

Sinusoidal grid definition

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This note shortly describes the sinusoidal equal-area grid on which the MERIS level 2 products are spatially binned.

The average size of the grid bins is equal to $1/12^\circ$, leading to 2160 rows in latitude, i.e. 1080 latitude rows in each hemisphere (the equatorial line is located between two rows of bins). This discretisation corresponds to roughly 9.277 km. Just below and above the equatorial line, the rows have 4320 bins. This number decreases regularly from the equator to the poles where the last latitude row have only 3 bins.

For each row, the left side of the first bin is always aligned with longitude -180° while the right side of the last bin is aligned with longitude $+180^\circ$, covering all the latitude row area. The number of bins per row is always an integer number, computed in order to have the bin cell size as close as possible to 9.277 km, so that the effective longitudinal bin size may vary from one row to the next one.

Applying this simple rules from South to North pole leads to a total of 5,940,422 bins.

The pseudo-code below can be used to build the sinusoidal grid, i.e. to link the index of each bin (n) to its geolocation in longitude and latitude ($\text{bin_lon}[n]$, $\text{bin_lat}[n]$).

Input parameters:

re: earth equatorial radius = 6378.137 km

nptlat: number of latitude rows = 2160

```
/* effective size (km and deg) of a cell in latitudinal direction */
de_lat=PI*re/(double)(nptlat);
dlat=180./(double)(nptlat);

/* computes the number of cells in longitudinal direction for each row */
/* and the bin effective longitudinal size */
npt_all=0;
for (n=0;n<nptlat;n++) {
    double pn;
    grd_lat[n]=-90.+dlat/2.+(double)(n)*dlat;
    pn=2.*PI*re*cos(grd_lat[n]*RAD);
    nptlon[n]=(int)(0.5+pn/bin_size);
    npt_all+=nptlon[n];
    dlon[n]=360./(double)(nptlon[n]);
}

/* geolocation of the bins */
bin_lon=(float *)malloc(sizeof(float)*npt_all);
bin_lat=(float *)malloc(sizeof(float)*npt_all);
n=0;
for (ilat=0;ilat<nptlat;ilat++) {
    for (ilon=0;ilon<nptlon[ilat];ilon++) {
        bin_lat[n]=grd_lat[ilat];
        bin_lon[n]=-180.0+dlon[ilat]/2.+(double)(ilon)*dlon[ilat];
        n++;
    }
}
```

References

Reports of the International Ocean-Colour Coordinating Group

IOCCG Report Number 4, 2004

Guide to the Creation and Use of Ocean-Colour, Level-3, Binned Data Products

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