Notes on GPolygon and Bounding Box:
Impact on granules spatial description and searches

Andrey Savtchenko[1] and Evan Manning[2]

Version 2005.12.02

[1] L-3 Communications GSI Inc.
[2] AIRS Science Team, NASA JPL

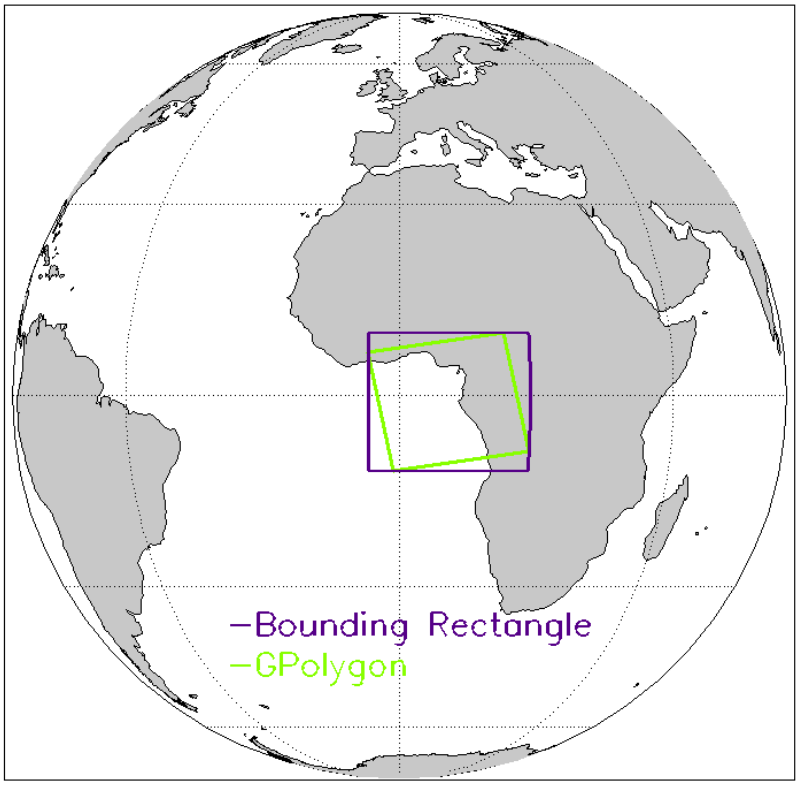

Figure 1 The region of a granule represented as GPolygon vs. Bounding rectangle. The GPolygon accurately reflects the data coverage, whereas the Bounding Rectangle covers a larger area. The difference between the GPolygon and the Bounding Rectangle for tropical granules is small, resulting from orbital inclination**.**

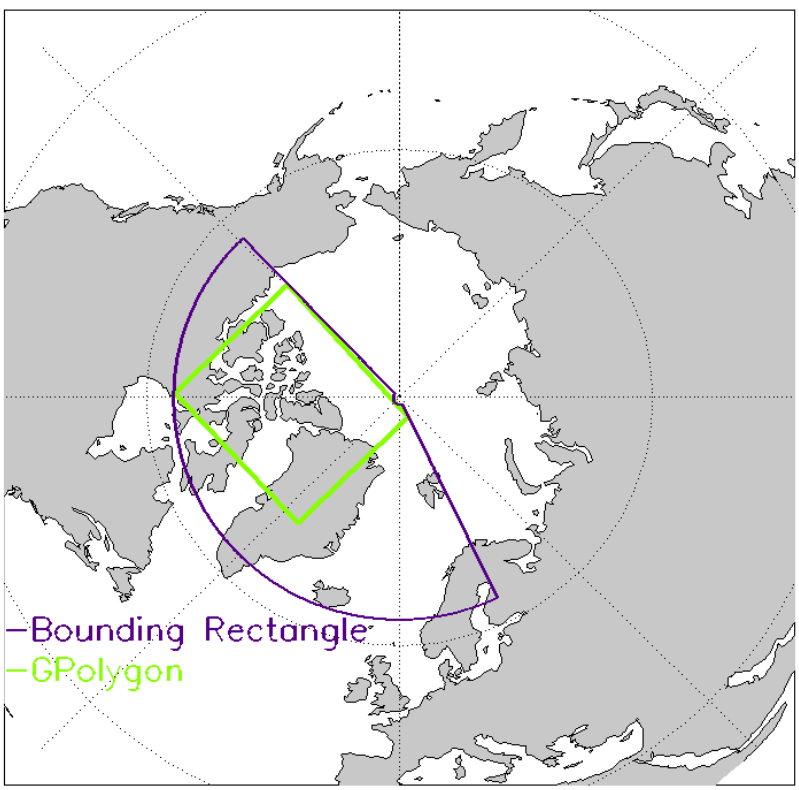

Figure 2 The region of a polar granule represented as GPolygon vs. Bounding rectangle. GPolygon still corresponds closely to actual data coverage, but Bounding Rectangle does not. The North and South bounding latitudes project into arcs.

The ECS Data Model supports several ways to represent the area covered by a granule. AIRS products have always used the "Bounding Rectangle" Spatial Domain Container, which uses 4 fields to hold the extreme latitudes and longitudes of the granule: "North Bounding Coordinate", "South Bounding Coordinate", "East Bounding Coordinate", "West Bounding Coordinate". Release of V5 AIRS products may change from the Bounding Rectangle model to the GPolygon model, with 4 points for the 4 corners of the granule. Although the GPolygon representation is much more accurate, this change will inconvenience AIRS data users with applications that use the Bounding Rectangle. Please contact us at help@disc.gsfc.gov if you are using Bounding Rectangle.

Figures 1 and **2** show Bounding Rectangle and GPolygon for one tropical granule and one polar granule. The distortion of using a Bounding Rectangle is relatively minor for the tropical granule in **Figure 1**, but large for the polar granule in **Figure 2**.

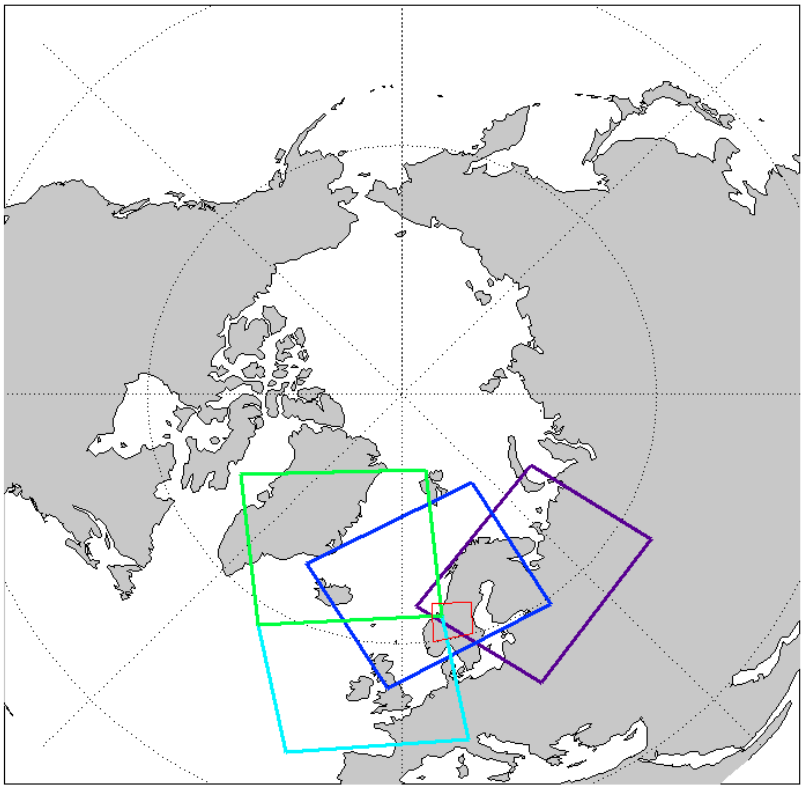

Figure 3 Spatial search results using "GPolygon".

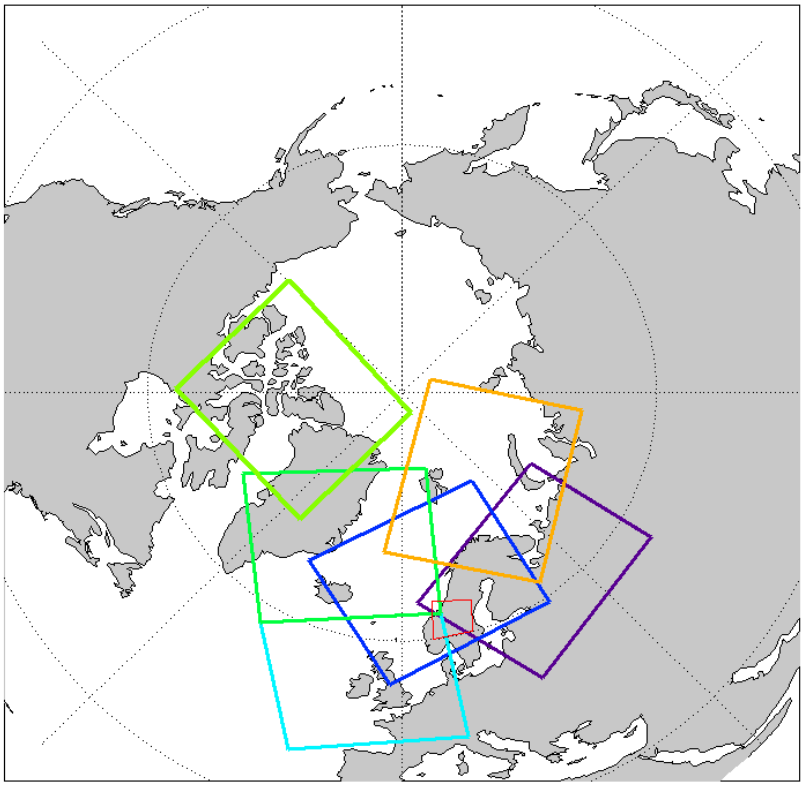

Figure 4 Spatial search results using "Bounding Rectangle".

Figures 3 and **4** demonstrate the differences in the search results when data types have different kinds of Spatial Domain Container.

The results presented are from a search using the EOSDIS Data Gateway (EDG). The small red box indicates user's region of interest.

The search using GPolygon in **Figure 3** returns only granules that intersect the search box.

In contrast, the search using Bounding Rectangle in **Figure 4** returns extra granules far from the user's region of interest.

When such a query is used to order data, then it inconveniences not only the original user, but all other users as well, because the transfer of the unwanted data wastes network bandwidth.