

ArcGIS Georegistration Coding – Digitization of Tropical Cyclone Track Maps

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' TC registration tools
' revised 12 Nov 2007 by sts/WxAnalyst
'
' UIToolControl1 = 2-point raster registration
' UIButtonControl1 = Feature Table population for {lon,lat}

Dim mxDoc As IMxDocument
Dim mxActiveView As IActiveView
Dim mxScreenDisplay As IScreenDisplay
Dim mxSelLayer As ILayer
Dim xx(1) As Single
Dim yy(1) As Single
Dim lon(1) As Single
Dim lat(1) As Single
Dim PassCounter As Integer
Dim pStatus As IStatusBar

' Image registration tool, assume that selected image layer is loaded without registration, so
that
' upper left hand pixel is centered on (0,0) map coordinates (not screen coordinates)
' this means that upper left hand corner is located as (-0.5,+0.5) map coordinates

Private Function UIToolControl1_CursorID() As Variant
' use the cross cursor
UIToolControl1_CursorID = 3
End Function

' UIToolControl1 is enabled only if a raster layer is selected
Private Function UIToolControl1_Enabled() As Boolean
Dim rmxDoc As IMxDocument
Dim rselectedLayer As ILayer
Set rmxDoc = ThisDocument
Set rselectedLayer = rmxDoc.SelectedLayer
If rselectedLayer Is Nothing Then
UIToolControl1_Enabled = False
If PassCounter <> 0 Then
'oops, have left the operation, cancel
PassCounter = 0
Set Application.CurrentTool = Nothing
End If
Else
If TypeOf rselectedLayer Is IRasterLayer Then
UIToolControl1_Enabled = True
Else
UIToolControl1_Enabled = False
End If
End If
End Function

Private Sub UIToolControl1_Refresh(ByVal hDC As Long)
' MsgBox "tool refresh"
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'Get a reference to the ActiveView and ScreenDisplay
Set mxDoc = ThisDocument
Set mxActiveView = mxDoc.ActiveView
Set mxScreenDisplay = mxActiveView.ScreenDisplay
End Sub
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Private Sub UIToolControl1_Select()
If PassCounter = 0 Then
'this is the first time through, check conditions
'Get a reference to the ActiveView and ScreenDisplay
Set mxDoc = ThisDocument
Set mxActiveView = mxDoc.ActiveView
Set mxScreenDisplay = mxActiveView.ScreenDisplay
Set mxSelLayer = mxDoc.SelectedLayer
' these tests are not necessary, but do them anyway
If mxSelLayer Is Nothing Then
MsgBox "Select a layer in the Table of Contents", vbCritical, "No layer selected"
Exit Sub
End If
If Not TypeOf mxSelLayer Is IRasterLayer Then
MsgBox "Select a RASTER layer", vbCritical, "No layer selected"
Exit Sub
End If
'ok, ready to roll
PassCounter = 1
Set pStatus = Application.StatusBar
pStatus.Message(0) = "Define Pt# 1"
' send message to operator, in case they get interrupted
MsgBox "Click & Enter {lon,lat} for two points" & vbCrLf & "Cancel to start over"
End If
End Sub
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Private Sub UIToolControl1_MouseDown(ByVal button As Long, ByVal shift As Long,
ByVal x As Long, ByVal y As Long)
' PassCounter is normally zero
' PassCounter = 1 for lon,lat 1
' PassCounter = 2 for lon,lat 2

'fetch complete raster path and filename for definition of the World File
Dim mxRaster As IRasterLayer
Set mxRaster = mxSelLayer
Dim mxPath As String
mxPath = mxRaster.FilePath

Dim ss As String
Dim pPoint As IPoint
Dim pClone As IClone
'Get the point where the user clicked
If mxDoc.CurrentLocation.IsEmpty Then Exit Sub
'Clone the point because we don't want to alter
'the actual document's current location point
Set pClone = mxDoc.CurrentLocation
Set pPoint = pClone.Clone

If ((PassCounter < 1) Or (PassCounter > 2)) Then
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MsgBox "index out of range = " & CStr(PassCounter), vbCritical, "TC Registration Tool"
PassCounter = 0 'deactivate tool
Set Application.CurrentTool = Nothing
Exit Sub
End If

xx(PassCounter - 1) = pPoint.x
yy(PassCounter - 1) = pPoint.y

Dim UserValue As String
UserValue = InputBox("input longitude #" + CStr(PassCounter), "TC registration tool")
If UserValue = "" Then
    PassCounter = 0
    pStatus.Message(0) = ""
    Set Application.CurrentTool = Nothing
    Exit Sub
End If
lon(PassCounter - 1) = CSng(UserValue)
UserValue = InputBox("input latitude #" + CStr(PassCounter), "TC registration tool")
If UserValue = "" Then
    PassCounter = 0
    pStatus.Message(0) = ""
    Set Application.CurrentTool = Nothing
    Exit Sub
End If
lat(PassCounter - 1) = CSng(UserValue)

If PassCounter = 2 Then
    Dim a As Single
    Dim e As Single
    Dim c As Single
    Dim f As Single

'assume no rotation
' in ArcGIS 9.2, terms A and E will not invert
a = (lon(0) - lon(1)) / (xx(0) - xx(1))
e = (lat(0) - lat(1)) / (yy(0) - yy(1))
c = lon(1) - a * xx(1)
f = lat(1) - e * yy(1)

' construct world file name and extension
Dim mxExt As String
Dim newExt As String
mxExt = Right(mxPath, 3)
newExt = Mid(mxExt, 1, 1) & Mid(mxExt, 3, 1) & "w"
Dim newFile As String
newFile = Left(mxPath, Len(mxPath) - 3) & newExt
'MsgBox newFile, vbOKOnly, "new filename"

' delete that file if it exists
Open newFile For Binary Access Write As #1
Close 1
Kill newFile
Open newFile For Output As #1

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' write out contents, A,B,D,E,C,F
Print #1, CStr(a) 'dx
Print #1, "0.0" 'rotation term
Print #1, "0.0" 'rotation term
Print #1, CStr(e) 'dy
Print #1, CStr(c) 'xo
Print #1, CStr(f) 'yo
' close the World File
Close 1

' the following code has sporadic results, and loaded image is not always registered properly
(??)
' remove raster file from TOC
' Dim pMap As IMap
' Set pMap = mxDoc.FocusMap
' Dim pActiveView As IActiveView
' Set pActiveView = pMap
' Get the selected layer
' Dim pSelItem As IUnknown
' Set pSelItem = mxDoc.SelectedItem
' If pSelItem Is Nothing Then
'   MsgBox "No Feature layer selected", vbCritical, "Error #TC01"
'   PassCounter = 0
'   Set Application.CurrentTool = Nothing
'   Exit Sub
'   End If
' Remove the Layer and refresh the map
' pMap.DeleteLayer mxDoc.SelectedLayer
' pActiveView.Refresh 'do this later
' mxDoc.UpdateContents

' MsgBox "Load image?", vbYesNo, "TC Registration Tool"

' reload raster file
' (to reset, delete world file and reload by hand)
' Dim pRWFactory As IWorkspaceFactory
' Set pRWFactory = New RasterWorkspaceFactory
' Dim pRasterWorkspace As IRasterWorkspace
' Set pRasterWorkspace = pRWFactory.OpenFromFile("c:\arcdata\TC\Template\", 0)
'*****
' Dim pRDataset As IRasterDataset
' Set pRDataset = pRasterWorkspace.OpenRasterDataset("Tonga1939.jpg")
' Dim pRLayer As IRasterLayer
' Set pRLayer = New RasterLayer
' pRLayer.CreateFromDataset pRDataset
' pMap.AddLayer pRLayer
" move layer to bottom
' pMap.MoveLayer pRLayer, pMap.LayerCount - 1
' mxDoc.UpdateContents
' pActiveView.Extent = pRLayer.AreaOfInterest
' pActiveView.Refresh

Set pStatus = Application.StatusBar
pStatus.Message(0) = "World File created"
MsgBox "World File created, reload raster", vbOKOnly, "TC Registration Tool"

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pStatus.Message(0) = ""
Set Application.CurrentTool = Nothing
PassCounter = 0
End If

If PassCounter = 1 Then
    Set pStatus = Application.StatusBar
    pStatus.Message(0) = "Define Pt# 2"
    PassCounter = 2
End If

End Sub

' UIButtonControl1 is enabled only if a feature layer is selected
Private Function UIButtonControl1_Enabled() As Boolean
    Dim fmxDoc As IMxDocument
    Dim fselectedLayer As ILayer
    Set fmxDoc = ThisDocument
    Set fselectedLayer = fmxDoc.SelectedLayer
    If fselectedLayer Is Nothing Then
        UIButtonControl1_Enabled = False
    Else
        If TypeOf fselectedLayer Is IFeatureLayer Then
            UIButtonControl1_Enabled = True
        Else
            UIButtonControl1_Enabled = False
        End If
    End If
End Function

' TC {lon,lat} button control

Private Sub UIButtonControl1_Click()
    Dim bmxDoc As IMxDocument
    Dim bselectedLayer As ILayer
    Dim bfLayer As IFeatureLayer
    Dim bfClass As IFeatureClass
    Dim X_Pos As Double
    Dim Y_Pos As Double

    Set bmxDoc = ThisDocument
    Set bselectedLayer = bmxDoc.SelectedLayer
    If bselectedLayer Is Nothing Then
        MsgBox "Select a layer in the Table of Contents.", vbCritical, "No layer selected"
        Exit Sub
    End If
    If Not TypeOf bselectedLayer Is IFeatureLayer Then
        MsgBox "Select a feature layer in the Table of Contents.", vbCritical, "Selected layer is not
a feature layer"
        Exit Sub
    End If

    Set bfLayer = bselectedLayer
    Set bfClass = bfLayer.FeatureClass

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If bfClass.ShapeType = esriGeometryPoint Then
  MsgBox "we have a point feature!"
  If bfClass.FindField("Lon") Then
    MsgBox "field Lon exists"
    If bfClass.FindField("Lat") Then
      MsgBox "field Lat exists"

      X_Pos = bfClass.FindField("Lon")
      Y_Pos = bfClass.FindField("Lat")

      Dim bfCursor As IFeatureCursor
      Dim bFeature As IFeature
      Dim bthePoint As IPoint

      Set bfCursor = bfClass.Update(Nothing, False)
      Set bFeature = bfCursor.NextFeature
      Do Until bFeature Is Nothing
        Set bthePoint = bFeature.Shape
        bFeature.Value(X_Pos) = bthePoint.x
        bFeature.Value(Y_Pos) = bthePoint.y
        bfCursor.UpdateFeature bFeature
        Set bFeature = bfCursor.NextFeature
      Loop
      MsgBox "Finished"

      End If
    End If
  Else
    MsgBox "This tool only works with point features", vbCritical, "Unsupported geometry
type"
    Exit Sub
  End If

End Sub

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