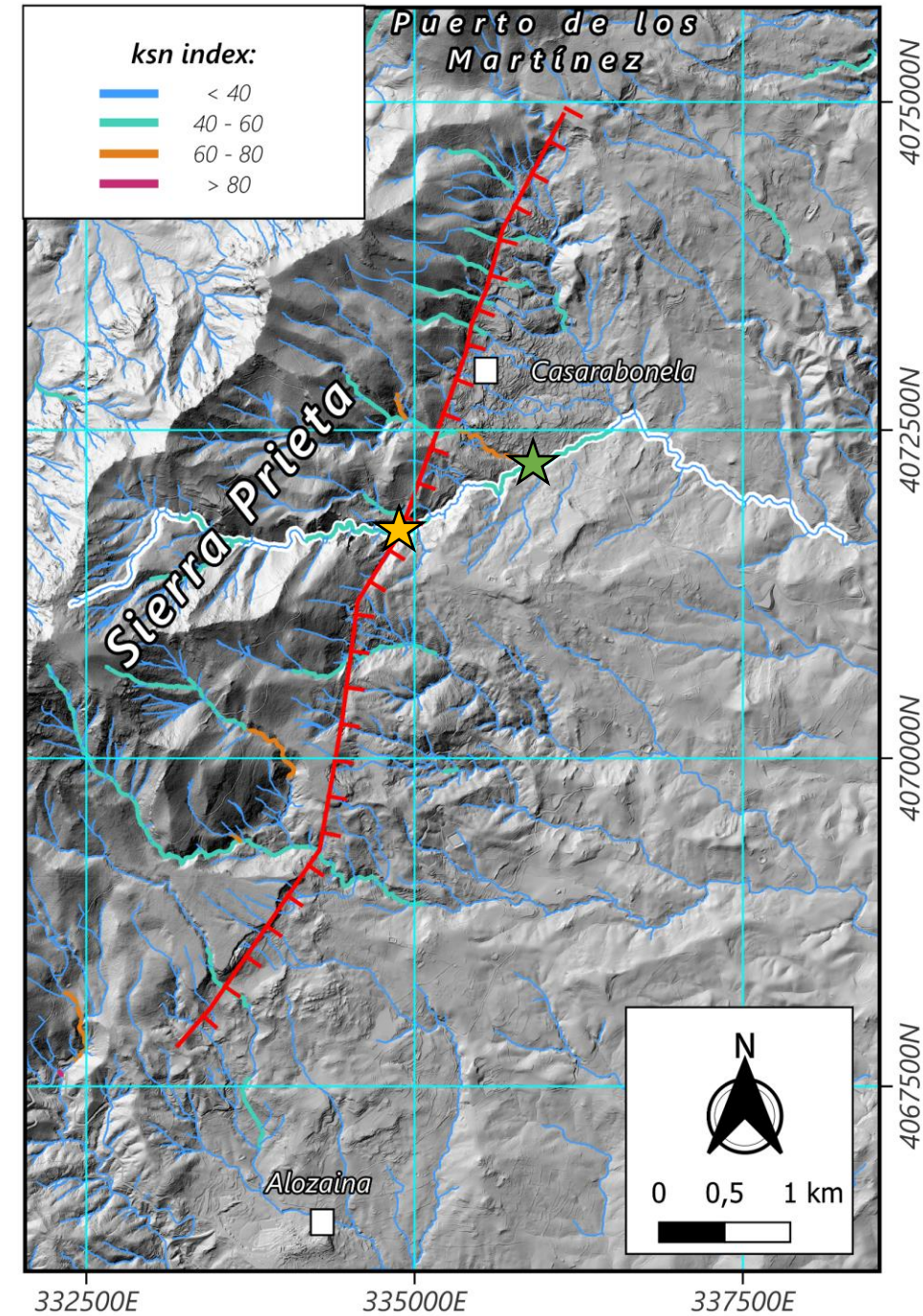
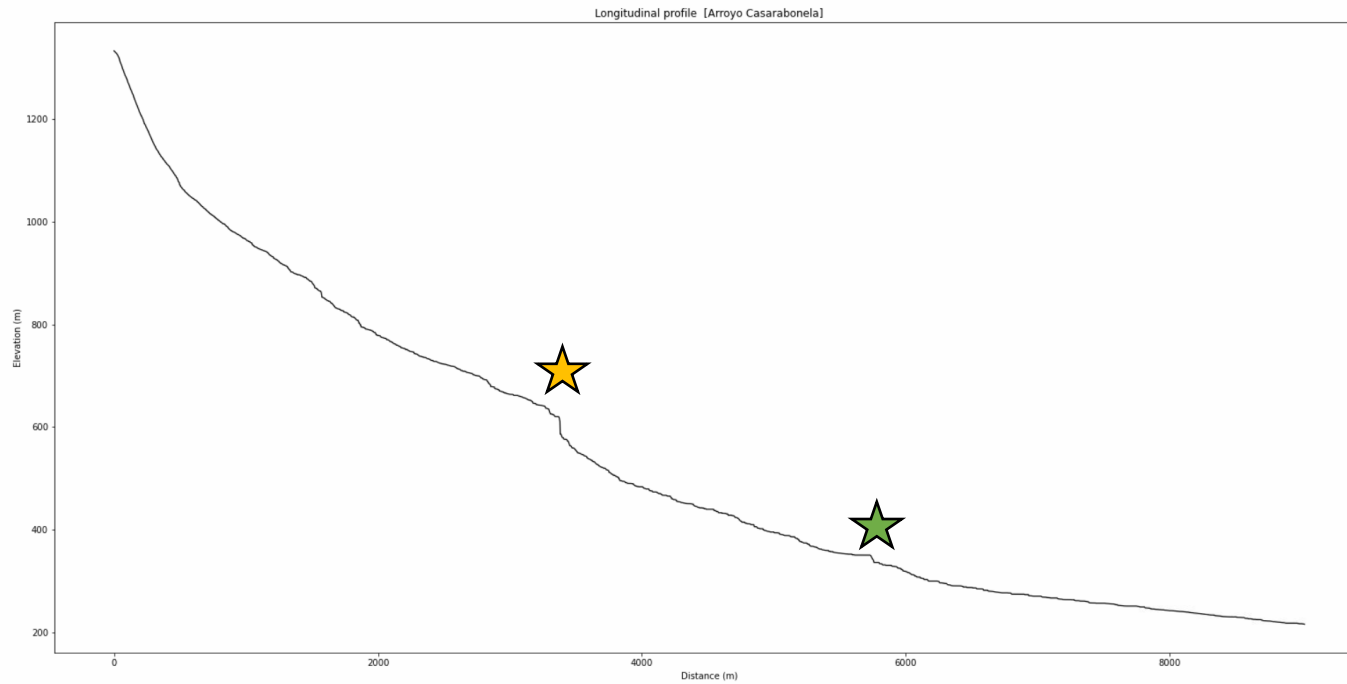


```
D:\Usuario\ROOT\Topopy\@_topopy-develop-2022\Scripts\script_strm_one_file.py
script_strm_one_file.py x  03_Channel_analysis.py x  04_Profiler_QtApp.py x  prueba_andreani.py x

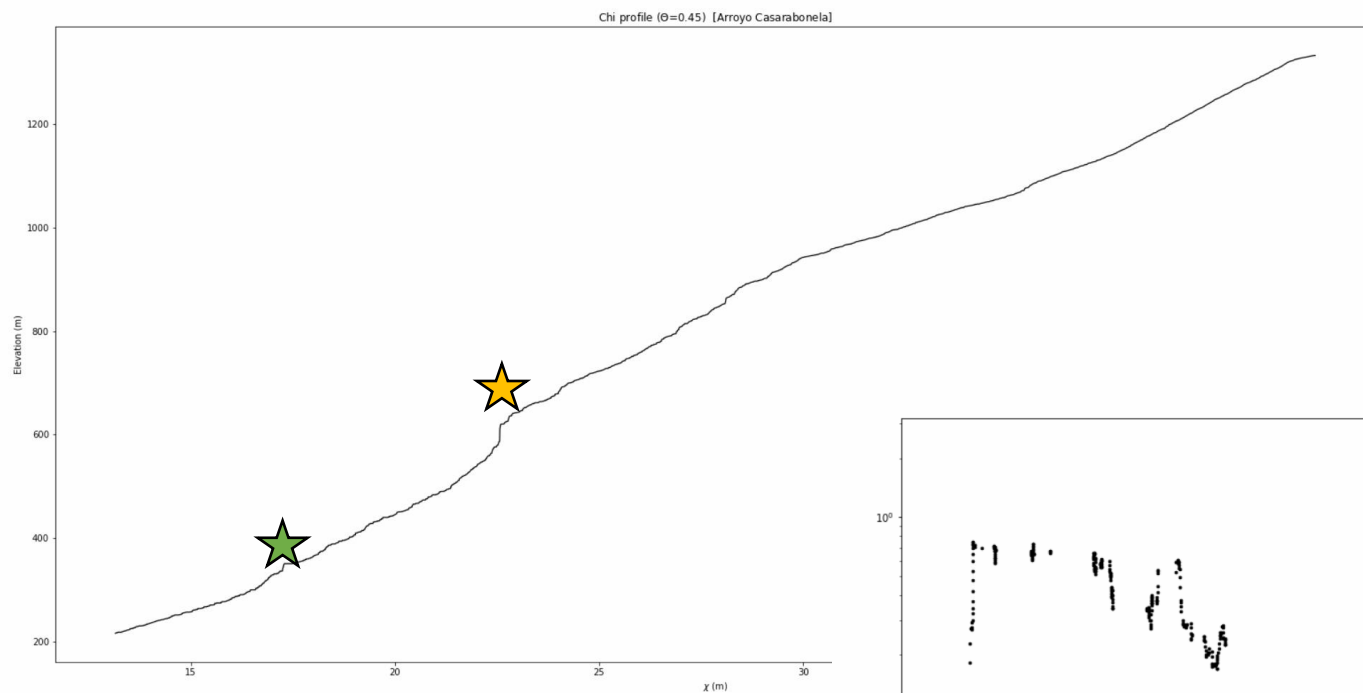
62  print("\t\t ¡Exito!\n\n")
63
64  print("Flujo de dirección - FLOW \n\t\t Cargando ...")
65
66  fd = Flow(dem, verbose = True)
67  fd.save("{}_fd.tif".format(outfolder,file))
68
69  print("\t\t ¡Exito!")
70
71  print("Flujo de acumulación - FLOW \n\t\t Cargando ...")
72
73  fac=fd.get_flow_accumulation()
74  fac.save("{}_fac.tif".format(outfolder,file))
75  print("\t\t ¡Exito!")
76
77  print("Network - NET \n\t\t Cargando ...")
78
79  net = Network(fd, 2000, 0.45, 5)
80  net.save("{}_net2k.net".format(outfolder,file))
81
82  shp_name="network_2k"
83  net.export_to_shp("{}_{}".format(outfolder,shp_name))
84
85
86  print("\t\t ¡Exito!")
87
88
89  for ro in ["heads","confluences","outlets"]:
90      poi = net.get_stream_poi(ro, coords="XY")
91      name = ("{}_poi_{}".format(outfolder,ro))
92     .savetxt(name, poi, delimiter=";", header="X;Y")
93      print("Archivo generado con éxito, guardado en: ", name)
94      poi, name)
95
96  net.get_stream_poi(kind="heads", coords="XY")
97  outs = net.get_stream_poi(kind="confluences", coords="XY")
98  et.get_stream_poi(kind="outlets", coords="XY")
99
100  tenemos las cuencas principales con outlets
101  fd.get_drainage_basins(outlets = outs)
102  ave("{}_basin_{}_{}.tif".format(outfolder,file,"outlets"))
103
104  tenemos las cuencas secundarias con outlets
105  = fd.get_drainage_basins(outlets = confluences)
106  ave("{}_basin_{}_{}.tif".format(outfolder,file,"confluences"))
107
108  =====
109  de la carpeta para guardar chi
110  rchi = ("{}_geo_index").format(outfolder)
111
112  carpeta existe continua, y si no la crea
113  th.exists(outfolderchi):
114      t(("Ya existe ruta especificada para {}".format(outfolderchi))
```



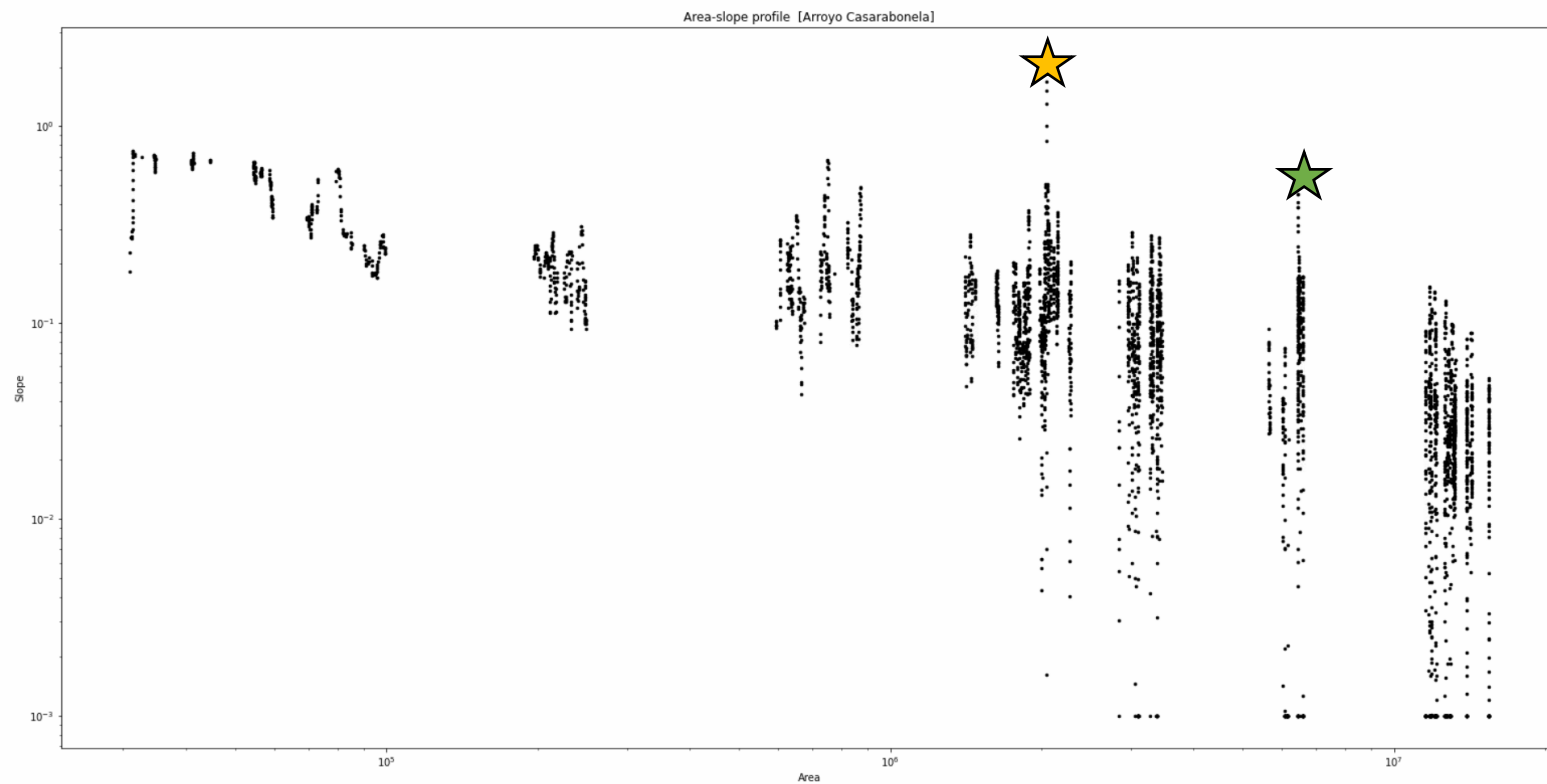
Morphometric analysis



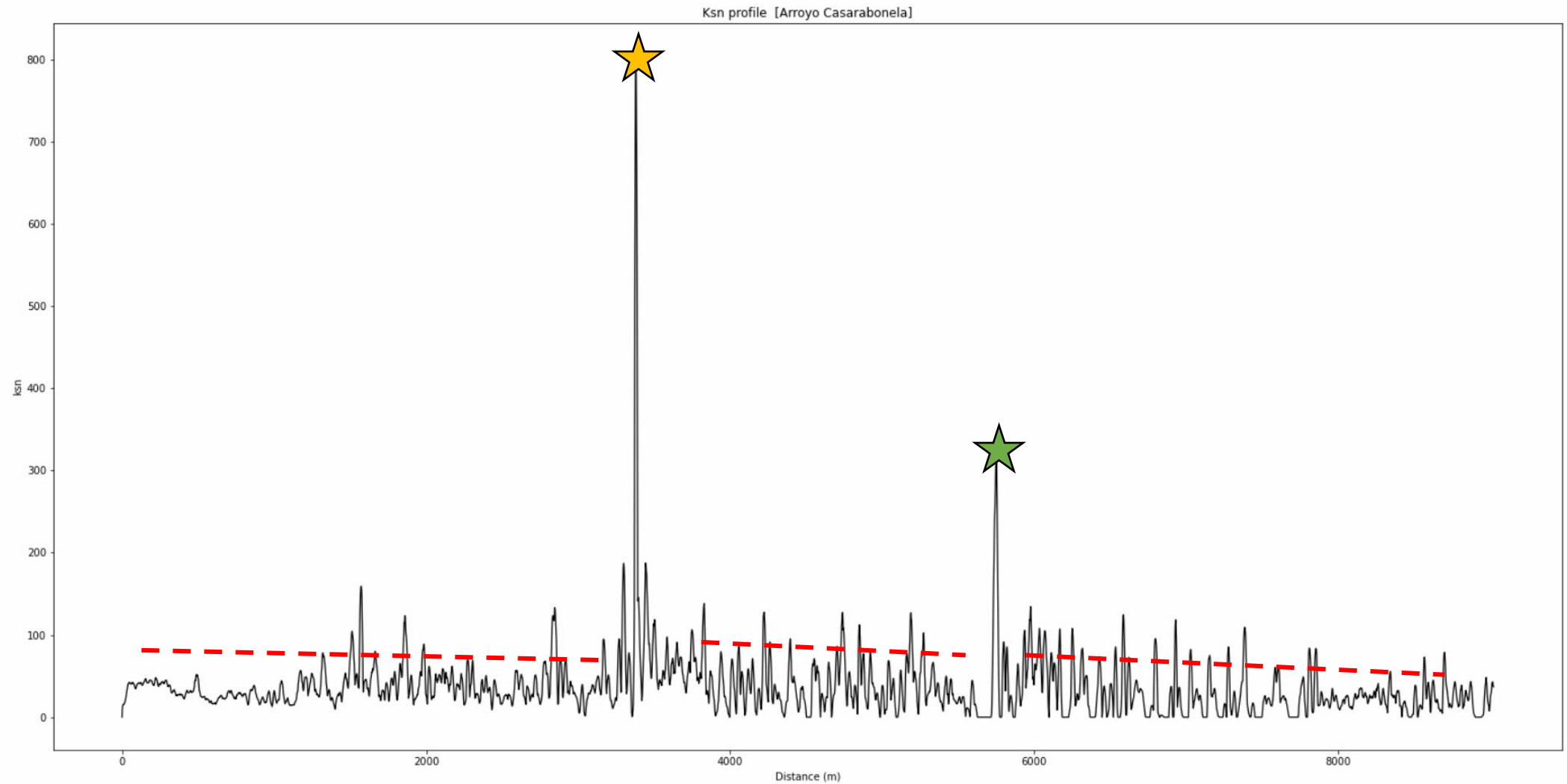
χ -index profile



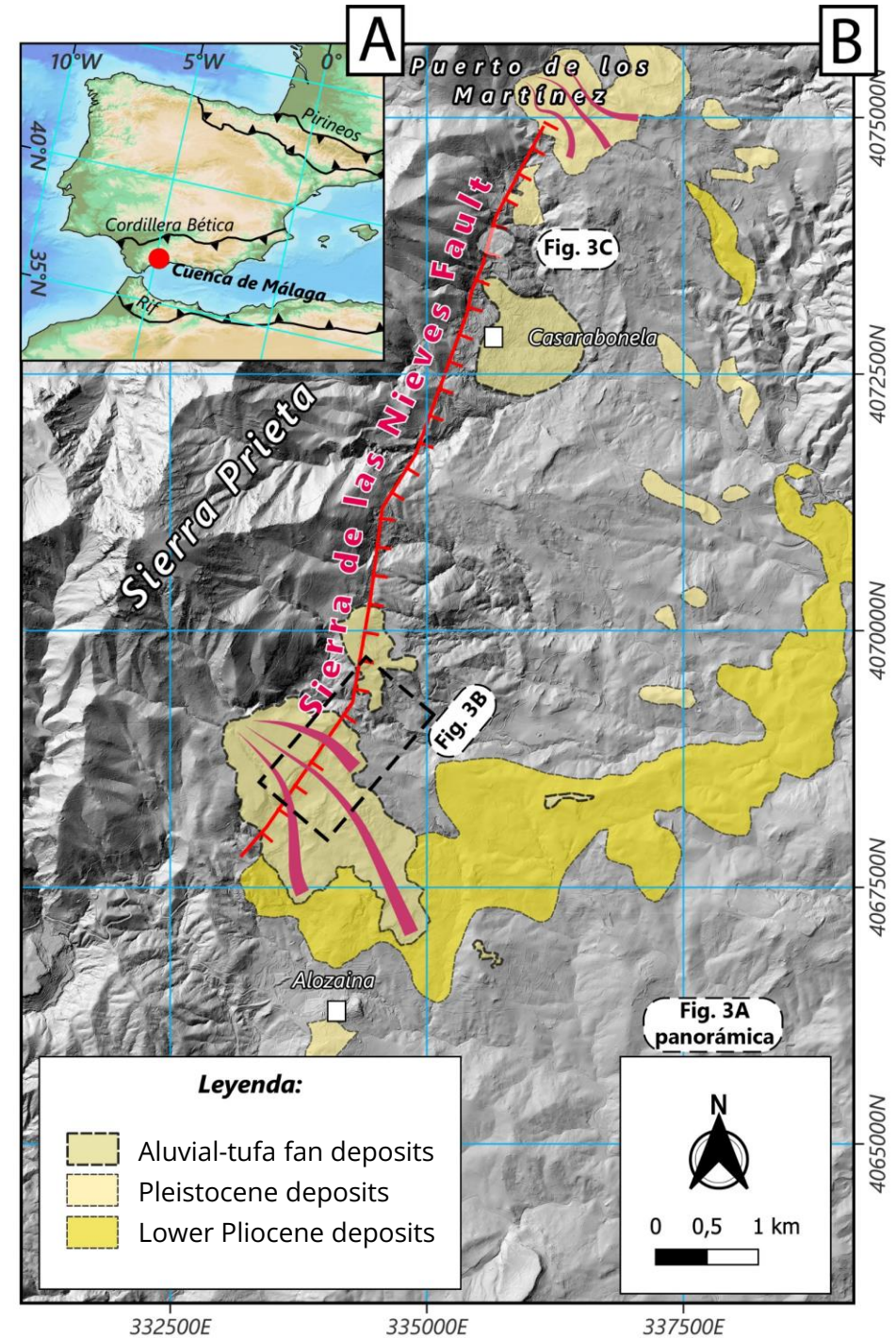
Log-log area-slope profile



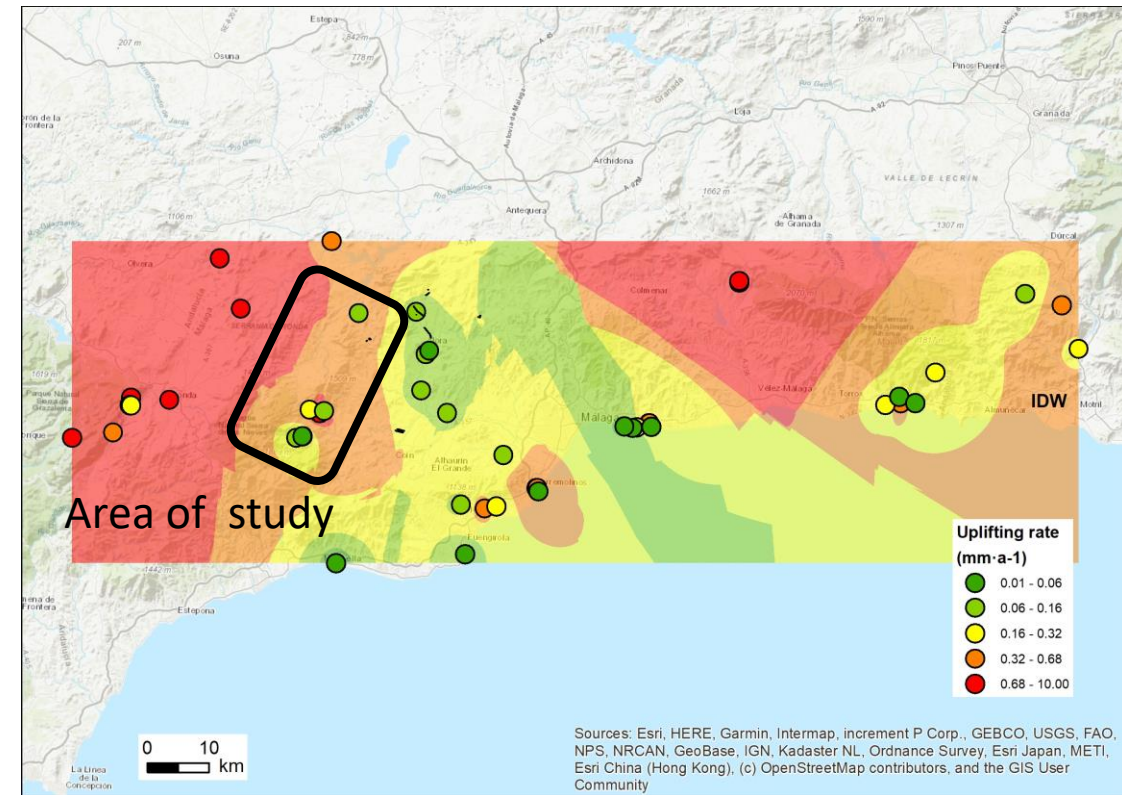
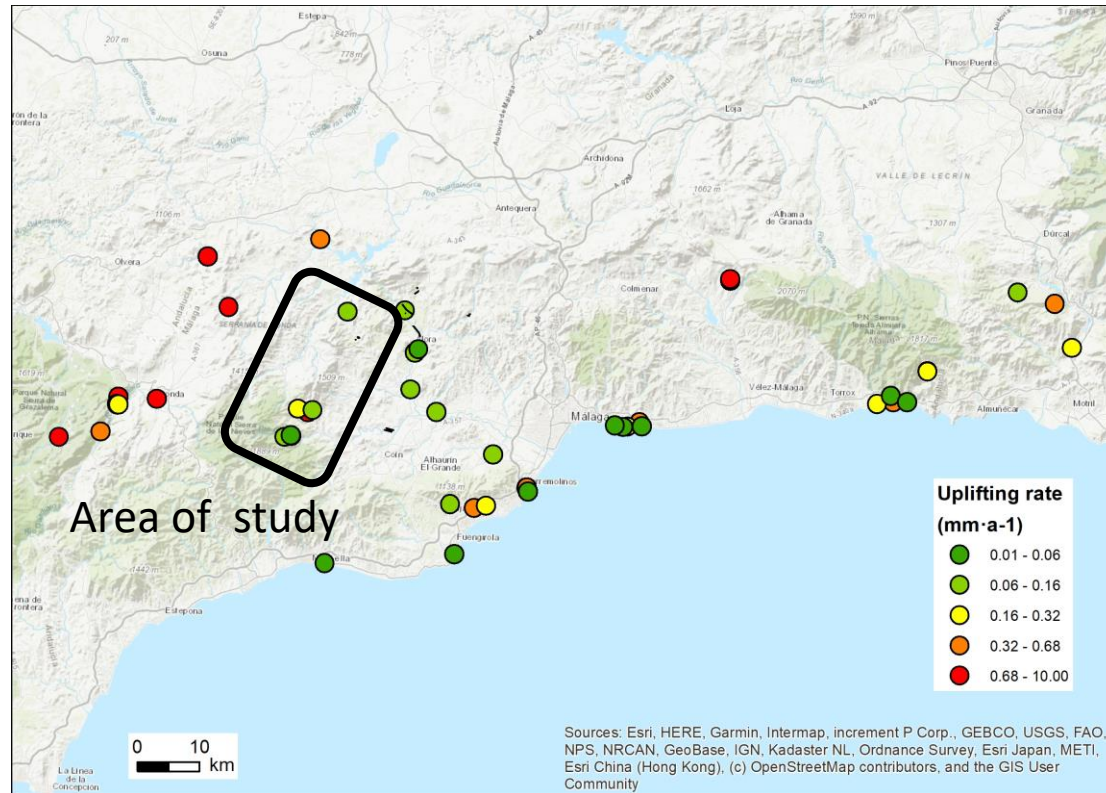
Ksn index profile ($m/n = 0.45$)



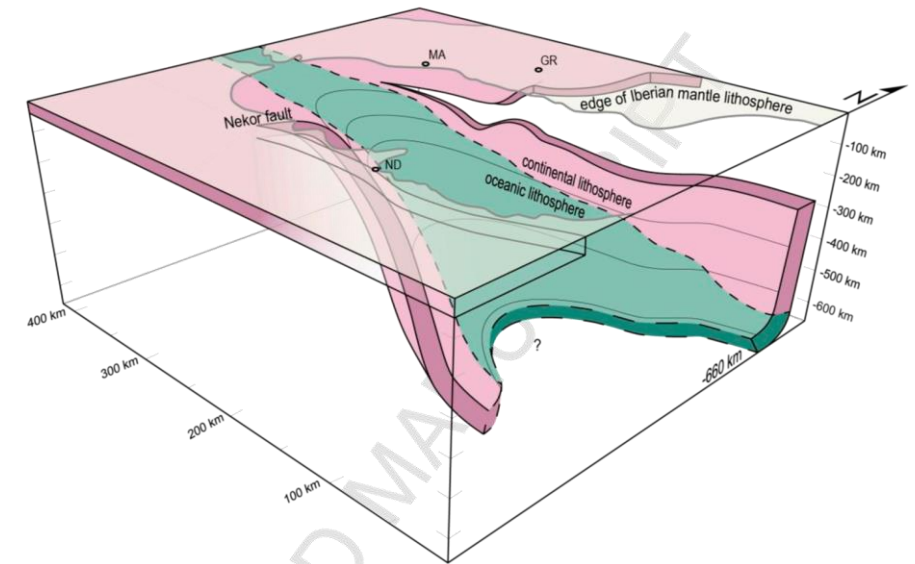
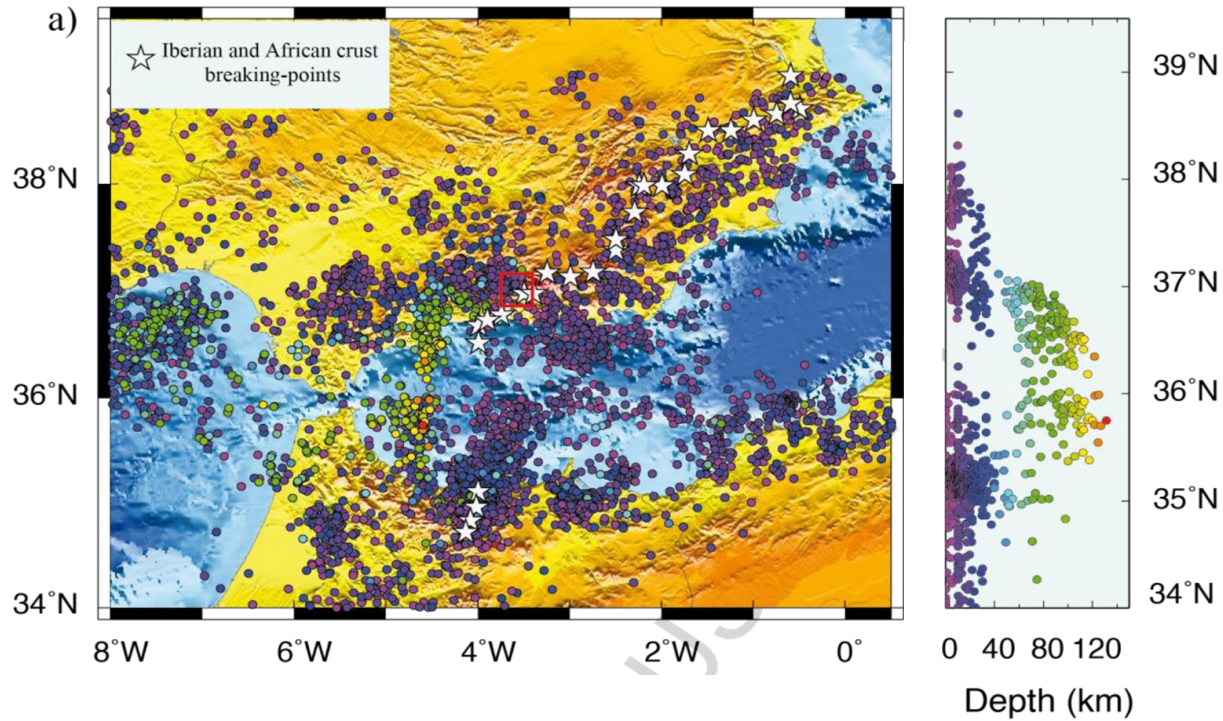
- The recognition of Pliocene marine deposits at 620 m.a.s.l. allow to calculate an uplift rate between **0.13 - 0.10 m/ky** for Sierras de las Nieves Fault system.



Geochronology previous works



Crustal structure beneath the Betic Cordillera



Mancilla *et al.*, 2015

Summary

- The use of morphometric analysis, fieldwork, geochronology and previous data allow to describe the Sierra de las Nieves Fault .
- New data samples using U/Th technique will improve the age of alluvial-tufa deposits and the uplift rates.
- The recognition of Pliocene marine deposits at 620 m.a.s.l. allow to calculate an uplift rate between ***0.13 - 0.10 m/ky*** for Sierras de las Nieves Fault system.
- The superficial expression of landscape of Málaga basin suggest a connection to the structure beneath the Betics, such as slab delamination.

Knickpoints and faulted alluvial fans: evidence of orogen parallel active extension related to delamination in the Western Betics.

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