Sky map reconstruction from Cylinders

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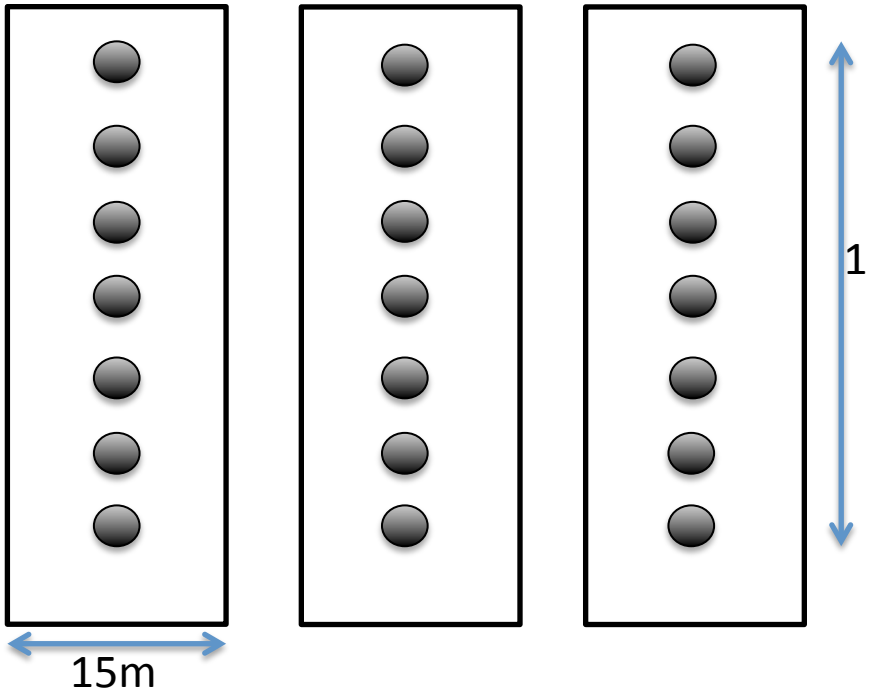
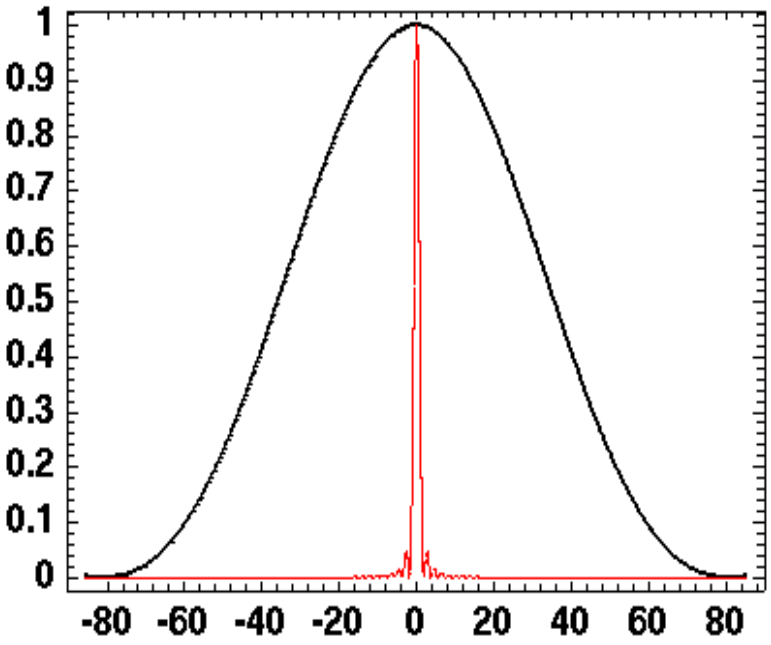
aim

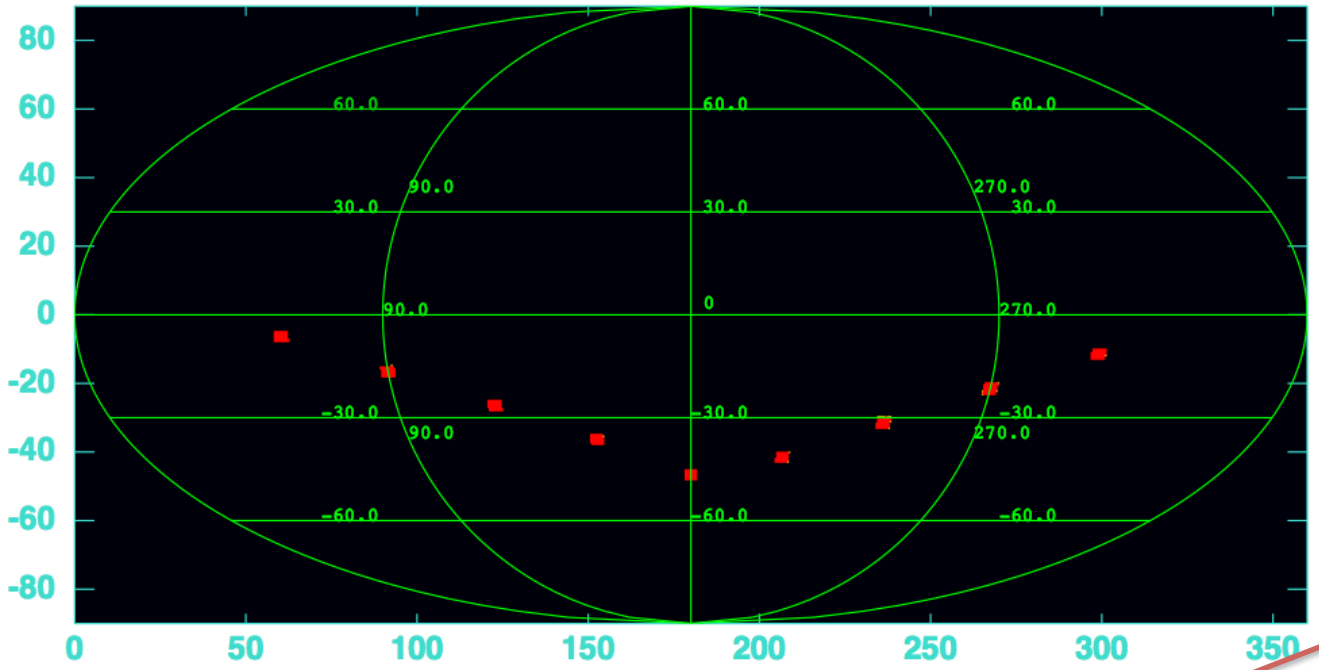
- Showing the grating lobe effect in cylinders with different feeds spacing.



Config A : 32 feeds	32 feeds	32 feeds
Config B : 31 feeds	32 feeds	33 feeds
Config C : 29 feeds	32 feeds	35feeds

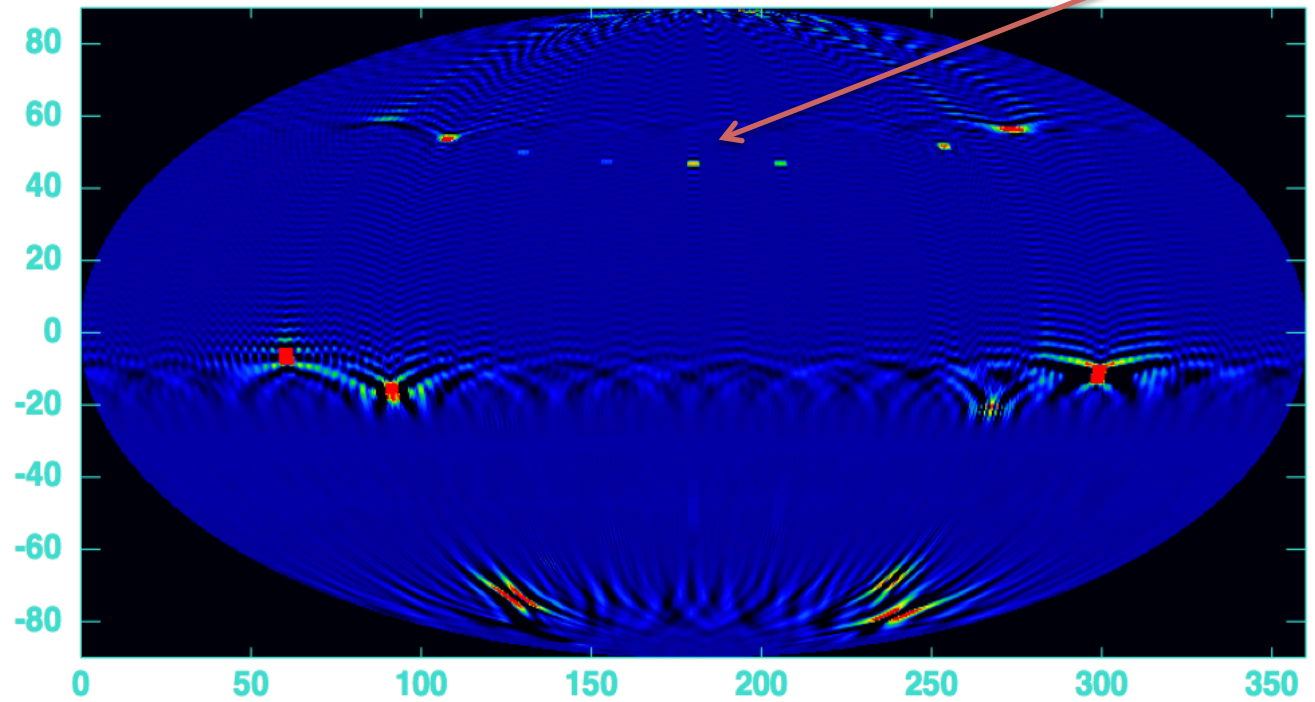
Single feed response: 13m*0.3m
Black: 13m; red: 0.3m



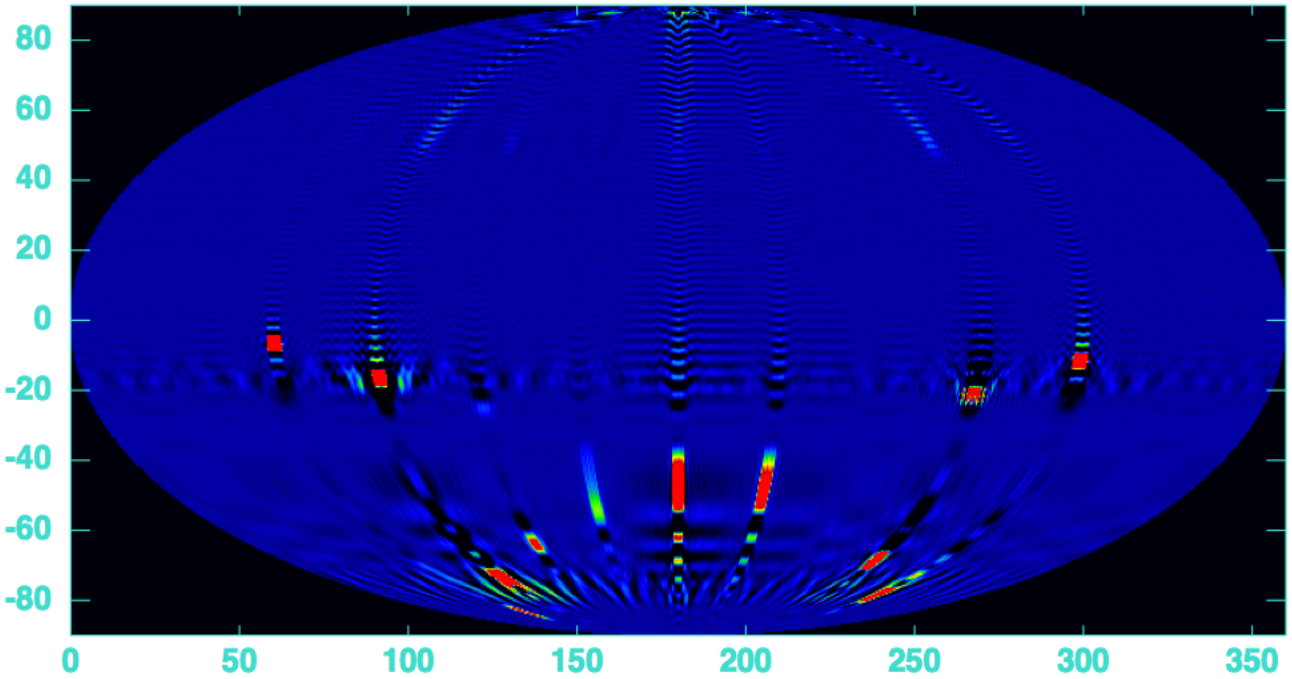


Box sources in
south part of sky

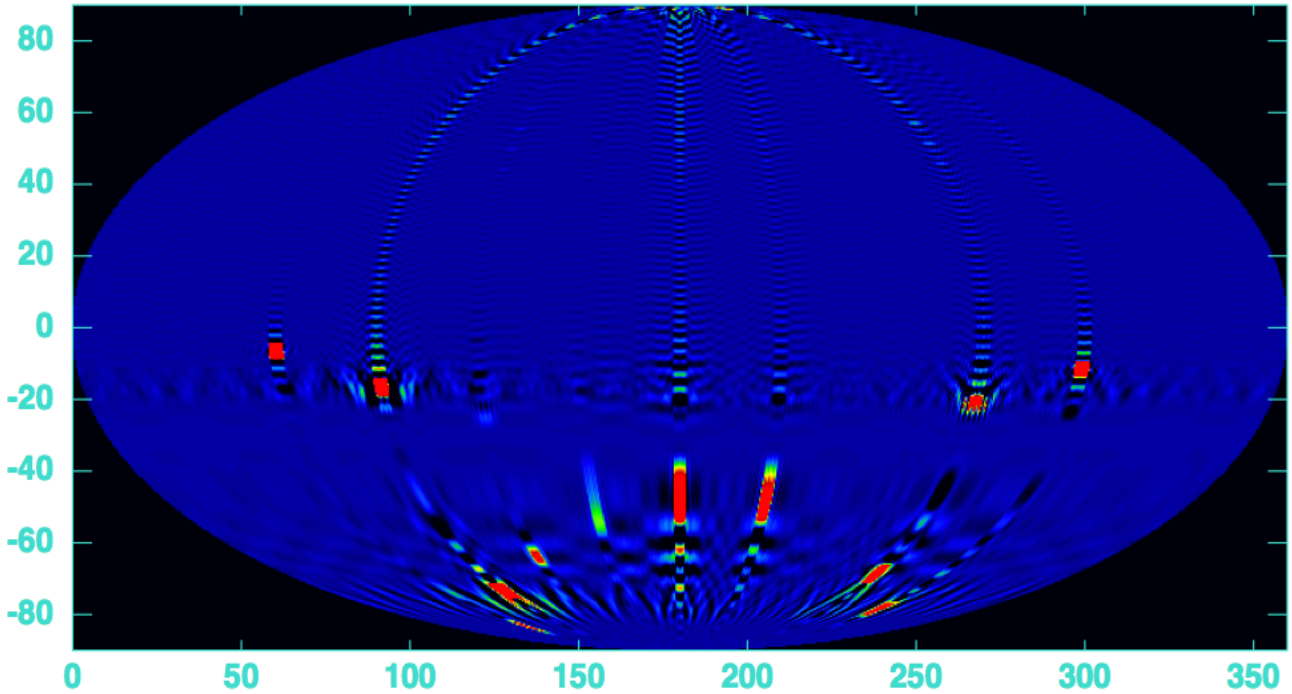
Spurious source image



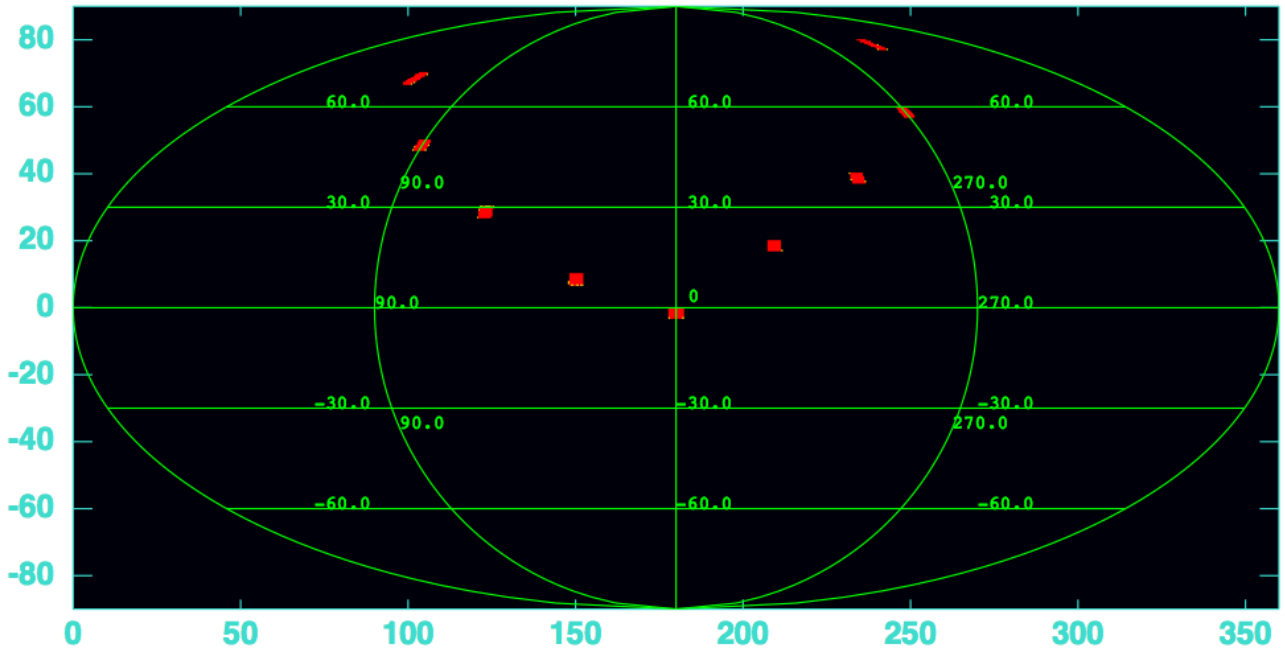
Reconstructed map by
configuration A : 32*3



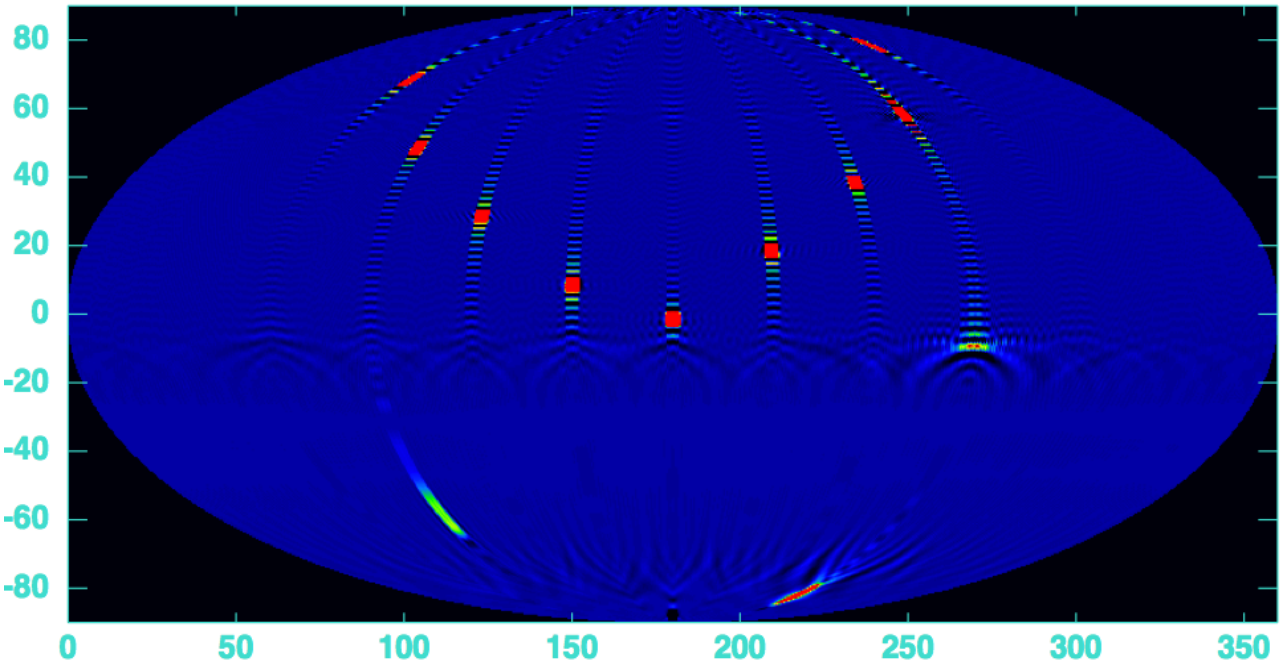
Reconstructed map by configuration B : 31,32,33



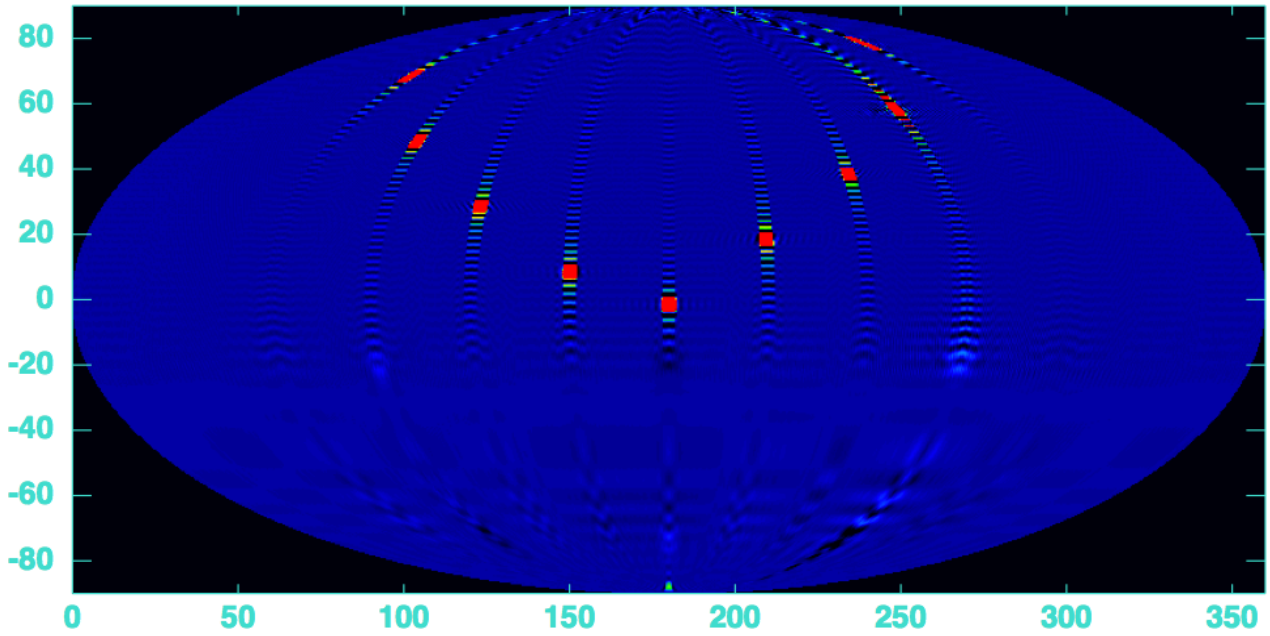
Reconstructed map by configuration C : 29,32,35



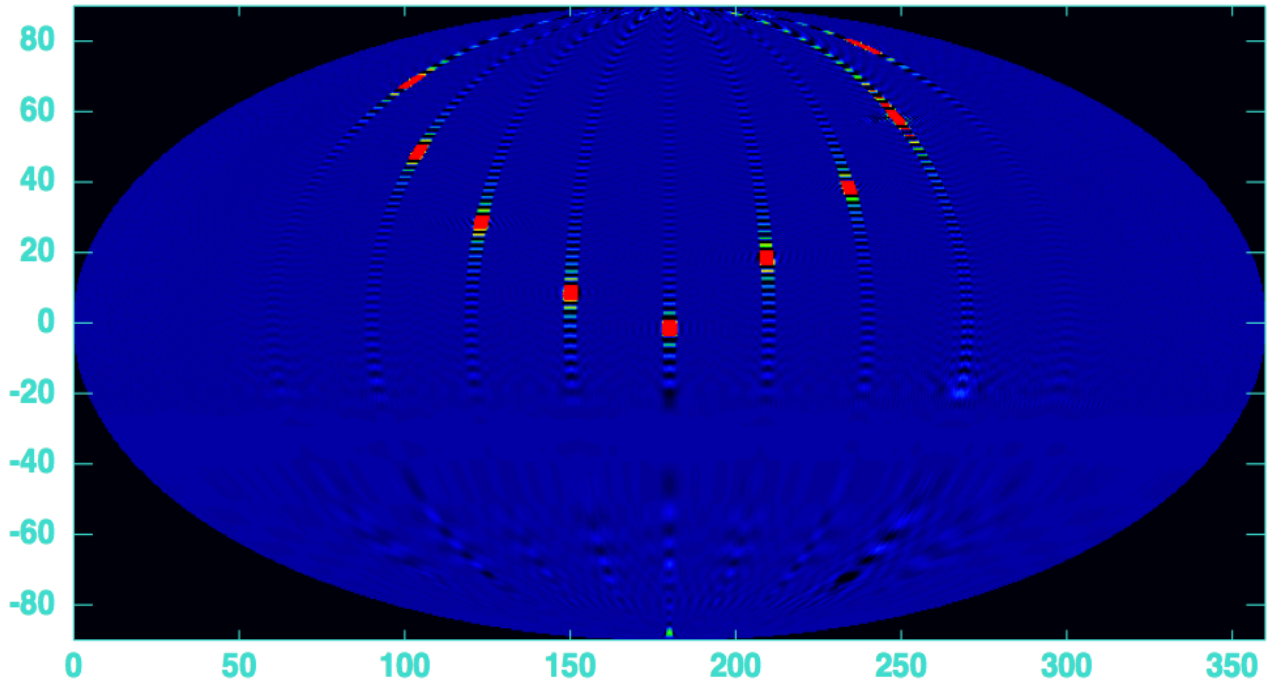
Box sources in
north part of sky



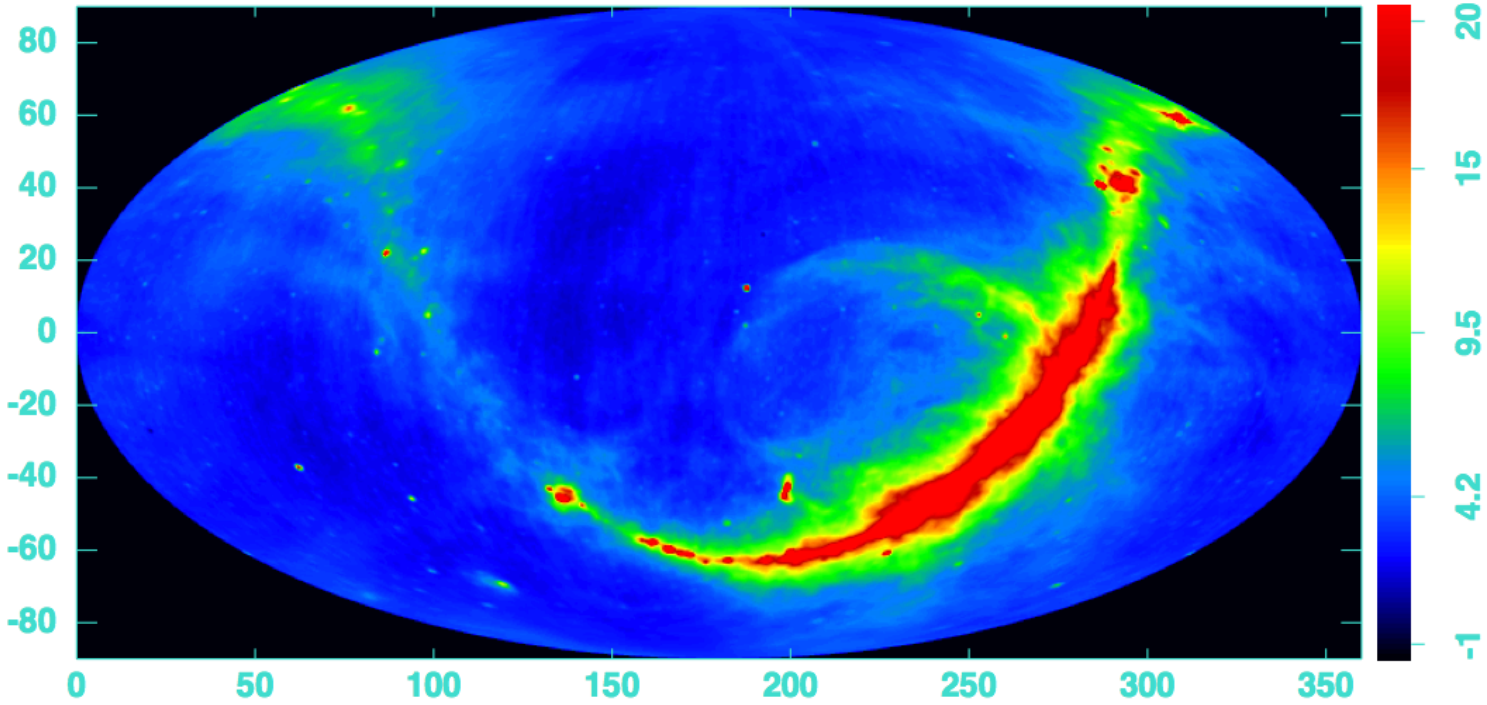
Reconstructed map by
configuration A : 32*3



Reconstructed map by configuration B : 31,32,33

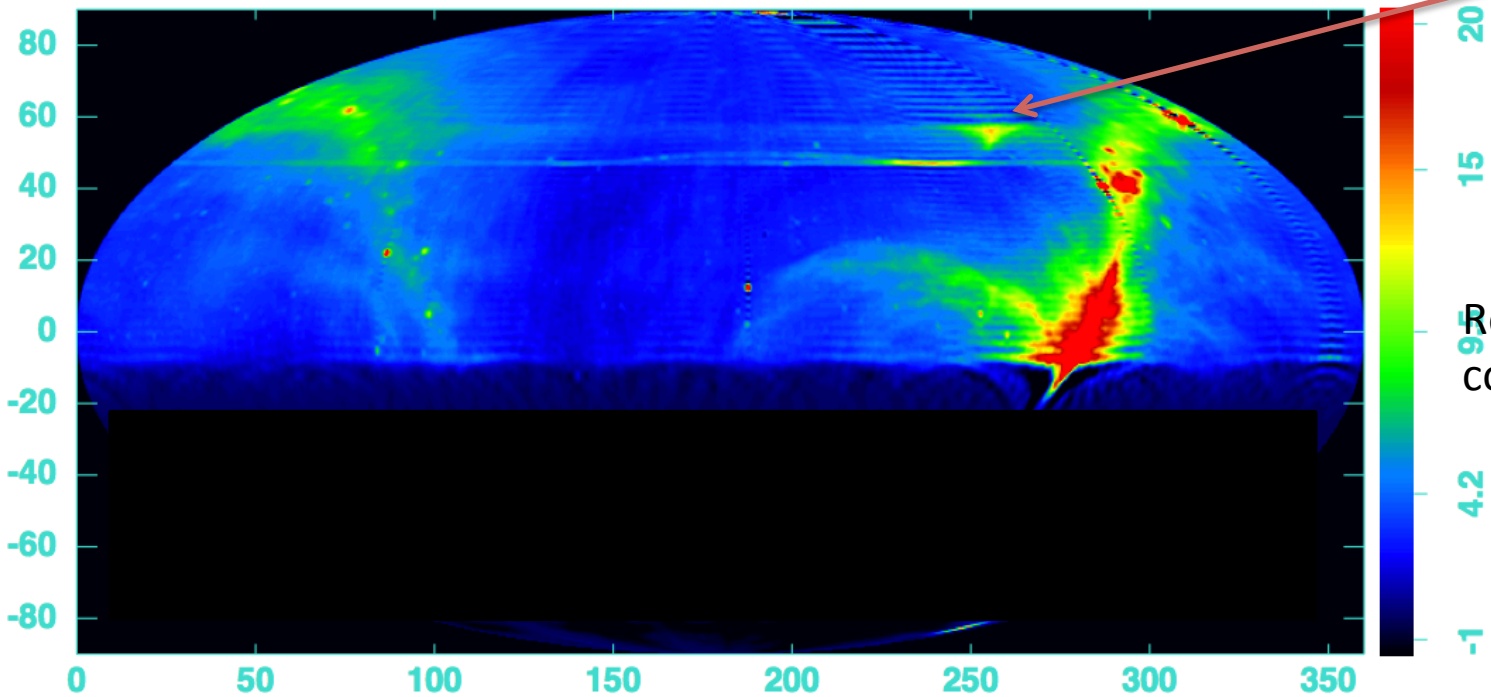


Reconstructed map by configuration C : 29,32,35

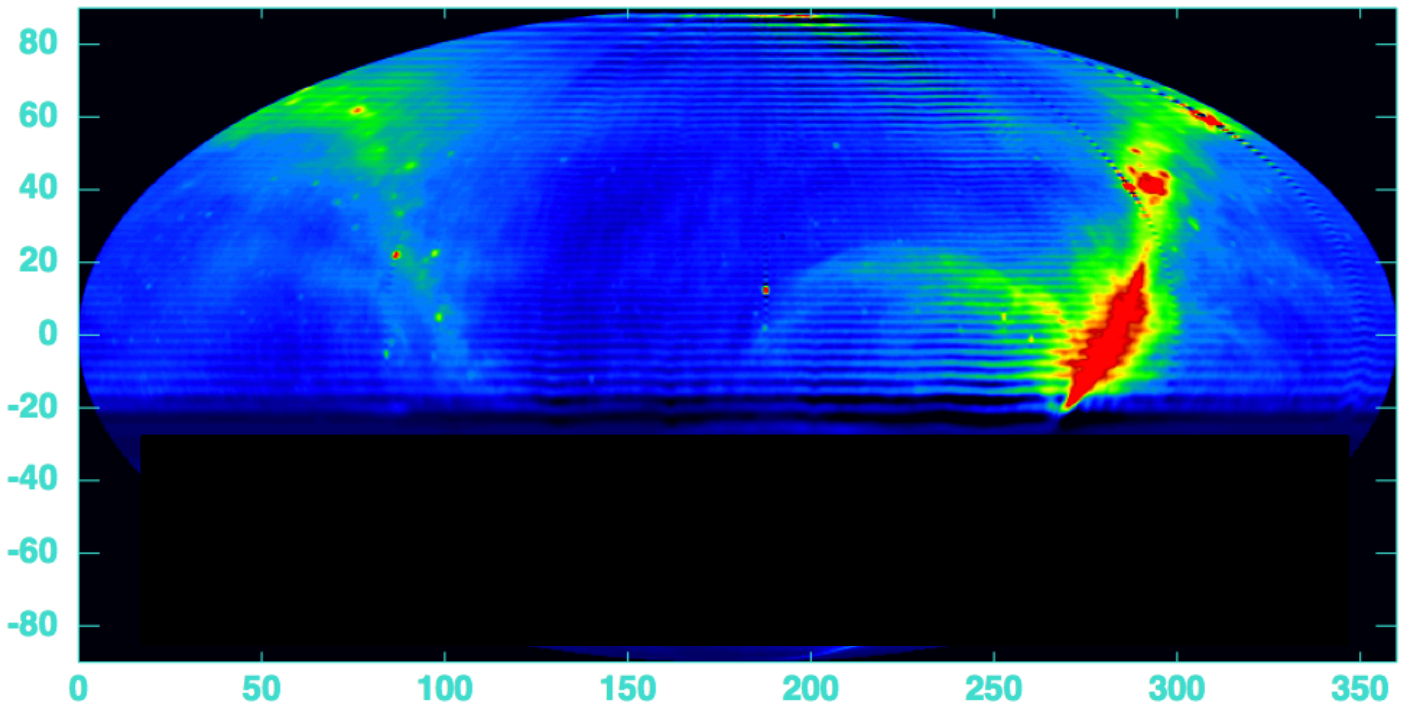


Input galaxy map

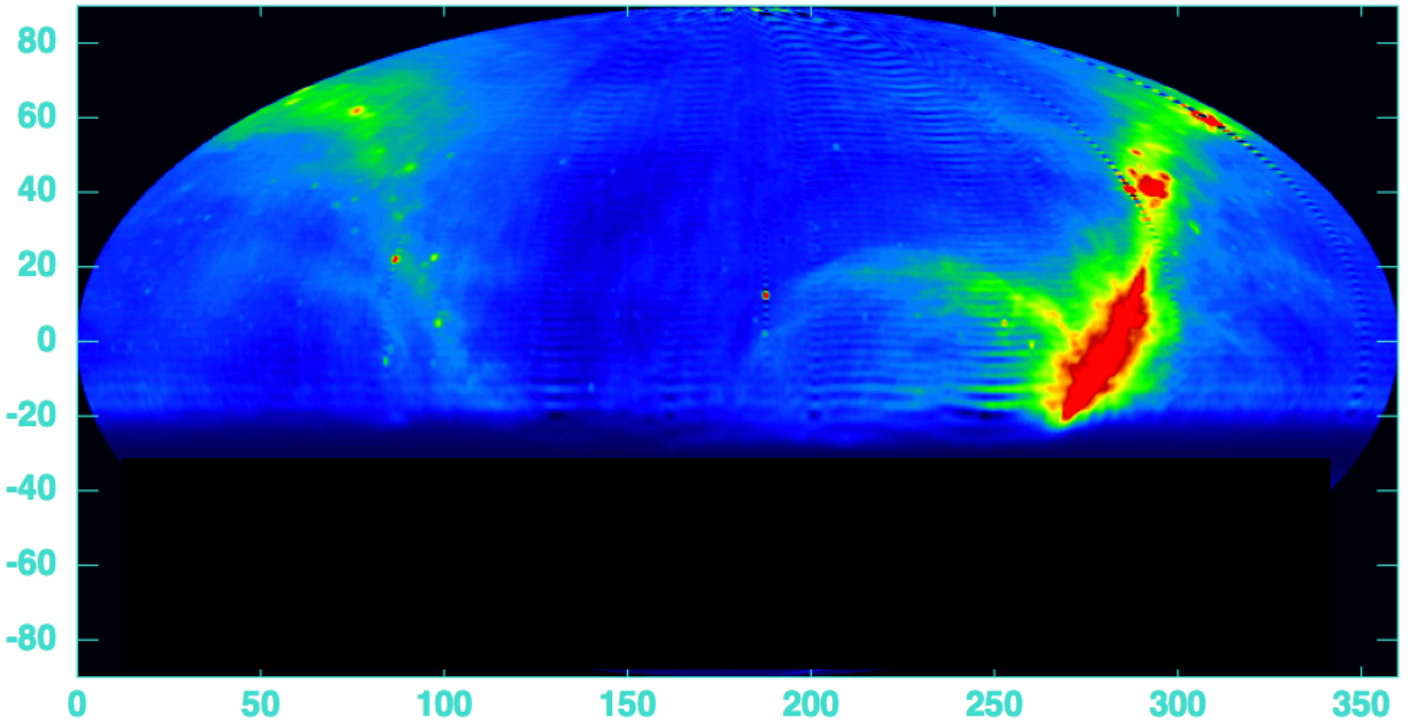
Spurious image



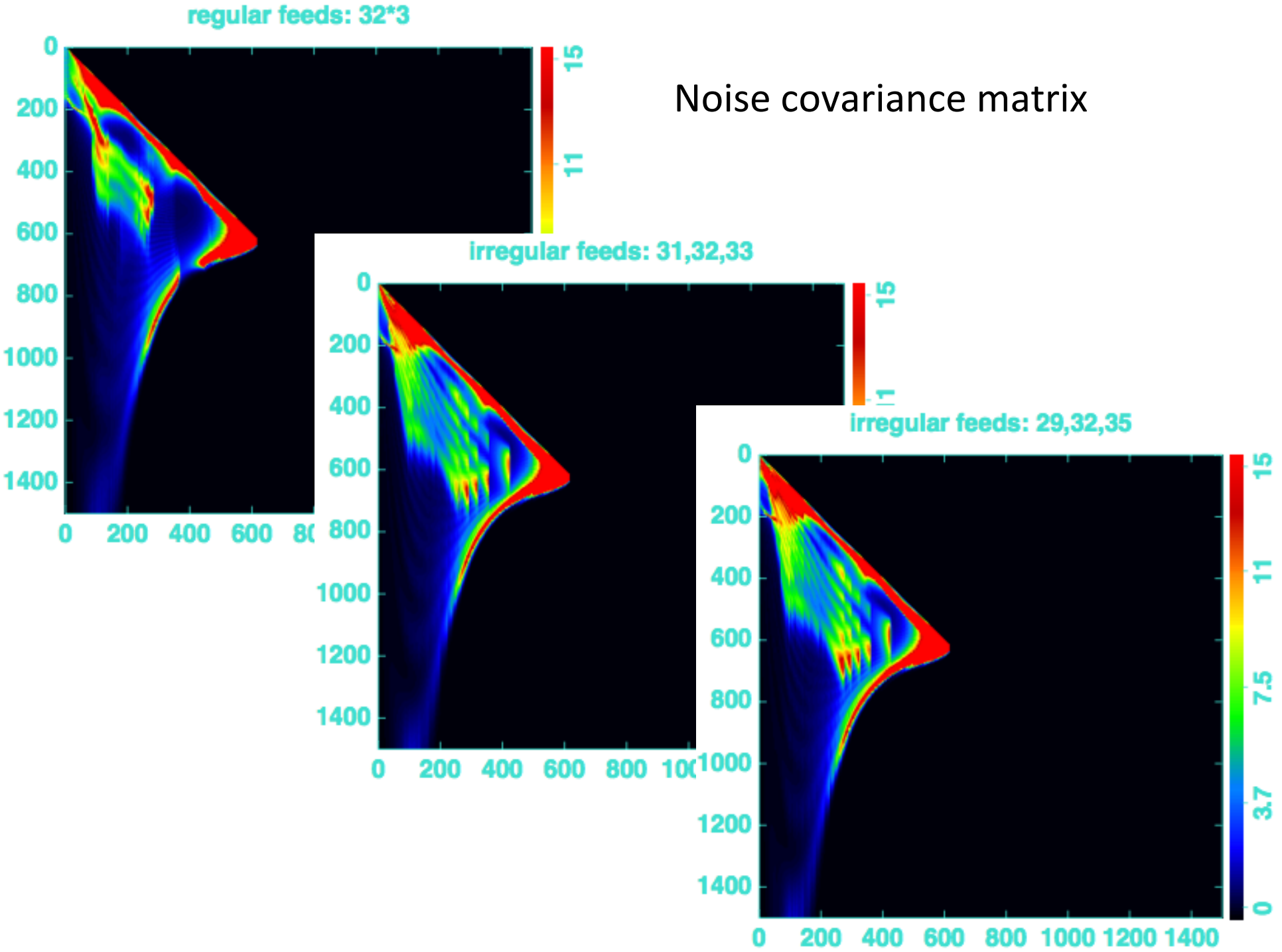
Reconstructed map by configuration A : 32*3

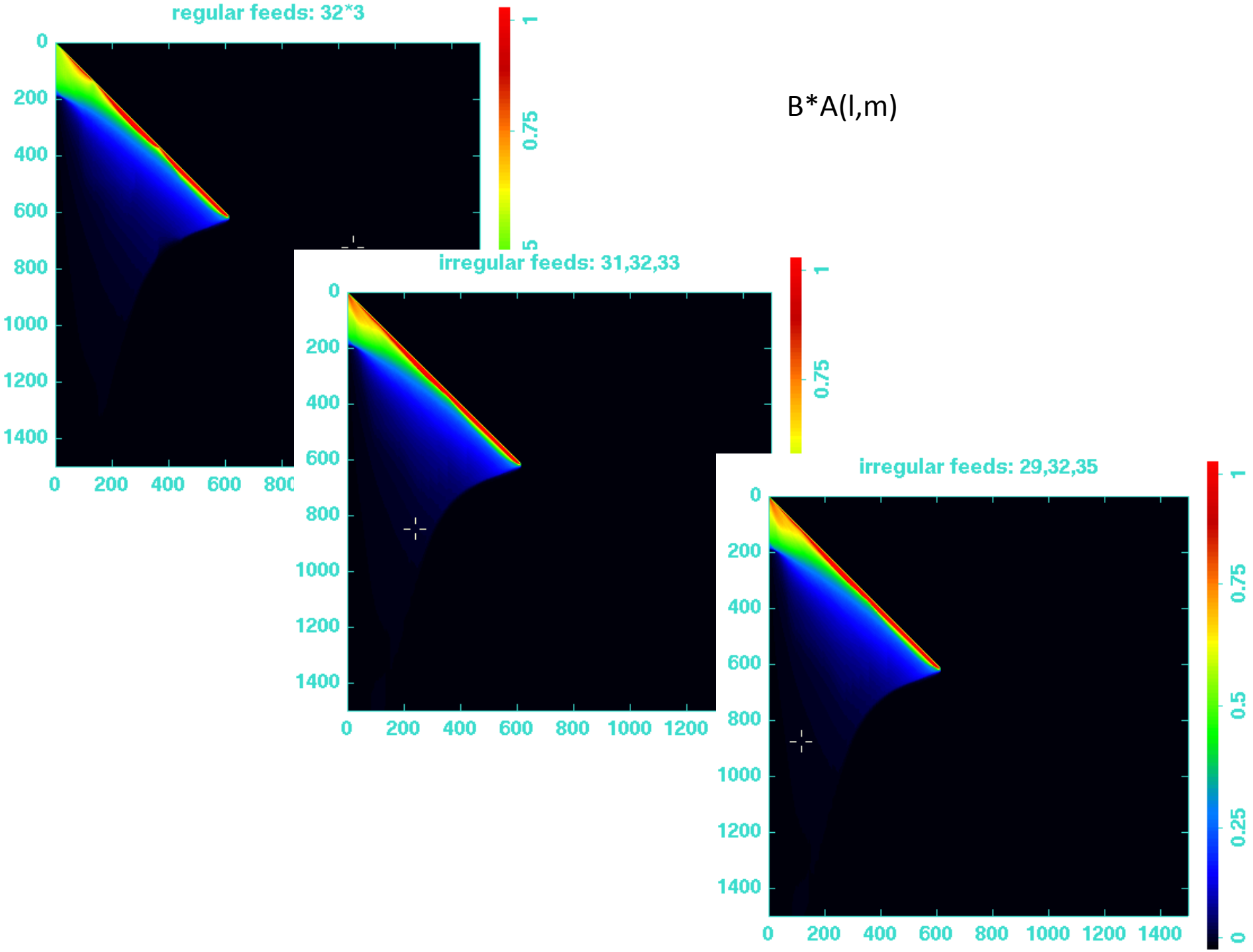


Reconstructed map by configuration B : 31,32,33

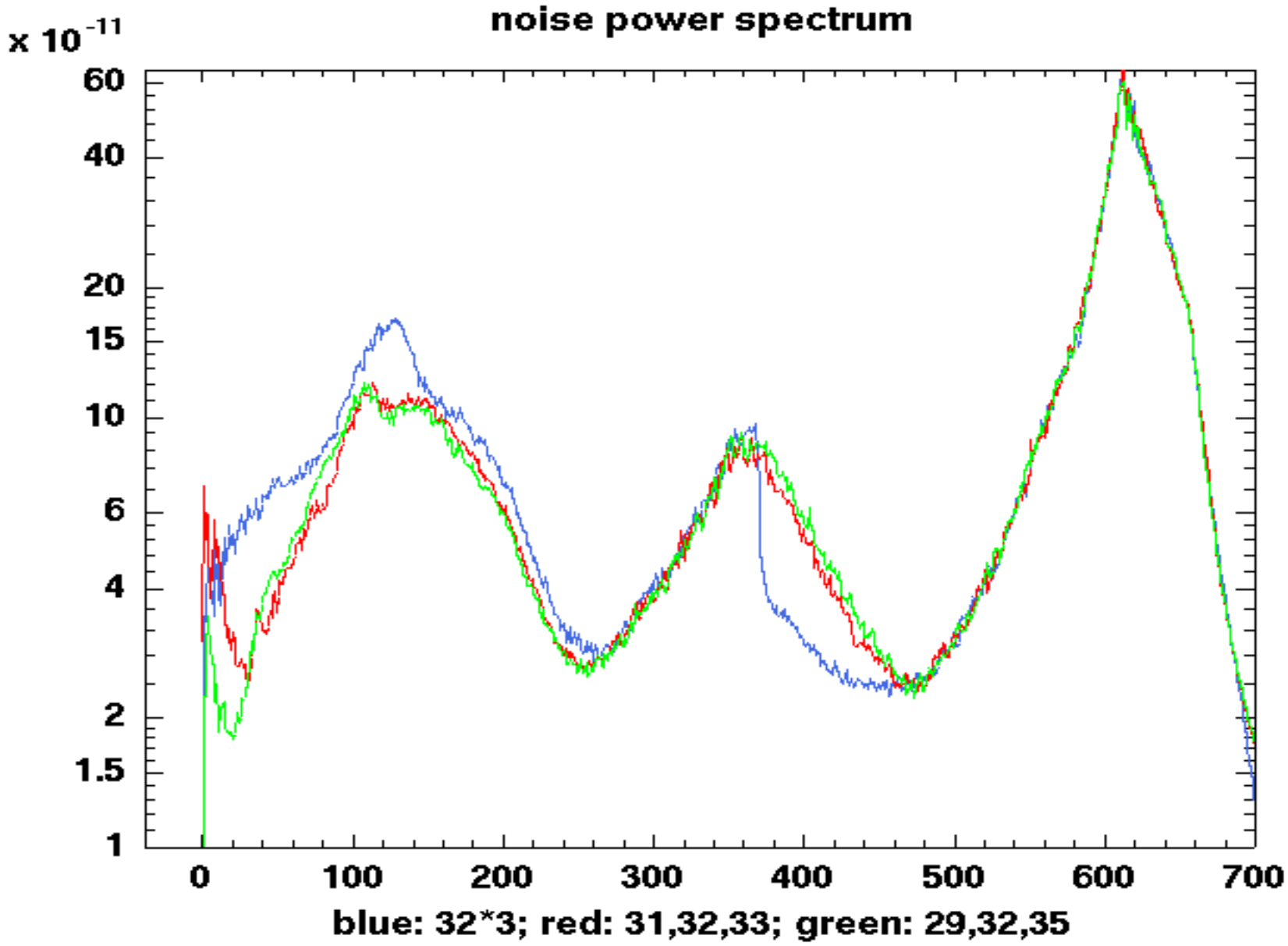


Reconstructed map by configuration C : 29,32,35


regular feeds: 32*3
irregular feeds: 31,32,33
irregular feeds: 29,32,35
Noise covariance matrix


regular feeds: 32*3
irregular feeds: 31,32,33
irregular feeds: 29,32,35
B*A(l,m)

Noise power spectrum C(l) for the three 3-Cylinder Tianlai configurations with 96 dual polarization feeds



Conclusion

- Cylinders regular spacing feeds create spurious image
- Cylinders irregular spacing feeds bring stripes instead of spurious image.
- Configuration 3 have less stripes – however, the stripes are due to sharp cut in the (l,m) plane response introduced by the map reconstruction and can be removed/cleaned applying weight in (l,m) plane
- The alm coverage from cylinder regular have a gap along l=400, and bring a decrease at corresponding place for noise power spectrum.