MERIS/AATSR & Sentinel-3 land-water mask

6th April 2017
Overview

• Inconsistencies in previous masks
  – Inconsistency between coastline mask and land/ocean mask
  – Inconsistency between tidal regions mask and land/ocean mask

• Improvements of MERIS & Sentinel-3 masks:
  – Land/Water mask
  – Land/Ocean mask
  – Intertidal zone mask
  – Coastline mask
  – Mask consistency
Inconsistency between coastline mask and land/ocean mask

- Location differences between high resolution coastline (red) and mask for land/ocean classification (land shown in black)
Inconsistency between coastline mask and land/ocean mask

- Mask for land/ocean classification (land = black) superimposed by mask for tidal regions (transparent yellow)
Land/Water mask

- New masks based on Land Cover CCI WB product with improvements
- The old MERIS/Sentinel-3 land/water mask and the SRTM WB product had many land artefacts where water was masked as land

Old land water mask land artefacts shown in red and SRTM WB land artefacts shown in yellow
Land/Water mask

- Inland water bodies, especially over northern America were extremely underestimated

Water masked in old mask shown in blue and additional water masked in new land/water mask shown in red
Land/Ocean mask

- The mask for land/ocean mask is derived from the mask for land/water mask

- This was done by:
  - Converting land/water mask to vector format
  - Selecting the ocean water
  - Cutting of big rivers with help of buffered GSHHS coastline
  - Convert to raster

Example of vectorised and extracted ocean areas (rivers still present)

Example of GSHHS (red) superimposed to current ocean mask (blue)

0.033 degree buffered GSHHS (green) compared to original GSHHS (red) and current ocean mask (blue)
Land/Ocean mask

Ocean mask with remaining inland water (left); Refined ocean mask without inland water (right)
Intertidal mask

Old mask

New mask
Tidal mask

Old mask

New mask
Input data & methodology

1. FES 2004 K1 and M2 tidal amplitude data
2. GEBCO bathymetry data

Methodology

1. Threshold of 0.75 used on K1 and M2 tidal amplitude sum.
2. Threshold of 15m below zero on bathymetry data to generate shallow water mask
3. Intersect mask 1 & 2 to generate shallow water tidal influence mask
4. Intersect with land/ocean mask for further refinements
5. Fill areas between mask and land areas if existing
Coastline mask

• To create a coastline mask which is consistent to the two previous masks, the coastline was derived from the new land/ocean mask.
Mask consistency

- All masks are consistent with each other
  - Masks align on pixel level
  - Masks complement each other without any gaps

Ocean areas from land/ocean mask in dark blue; Coastline mask in red; Tidal regions mask intersecting with water mid blue; Water from land/water mask light blue and land dark green; Land intersecting with tidal region mask light green