



XVII CONFERENCIA COLOMBIANA
DE USUARIOS ESRI | **2015**

CON MAPAS SE DICE MEJOR

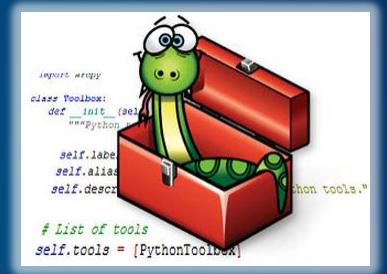


Automatización en ArcGIS Pro con Python

Marcela Londoño Botero - Xander Bakker

Contenido

- Introducción a ArcGIS Pro 1.1
- ¿Por que Python?
- Arcpy
- Análisis Raster con Python
- Python toolbox y Add-Ins
- SciPy Stack
- Trabajar con mapas
- Recursos
- GeoNet





ArcGIS Pro 1.1

Introducción

ArcGIS Pro



Contenido 2D.

Poderoso y sencillo.

Contenido 3D.

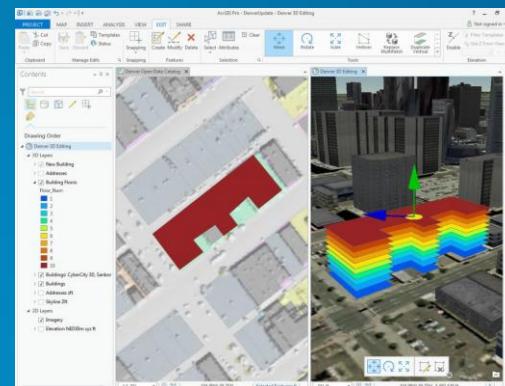


Rápido.

Arquitectura



Nativo a 64 Bits.



Motor de gráficos
2D y 3D.



Integración con ArcGIS
Online y almacenamiento
en la nube.



Python

¿Quienes están usando Python actualmente?



Power of Python

Bill Moreland
Mark Janikas

Jim Tocherman @jtocherman · Mar 12
If your not using **#Python**, your doing things the hard way. **#DevSummit**
#ProTip

Expand

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Followed by Shaun Walbridge and 11 others
Brett Lord-Castillo @blordcastillo · Mar 11
Time for a big portion. Bill Moreland "python is the language of **#ArcGIS**"
#devsummit

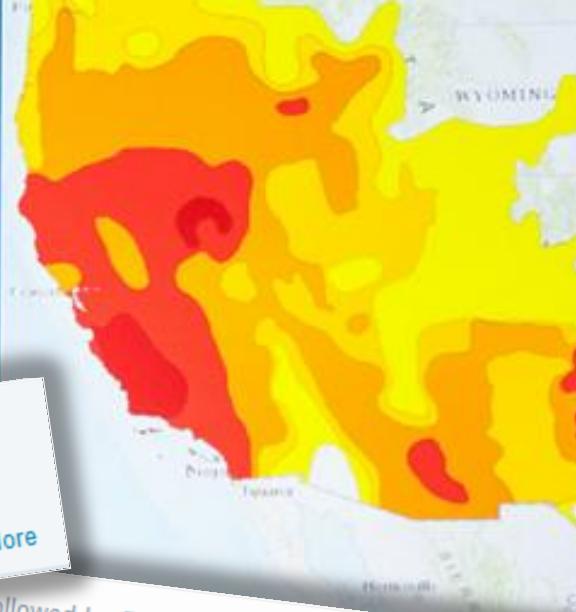
from Palm Springs, CA

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Ted Chapin @ChapinGIS · Mar 11
"Python is the language of GIS" **#DevSummit**
Expand

Reply Retweet Favorite More

Power of
Python
Bill Moreland
Mark Janikas



¿Por qué Python?

```
1 #include<stdio.h>
2 #include<conio.h>
3
4 int main() {
5     printf("Hello World!");
6     getch();
7 }
```

C++

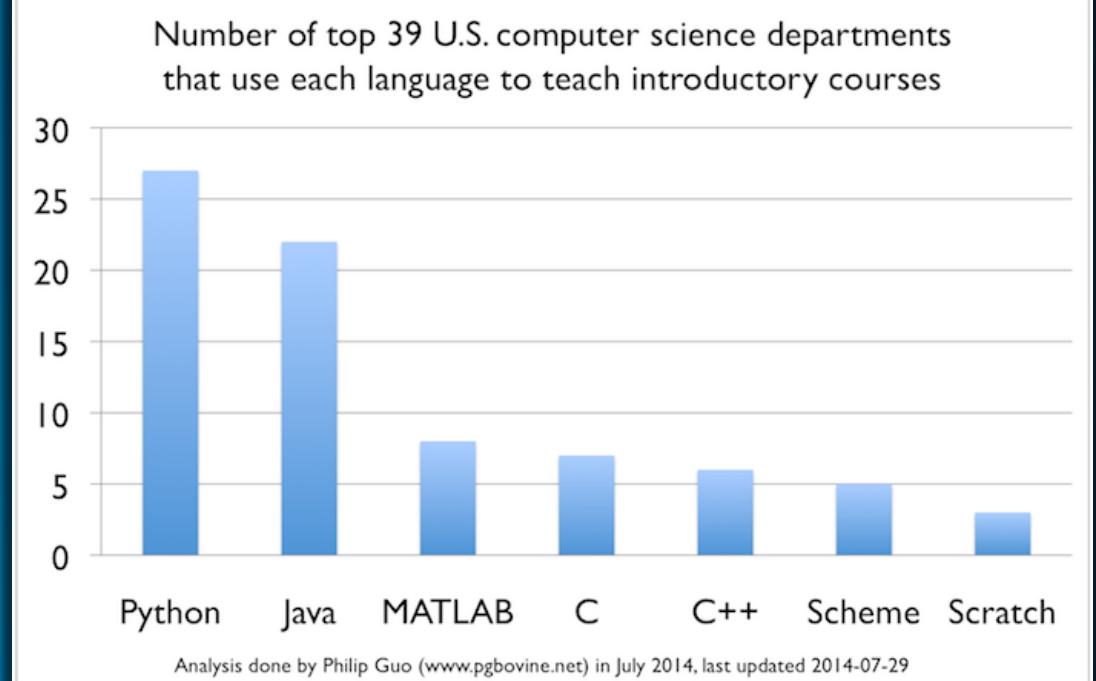
```
1 public class HelloWorld {
2
3     public static void main(String[] args) {
4         System.out.println("Hello World!");
5     }
6 }
7 }
```

Java

```
1 print "Hello World!"
```

Python

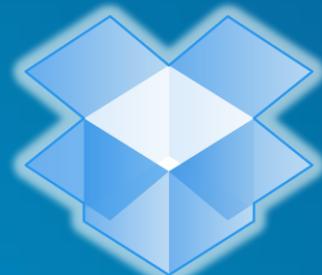
Python es fácil



¿Por qué Python?



Instagram



Dropbox



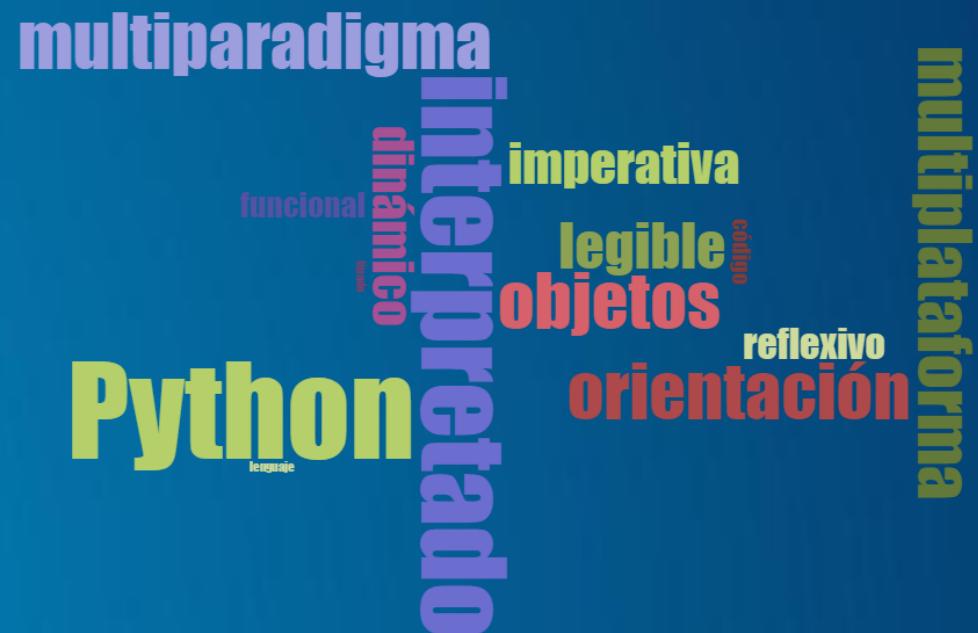
Pinterest



... a pesar de ser sencillo, es poderoso ...

¿Por qué Python?

- Código abierto, libre distribución.
- Sencillo, fácil de aprender y mantener.
- Amplia aceptación.
- Multiplataforma.
- Tareas programadas.
- Modular (56.000 paquetes en PyPI).



Estructura y elementos del lenguaje

Estructura

- Indentación

```
inicio de la estructura de control:  
expresiones
```

- Codificación

```
# -*- coding: utf-8 -*-  
print "En el Ñágara encontré un Ñandú"
```

- Asignación múltiple

```
a, b, c = 'string', 15, True
```

Estructura y elementos del lenguaje

Variables

- Tipos de datos: Cadena de texto, número (entero, octal, hexadecimal, real, booleano)

```
mi_cadena = "Hola Mundo!"  
edad = 35  
precio = 7435.28  
verdadero = True
```

- Tipos de datos complejos: Tuplas, Listas, Diccionarios.

```
mi_tupla = ('cadena de texto', 15, 2.8, 'otro dato', 25)  
  
mi_lista = ['cadena de texto', 15, 2.8, 'otro dato', 25]  
mi_lista[2] = 3.8 # el tercer elemento ahora es 3.8  
mi_lista.append('Nuevo Dato')
```

Estructura y elementos del lenguaje

Variables

- Tipos de datos: Cadena de texto, número (entero, octal, hexadecimal, real, booleano)
- Tipos de datos complejos: Tuplas, Listas, Diccionarios.
- Objetos (geometrías, referencias espaciales, etc)

```
# -*- coding: utf-8 -*-
import arcpy
punto = arcpy.Point()
punto_geo = arcpy.PointGeometry()
multi_punto = arcpy.Multipoint()
linea = arcpy.Polyline()
poligono = arcpy.Polygon()

# propiedades
el_area = poligono.area
conteo = multi_punto.pointCount

# métodos
punto_medio = linea.positionAlongLine(0.5, True)
punto_projectado = punto_geo.projectAs(sr, trans)
pol_convexhull = multi_punto.convexHull()
```

Estructura y elementos del lenguaje

Estructuras de Control de Flujo

- Control condicional (if)

```
if semáforo == verde:  
    print "Cruzar la calle"  
else:  
    print "Esperar"
```

- Control iterativo (while, for)

```
mi_lista = ['Juan', 'Antonio', 'Pedro', 'Herminio']  
for nombre in mi_lista:  
    print nombre
```

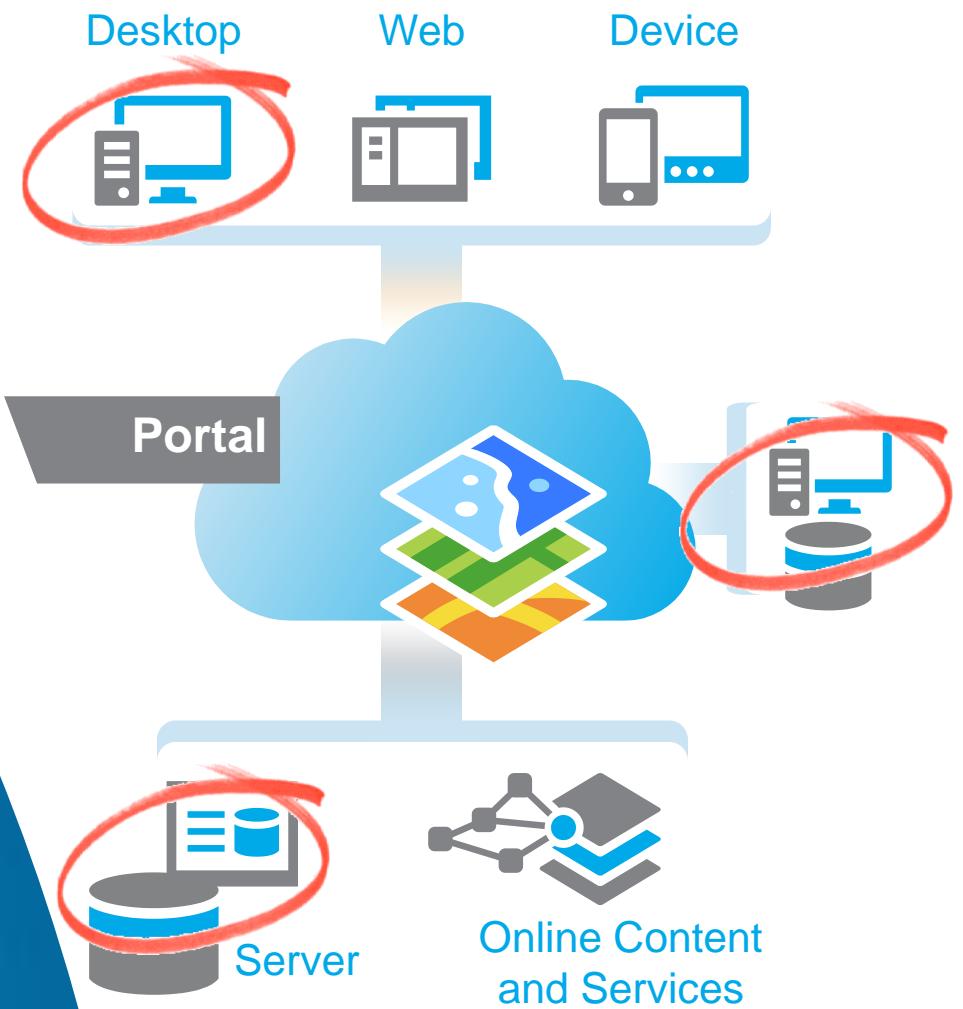
```
# -*- coding: utf-8 -*-  
anio = 2001  
while anio <= 2012:  
    print "Informes del Año", str(anio)  
    anio += 1
```

Arcpy

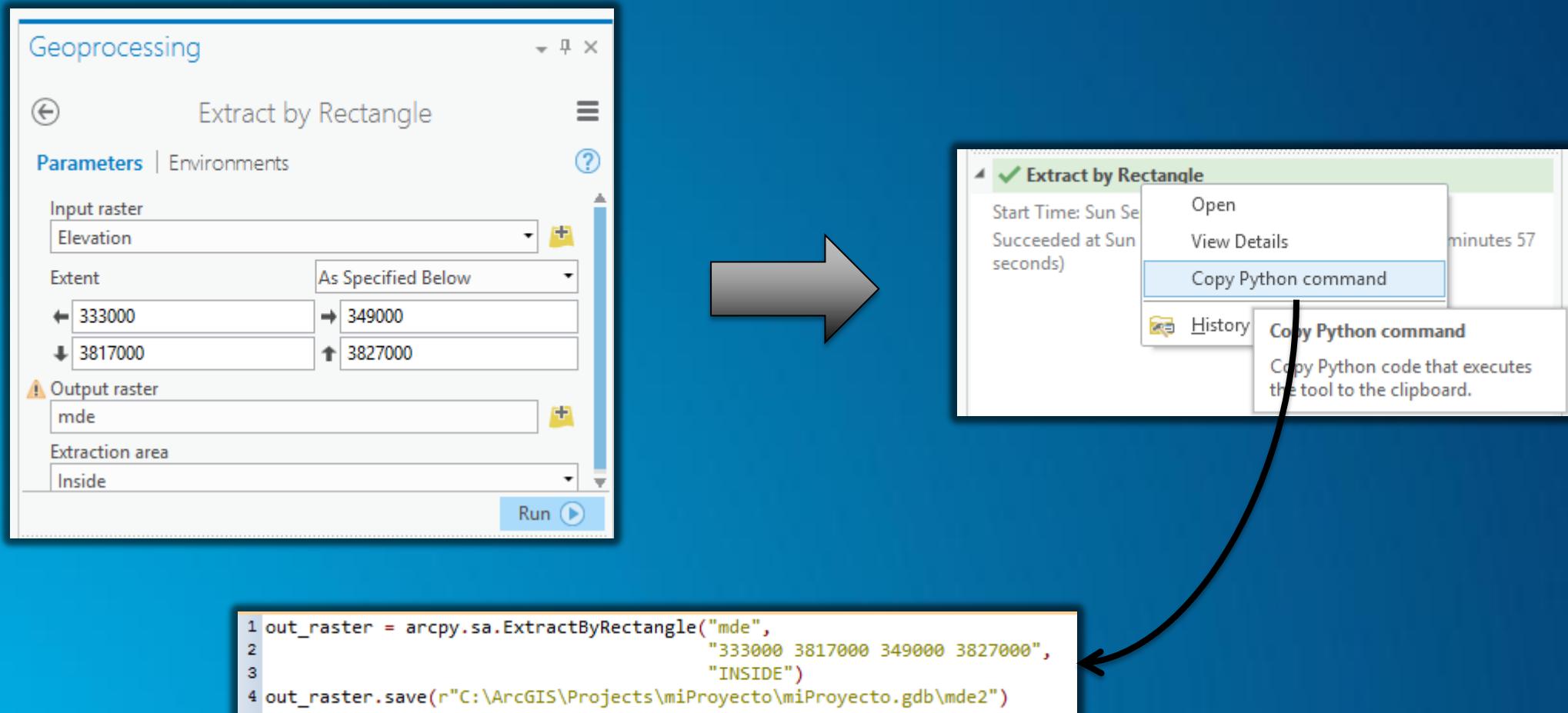
Biblioteca de Python + elementos propios de ArcGIS



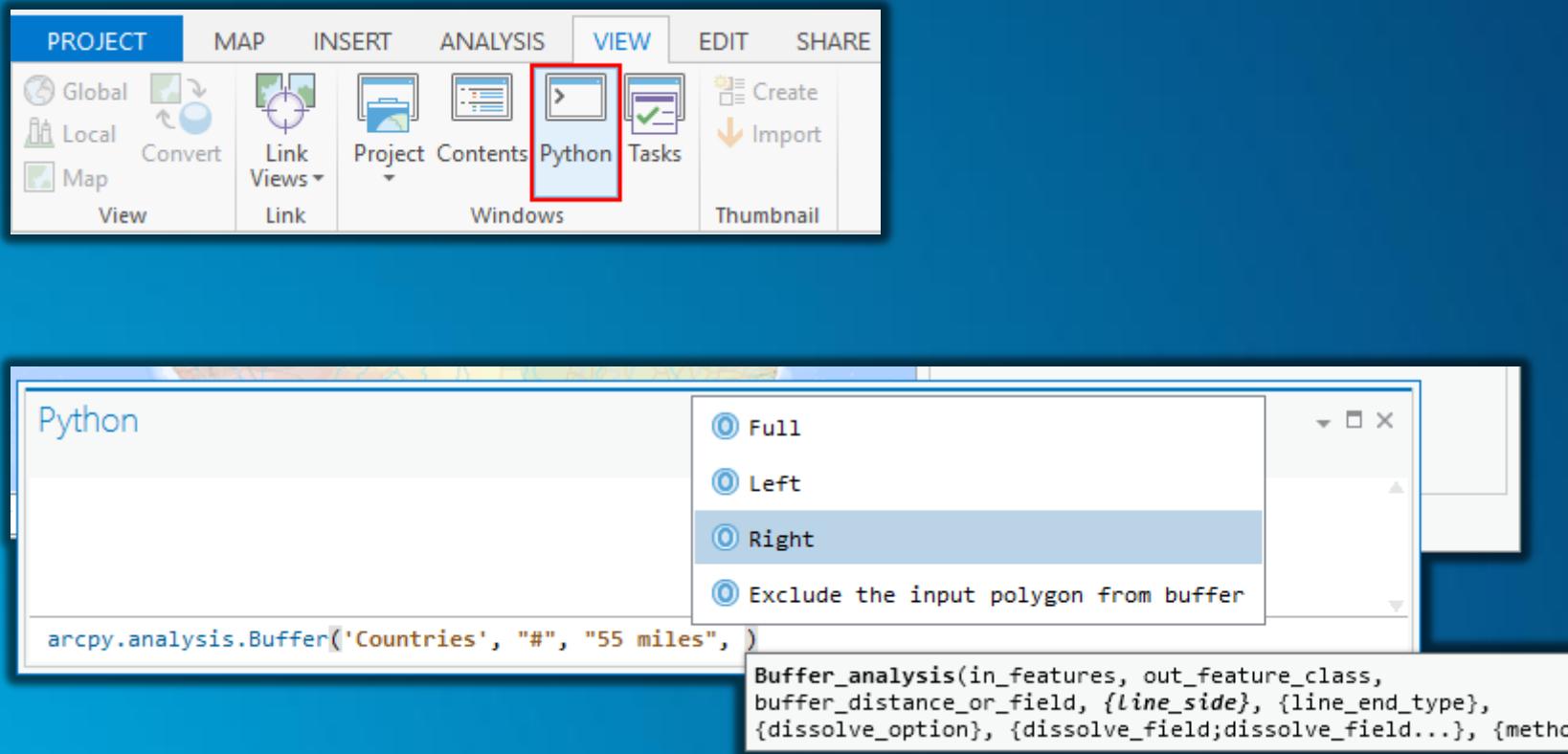
Python en la Plataforma ArcGIS



Ventana de resultados



La ventana de Python



Módulos de arcpy en ArcGIS Pro

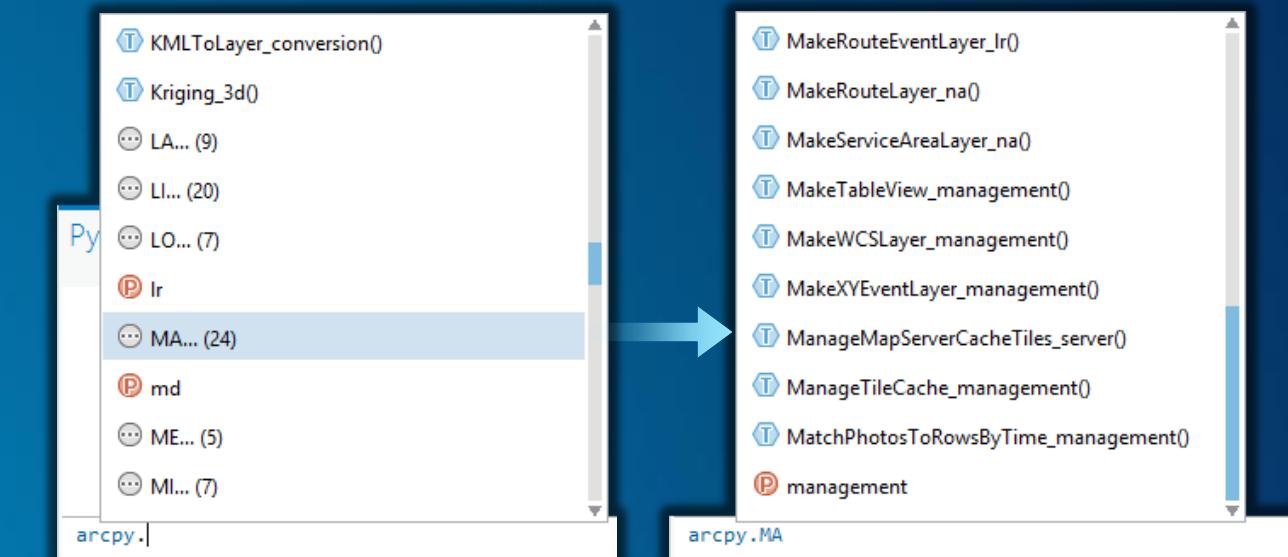
Data Access module – *arcpy.da*

Mapping module – *arcpy.mp*

Network Analyst module – *arcpy.na*

Spatial Analyst module – *arcpy.sa*

Workflow Manager module – *arcpy.wmx*



Requieren licencia (extensión)



Demo: arcpy

Describe, Listas y Diccionarios

Demo

```
desc = arcpy.Describe('Andenes')
sr = desc.spatialReference
sr.name
# 'GCS_MAGNA'

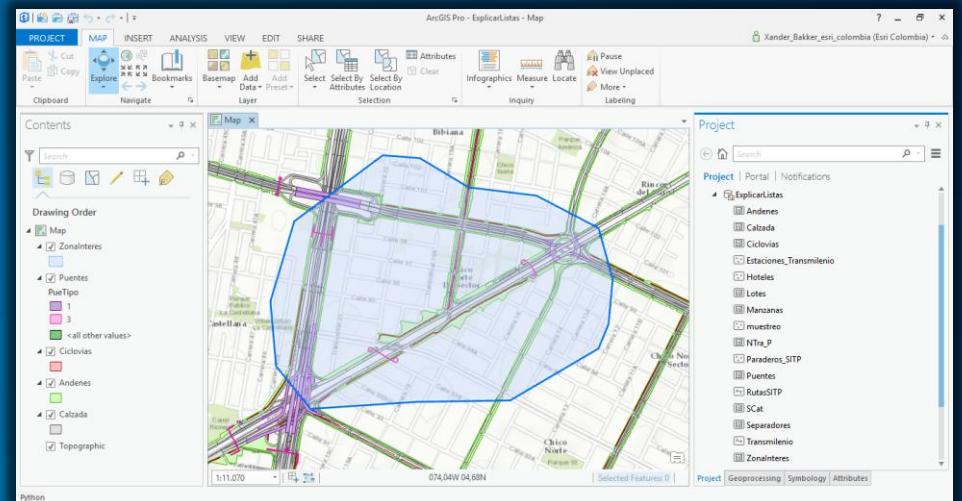
sr.factoryCode
# 4686

desc.shapeType
# 'Polygon'

# jalar 4 featureclasses en lista
lista1 = ["Puentes", "Ciclovias", "Andenes", "Calzado"]
for nombre in lista1:
    print(nombre)
# Puentes
# Ciclovias
# Andenes
# Calzado

ws =
"C:\\\\Users\\\\Xander\\\\Documents\\\\ArcGIS\\\\Projects\\\\ExplicarListas\\\\ExplicarListas.gdb"
lista2 = arcpy.ListFeatureClasses('*', "POINT", "")
print(lista2)
# ['Hoteles', 'Estaciones_Transmilenio', 'Paraderos_SITP', 'muestreo']

for nombre in lista2:
    desc = arcpy.Describe(nombre)
    print(nombre, desc.spatialReference.name)
# Hoteles GCS_WGS_1984
# Estaciones_Transmilenio GCS_WGS_1984
# Paraderos_SITP GCS_WGS_1984
# muestreo GCS_MAGNA
```



Demo

```
lista3 = [nombre for nombre in lista2 if
arcpy.Describe(nombre).spatialReference.name == 'GCS_WGS_1984']
print(lista3)
# ['Hoteles', 'Estaciones_Transmilenio', 'Paraderos_SITP']

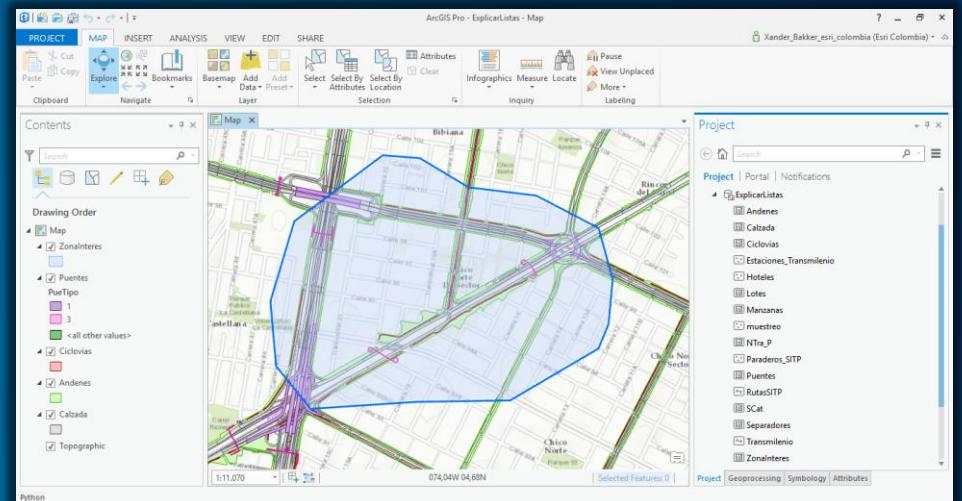
for nombre in lista3:
    nombre_salida = "{0}_recorte".format(nombre)
    print("Recortando {0} para crear fc {1}".format(nombre, nombre_salida))
    arcpy.Clip_analysis(nombre, 'ZonaInteres', nombre_salida)
# Recortando Hoteles para crear fc Hoteles_recorte
# Recortando Estaciones_Transmilenio para crear fc Estaciones_Transmilenio_recorte
# Recortando Paraderos_SITP para crear fc Paraderos_SITP_recorte

arcpy.GetCount_management('Andenes')
# <Result '346'>

int(arcpy.GetCount_management('Andenes').getOutput(0))
# 346

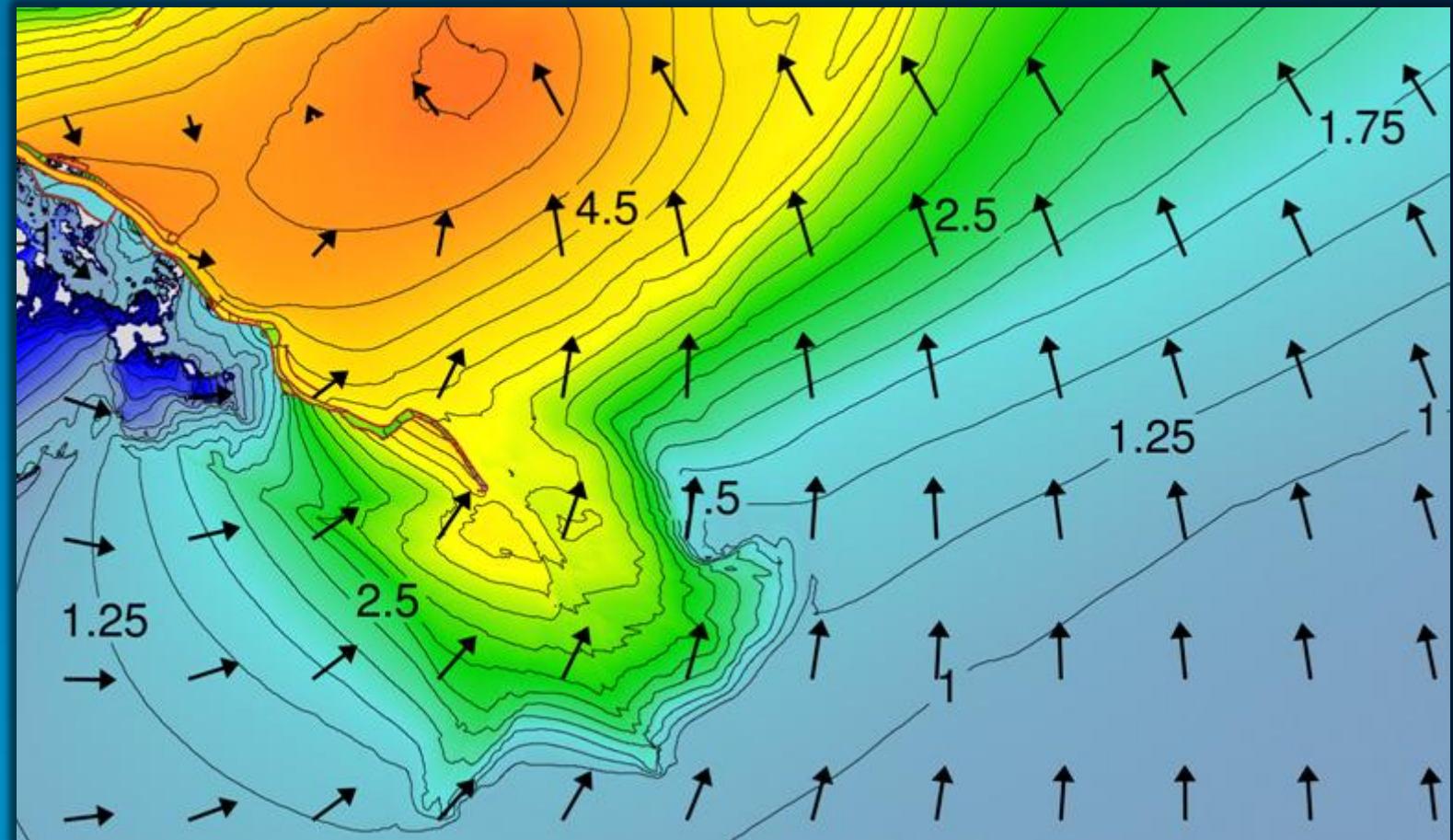
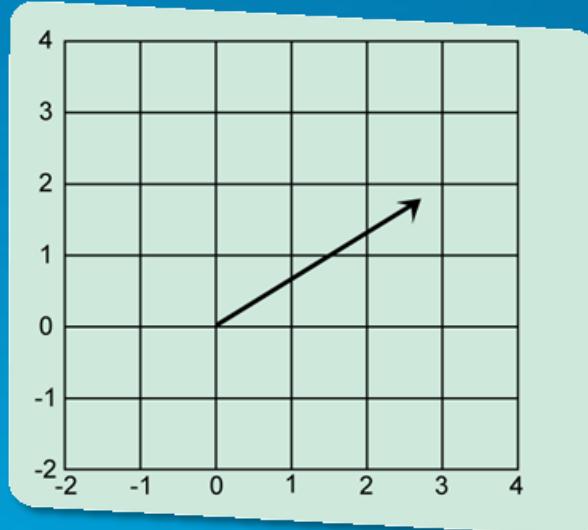
def Contar(fc):
    return int(arcpy.GetCount_management(fc).getOutput(0))

Contar("Puentes")
# 44
```

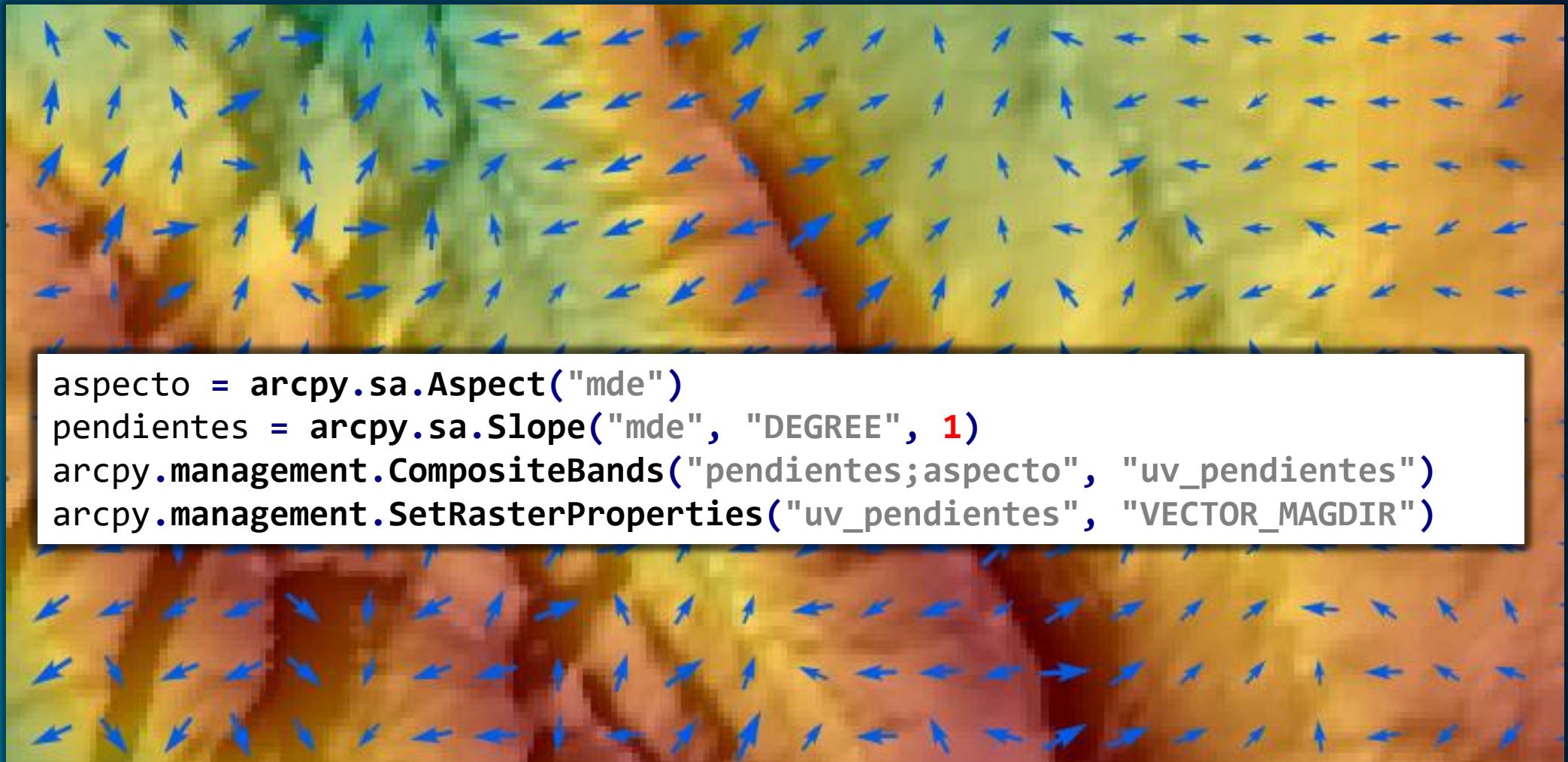


Análisis raster con Python

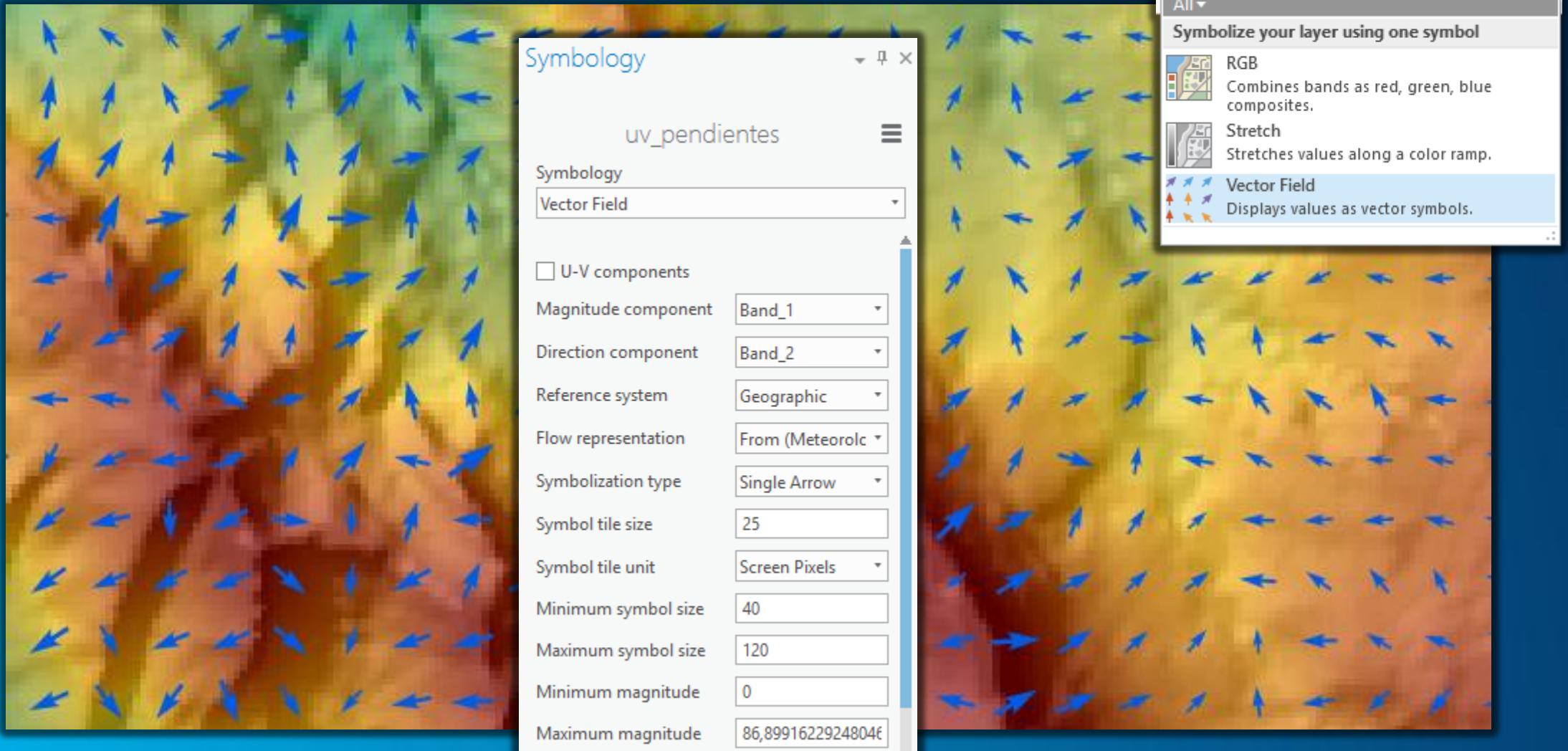
Simbología “Vector Field”



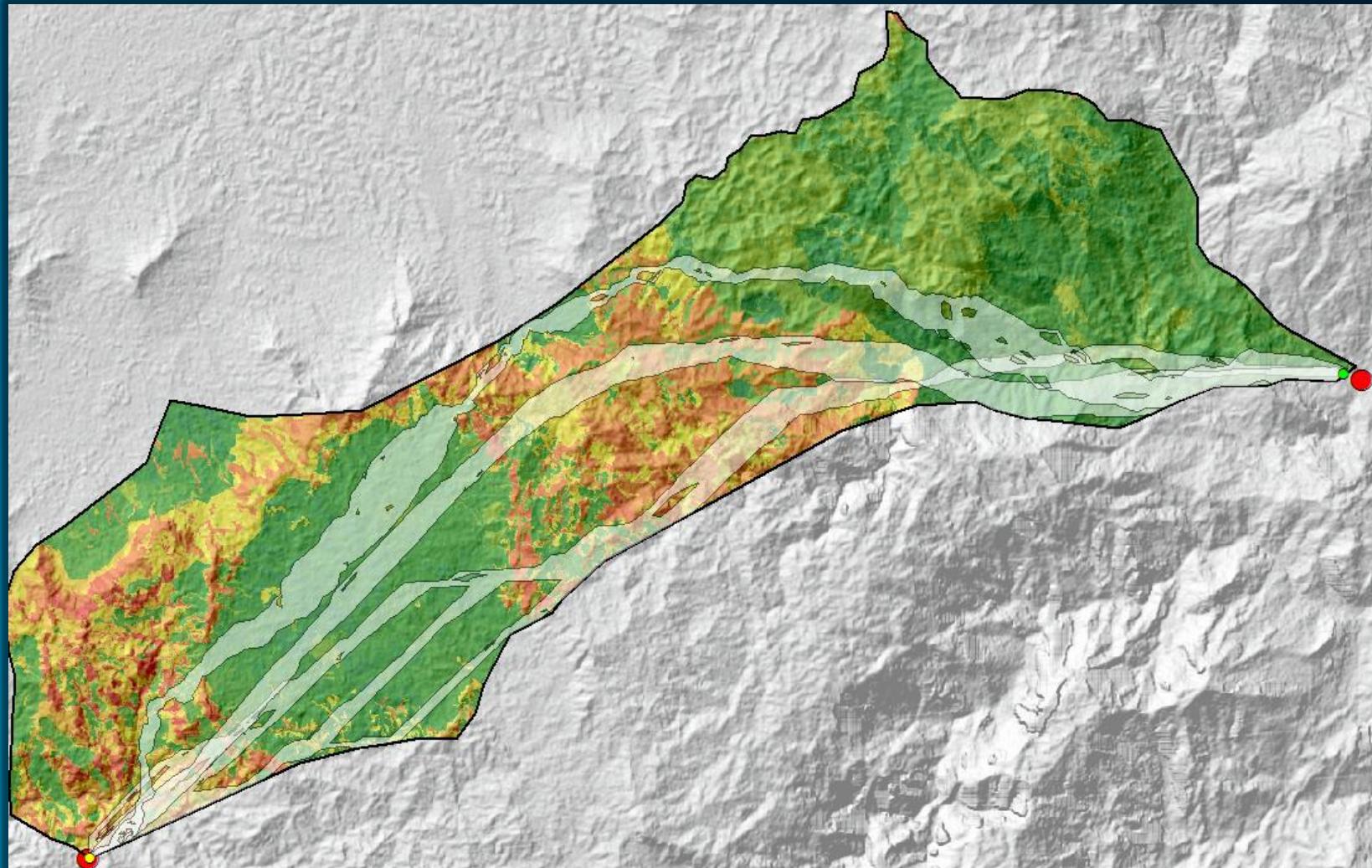
Simbología “*Vector Field*”, aplicada a un MDE



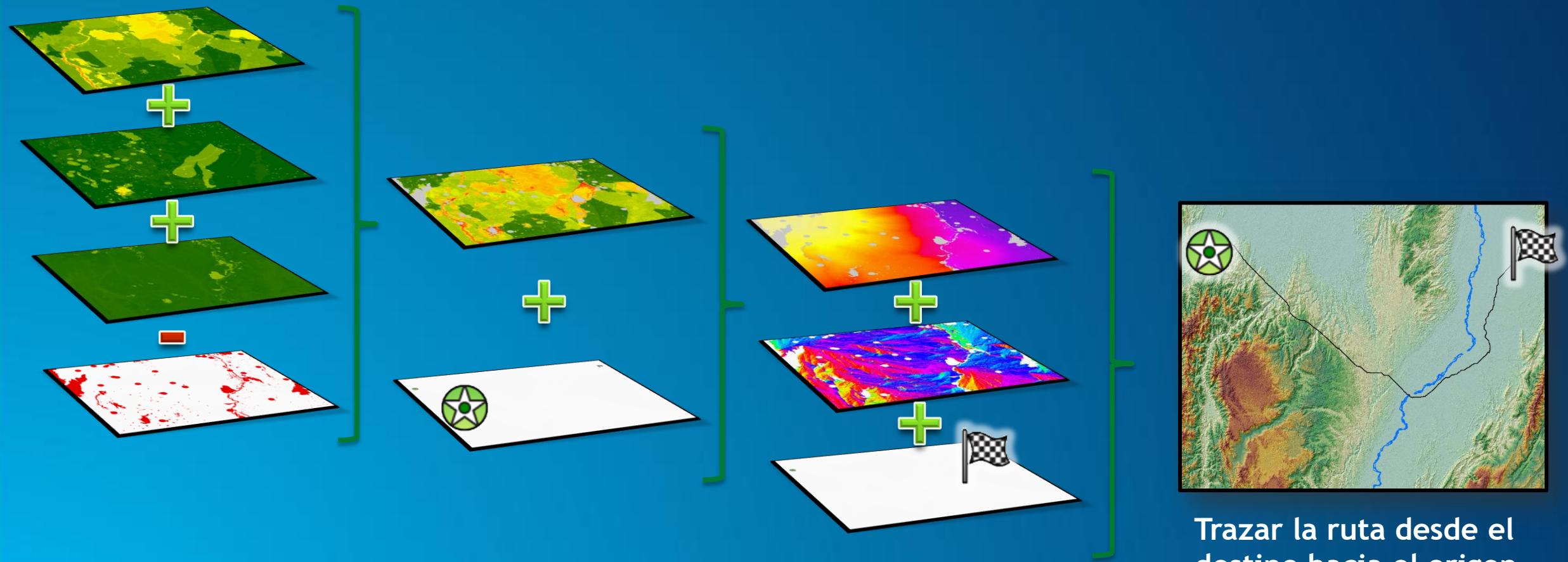
Simbología “Vector Field”, aplicada a un MDE



Análisis raster con Python



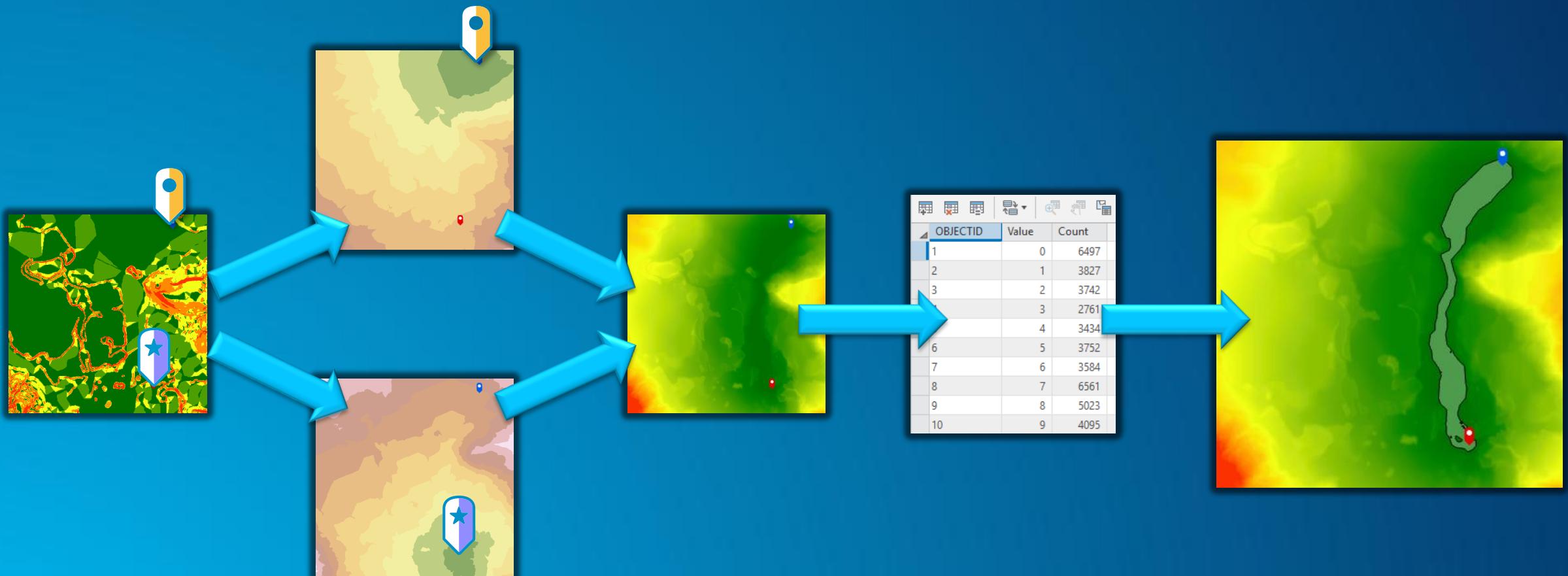
Ruta óptima



Trazar la ruta desde el destino hacia el origen

Calcular un *Corredor* de ruta óptima según método EPRI

Demo



Demo

ArcGIS Pro - 2 Analysis Raster - Map

FEATURE LAYER

PROJECT MAP INSERT ANALYSIS VIEW EDIT SHARE APPEARANCE LABELING DATA

Xander_Bakker_esri_colombia (Esri Colombia)

Clipboard Paste Cut Copy Explore Bookmarks Basemap Add Data Add Preset Select Select By Attributes Select By Location Attributes Clear Infographics Measure Locate Pause View Unplaced More Labeling

Contents

Map

Search

Drawing Order

- Map
 - punto_inicio
 - punto_fin
 - cmp_total_macroCorredor
 - cmp_total
 - Topographic

Value

6,9391

1,52767

Topographic

1:78,733 075,21W 06,02N Selected Features: 0

Geoprocessing

Calcular Macro Corredor

Raster con Costos: cmp_total

Punto de Inicio: punto_inicio

Punto Final: punto_fin

Porcentaje: 10

Macro Corredor: is Raster\2 Analysis Raster.gdb\cmp_total_macroCorredor1

Run

Calcular Macro Corredor

Start Time: Sat Sep 26 15:32:18 2015

Running script macroCorredor...

Leyendo parametros de entrada...

Calculando costo distancia desde el punto de inicio

Calculando costo distancia desde el punto final

Project Geoprocessing Symbology Attributes

Python

The screenshot displays a geoprocessing workflow in ArcGIS Pro. On the left, the 'Contents' pane shows a map with several layers: 'punto_inicio' (purple dot), 'punto_fin' (blue dot), 'cmp_total_macroCorredor' (highlighted in blue), 'cmp_total' (color-coded raster), and 'Topographic'. A color scale for 'cmp_total' ranges from green (1,52767) to orange (6,9391). The main map view shows a terrain surface with contour lines and a colored cost distance raster overlay. The 'Geoprocessing' pane on the right shows a job named 'Calcular Macro Corredor' with parameters for 'Raster con Costos' (set to 'cmp_total'), 'Punto de Inicio' (set to 'punto_inicio'), 'Punto Final' (set to 'punto_fin'), and 'Porcentaje' (set to 10). The 'Macro Corredor' output is set to 'is Raster\2 Analysis Raster.gdb\cmp_total_macroCorredor1'. The status bar at the bottom indicates the start time of the process.

Demo

```
import os

# datos de entrada
ras_cost = r"C:\CCU2015\2 Analisis Raster\2 Analisis Raster.gdb\cmp_total"
fc_inicio = r"C:\CCU2015\2 Analisis Raster\2 Analisis Raster.gdb\punto_inicio"
fc_final = r"C:\CCU2015\2 Analisis Raster\2 Analisis Raster.gdb\punto_fin"
porcentaje = 0.10
fc_salida = r"C:\CCU2015\2 Analisis Raster\2 Analisis Raster.gdb\MacroCorredor_v01"

# definir el espacio de trabajo
ws, fc_nombre = os.path.split(fc_salida)
arcpy.env.workspace = ws
arcpy.env.overwriteOutput = True

# costos de distancia y la suma
costdist1 = arcpy.sa.CostDistance(fc_inicio, ras_cost)
costdist2 = arcpy.sa.CostDistance(fc_final, ras_cost)
costdist_suma = costdist1 + costdist2

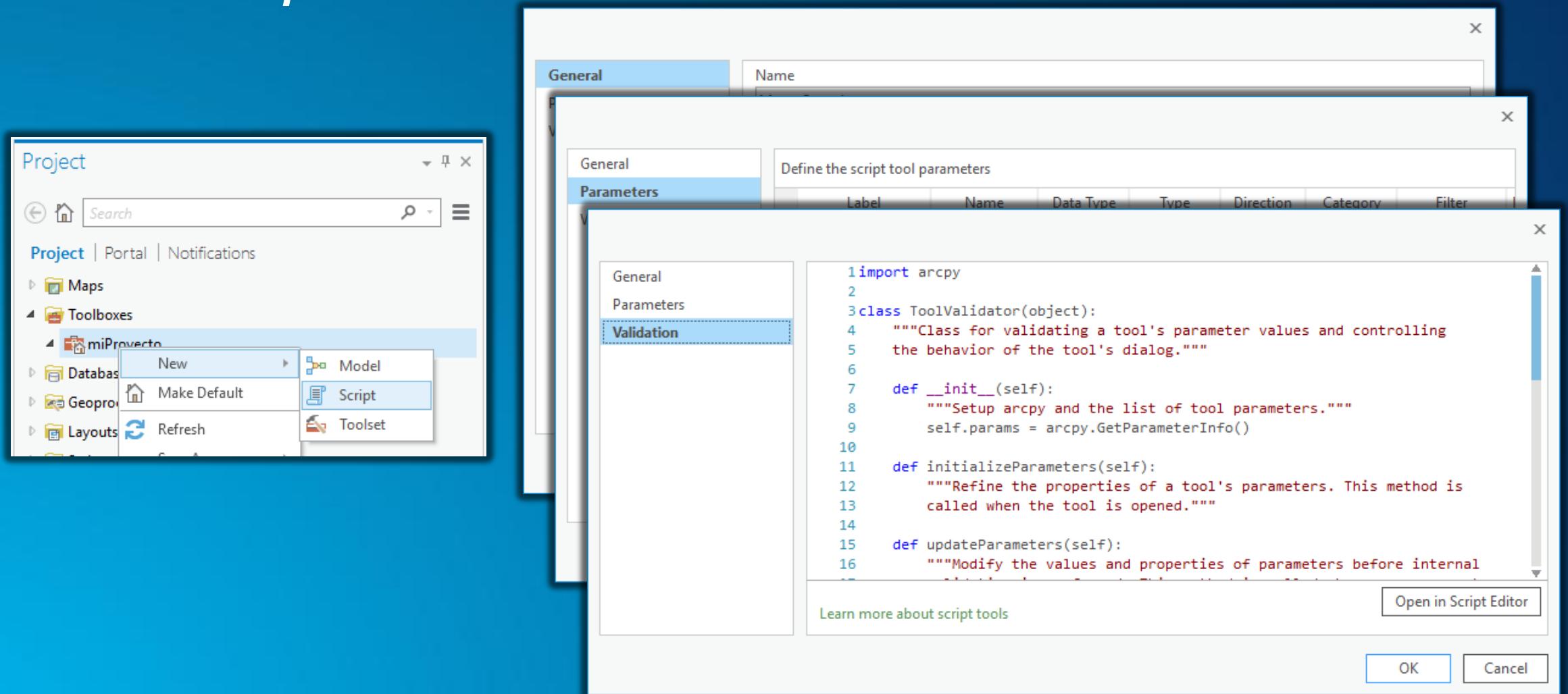
# crear un mapa entero
cd_rango1000f1 = (costdist_suma - costdist_suma.minimum) / (costdist_suma.maximum - costdist_suma.minimum) * 1000
cd_rango1000 = arcpy.sa.Int(cd_rango1000f1)

# diccionario con valor de celda y conteo
fld_val = "Value"
fld_cnt = "Count"
dct = {r.getValue(fld_val): r.getValue(fld_cnt) for r in arcpy.SearchCursor(cd_rango1000)}

# determinar el valor de celda que corresponde a 10% cumulativo
total = sum(dct.values())
frac = total * porcentaje
val, suma = 0, 0
for v, cnt in sorted(dct.items()):
    suma += cnt
    if suma < frac:
        val = v

# generar macro corredor y convertir a poligonos
macro_corr = arcpy.sa.Con(cd_rango1000 <= val, 1)
arcpy.RasterToPolygon_conversion(macro_corr, fc_salida)
```

Crear un *Script Tool*



Python Toolbox y Add-Ins

ArcGIS Pro

Caja de Herramientas Python

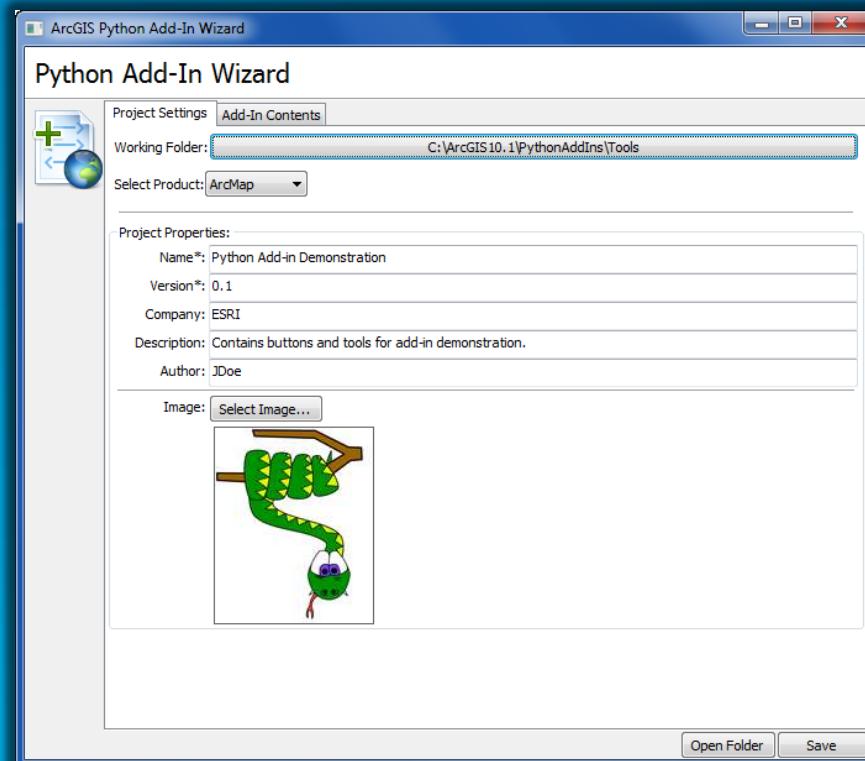
Python toolbox

- Value tables (*GPValueTable*).
- Tipos de datos compuestos.
- Validación de licencias.

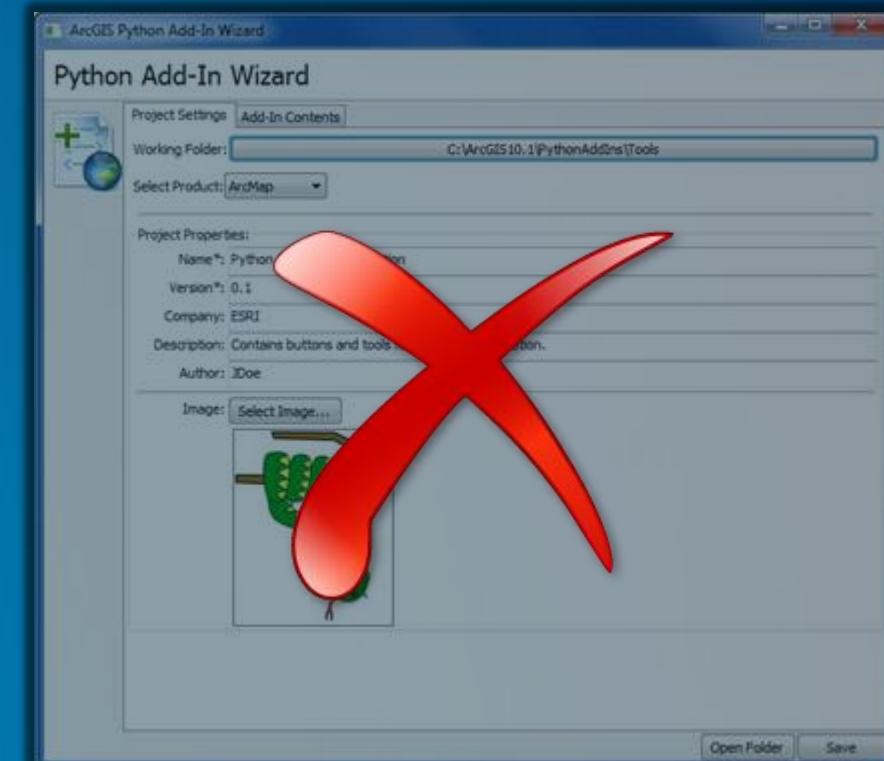
```
• 1 import arcpy
• 2
• 3 class Toolbox(object):
• 4     def __init__(self):
• 5         """Define the toolbox (the name of the toolbox is the name of the
• 6          .pyt file)."""
• 7         self.label = "Toolbox"
• 8         self.alias = ""
• 9
•10
•11     # List of tool classes associated with this toolbox
•12     self.tools = [Tool]
•13
•14 class Tool(object):
•15     def __init__(self):
•16         """Define the tool (tool name is the name of the class)."""
•17         self.label = "Tool"
•18         self.description = ""
•19         self.canRunInBackground = False
•20
•21     def getParameterInfo(self):
•22         """Define parameter definitions"""
•23         params = None
•24         return params
•25
•26     def isLicensed(self):
•27         """Set whether tool is licensed to execute."""
•28         return True
•29
•30
•31     def updateParameters(self, parameters):
•32         """Modify the values and properties of parameters before internal
•33         validation is performed. This method is called whenever a parameter
•34         has been changed."""
•35         return
•36
•37     def updateMessages(self, parameters):
•38         """Modify the messages created by internal validation for each tool
•39         parameter. This method is called after internal validation."""
•40         return
•41
•42     def execute(self, parameters, messages):
•43         """The source code of the tool."""
•44         return
```

Python Add-Ins en ArcGIS Pro

ArcGIS for Desktop

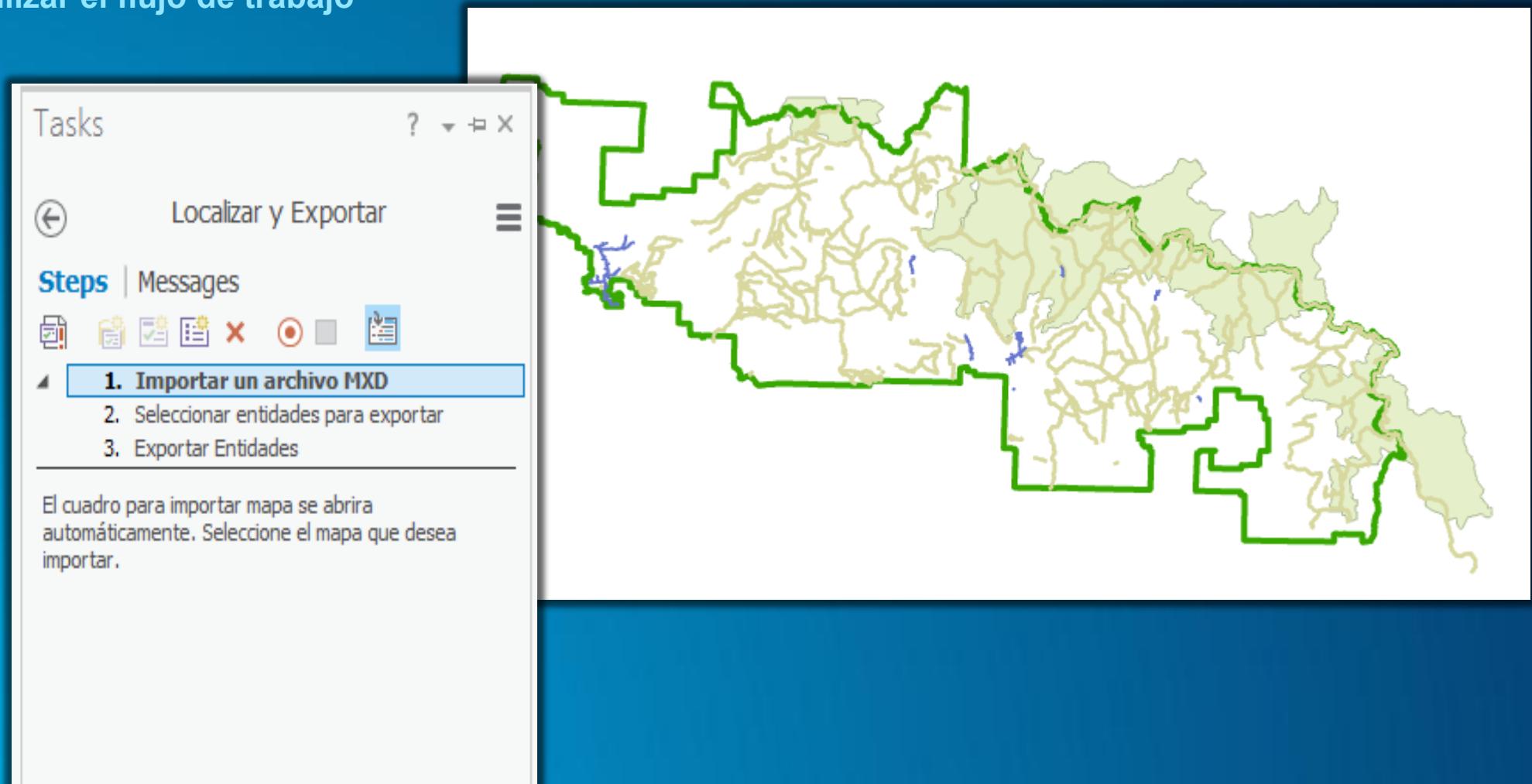


ArcGIS Pro



Usar tareas

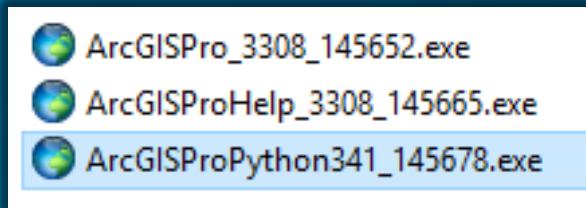
... para agilizar el flujo de trabajo



SciPy Stack

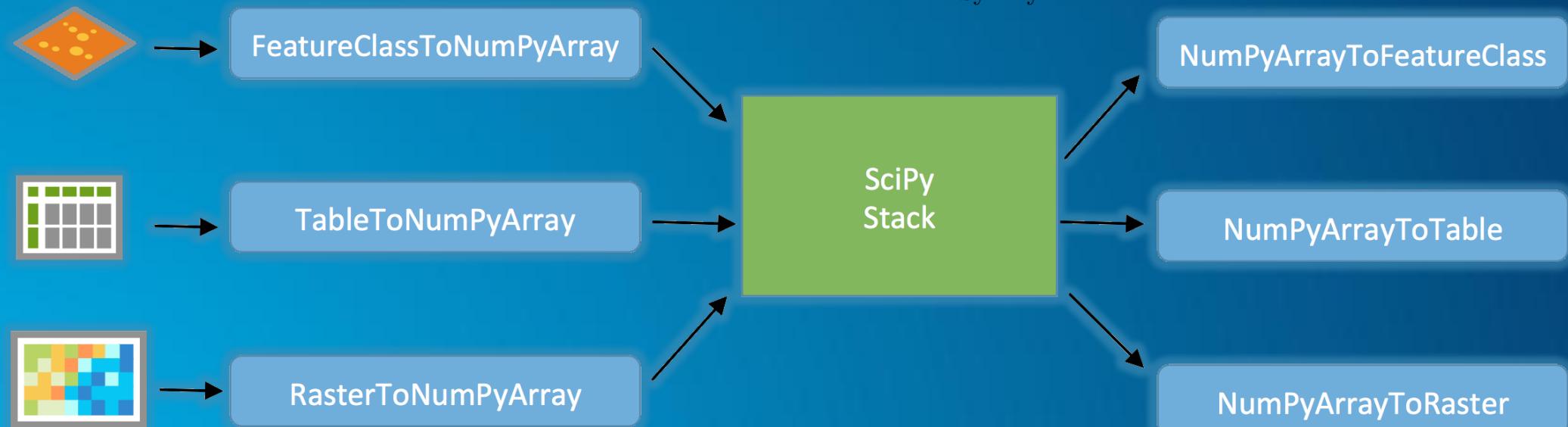
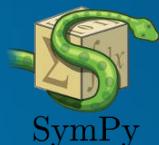
SciPy: Instalación

Instalación adicional a ArcGIS Pro 1.1

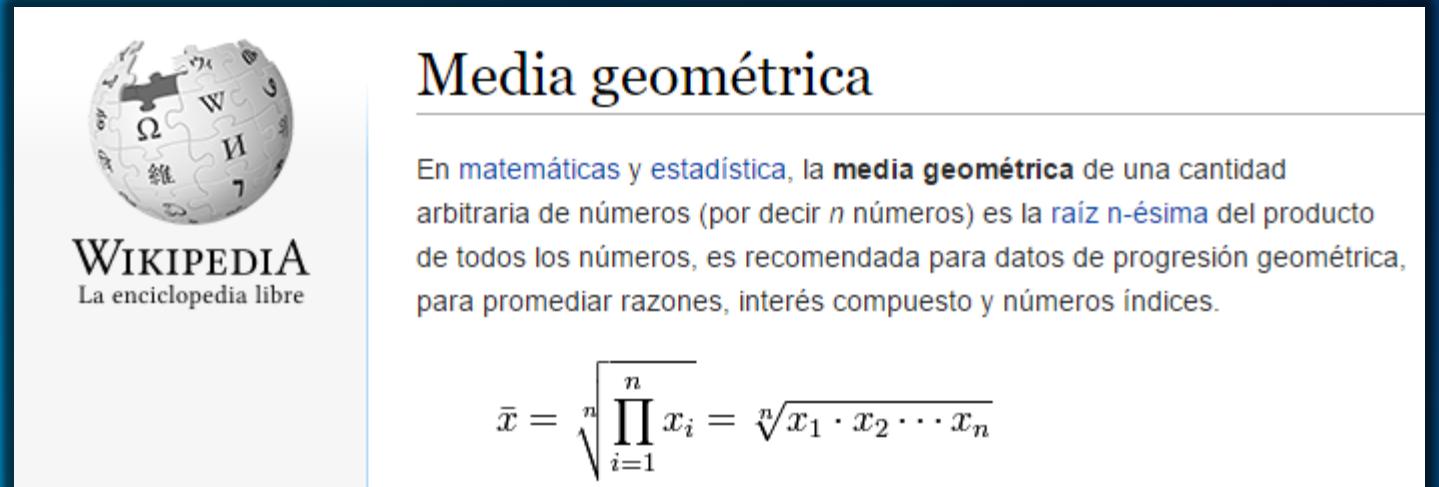


Naam	Gewijzigd op	Type
matplotlib	29-8-2015 13:08	Bestandsmap
matplotlib-1.4.0-py3.4.egg-info	29-8-2015 13:08	Bestandsmap
mpl_toolkits	29-8-2015 13:08	Bestandsmap
nose	29-8-2015 13:08	Bestandsmap
nose-1.3.4-py3.4.egg-info	29-8-2015 13:08	Bestandsmap
numpy	29-8-2015 13:09	Bestandsmap
pandas	29-8-2015 13:09	Bestandsmap
pandas-0.14.0-py3.4.egg-info	29-8-2015 13:09	Bestandsmap
past	29-8-2015 13:09	Bestandsmap
pip	29-8-2015 13:09	Bestandsmap
pip-1.5.6.dist-info	29-8-2015 13:09	Bestandsmap
pyparsing-2.0.2-py3.4.egg-info	29-8-2015 13:09	Bestandsmap
PyPDF2	29-8-2015 13:09	Bestandsmap
PyPDF2-1.23-py3.4.egg-info	29-8-2015 13:09	Bestandsmap
python_dateutil-2.2-py3.4.egg-info	29-8-2015 13:09	Bestandsmap
scipy	29-8-2015 13:10	Bestandsmap
setuptools	29-8-2015 13:10	Bestandsmap
setuptools-2.1.dist-info	29-8-2015 13:10	Bestandsmap
six-1.8.0.dist-info	29-8-2015 13:10	Bestandsmap
sympy	29-8-2015 13:11	Bestandsmap

SciPy Stack



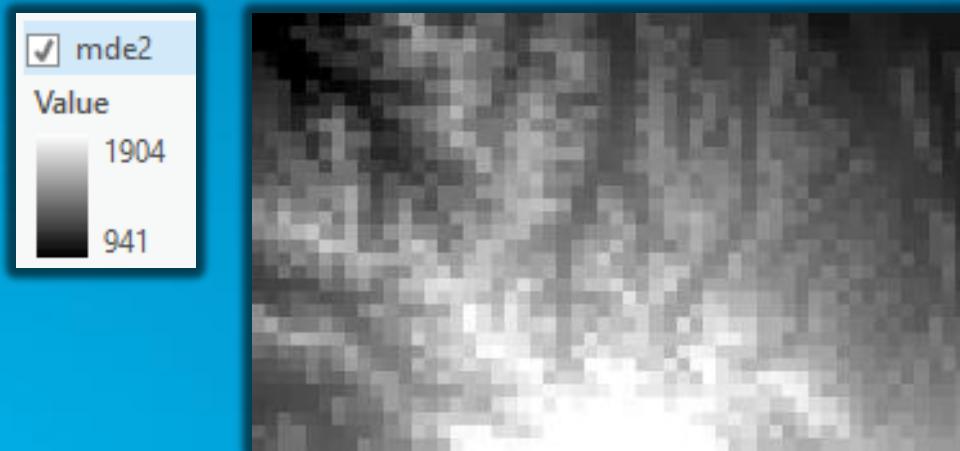
SciPy y Numpy



The image shows the Wikipedia logo, which is a globe with various symbols from different languages, followed by the word "WIKIPEDIA" and the tagline "La enciclopedia libre".

Media geométrica

En matemáticas y estadística, la **media geométrica** de una cantidad arbitraria de números (por decir n números) es la **raíz n-ésima** del producto de todos los números, es recomendada para datos de progresión geométrica, para promediar razones, interés compuesto y números índices.

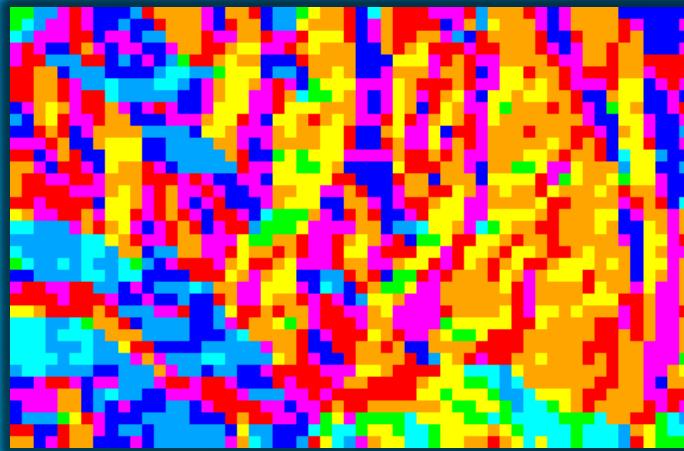
$$\bar{x} = \sqrt[n]{\prod_{i=1}^n x_i} = \sqrt[n]{x_1 \cdot x_2 \cdots x_n}$$


```
import scipy.stats  
np_ras = arcpy.RasterToArray('mde2')  
media_geo = scipy.stats.stats.gmean(np_ras, axis=None)  
  
print(media_geo)  
1352.41
```

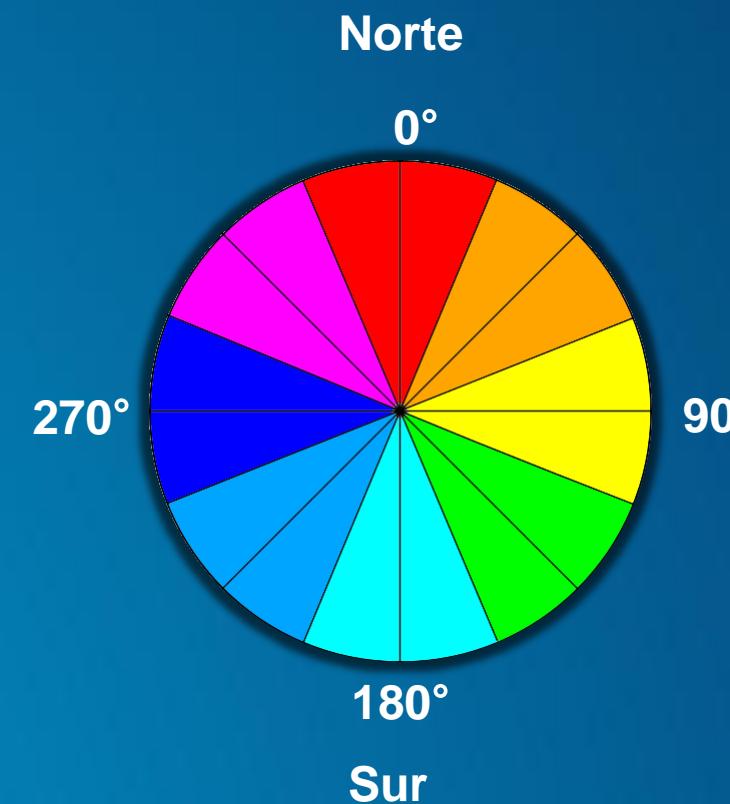
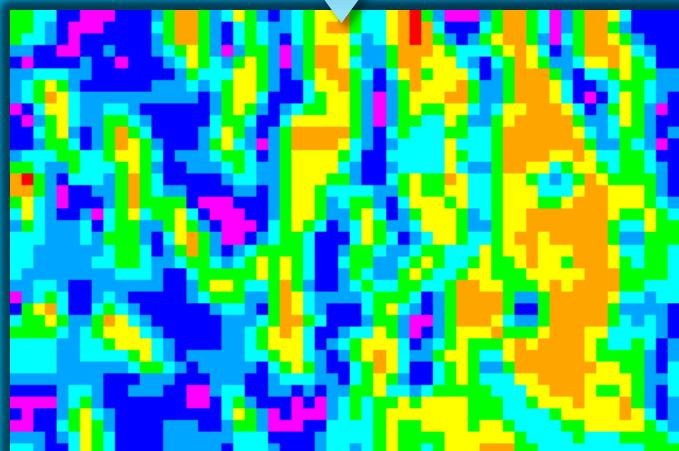


```
print(arcpy.GetRasterProperties_management('mde2', 'MEAN'))  
1361,29741863075
```

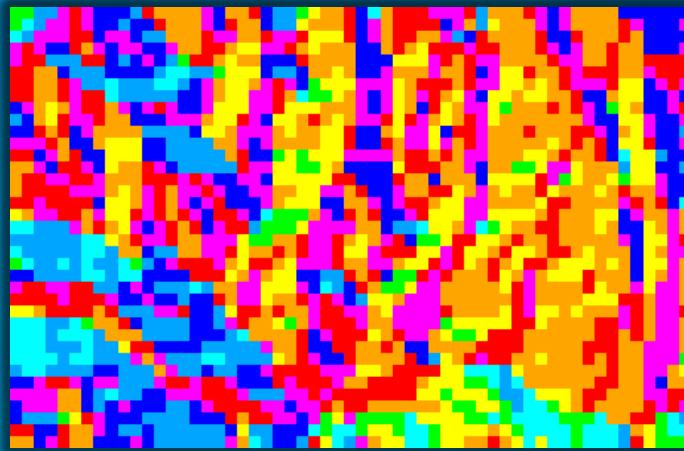
SciPy y Numpy



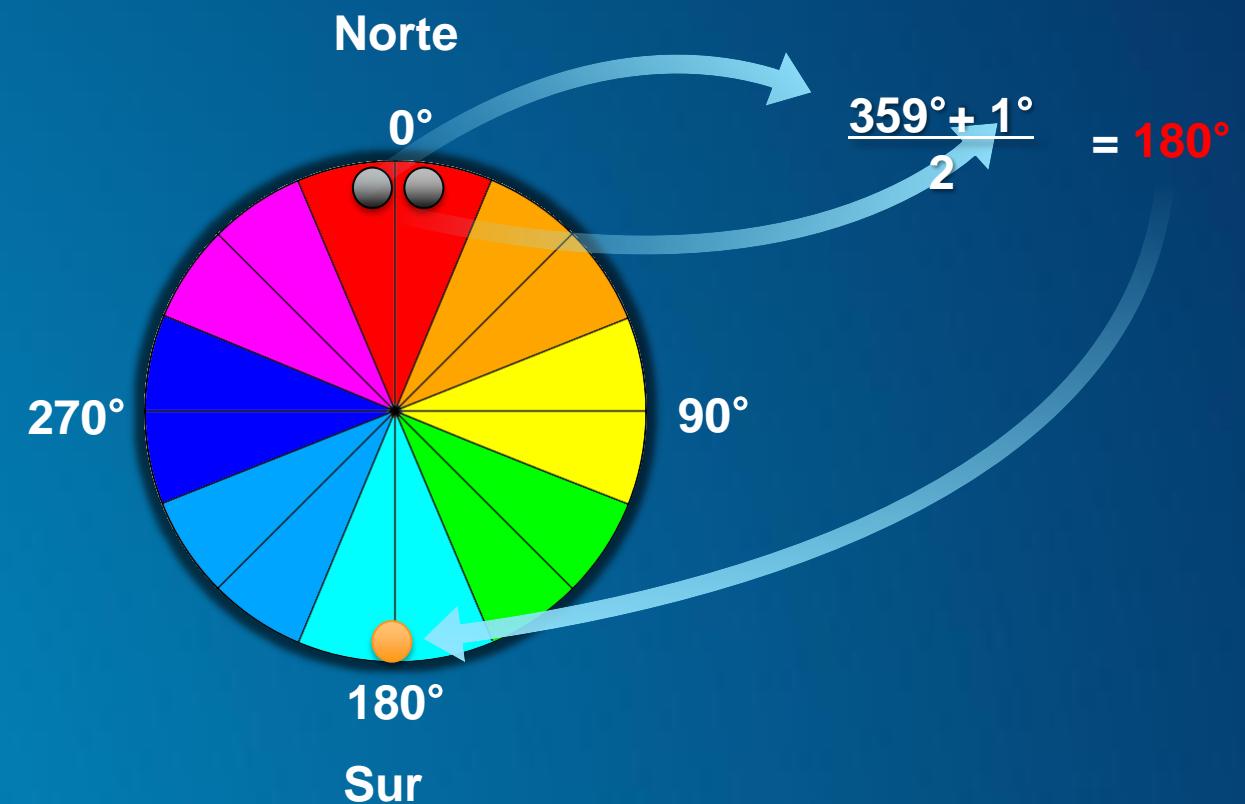
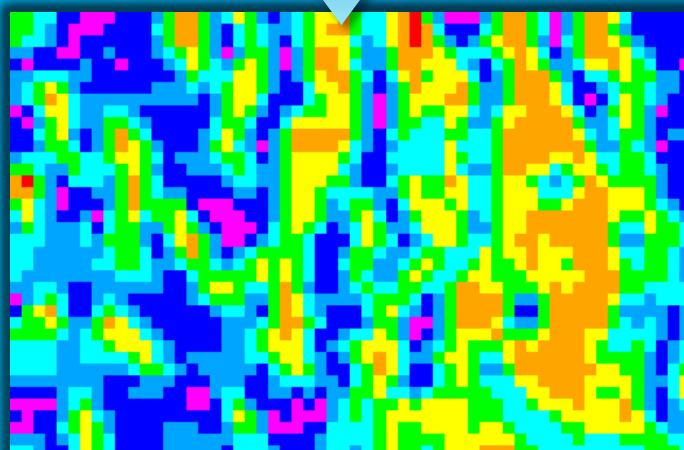
Promedio con Focal Statistics



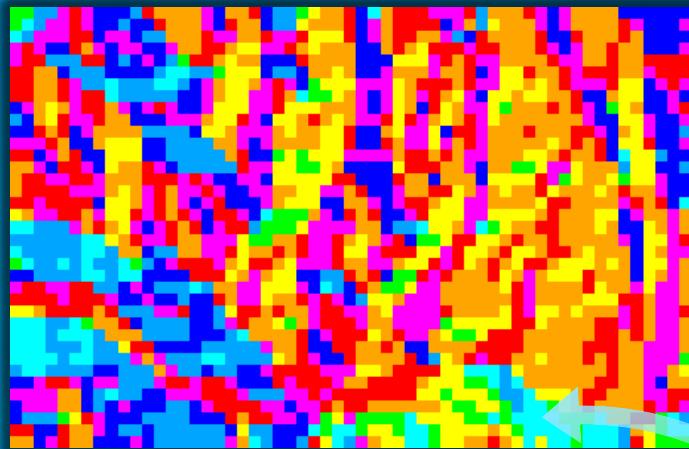
SciPy y Numpy



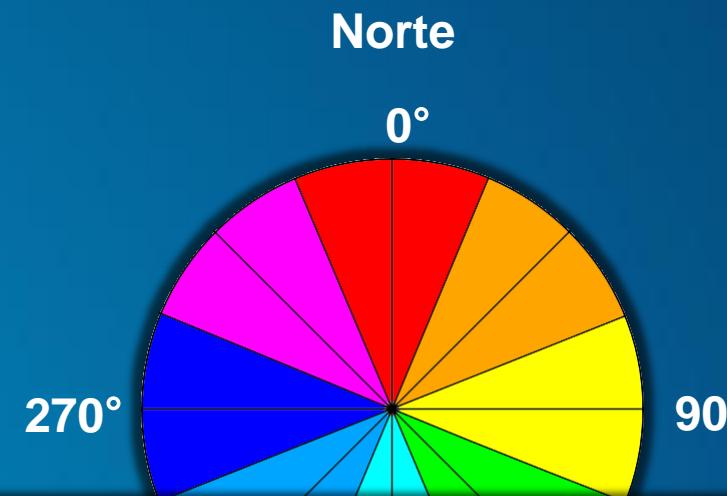
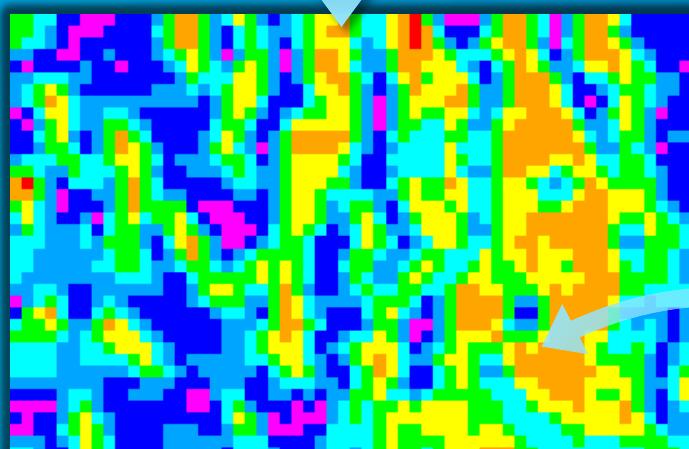
Promedio con Focal Statistics



SciPy y Numpy



Promedio con Focal Statistics



Python

```
import scipy.stats.morestats as morestats  
import math  
  
np_ras = arcpy.RasterToArray(arcpy.Raster('asp2')/180*math.pi)  
print(morestats.circmean(np_ras)/math.pi*180)  
4.721069443  
  
np_ras = arcpy.RasterToArray(arcpy.Raster('aspavg3')/180*math.pi)  
print(morestats.circmean(np_ras)/math.pi*180)  
166.96755328
```

Matplotlib

Generar gráficos avanzados

```
import numpy as np
import matplotlib.pyplot as plt

Y, X = np.mgrid[-3:3:100j, -3:3:100j]
U = -1 - X**2 + Y
V = 1 + X - Y**2
speed = np.sqrt(U*U + V*V)

plt.streamplot(X, Y, U, V, color=U, linewidth=2, cmap=plt.cm.autumn)
plt.colorbar()

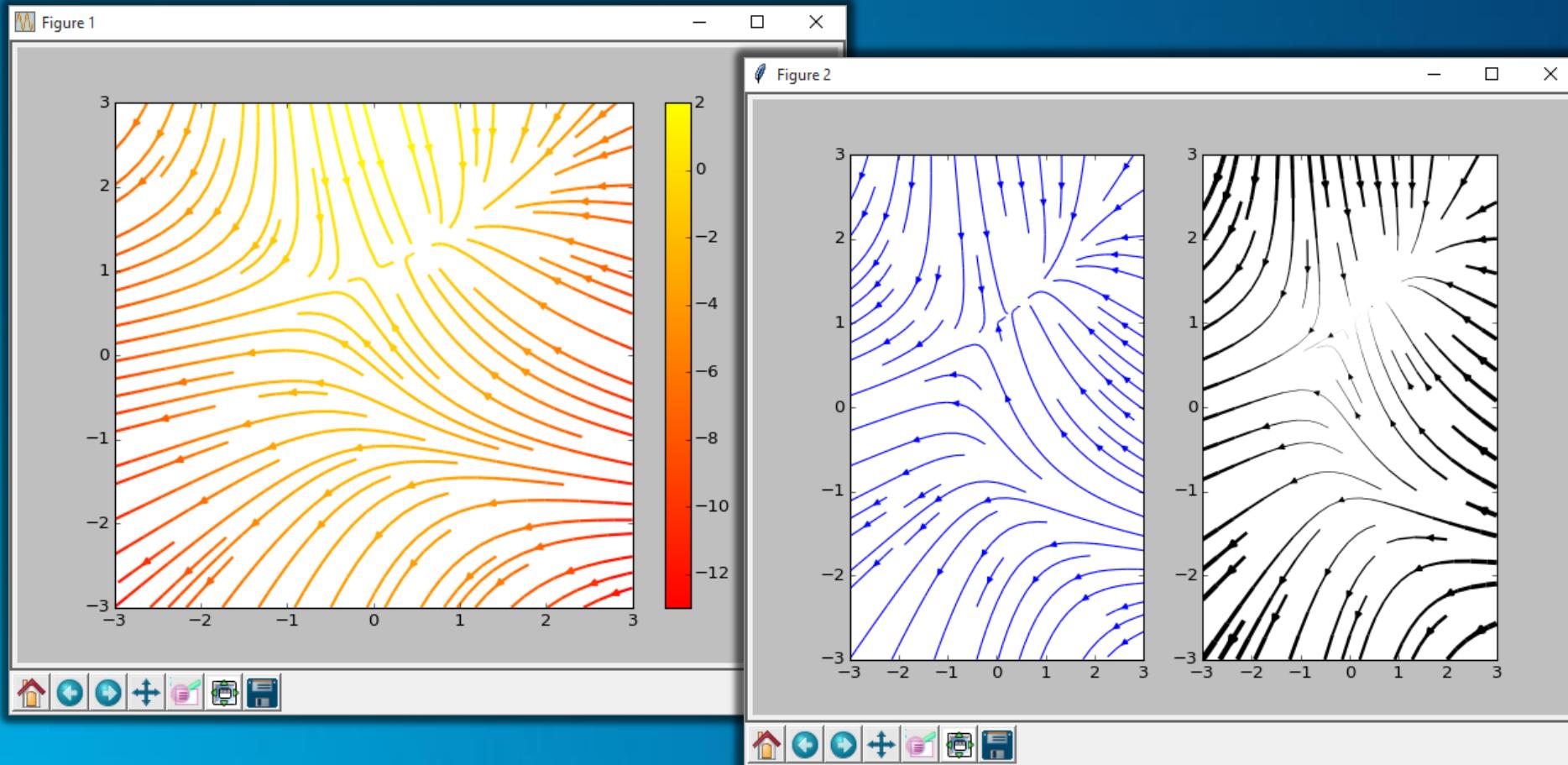
f, (ax1, ax2) = plt.subplots(ncols=2)
ax1.streamplot(X, Y, U, V, density=[0.5, 1])

lw = 5*speed/speed.max()
ax2.streamplot(X, Y, U, V, density=0.6, color='k', linewidth=lw)

plt.show()
```

Matplotlib

Generar gráficos avanzados



Matplotlib + scipy (ndimage)

Generar gráficos avanzados

```
import arcpy
import scipy.ndimage as nd
from matplotlib import pyplot as plt
fig = plt.figure(figsize=(10, 10))

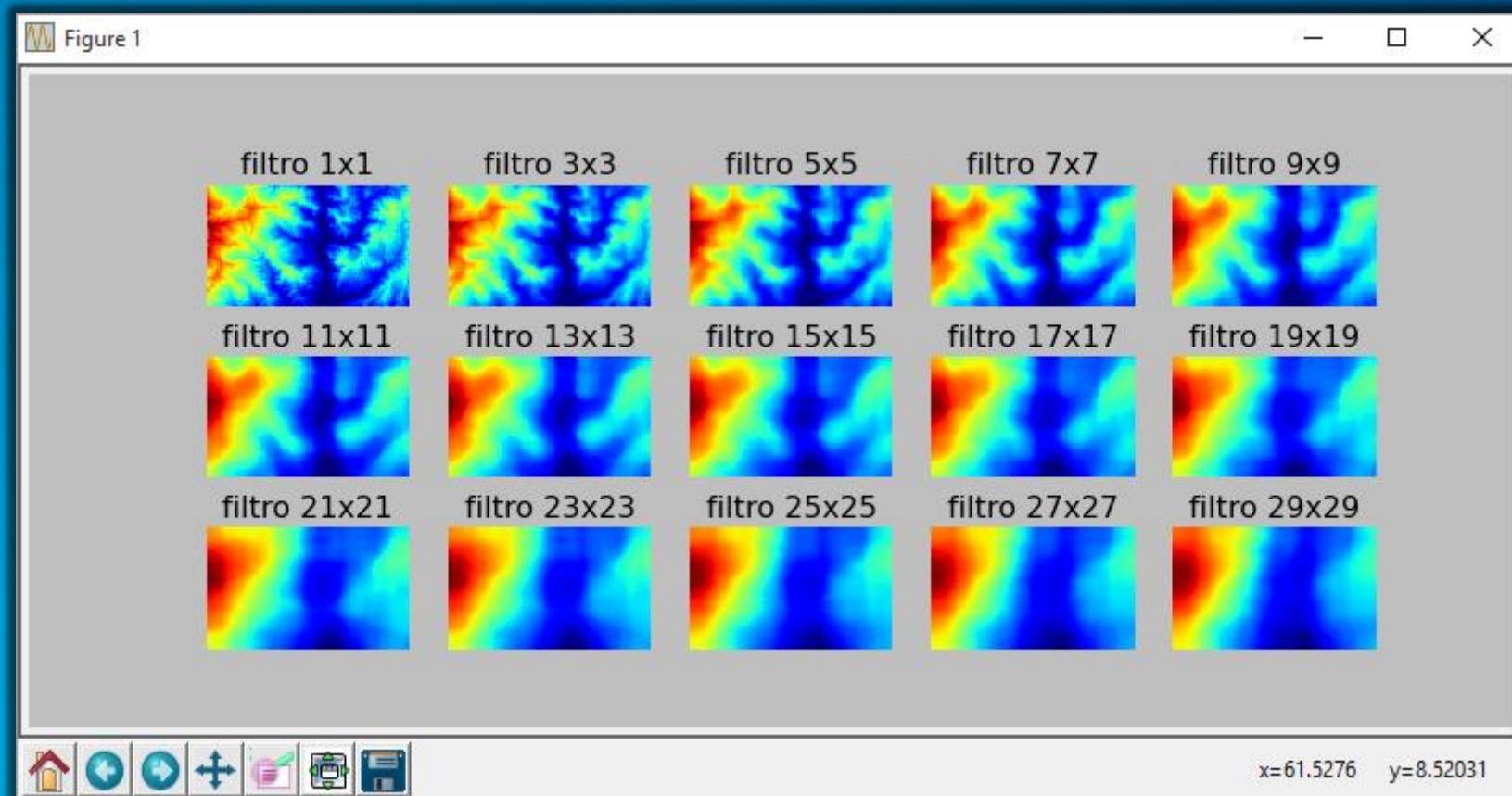
r = arcpy.RasterToArray('mde2', "", 30, 30, 0)

for i in range(10):
    size = (i+1) * 3
    print("Procesando {}".format(size))
    med = nd.median_filter(r, size)
    a = fig.add_subplot(5, 5,i+1)
    plt.imshow(med, interpolation='nearest')
    a.set_title('{}x{}'.format(size, size))
    plt.axis('off')
    plt.subplots_adjust(hspace = 0.1)
    prev = med
    plt.savefig(r"C:\ArcGIS Pro-yectos\grafico_{0}.png".format(i), bbox_inches='tight')

plt.show()
```

Matplotlib + scipy (ndimage)

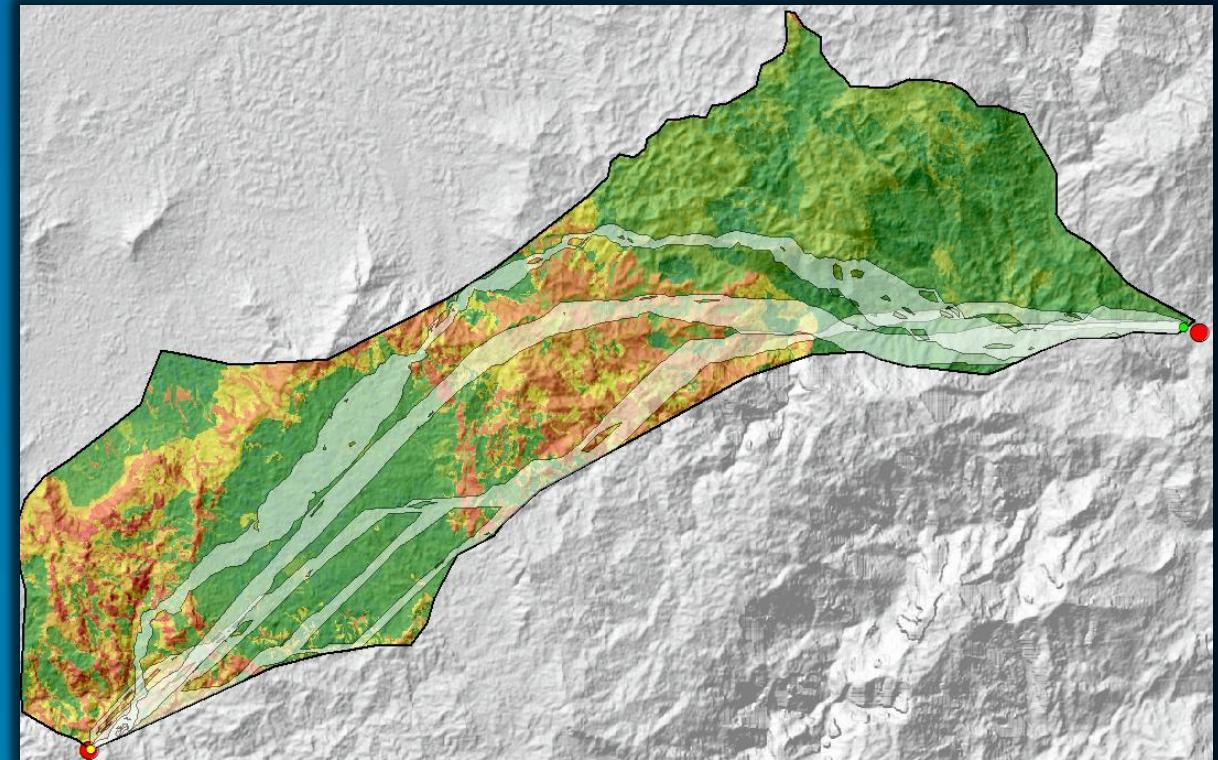
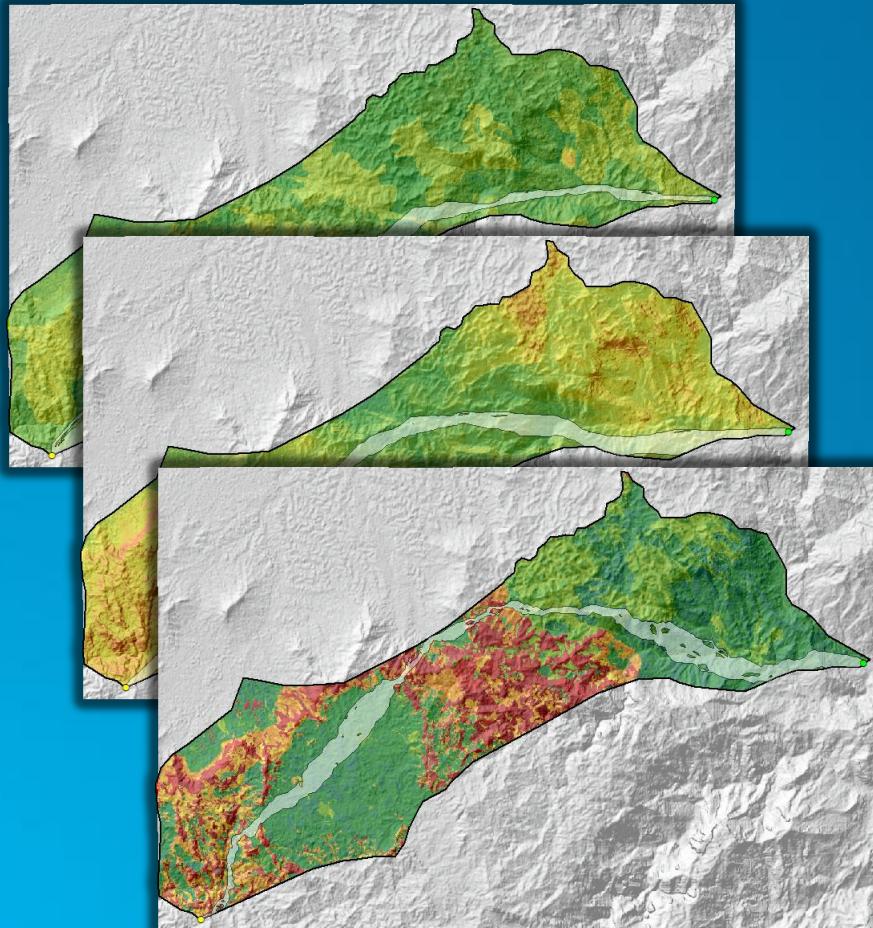
Generar gráficos avanzados



<http://matplotlib.org/gallery.html>

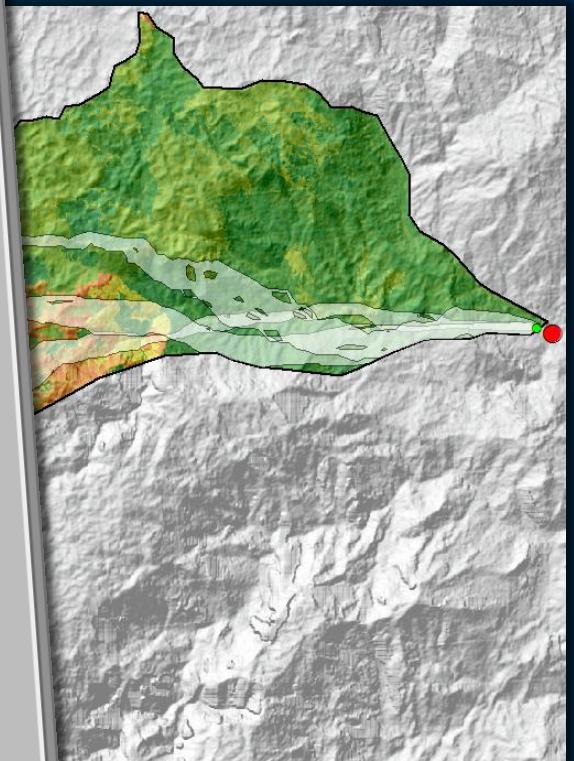
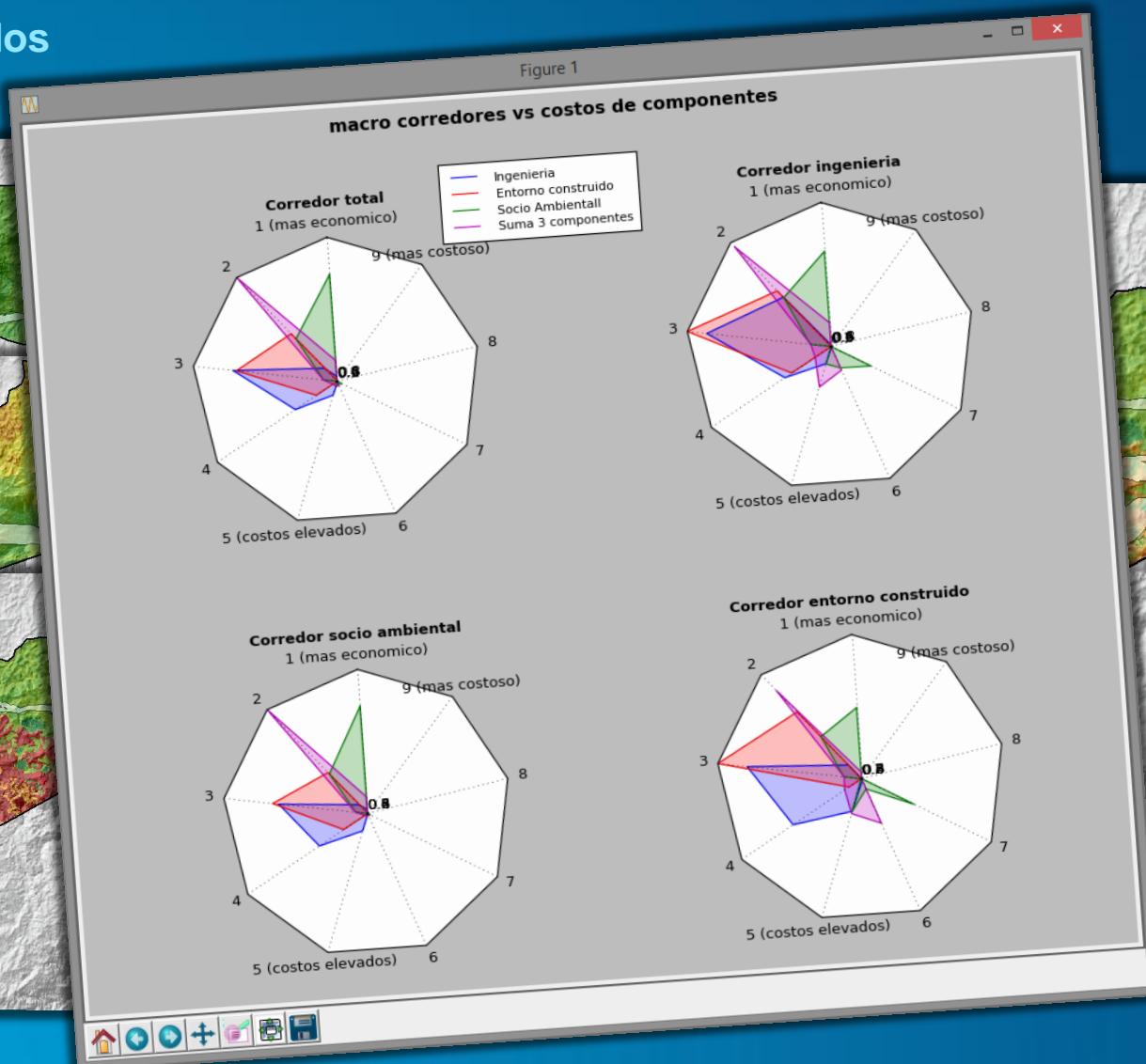
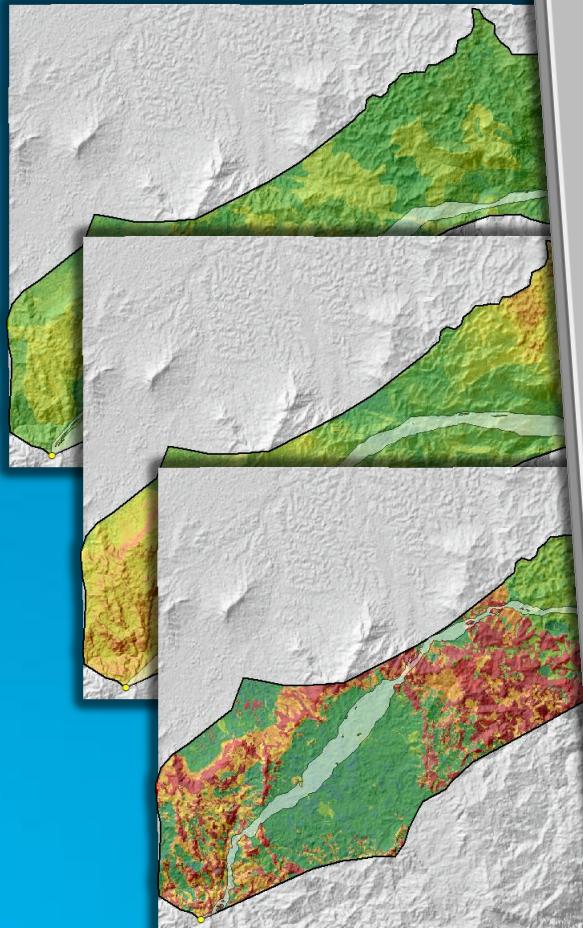
Matplotlib con datos de ArcGIS

Generar gráficos avanzados



Matplotlib con datos de ArcGIS

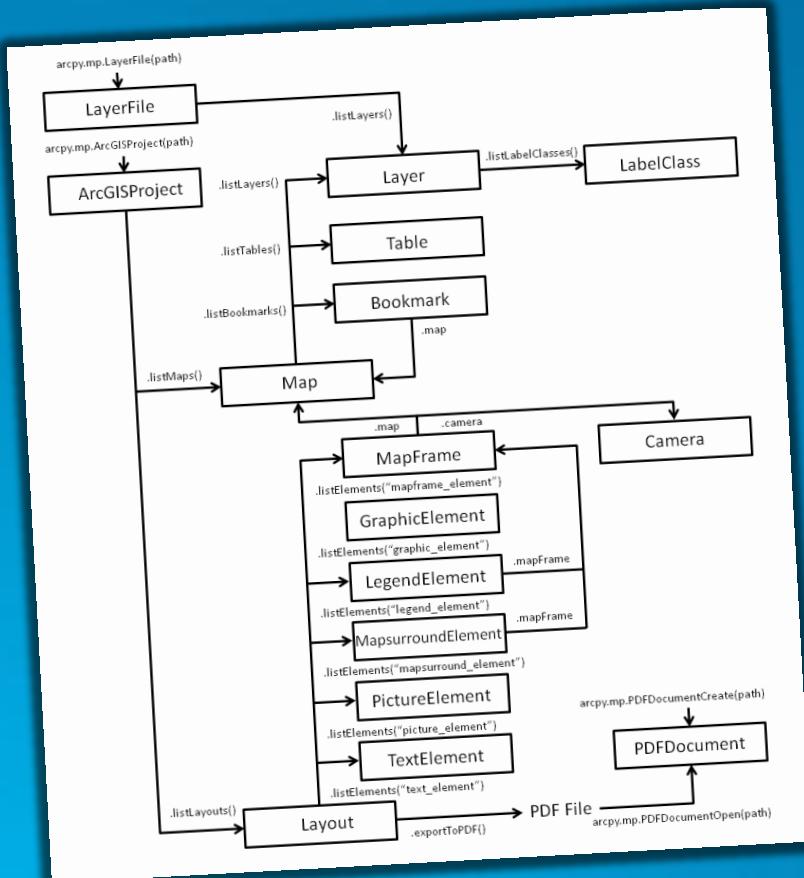
Generar gráficos avanzados



Cartografía automatizada

Trabajar con mapas

Arcpy.mapping (ArcGIS for Desktop) vs Arcpy.mp (ArcGIS Pro)

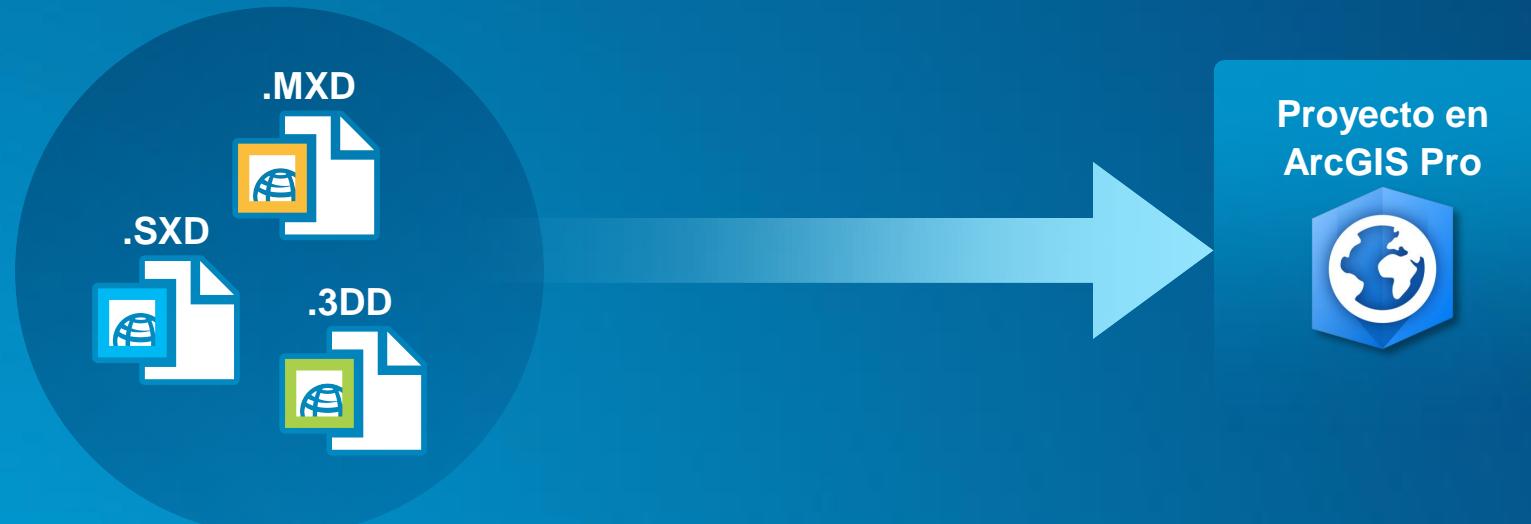


.mxd + .3dd + .sdx
.lyr
mapping.MapDocument
mapping.ListDataFrames
data frame

.prjx
.lyrx
mp.ArcGISProject
mp.ArcGISProject().listMaps
Map, MapFrame y Camera

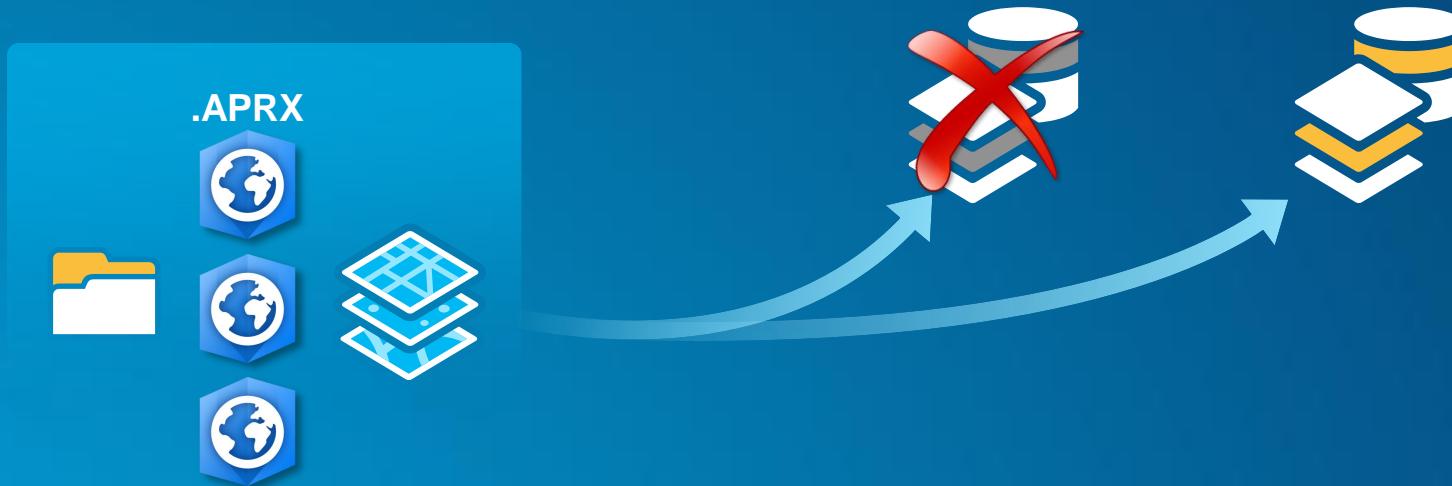
*Exportar a partir de objetos
Layout y MapFrame
Manejo de capas son parte de
los objetos Map y LayerFile*

Importar Documentos de ArcMap, ArcScene y ArcGlobe



```
aprx = arcpy.mp.ArcGISProject("CURRENT")
aprx.importDocument(r"C:\Proyectos\Carto\Colombia.mxd", include_layout=True)
aprx.importDocument(r"C:\Proyectos\Datos\Medellin.mxd", include_layout=False)
aprx.importDocument(r"D:\Datos\Hidro.3dd")
aprx.importDocument(r"D:\Datos\Laureles.sxd")
```

Cambiar fuentes de datos



- Actualizar las fuentes de todas las capas en un 'Layer File' (.LYRX).
- Actualizar las propiedades de 'Joins' y 'Relates'.
- Más opciones para actualizar propiedades de una conexión sde.

Cambiar fuentes de datos

```
Python

import arcpy, pprint
proy = arcpy.mp.ArcGISProject('CURRENT')
mapa = proy.listMaps()[0]
capa = mapa.listLayers()[2]
pprint.pprint(capa.connectionProperties)
```



```
Python

{'connection_info': {'database': 'C:\\\\Users\\\\Xander\\\\Documents\\\\ArcGIS\\\\Projects\\\\\ExplicarListas\\\\ExplicarListas.gdb'},
 'dataset': 'SCat',
 'relates': [{['cardinality': 'one_to_many',
   'connection': {'connection_info': {'database': 'C:\\\\CCU2015\\\\Relates ' +
     'y ' +
     'Joins\\\\Ejemplo\\\\Ejemplo.gdb'},
   'dataset': 'Hoteles',
   'workspace_factory': 'File Geodatabase'},
   'foreign_key': 'SCaCodigo',
   'name': 'SCat_Hoteles',
   'primary_key': 'SCaCodigo'},
  {'cardinality': 'one_to_many',
   'connection': {'connection_info': {'database': 'C:\\\\CCU2015\\\\Relates ' +
     'y ' +
     'Joins\\\\Ejemplo\\\\Ejemplo.gdb'},
   'dataset': 'Estaciones_Transmilenio',
   'workspace_factory': 'File Geodatabase'},
   'foreign_key': 'SCaCodigo',
   'name': 'SCat_Transmilenio',
   'primary_key': 'SCaCodigo']}],
 'workspace_factory': 'File Geodatabase'}
```

http://proceedings.esri.com/library/userconf/devsummit15/papers/dev_int_213.pdf

Cambiar fuentes de datos

```
Python

import arcpy, pprint
proy = arcpy.mp.ArcGISProject('CURRENT')
mapa = proy.listMaps()[0]
capa = mapa.listLayers()[2]
pprint.pprint(capa.connectionProperties)
```



```
Python

{'connection_info': {'database': 'C:\\\\Users\\\\Xander\\\\Documents\\\\ArcGIS\\\\Projects\\\\\ExplicarListas\\\\ExplicarListas.gdb'},
 'dataset': 'SCat',
 'relates': [{['cardinality': 'one_to_many',
   'connection': {'connection_info': {'database': 'C:\\\\CCU2015\\\\Relates y Joins\\\\Ejemplo\\\\Ejemplo.gdb'},
     'dataset': 'Hoteles',
     'workspace_factory': 'File Geodatabase'},
   'foreign_key': 'SCaCodigo',
   'name': 'SCat_Hoteles',
   'primary_key': 'SCaCodigo'},
  {'cardinality': 'one_to_many',
   'connection': {'connection_info': {'database': 'C:\\\\CCU2015\\\\Relates y Joins\\\\Ejemplo\\\\Ejemplo.gdb'},
     'dataset': 'Estaciones_Transmilenio',
     'workspace_factory': 'File Geodatabase'},
   'foreign_key': 'SCaCodigo',
   'name': 'SCat_Transmilenio'}}]
```

```
prop_con = capa.connectionProperties
prop_con['connection_info']['database'] = r"C:\\\\CCU2015\\\\Relates y Joins\\\\Ejemplo\\\\Ejemplo.gdb"
capa.connectionProperties = prop_con
```

http://proceedings.esri.com/library/userconf/devsummit15/papers/dev_int_213.pdf

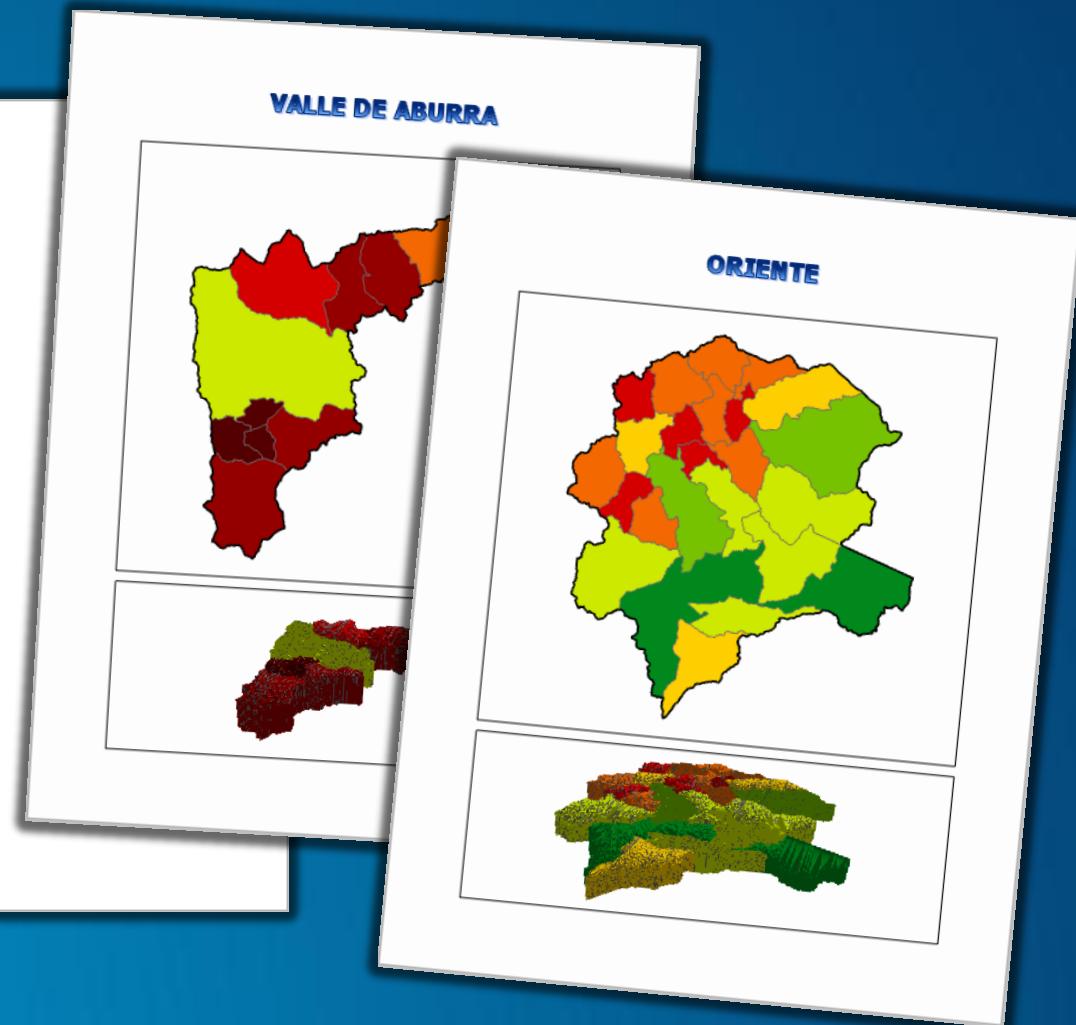
Generar cartografía

Demo



Contenido

BAJO CAUCA	2
MAGDALENA MEDIO	3
NORDESTE	4
NORTE	5
OCCIDENTE	6
ORIENTE	7
SUROESTE	8
URABA	9
VALLE DE ABURRA	10



Demo

ArcGIS Pro - CartoDemo - Portada

Xander_Bakker_esri_colombia (Esri Colombia)

PROJECT LAYOUT INSERT ANALYSIS VIEW SHARE

Map Frame

Map Frames Map Surrounds Text Graphics Styles

Contents

Search

Portada

txtTitulo Picture Antioquia Map Frame

Antioquia Subregion Portada Contenido laySubRegion

Subregiones de Antioquia

CCU

1:2.725.212 44% 9,808 , 6,145

Project Portal Notifications

Maps Toolboxes Databases Layouts

Antioquia Contenido laySubRegion Portada Subregion

Styles Folders Locators

Project Geoprocessing Symbology Attributes

Python

The screenshot displays the ArcGIS Pro interface with a layout titled "Portada". The layout contains a map frame showing the subregions of Antioquia, a title "Subregiones de Antioquia", and a picture placeholder. The Project panel on the right lists various project components such as Maps, Toolboxes, Databases, and Layouts, with "Layouts" currently expanded to show "Antioquia", "Contenido", "laySubRegion", "Portada", and "Subregion". The bottom navigation bar includes tabs for Project, Geoprocessing, Symbology, and Attributes.

Demo

```
# -*- coding: utf-8 -*-
import os

# ambiente
arcpy.env.overwriteOutput = True

# crear enlace a proyecto Pro actualmente abierto
proy = arcpy.mp.ArcGISProject("CURRENT")

# carpeta PDF
ws, pr = os.path.split(proy.filePath)
carpeta_pdf = os.path.join(ws, "pdf")

# crear enlaces a layouts
lyt_por = proy.listLayouts("Portada")[0]
lyt_cont = proy.listLayouts("Contenido")[0]
lyt_subr = proy.listLayouts("laySubRegion")[0]

# crear enlace a la lista de contenido
txt_cont = lyt_cont.listElements('TEXT_ELEMENT', 'txtContenido')[0]
txt_pag = lyt_subr.listElements('TEXT_ELEMENT', 'txtPagina')[0]
txt_subr = lyt_subr.listElements('TEXT_ELEMENT', 'txtSubRegion')[0]

# mapframe
mf = lyt_subr.listElements('MAPFRAME_ELEMENT', 'Subregion Map Frame')[0]

# capas para definir query
lyr_muni = mf.map.listLayers("Municipios")[0]
lyr_subr = mf.map.listLayers("SubRegiones")[0]

# campos para usar en query
fld_subr = "NOM_DIV_TERRITORIAL2"
fld_code_subr = "COD_DIV_TERRITORIAL2"
fld_code_muni = "COD_DIV_SUPERIOR"

# abrir capa de Subregiones para listar subregiones
md_ant = proy.listMaps("Antioquia")[0]
fc_subreg = md_ant.listLayers("Subregiones")[0]
```

Demo

```
# inicialmente exportar portada
print("Exportando portada")
pdf_libro = os.path.join(carpeta_pdf, "mi_libro.pdf")
lyt_por.exportToPDF(pdf_libro)

# iniciar el bucle
page = 2
lst_content = []
lst_pdf = []
with arcpy.da.SearchCursor(fc_subreg, ("SHAPE@", fld_subr, fld_code_subr)) as curs:
    for row in curs:
        # para cada subregion, leer datos
        page += 1
        ext = row[0].extent
        nombre = row[1]
        codigo = row[2]
        print("Exportando subregion '{0}'".format(nombre))

        # ajustar lista de contenido y aplicar query definition
        lst_content.append("{0} ..... {1}".format(nombre, page))
        lyr_subr.definitionQuery = "{0} = '{1}'".format(arcpy.AddFieldDelimiters(lyr_subr, fld_subr), nombre)
        lyr_muni.definitionQuery = "{0} = '{1}'".format(arcpy.AddFieldDelimiters(lyr_muni, fld_code_muni), codigo)

        # ajustar extent del mapa
        mf.camera.setExtent(ext)
        mf.camera.scale = mf.camera.scale * 1.05

        # ajustar textos en la pagina y exportar la hoja
        txt_subr.text = nombre
        txt_pag.text = "Pagina {0}".format(page)
        pdf_subr = os.path.join(carpeta_pdf, "{0}.pdf".format(nombre))
        lst_pdf.append(pdf_subr)
        lyt_subr.exportToPDF(pdf_subr)
```

Demo

```
# crear la pagina de contenido
print("Exportando contenido")
txt_cont.text = "\n".join(lst_content)
pdf_cont = os.path.join(carpeta_pdf, "Contenido.pdf")
lyt_cont.exportToPDF(pdf_cont)
lst_pdf.insert(0, os.path.join(carpeta_pdf, "Contenido.pdf"))

# agregar las hojas al libro
print("Armando libro")
pdf_doc = arcpy.mp.PDFDocumentOpen(pdf_libro)
for pdf_hoja in lst_pdf:
    pdf_doc.appendPages(pdf_hoja)
pdf_doc.saveAndClose()

# eliminar variables
del proy, lyt_por, lyt_cont, lyt_subr, lyr_muni, lyr_subr, txt_cont, txt_pag
del txt_subr, mf, md_ant, fc_subreg, pdf_libro, ext, pdf_subr, pdf_cont
del pdf_doc
print("listo")
```

Recursos

Ayuda en línea

The screenshot shows the ArcGIS Pro help interface with the title "ArcGIS Pro". The navigation bar includes "Home", "Get Started", "Help", "Tool Reference", "ArcPy" (which is highlighted), and "Community". Below the navigation bar, the URL <http://pro.arcgis.com/en/pro-app/arcpy/main/arcgis-pro-arcpy-reference.htm> is displayed.

<http://pro.arcgis.com/en/pro-app/arcpy/main/arcgis-pro-arcpy-reference.htm>

The screenshot shows the ArcGIS for Desktop 10.3 help interface with the title "ArcGIS for Desktop 10.3". The navigation bar includes "Home", "Get Started", "Map", "Analyze" (which is highlighted), "Manage Data", "Tools", and "More...". Below the navigation bar, the URL <http://desktop.arcgis.com/en/desktop/latest/analyze/arcpy/what-is-arcpy-.htm> is displayed.

<http://desktop.arcgis.com/en/desktop/latest/analyze/arcpy/what-is-arcpy-.htm>

The screenshot shows the ArcPy Café website. The header features the title "ArcPy Café" and the tagline "Get all your ArcGIS Python Recipes here!". Below the header is a navigation bar with "Home" (highlighted) and "About". To the right, there is a link "ArcGIS Team Python" next to a small globe icon.

<https://arcpy.wordpress.com/>

Presentaciones UC 2015 y DevSummit 2015



<http://video.esri.com/series/253/2015-esri-user-conference-tech-sessions>



<http://video.esri.com/series/227/2015-esri-developer-summit-tech-sessions>

Presentaciones UC 2015 San Diego

Main Recent Proceedings User Groups

2015 Esri User Conference Technical Workshops

Search for presentation slides from the [Esri User Conference](#) technical workshops presented July 20–24, 2015 in San Diego, California. Offerings cover a wide variety of topics and levels of expertise.

Paper Sessions **Technical Workshops**

Show 10 entries

Python X

Title	Media	Presenters	Track
Creating a Hydrologically Conditioned DEM	PDF PPT	Dean Djokic	Python for Analysis
ArcGIS Pro: a Quick Tour of Python	PDF PPT	David Wynne	Developer (Demo Theater)
Advanced Map Automation with Python	PDF PPT	Jeff Barrette, Jeff Moulds	Python for Arcgis
Agent-Based Modeling with ArcGIS and Agent Analyst	PDF PPT	Kevin Johnston	Python for Analysis
Python and REST	PDF PPT	Kevin Hibma	Python for Analysis
Python - Raster Analysis	PDF PPT	Kevin Johnston, Nawajish Noman	Python for Arcgis

<http://proceedings.esri.com/library/userconf/proc15/tech-workshops.html>

Automatización de flujos de trabajo en ArcGIS Pro con Python

GitHub

The screenshot shows the Esri GitHub page with a blue geometric background. At the top, it says "Esri is on GitHub!" and encourages developers to browse open source code and get started with the ArcGIS platform. A prominent orange "BROWSE ON GITHUB" button is centered. Below this, a message asks if users need an ArcGIS subscription, offering free development. A search bar at the top is set to "Python". The main content area displays six GitHub repository cards:

- gis-tools-for-hadoop** (Python): The GIS Tools for Hadoop are a collection of GIS tools for spatial analysis of big data. 82 stars.
- ago-admin-wiki** (Python): A collection of code samples, scripts, hacks, tools, and information for ArcGIS Online administrators. 10 stars.
- arcrest** (Python): Python package for REST API (AGS, AGOL, webmap JSON, etc.). 31 stars.
- geoprocessing-tools-for-hadoop** (Python): The Hadoop GP Toolbox provides tools to exchange features between a Geodatabase. 143 stars.
- ago-tools** (Python): A Python package to assist with administering ArcGIS Online Organizations. 39 stars.
- dojo-theme-flat** (Python): Custom flat theme based on Twitter's Bootstrap for Dojo dijits, dgrid, and esri widgets.

<https://esri.github.io/#Python>

ArcScripts

The screenshot shows the ArcScripts (BETA) website interface. At the top, there is a navigation bar with links for "ArcScripts Search", "FEATURES", "PLANS", "DOCUMENTATION", "COMMUNITY", "SEARCH", a search icon, and "Sign In". Below the navigation bar is a purple header bar with the text "ArcScripts (BETA)". On the left side, there is a search form with the following fields:

- Search (input field)
- Language (dropdown menu set to "Python")
- Software Product (dropdown menu set to "ArcGIS Pro")
- Result Type (dropdown menu set to "All")
- Items Per Page (dropdown menu set to "10")

Below the search form is a blue "SEARCH" button. To the right of the search form is a "Refine Your Search" section with three options:

- Add/remove keywords from the search string
- Add software versions to the search string
- Add the author's name to the search string

Below this section is a blue "LOGIN TO UPLOAD" button. At the bottom of the page is a table displaying search results:

Title	Software	Language	Author	Modified	Result Type
Network Analysis with Python (User Conference 2015)		python, Python	dmandlo	July 31, 2015	Geoprocessing Sample
Create Points on Lines			ian_broad	July 11, 2015	Geoprocessing Sample
Display GTFS Route Shapes			mmorang	June 11, 2015	Geoprocessing Sample

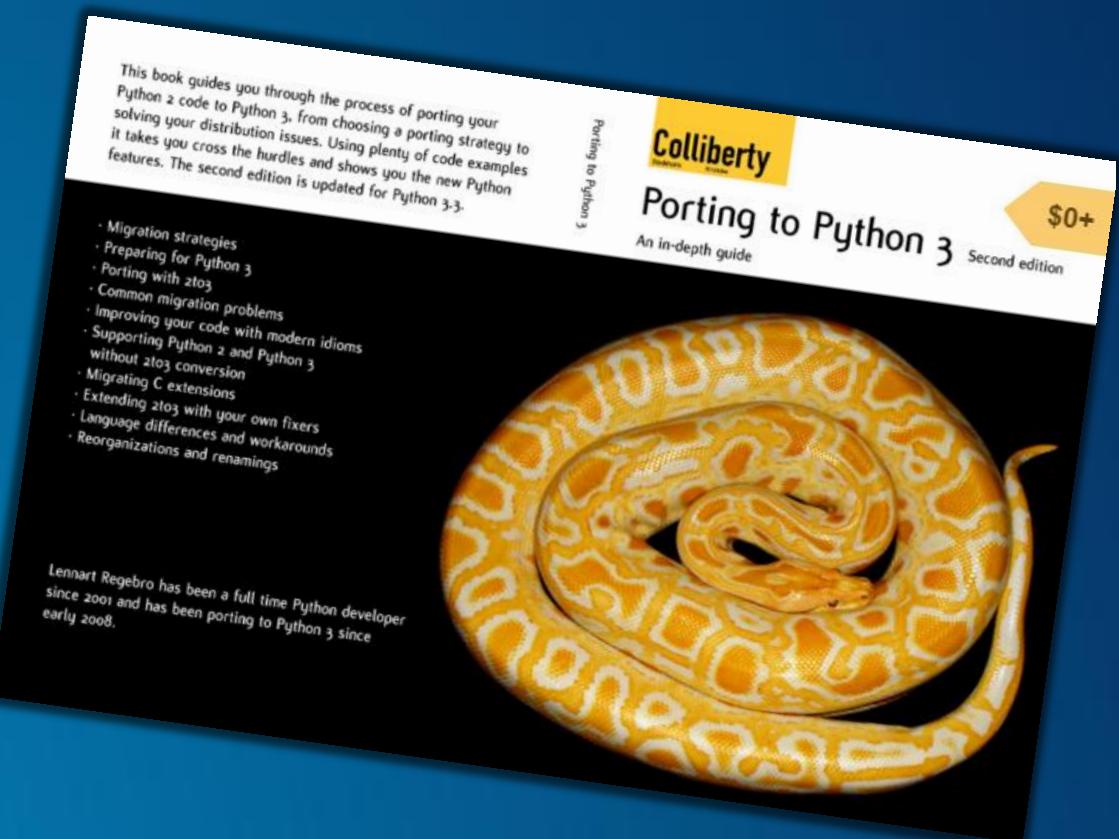
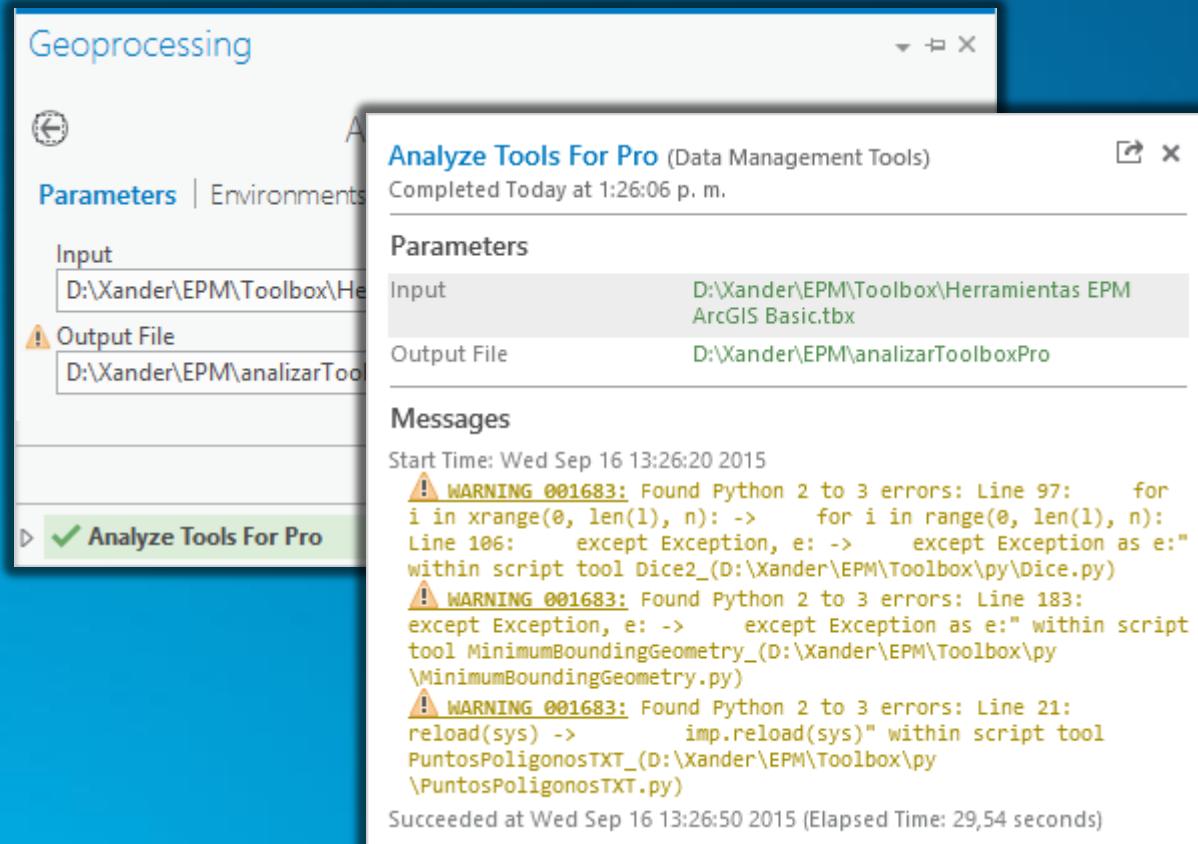
<http://arcscripts.arcgis.com/>

Aprender Python



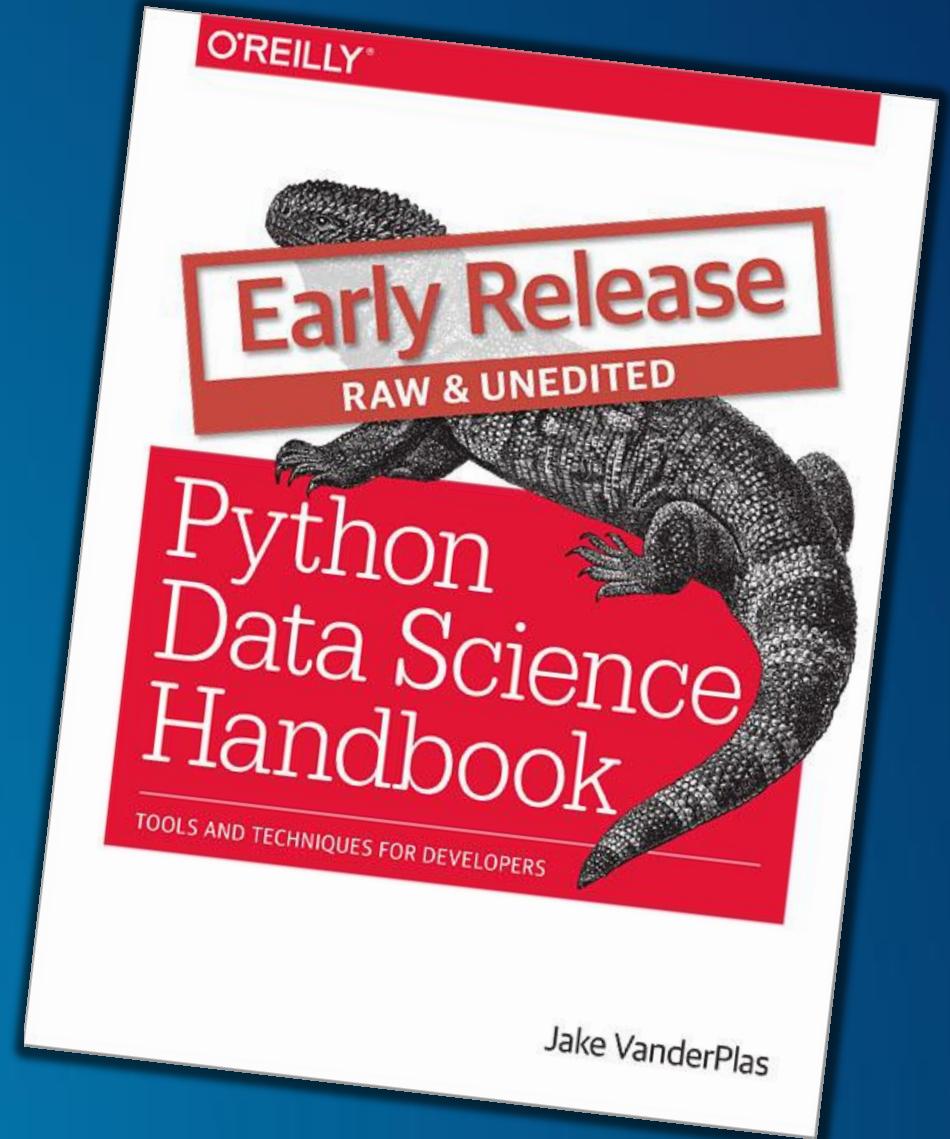
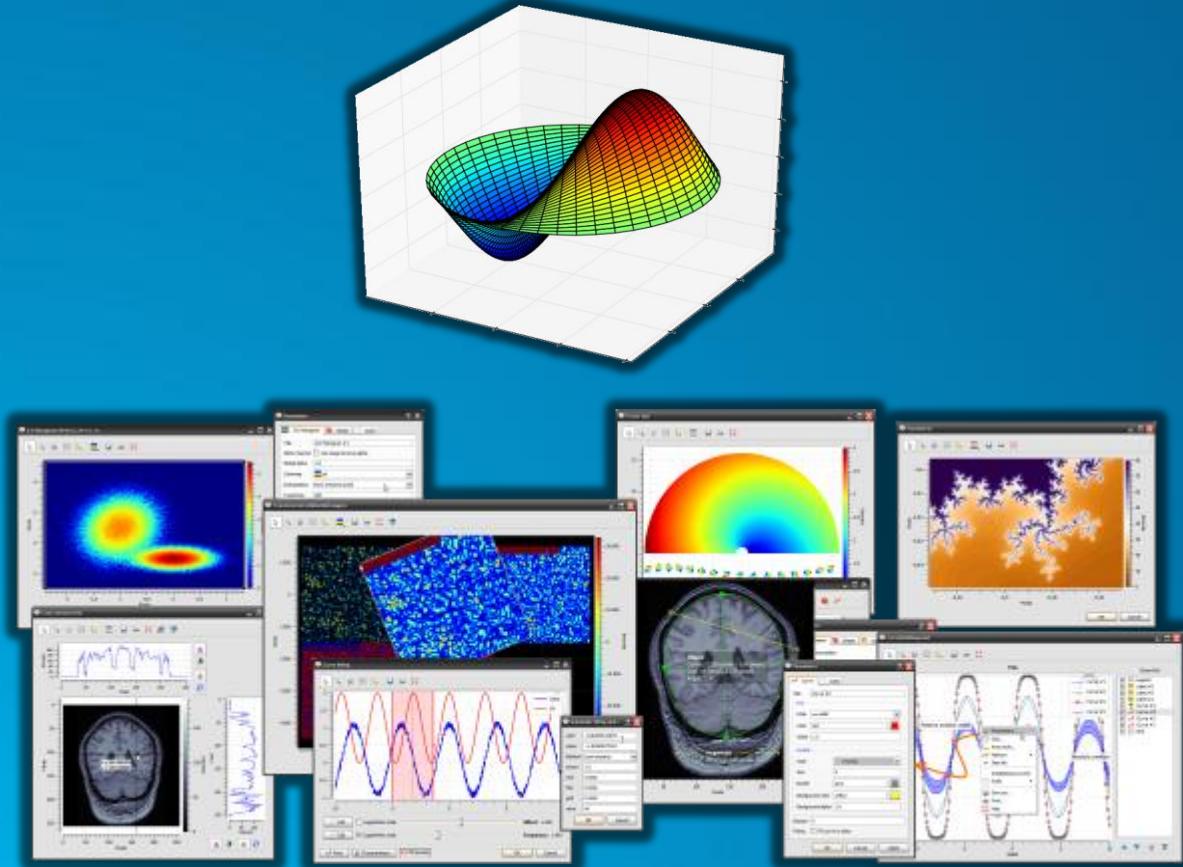
- <https://librosweb.es/libro/python/>
- <http://esripress.esri.com/display/index.cfm>

Diferencias entre Python 2.7 y 3.4



- <http://python3porting.com/>
- http://python-future.org/compatible_idioms.html
- <https://docs.python.org/3/howto/pyporting.html#learn-the-differences-between-python-2-3>

Python y Datos Científicos



<http://shop.oreilly.com/product/0636920034919.do#>

GeoNet

GeoNet

The Esri Community



Home

Content

People

Places

Map



Search

All Places > Developers > GIS Developers

Python

Overview Content People Subspaces and Projects More Actions About Manage

Following in 1 stream

All Content (7480) Filter by shared content

Filter by action: None

Type to filter by text Filter by tag Sort by latest activity: newest first

Title	Author	Latest activity	Views	Likes	Comments	Actions
ArcGIS 10 with Python 2.6.5. and Windows 7 64 bit	Omer Sarikaya	August 25, 2015 1:11:23 PM	1964	0	0	12
Passing variable to another script	Manuel Frias	August 25, 2015 8:33:25 AM	75	0	0	1
Removing ZM From Geometry Column Polygon Using ArcPy?	Behrouz Hosseini	August 24, 2015 7:02:40 PM	177	0	0	6
layer workspace path points to a .sde file that doesn't exist, yet the layer still draws	Theodore Rakel	August 24, 2015 4:05:29 PM	132	0	0	12
Labeling Related Table - Python	Patrick Empey	August 24, 2015 3:41:48 PM	102	0	0	1

Start a discussion Upload a file Write a document Write a blog post Create a poll Create an event Create a video

0

VIEW THE BLOG Python

Create Use large menu

CONTENT

- Discussion
- Uploaded File
- Document
- Blog Post
- Poll
- Status Update
- Message
- Event
- Video

PLACES

- Project

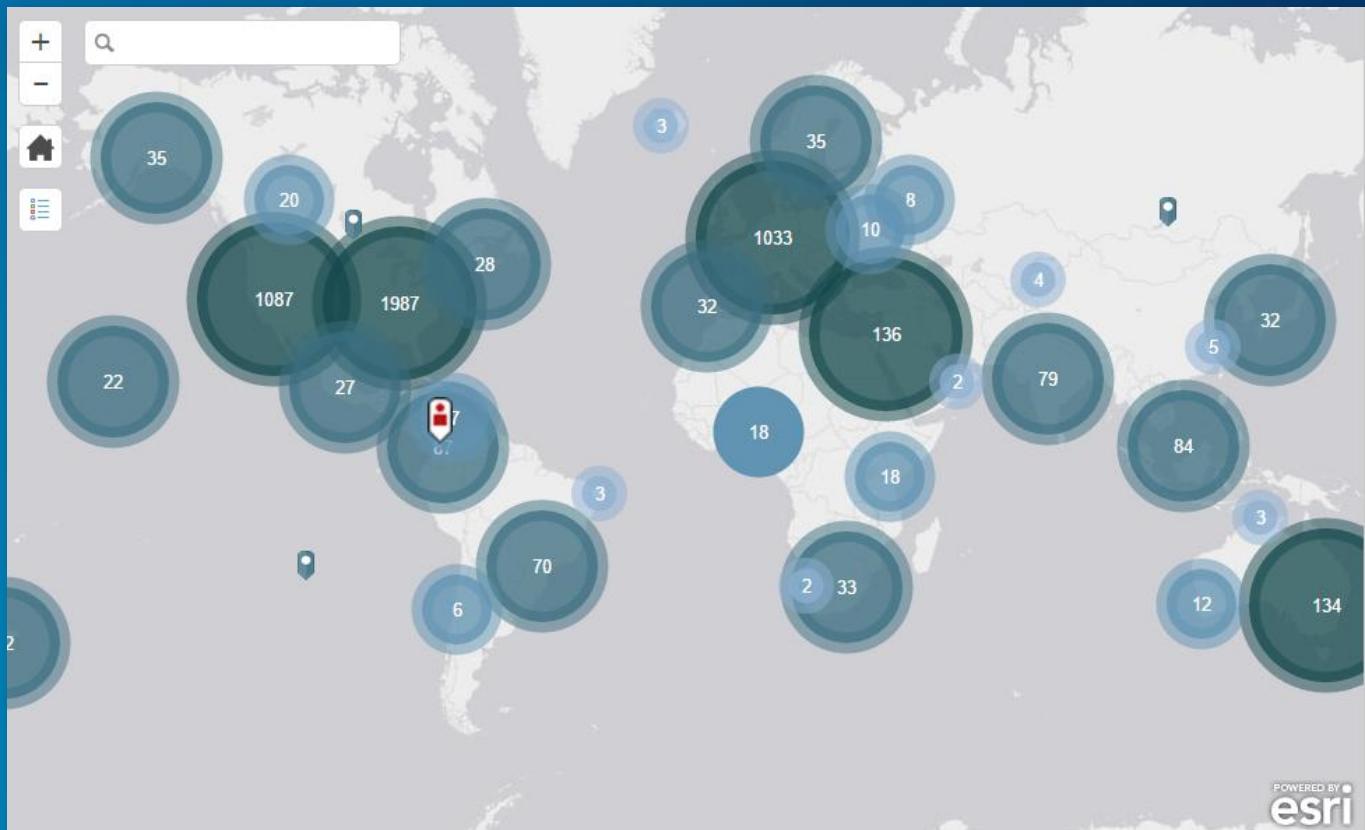
[Home](#)[Content](#)[People](#)[Places](#)[Map](#)Search

¿Tienen una cuenta en GeoNet?



Lugares más visitados (últimos 30 días)

- 1) *GIS* – (820.000)
 - 2) *ArcGIS API for JavaScript* (545.000)
 - 3) *Managing Data* – (510.000)
 - 4) *Python* – (475.000)



[Home](#)[Content](#)[People](#)[Places](#)[Map](#)Search

Some Python Snippets

Created by Xander Bakker on Jul 23, 2014 10:03 PM. Last modified by Xander Bakker on Dec 29, 2014 4:51 PM.

General snippets

```
01. filePathName = 'C:/Folder/SubFolder/afile.ext'
02.
03.
04. # Results in:
05. filePath = 'C:/Folder/SubFolder'
06. fileName = 'afile.ext'
07.
```

```
01. def FieldExist(tbl, fieldname):
02.     """Check if a field exists, return boolean"""
03.     return bool(arcpy.ListFields(tbl, fieldname))
04.
```

```
01. # format a number to 3 digits (with leading zero's)
02. text = "%03d" % (value,)
03.
```

or following the suggestion of [Neil Ayres](#):

```
01. length = 7
02. value = 123
03. text = "{0}".format(value).zfill(length)
04.
05. # or indicating the number of decimals:
06. length = 10
07. value = 123.4567890
08. decimals = 2
09. text = "{0:.{1}f".format(round(value, decimals)).zfill(length)
```

Also have a look at this website: [Python String Format Cookbook | mkaz.com](#) as was suggested by [Anthony Giles](#) in this thread: [What is label expression for formatting a number to have thousands separator and decimals?](#)

- Validar si un campo existe.
- Trabajar con diccionarios.
- Comparando listas con sets.
- Combinar listas.
- Obtener lista de valores únicos.
- Sumar una columna.
- Consideraciones con cursos.
- Usando eval.
- Definir el nivel de licencia.
- Trabajar con dominios.

Conclusiones

- El uso de Python en ArcGIS Pro permite la automatización de flujos de trabajo.
- Python nos permite tener acceso a las funcionalidades del SciPy Stack.
- Mediante el scripting de Python utilizado en ArcGIS Pro, es posible hacer análisis robustos a datos Raster, vectorial y tabular.

Recursos

Esri Colombia

<http://www.esri.co>

ArcGIS Online

<http://www.arcgis.com/features/>

Ayuda ArcGIS Online

<http://doc.arcgis.com/es/arcgis-online/>

Comunidad Esri

<http://geonet.esri.com/>

Síganos en:



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Gracias



Contáctenos: www.esri.co
mlondono@esri.co
xbakker@esri.co



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Mapas que **SIGNifican**