

Digitisation of PRESASS/PRESAO Seasonal Forecasts: QGIS v2.18.12

Introduction

This document should allow the users to take a PRESASS seasonal forecast map, and turn it into a set of forecast probabilities on a latitude/longitude grid. This should facilitate verification of forecasts. The grid should be the same as the observations, that will be used in forecast verification; here, the CHIRPS grid is used.

Prepared on 2018-07-30 by Jenny Pirret (Met Office), as part of the ASPIRE project within WISER.

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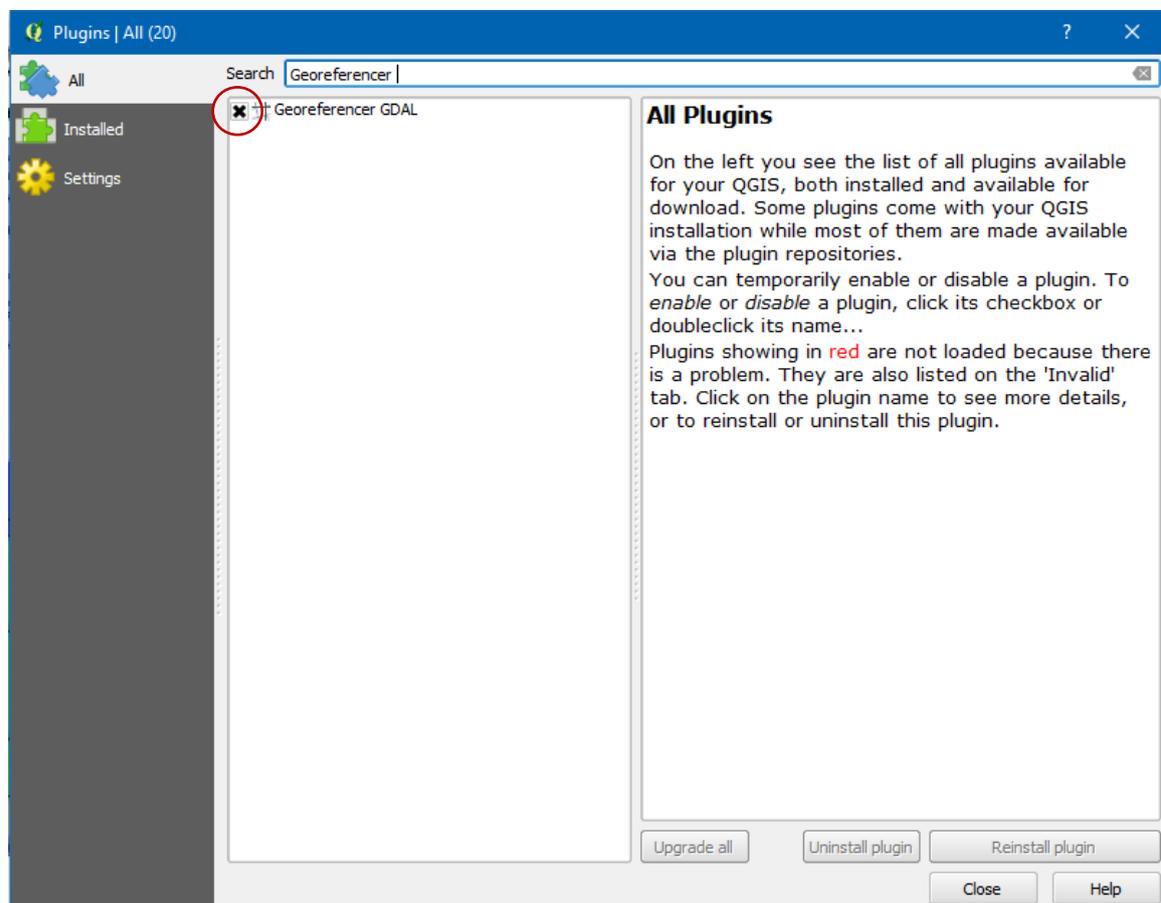


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Preliminary

- Install QGIS using <https://qgis.org/en/site/forusers/download.html>
- Have a PRESASS forecast map in .PNG format
- Enable the Georeferencer plugin. Go to Plugins menu -> Manage and Install Plugins. Search for 'georeferencer' and ensure the box next to it (circled in red on this screenshot) is filled:



- Download global countries' shapefiles from Natural Earth (ne_50m_admin_countries.shp), available from <https://www.naturalearthdata.com/downloads/50m-cultural-vectors/50m-admin-0-countries-2/>.

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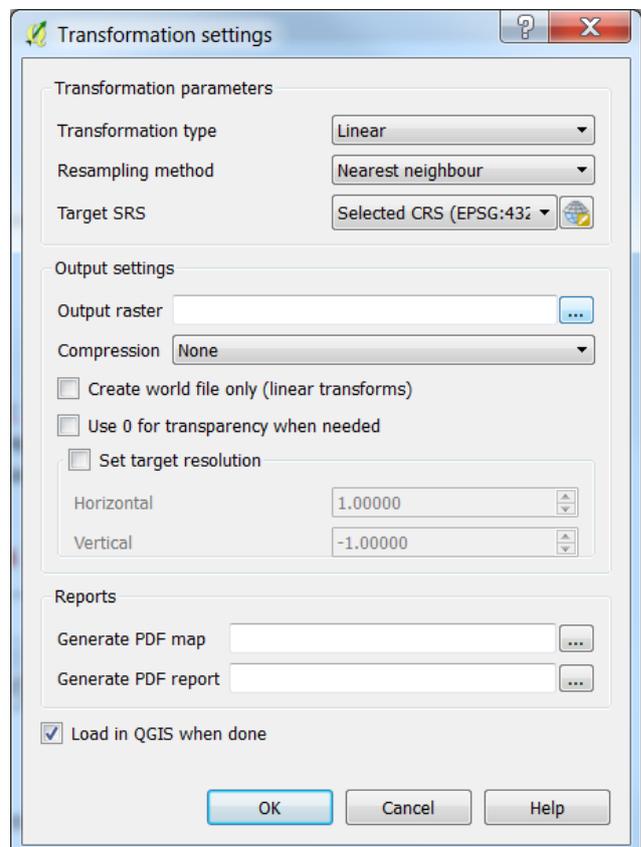


Part 1: Georeferencer

1. Start a new project.
2. Go to Raster -> Georeferencer -> Georeference.... A new window should open.
3. Open Raster -> Browse for image of forecast. Once done, you may need to specify the co-ordinate reference system; a reasonable default is WGS:84 / EPSG:4326.



4. Ensure the icon circled above is highlighted. Click on a point and enter its latitude and longitude. Repeat this several times. Use a large spatial spread of points that can be clicked on accurately (e.g. corners or joints in borders). A set of example points are shown on the next page.
5. Settings -> Transformation settings. A new window should open. Ensure Transformation type is linear. Check the 'Load in QGIS when done' box. Click OK.
6. Click 'Start Georeferencing' icon.



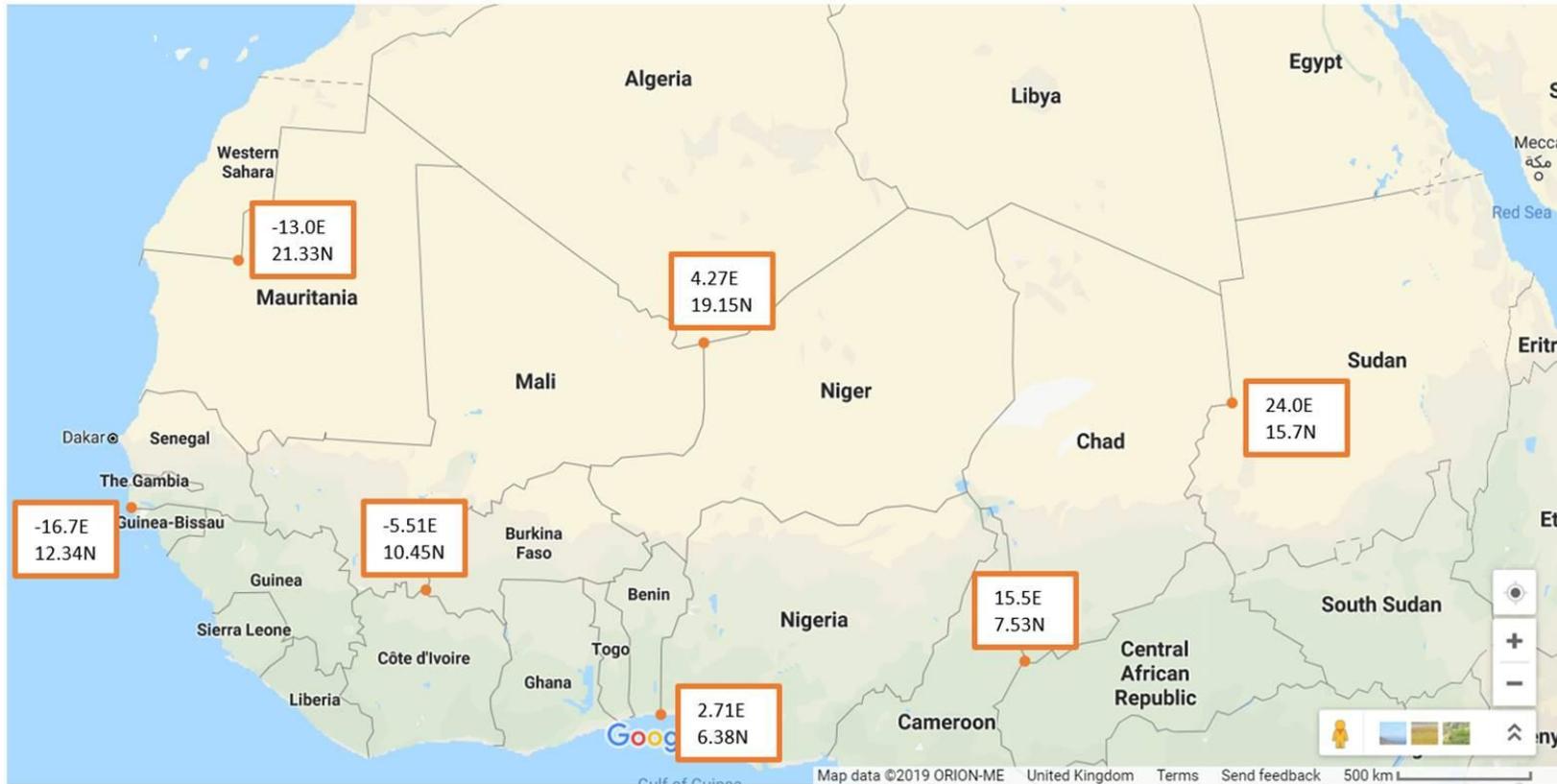
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Example points for georeferencing



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7. If the points in the Georeferencer window have a red line next to them (see illustration), check the table of points for any errors. Delete the layer in the main QGIS window by right-clicking in the layers panel. Correct any errors in the Georeferencer table and repeat step 6. Alternatively, close everything and start from Step 1.

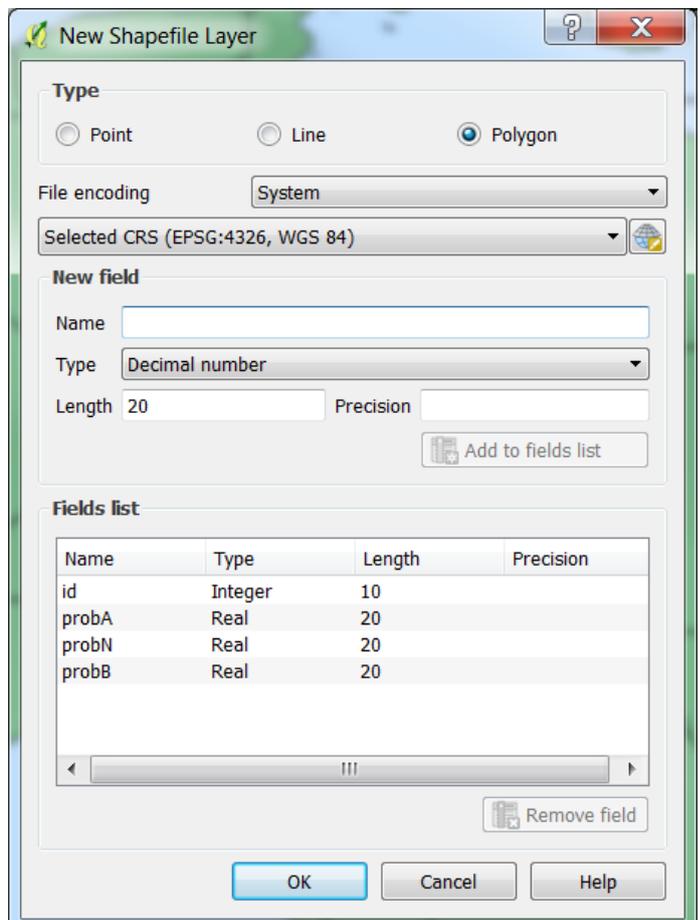


8. Ensure the image has loaded in the main QGIS window, then close the Georeferencer window.

We recommend that now, you choose to view both the Layers Panel and Layer Styling. Select each in turn from View -> Panels, and a new window should open. If preferred, the window can be click-dragged to a side panel.

Part 2: Importing country boundaries

1. In main QGIS window, go to Layer -> Add Layer -> Add Vector Layer.
2. Browse for the file:
ne_50m_admin_0_countries.shp.
3. Go to 'Layer -> Create Layer -> New Shapefile Layer...', and you should see a window like that to the right.
 - a. Select Type as Polygon.
 - b. Under the 'New Field' heading, create three fields (probA, probN, probB). For each, enter the name, choose Decimal number type, then add to fields list.



New Shapefile Layer

Type: Point Line Polygon

File encoding: System

Selected CRS (EPSG:4326, WGS 84)

New field

Name:

Type: Decimal number

Length: 20 Precision:

Fields list

Name	Type	Length	Precision
id	Integer	10	
probA	Real	20	
probN	Real	20	
probB	Real	20	

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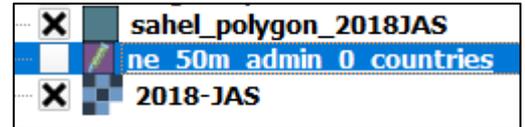


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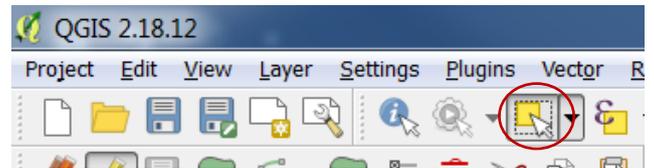


- c. Click OK, and save the new shapefile as sahel_polygon_{year}.shp. A new empty layer should appear in the main QGIS window.

4. In the Layers Panel of the main QGIS window, right click on the ne_50m_admin_0_countries layer and 'toggle editing'. The icon for toggle editing is a yellow pencil, which will appear next to the layer in the Layers Panel.



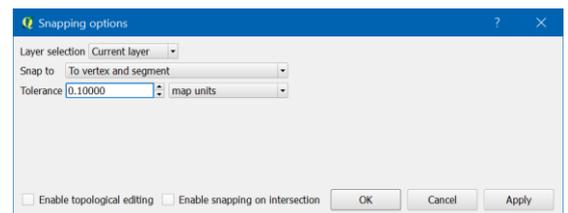
5. Click the 'Select Features' icon – circled in the illustration. Either draw a box including all of the countries of interest, or press the 'Shift' key while clicking each country in turn.



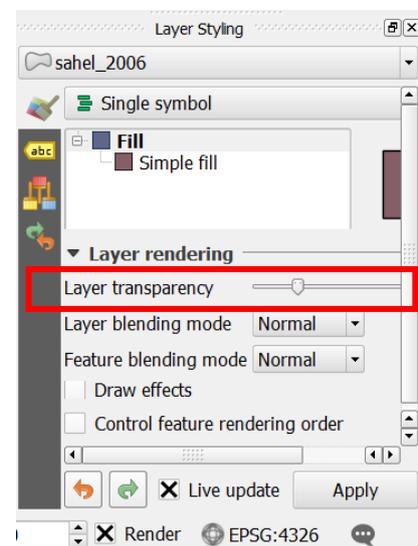
6. On the Edit menu, -> Copy Features.
7. Toggle editing off for the 'ne_...' layer by right-clicking and selecting it from the menu.
8. Toggle on editing for the 'sahel_...' layer. Using the Edit menu, -> Paste Features.

Part 3: Splitting into forecast areas

1. First go to Settings -> Snapping options. A new window like the one to the right should open. With 'sahel...' Layer selected in the Layers Panel, choose to snap to vertex and segment, with a tolerance of 0.1 map units.



2. In the Layer Styling section, typically on the sidebar, reduce layer transparency (highlighted in the illustration to the right) so that the forecast underneath is visible. If needed, change the colour, to make the forecast map clearer.



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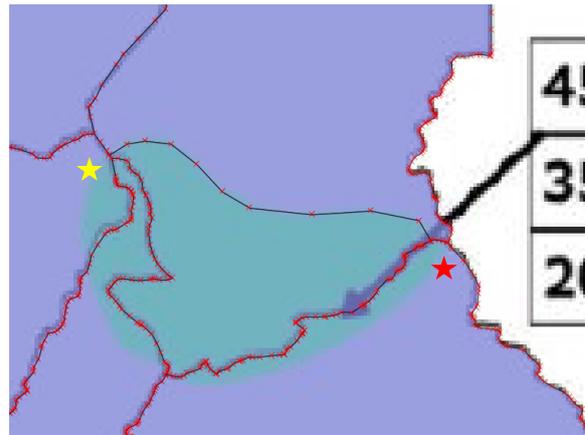
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- Ensure you can see the Advanced Digitisation toolbar (if not visible, try View -> Toolbars). Use split features (circled below) to outline the forecast areas. We strongly recommend using an external mouse for this part. Some tips:



- Start the line outside the map area, or on the opposite side of another boundary. On picture, yellow star shows where line was started
- Zoom in and out of the map or use the hand tool to move the map, even part-way through splitting.
- Right click to finish once you've crossed a boundary. In example, this was done at the red star.
- Save the edits to this layer.



- Open the attribute table by right-clicking on the 'sahel...' layer and choosing 'Open attribute table'
- Selecting a row in the attribute table will highlight the related area on the map. Two useful tools for seeing which area is highlighted are zoom to selection (magnifying glass with yellow square) and zoom to layer (same but grey square, see illustration).



id	probA	probN	probB
1	20	35	45
2	50	35	15
3	40	35	25
4	40	35	25
5	50	35	15
6	20	35	45
7	20	35	45
8	20	35	45
9	50	35	15
10	50	35	15
11	40	40	20
12	50	35	15
13	20	35	45
14	20	35	45
15	20	35	45
16	20	35	45

- For each map area, enter the forecast probA, probN and probB into the attribute table (example shown to right).
- Save edits and toggle editing off on the layer.
- Save your project; close QGIS; open QGIS; open up your project.

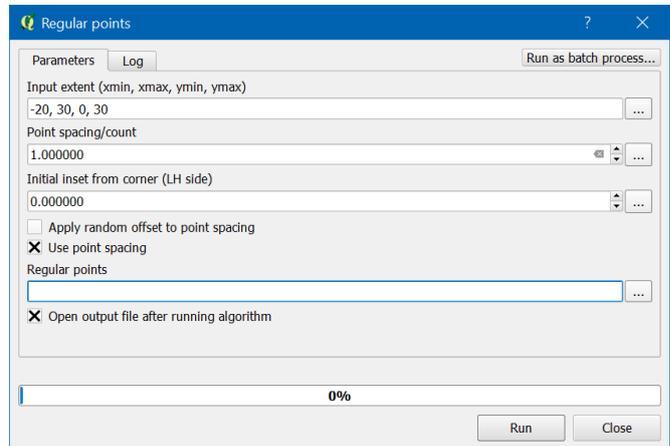
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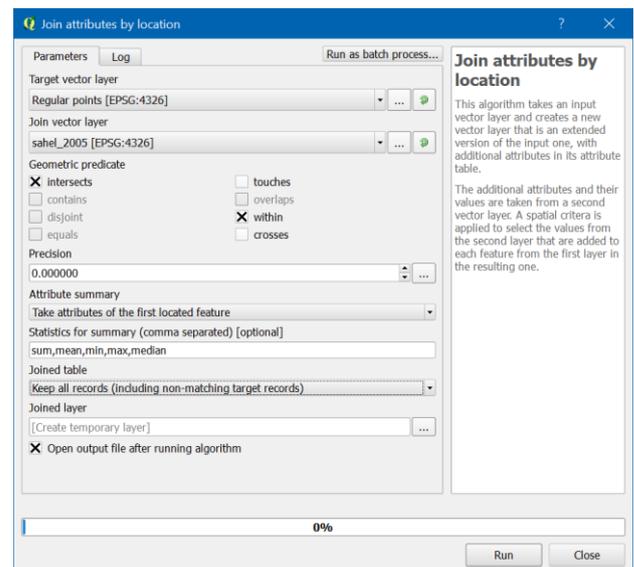


Part 4: Gridding and Exporting data

1. Create a regular grid, that matches the observations grid.
 - a. In main QGIS window, go to Vector -> Research Tools -> Regular points
 - b. The Input extent is a rectangle over the Sahel: -20, 30, 0, 30.
 - c. For CHIRPS data: Grid spacing: 1.0; Initial offset: 0.0
 - d. Click Run.



2. Merge the forecast attributes with the regular points. Go to Vector -> Data Management Tools -> Join attributes by location (see screenshot of new window).
 - a. Target vector layer: regular points
 - b. Join vector layer: sahel_polygon_{year}
 - c. If asked (varies with QGIS version), Geometric predicate: choose intersects and within
 - d. Joined table: Keep all records.
 - e. Click Run.



3. Open the attributes table for the merged layer to ensure that the attributes have transferred.

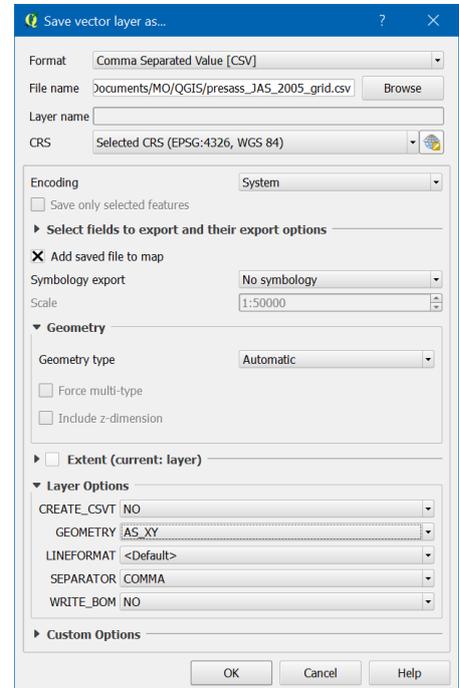
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4. Export the gridded data to a .csv file.
 - a. Right click the Joined layer -> Save as. A new window should open (see image, right)
 - b. Format: Comma Separated Variable (CSV)
 - c. File name: use 'Browse...' to name the file presass_{season}_{year}_grid.csv, e.g. presass_JAS_2017_grid.csv
 - d. Under Layer Options, set GEOMETRY to AS_XY.
 - e. Click OK.
5. You should now have a .csv file, containing columns for longitude (X), latitude (Y), and the forecast probabilities for each point.



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