

IGRF 2020 Evaluation

I use here different criteria described in the 2020 paper about the IGRF/DGRF evaluation.

Principles: The candidate models for epoch 2020.0 are compared to the arithmetic mean model. This analysis should be redone once we decide which weighting scheme we want to apply for the production of the IGRF-13.

The figure in the geographical domain are sketched at the Earth's mean radius.

The models are analyzed in the following order:

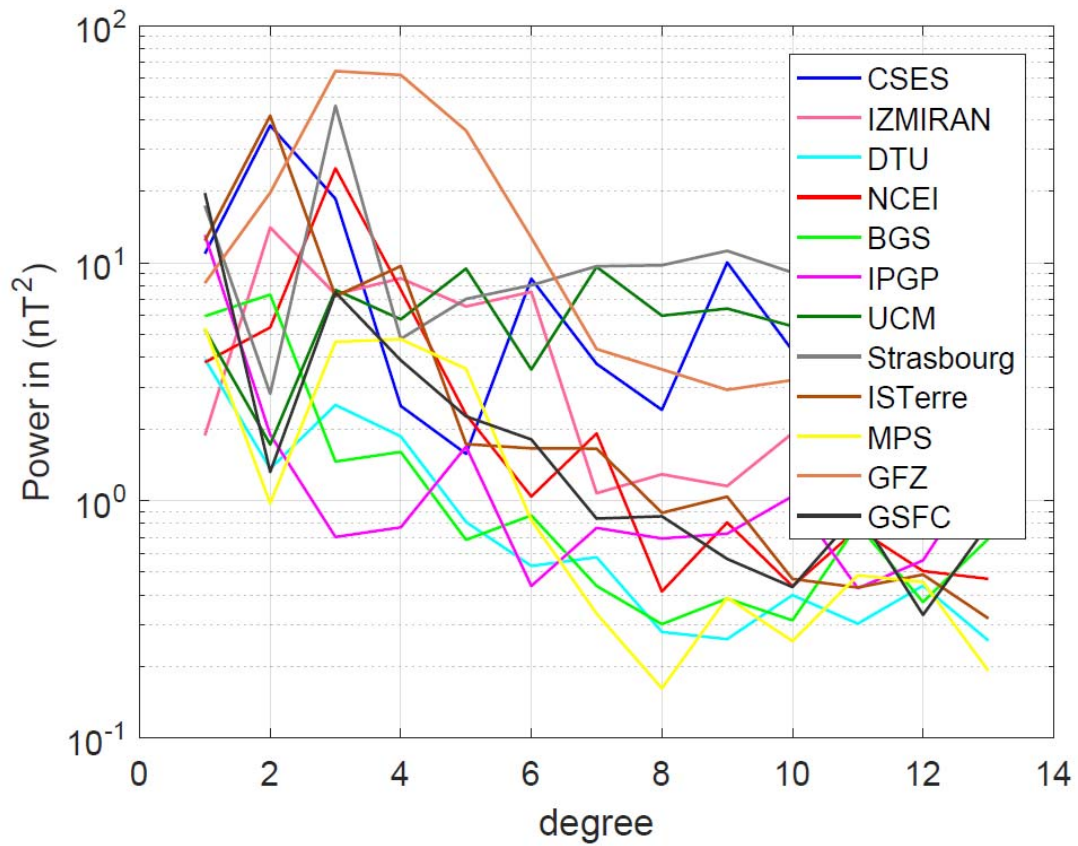
- 1: CSES
- 2: IZMIRAN
- 3: DTU
- 4: NCEI
- 5: BGS
- 6: IGP
- 7: UCM
- 8: Strasbourg
- 9: ISTerre
- 10: MPS
- 11: GFZ
- 12: GSFC

The last column is the arithmetic mean model. Attached is the matrix of RMS between all models corresponding to Ciaran's plot (in a different order).

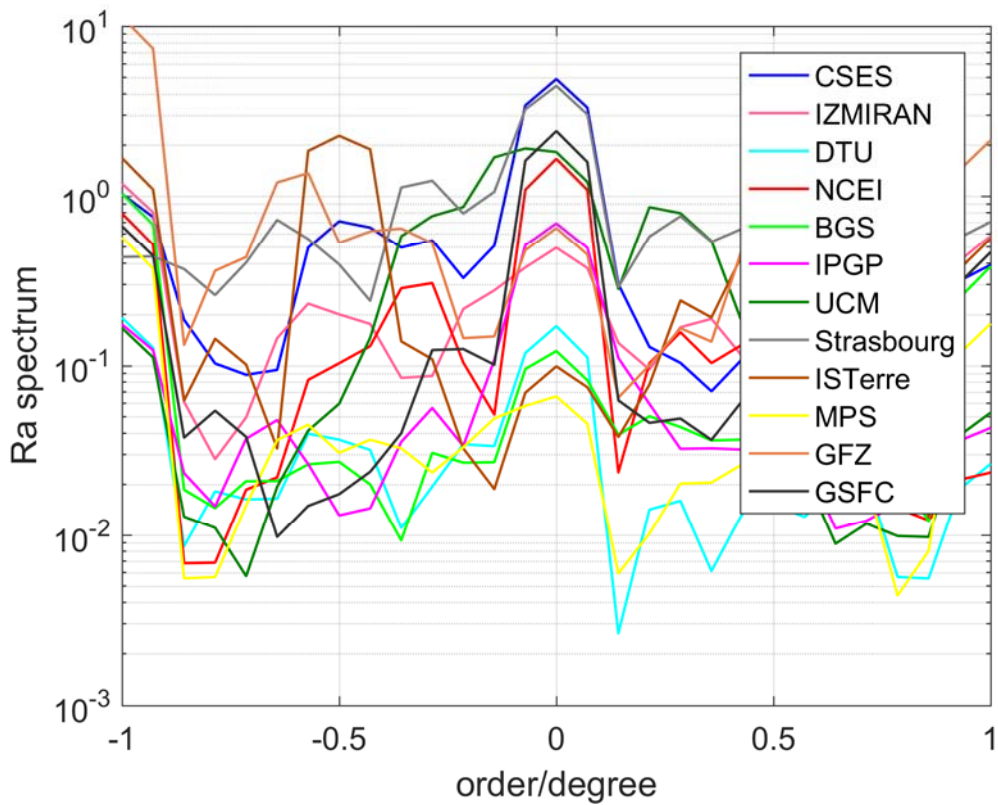
Summary: The histogram of RMS with respect to the arithmetic mean model indicates two groups of models. The CSES, Strasbourg and GFZ candidates models seem significantly different from the rest of the other candidates. The spectral analyses indicate that the difference arise mostly for degrees 2 to 3 for GFZ, while CSES and Strasbourg differ at all degrees. The azimuthal power spectrum indicates stronger difference for $n=m$ and $m=n/2$ for the GFZ model. Most models have an increase in the spectral difference for the zonal term. This, again, could come from the parameterization of the ring current. These conclusions are also supported by the difference to the mean for each individual coefficient.

The differences in the geographical domain simply confirm all these by showing north-south differences for all models and thus confirming the main difference of g_{10} in all candidate models. I notice that almost all models but Strasbourg have residuals above the equator and located over Australia and Pacific. I suspect that this arises because the Strasbourg model is so different in that region that the mean model is biased towards Strasbourg but this has to be further investigated.

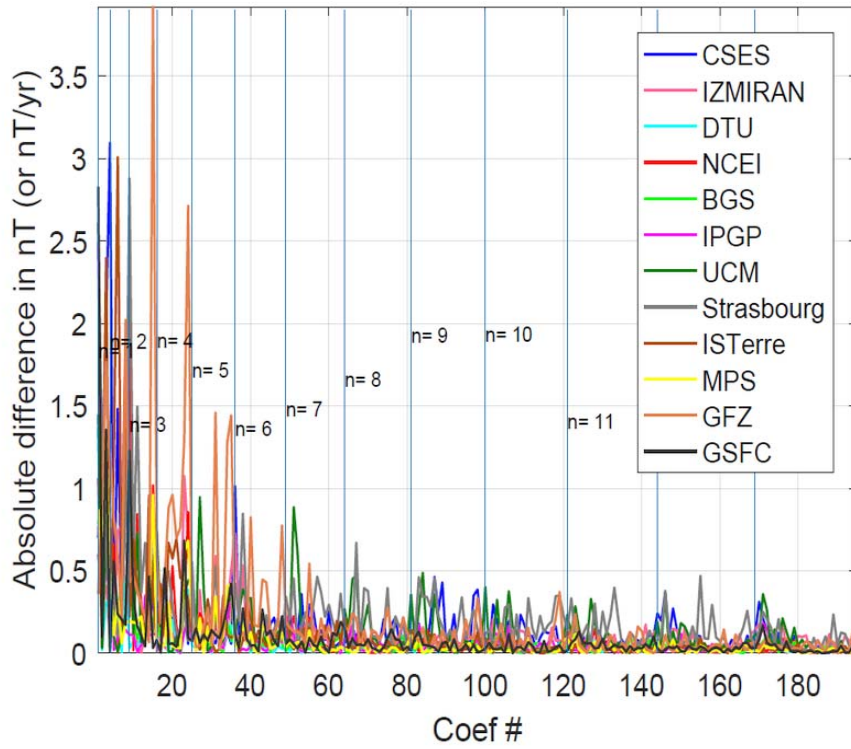
The power spectra of the difference to the mean are:



The azimuthal power spectrum is:

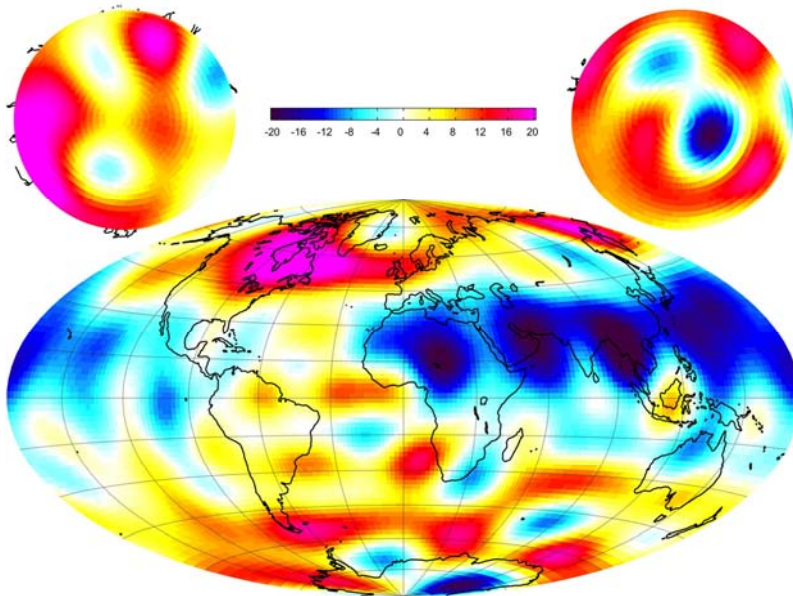


The coefficient difference is:

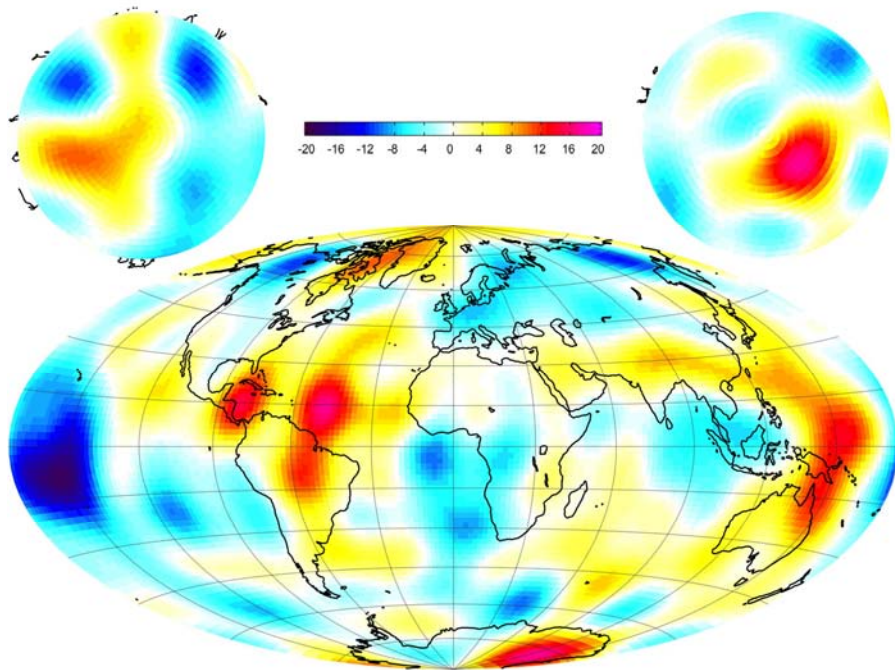


And the differences in the geographical domain for the radial component of each candidate model (at the Earth's mean radius) is:

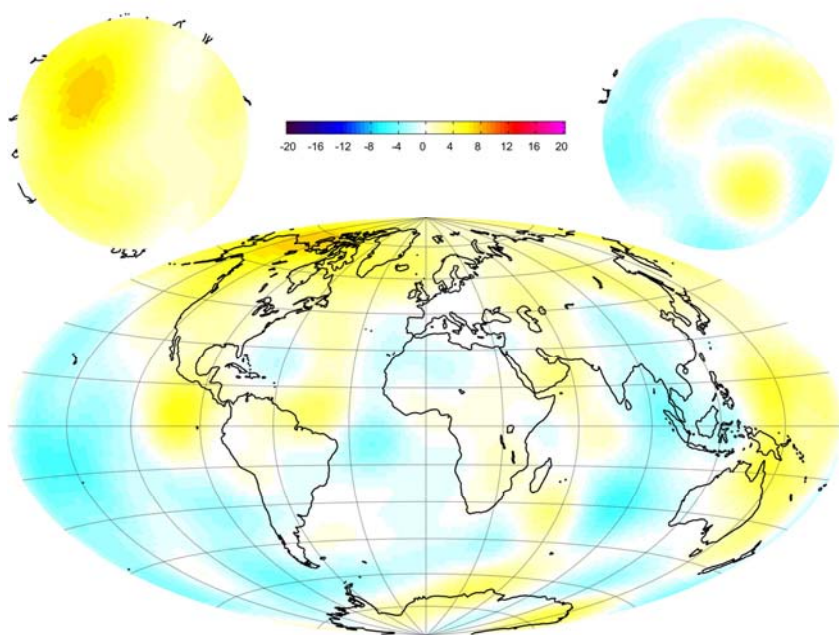
CES:



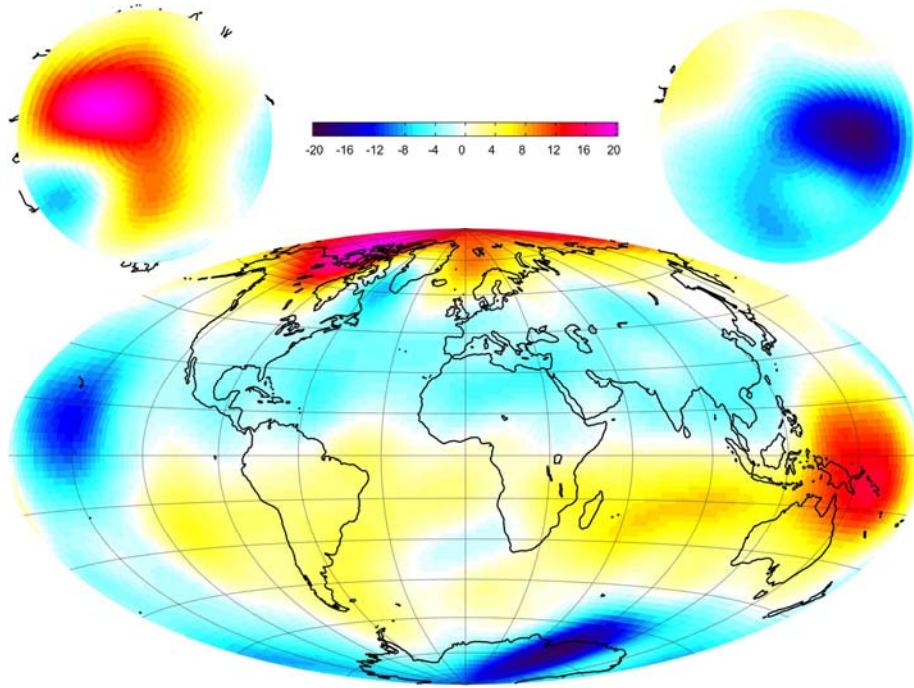
IZMIRAN:



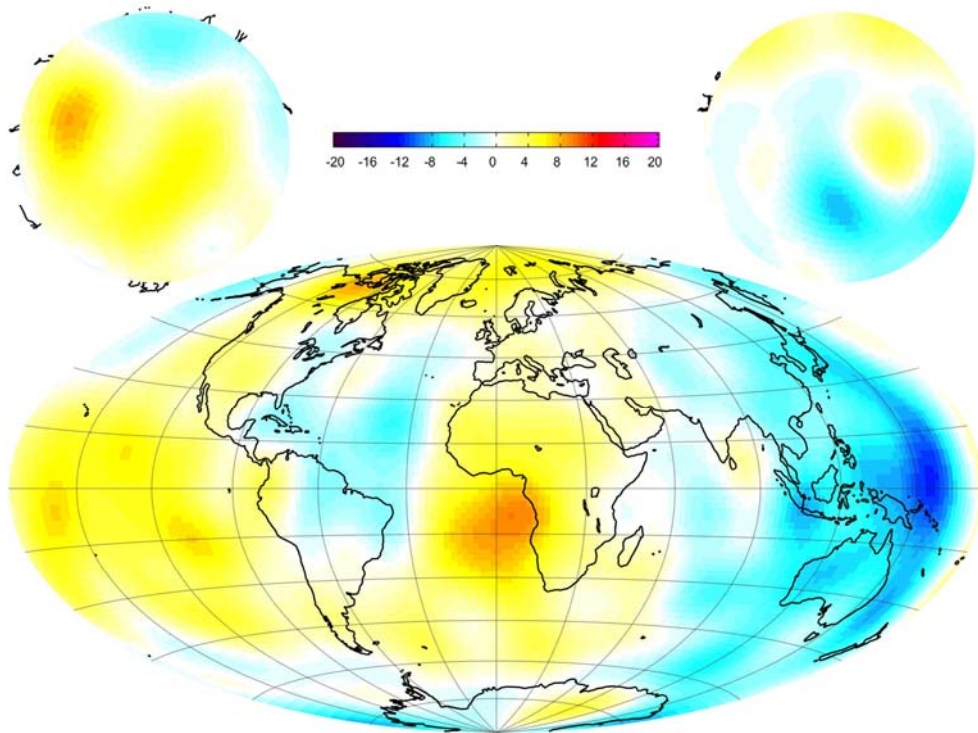
DTU:



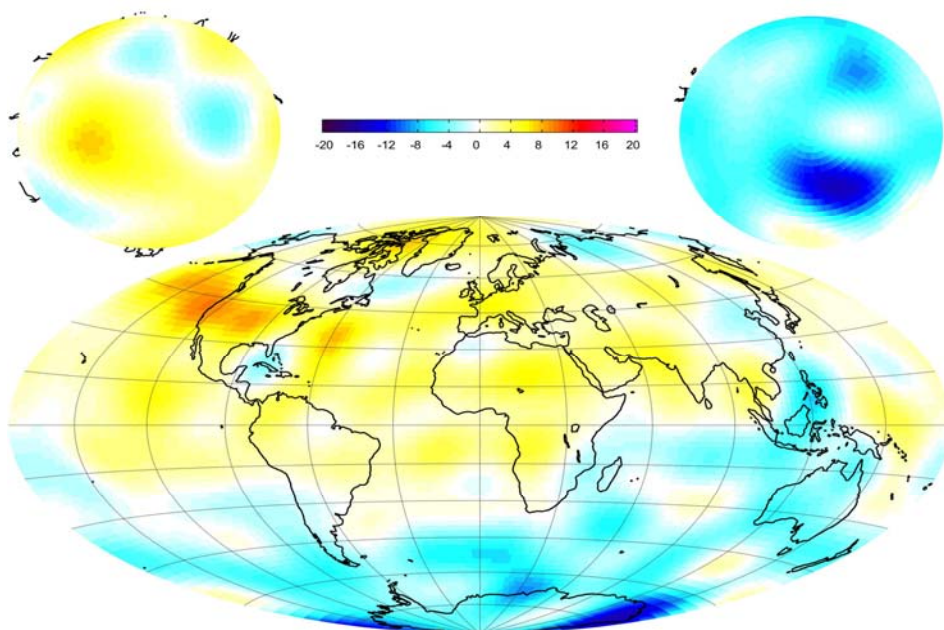
NCEI:



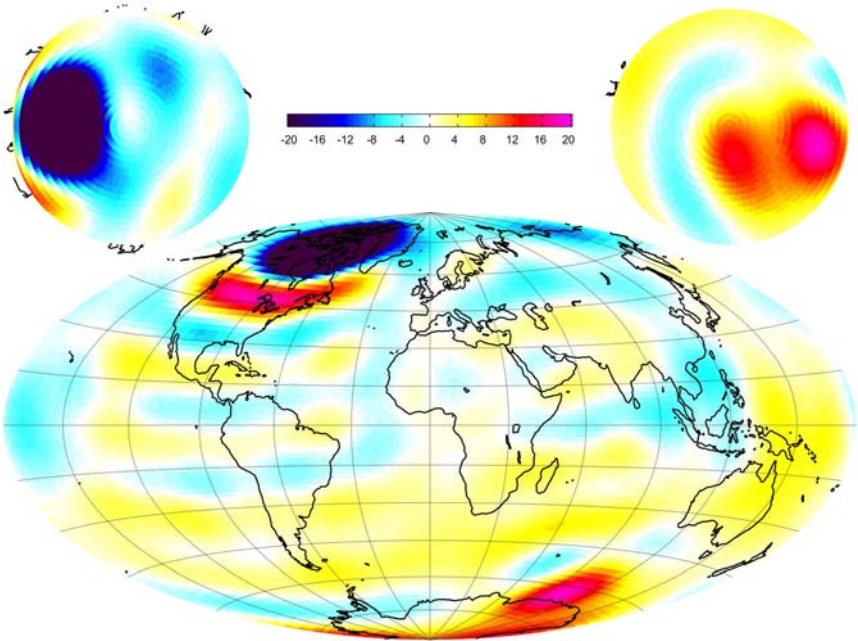
BGS:



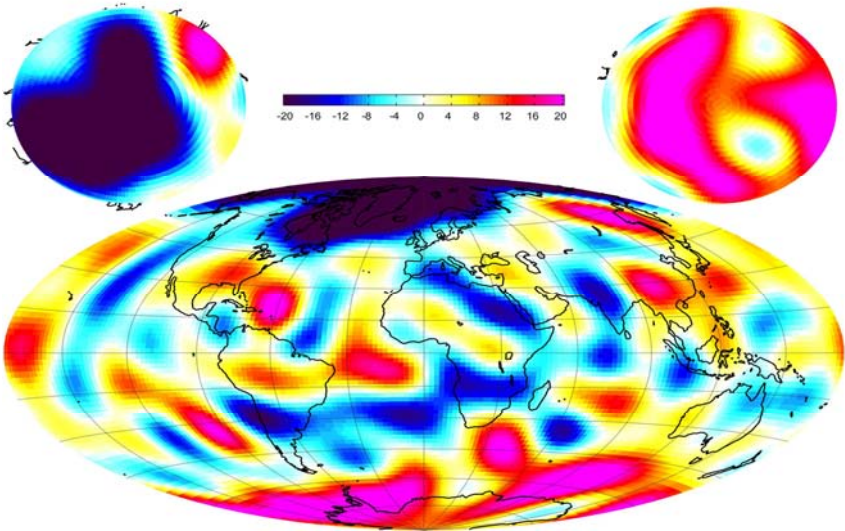
IPGP:



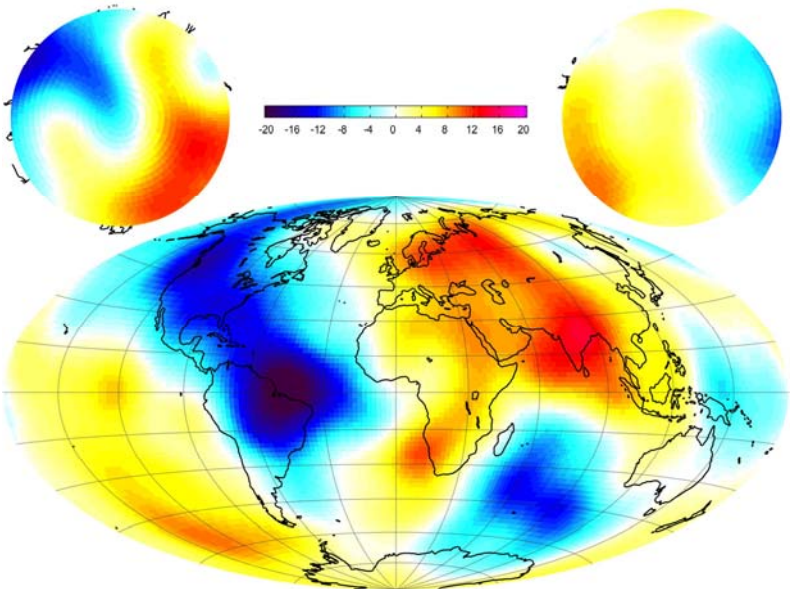
UCM:



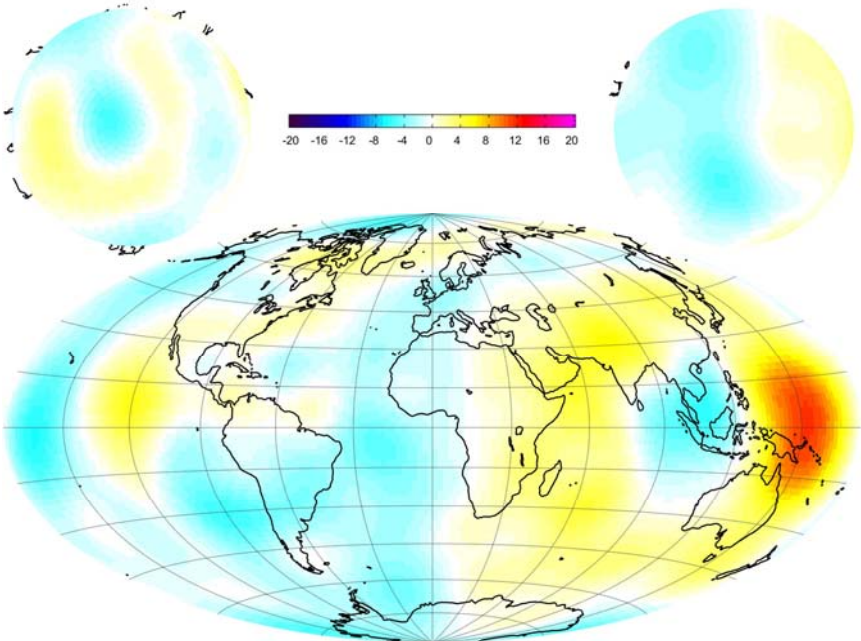
STRASBOURG:



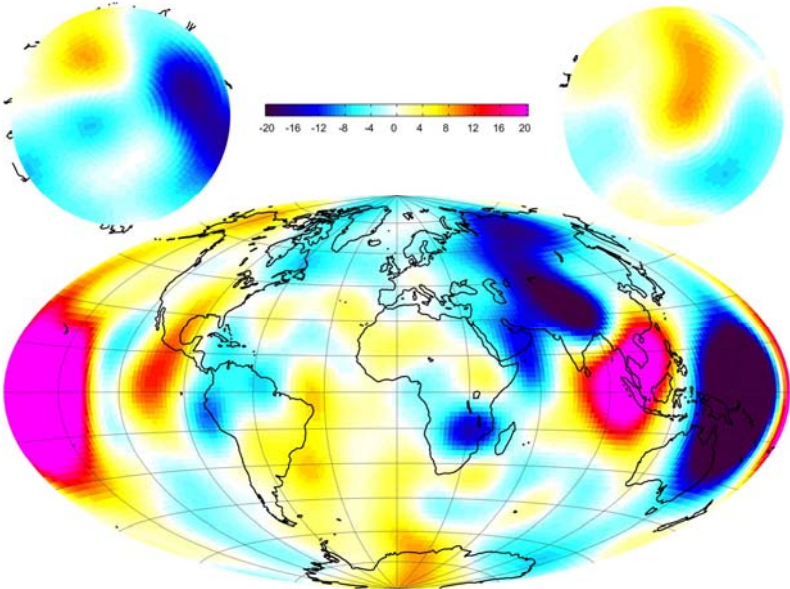
ISTERRE :



MPS :



GFZ :



GSCF :

