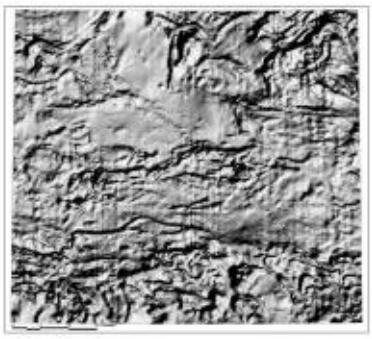
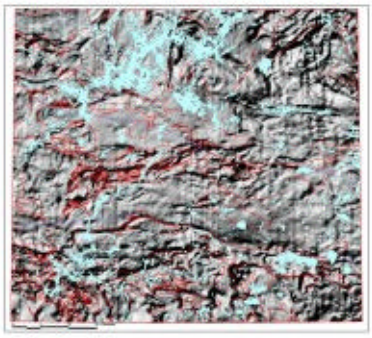
Selected Geophysical and Geological Images
Uhlman Lake area, NTS 64B

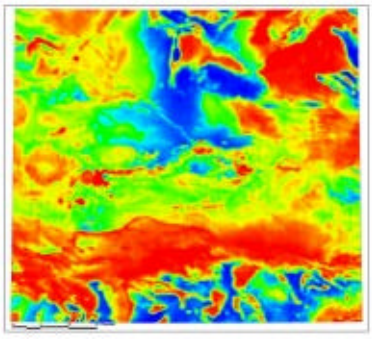
(Click on the image to see the detailed map)



Description: SHADED RELIEF MAGNETICS
Feature type: IMAGE (200 metre pixel size)
Processing and source: This shaded relief image was created by using the HILLSHADEfunction in ARC/INFO's Grid module with an azimuth of 135 degrees,an elevation of 45 degrees, and a vertical exaggeration of 8.The input to the HILLSHADE function was the raw, floating point,200 metre pixel grid.

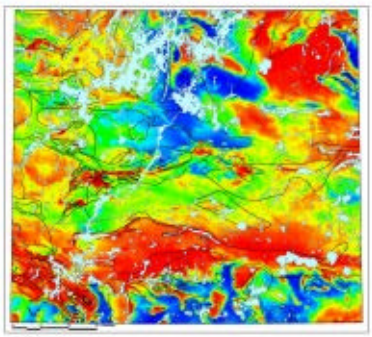


Description: SHADED RELIEF MAGNETICS
As above with the addition of lake polygons and geological contacts derived from 1:250 000 geological map (last image in file).

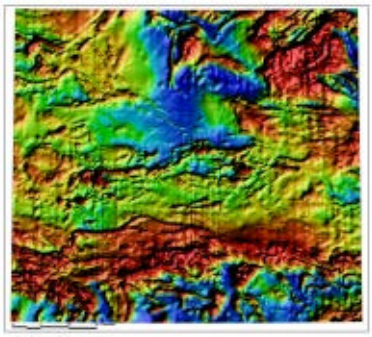


Description: TOTAL FIELD
Feature type: IMAGE (200 metre pixel size)
Processing and Source: The magnetic image represents the residual total magnetic field intensity, based on data from the holdings of the National Aeromagnetic Data Base maintained by the Geological Survey of Canada. Regional aeromagnetic data are collected in order to assist in geological mapping, and to develop an understanding of the formation and evolution of the Canadian landmass and adjacent offshore areas. Variations in intensity of the field are due to contrasting magnetic properties of the underlying rock units. Interpretation of these data supports geological mapping, particularly in areas of limited outcrop, and provides information on subsurface structure for mineral, oil and gas exploration. The airborne surveys were typically flown at an altitude of 305 m mean terrain clearance with a flight line spacing of 800 m. Older surveys were recorded in analogue form and more recent surveys, in the southwestern part of the province, were digitally acquired. Analogue data were manually compiled as 1:63 360 or 1:50 000 contour maps and later digitized along the flight lines, where those lines intersected contour lines. The International Geomagnetic Reference Field (IGRF) was removed from the observations, to minimize the masking effect of longer wavelength anomalies due to the Earth's core field. Surveys not flown at 305m mean terrain clearance were continued or draped to an idealized 305m surface, to facilitate leveling

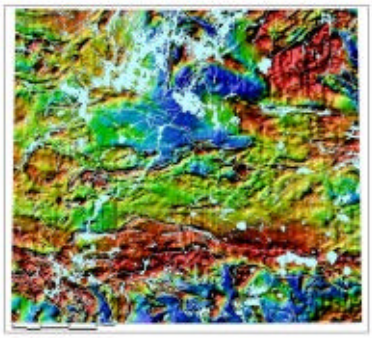
and enhance resolution. All surveys have been leveled to the national datum. High frequency differences between surveys at their borders have been minimized, to produce seamless data sets. The data have been gridded to an interval of 200m for this presentation. The grid was imported into ARC/INFO and a histogram equalization wasapplied to classify the raw data into 255 classes. These 255 pixel valuesare associated with the red,green,blue colour coordinates defined inthe file /support/colours/magnetic.clr.



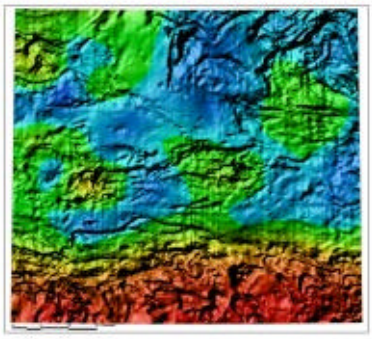
Description: TOTAL FIELD
As above with the addition of lake polygons and geological contacts derived from 1:250 000 geological map (last image in file).



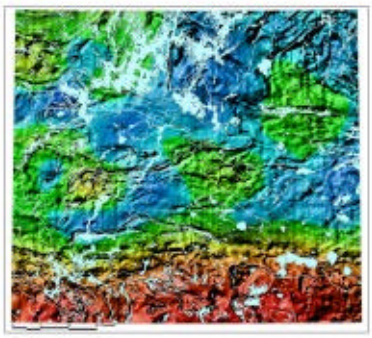
Description: COLOUR SHADED RELIEF MAGNETICS
Feature type: IMAGE (200 metre pixel size)
Processing:
Hue and Saturation components were extracted from colour magnetic image (TF_H). Saturation was modulated with the shaded relief magnetic image (TFSR_H) and an HSV colour composite image was created.



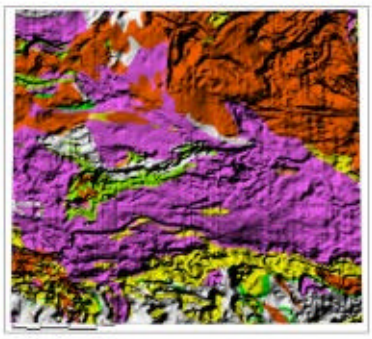
Description: COLOUR SHADED RELIEF MAGNETICS
As above with the addition of lake polygons and geological contacts derived from 1:250 000 geological map (last image in file).



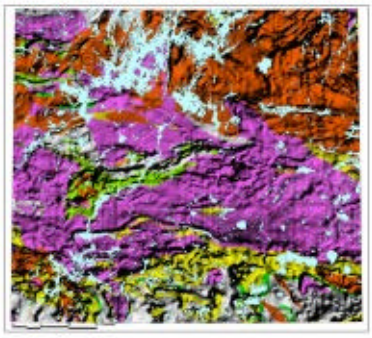
Description: GRAVITY-SHADED MAG IMAGE
Feature type: IMAGE (200 metre pixel size)
Processing.Hue and Saturation components were extracted from gravity image. Saturation was modulated with the shaded relief magnetic image and an HSV colour composite image was created.



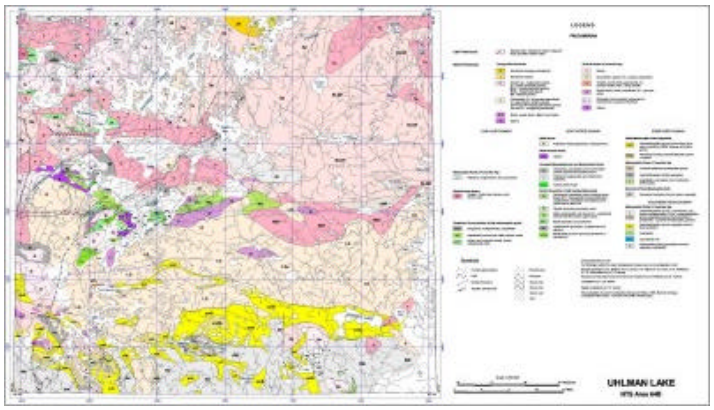
Description: GRAVITY-SHADED MAG IMAGE
As above with the addition of lake polygons and geological contacts derived from 1:250 000 geological map (last image in file).



Description: GEOLOGY INTEGRATED WITH SHADED RELIEF MAGNETICS
Feature type: IMAGE (200 metre pixel size)
Processing:.GEOLOGY was rasterized (converted from polygons to an image).Hue and Saturation components were extracted from the rasterized geology. Saturation was kept constant at values determined by polygon colours.



Description: GEOLOGY INTEGRATED WITH SHADED RELIEF MAGNETICS
As above with the addition of lake.



Description: GEOLOGY
Feature type: Polygon geology map
Processing
Geology was derived from Manitoba Energy and Mines 1986; Bedrock Geology Compilation Map Series, Uhlman Lake, NTS 64B, 1:250 000.

The following description is abstracted from Viljoen et.al, 1999[1]:

Detailed descriptive notes for aeromagetic/geology integrated images

The composite aeromagnetic/geology images shown here was produced using a hue-saturation-value colour transformation to combine a gray magnetic relief image generated from the regional aeromagnetic data with the unit colours from the geological map.

Data:
The airborne total magnetic field data used to produce the shaded magnetic field image was compiled from the National Aeromagnetic Database, Geophysical Data Centre, Geological Survey of Canada (GSC). These data were collected from a number of surveys, typically flown at 800 m line spacing and 305 m mean terrain clearance, then re-leveled and interpolated onto a 200 m grid. The geological map information used in the production of this map was derived from Manitoba Energy and Mines Map 79-2, "Geology of Manitoba".

Production Method:
Shading is used to emphasize low amplitude short wavelength variations in the magnetic field that are often geologically significant (Broome, 1990). Simulated illumination from the southeast at 45 degrees was used in order to emphasize northwest-southeast trending features. Integration of the shaded relief image with the geology was accomplished using the hue-saturation-value (HSV) colour transformation (Harris et al., 1994). Geological information is used to modulate the hue and saturation components of the image while the shaded-relief image controls the value, or black and white, component.

Interpretation:
Variations in the magnetic field intensity are largely controlled by the magnetic mineral content in the crust. The magnetic minerals, of which magnetite is the most important, rarely represents more than 1% of the bulk rock composition. Although magnetic mineral content is related to lithology, magnetic properties alone cannot identify rock type in the conventional classification system which is based on silicate and carbonate mineralogy (Grant, 1985). In spite of this theoretical limitation, investigation of this map reveals many magnetic features and textures that relate closely to the mapped structure and lithology. In other areas, correlation between geology and anomaly trends is poor. This variability can be explained by changes in magnetic mineral content due to complex oxidation, crystallization, and remanent magnetization effects related to local and regional metamorphic and deformation processes. it is important to recognize that magnetic anomalies reflect the history of the rocks as much or more than their bulk composition.

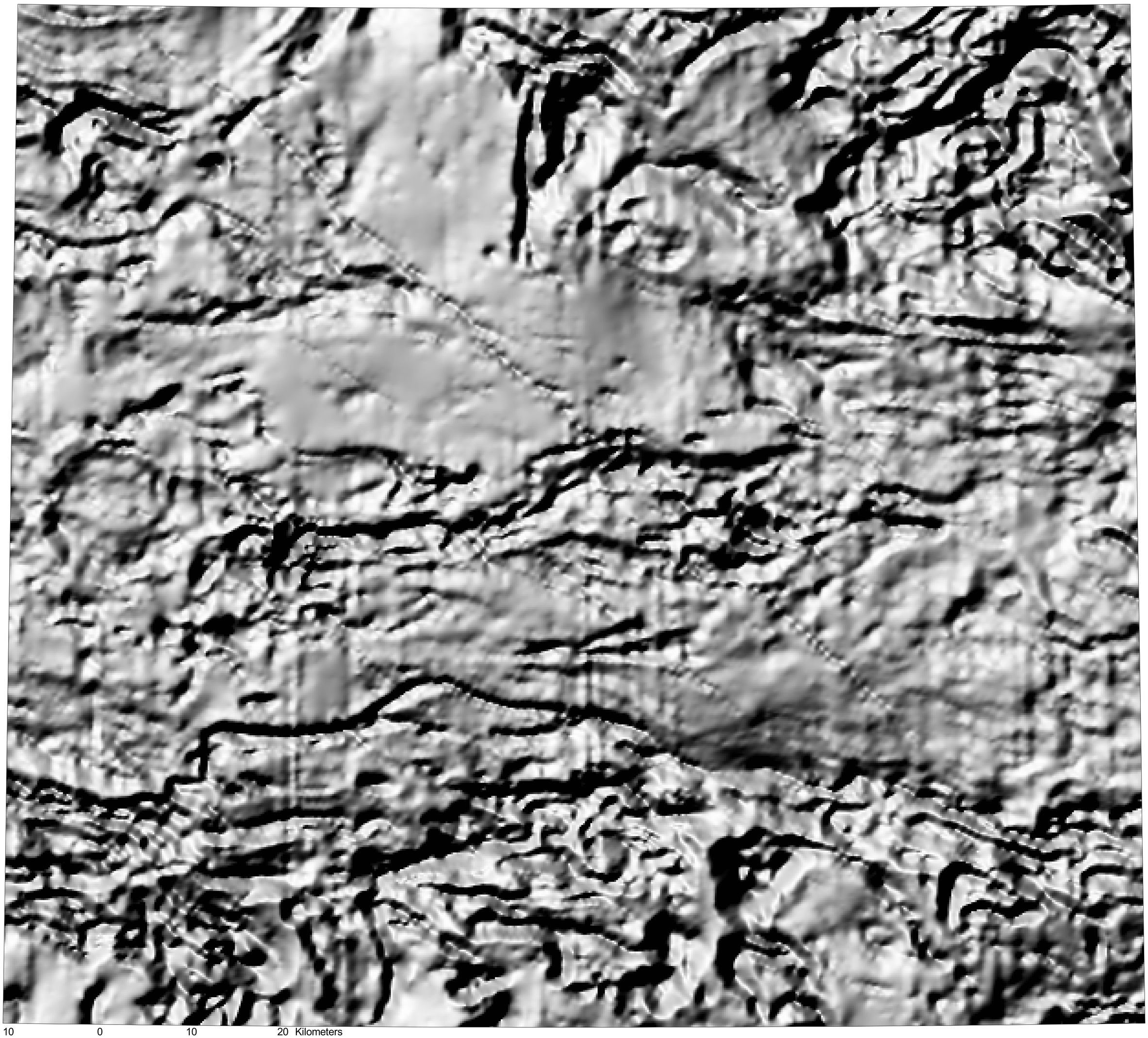
REFERENCES
Broome, J.
1990: Generation and interpretation of geophysical images with examples from the Rae Province, Northwestern Canadian Shield; Geophysics, v. 55, no. 8, p. 977-997

Grant, F.S.
1985: Aeromagnetics, geology, and ore environments, I. Magnetite in igneous, sedimentary, and metamorphic rocks: an overview; Geoexploration, 23: 303-333

[1] Viljoen, D., Chackowsky, L., Lenton, P. and Broome, H.J. 1999: Geology, Magnetic & Gravity Maps of Manitoba: A Digital Perspective; Manitoba Energy and Mines, Open File Report OF99-12; Geological Survey of Canada Open File Report OF D3695, CD-ROM.

Harris, J.R., Bowie, C., Rencz, A., and Graham, D.
1994: Computer Enhancement techniques for the integration of remotely sensed, geophysical, and thematic data for the geosciences; Canadian Journal of Remote Sensing, v. 20, no. 3

Original digital compilation of integrated Geology-Shaded Total Magnetic field by John Broome, 1995
Updated digital compilation and CD-ROM organization by David Viljoen, Apr, 1999
Geology from Manitoba Energy and Mines Map 79-2
Digital cartography by the Geoscience Information Division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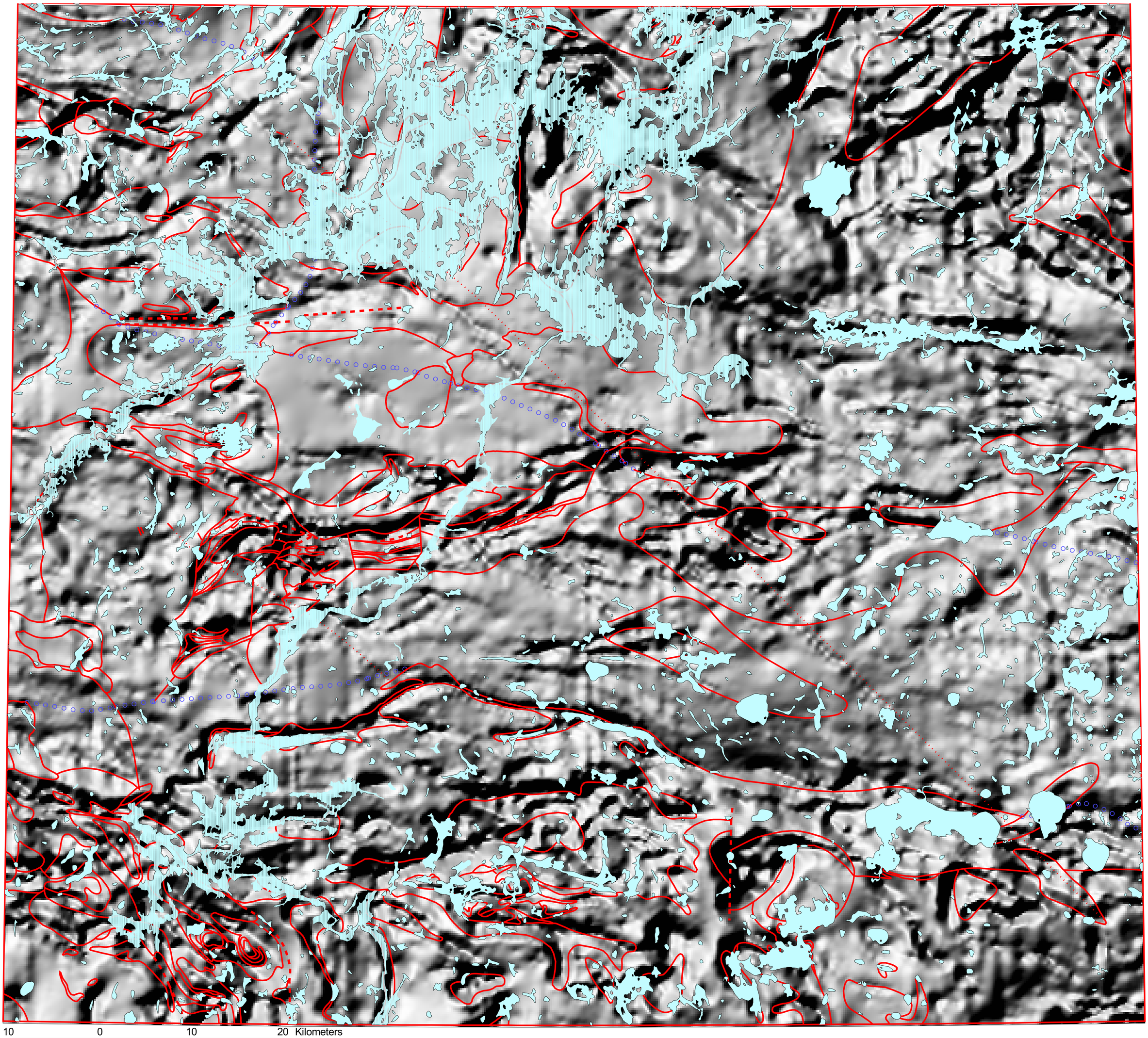
20 Kilometers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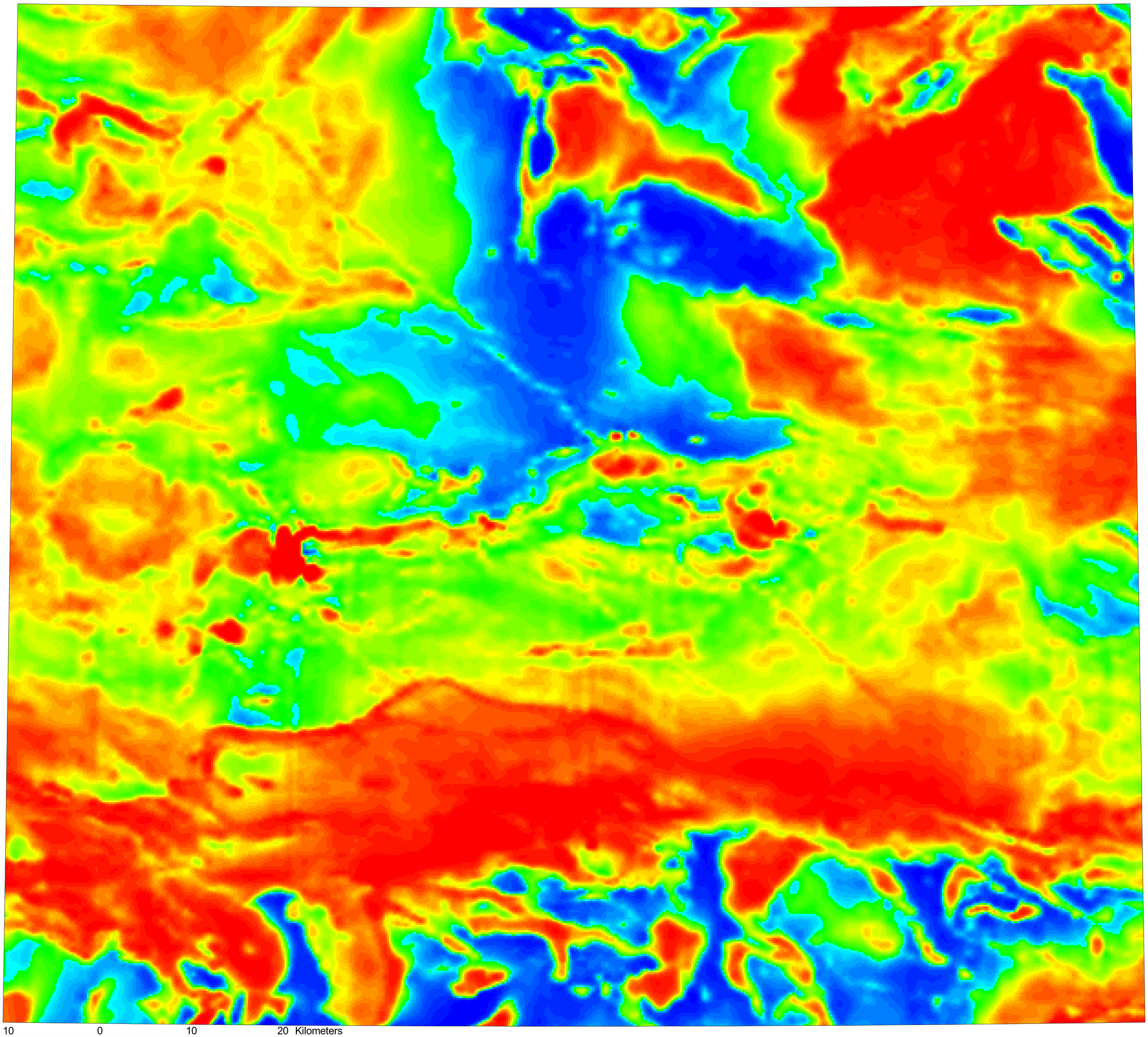
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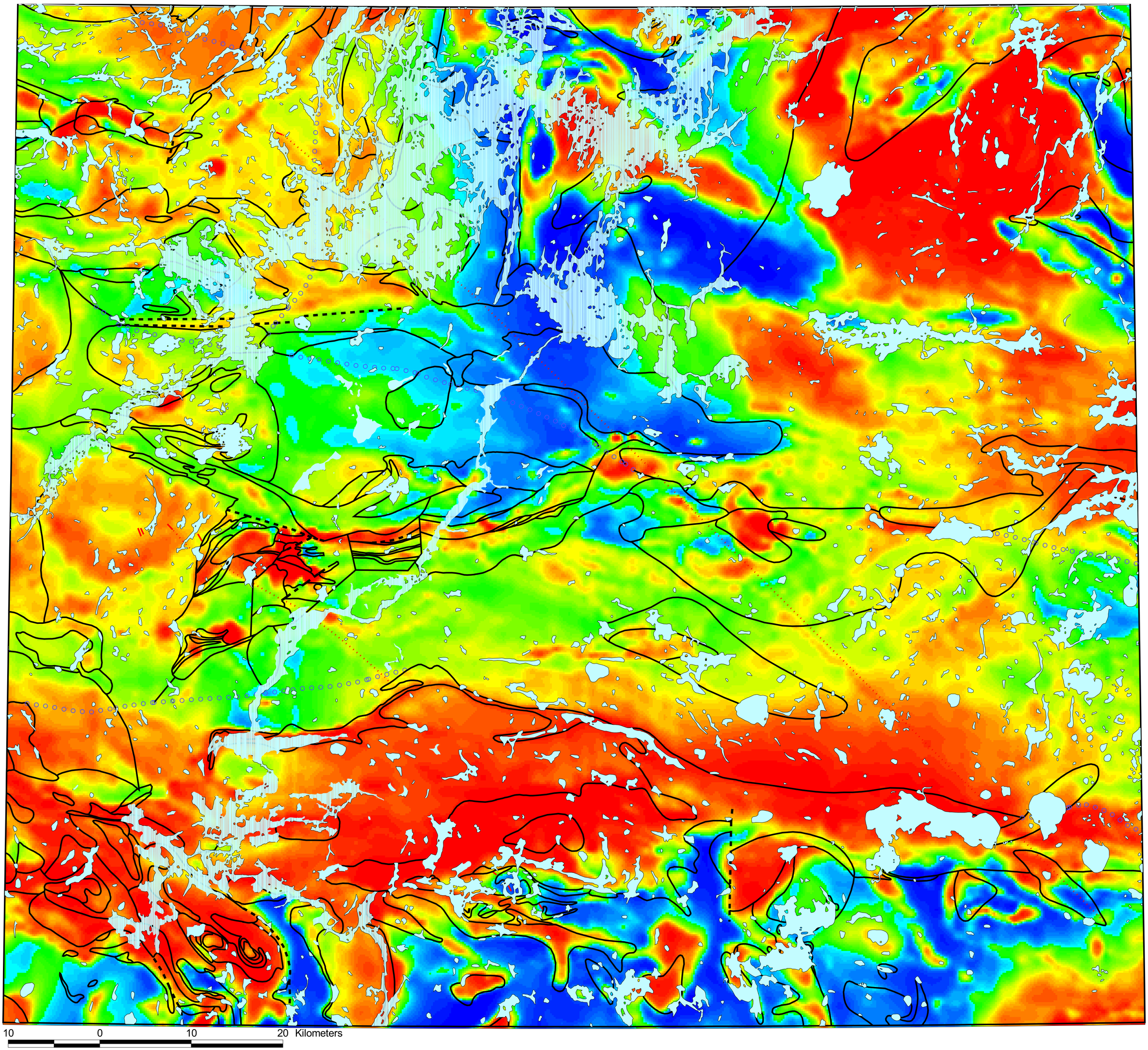
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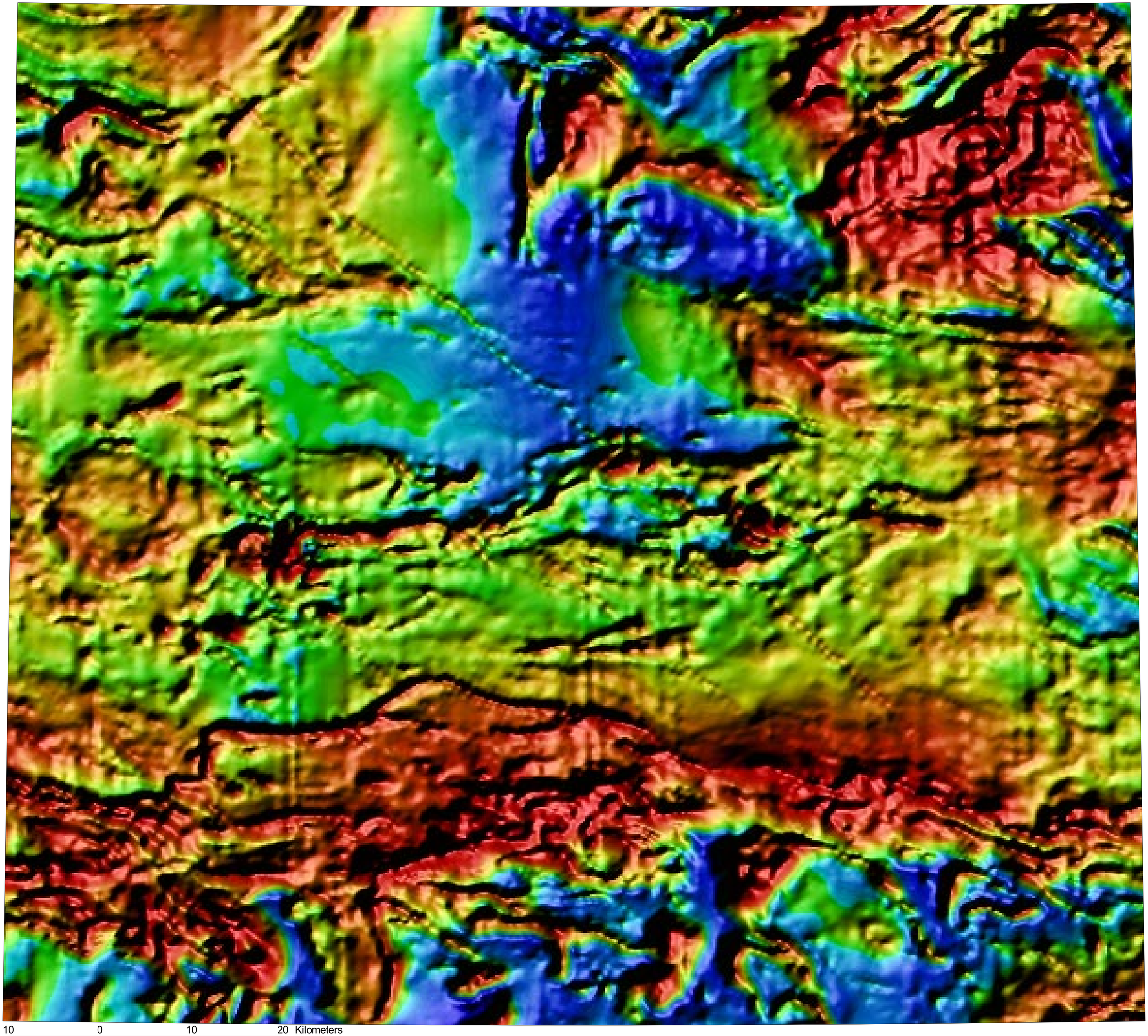
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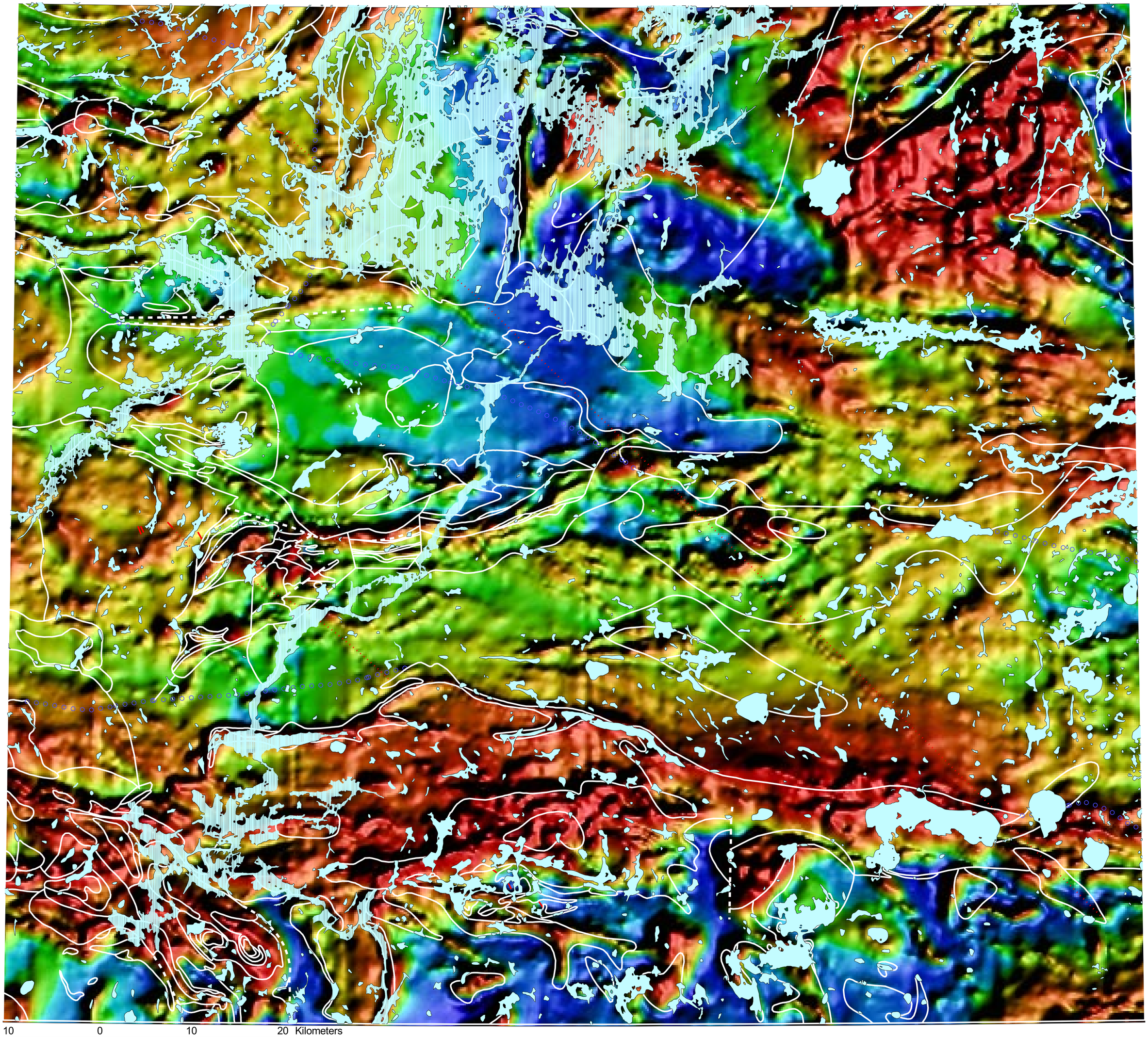
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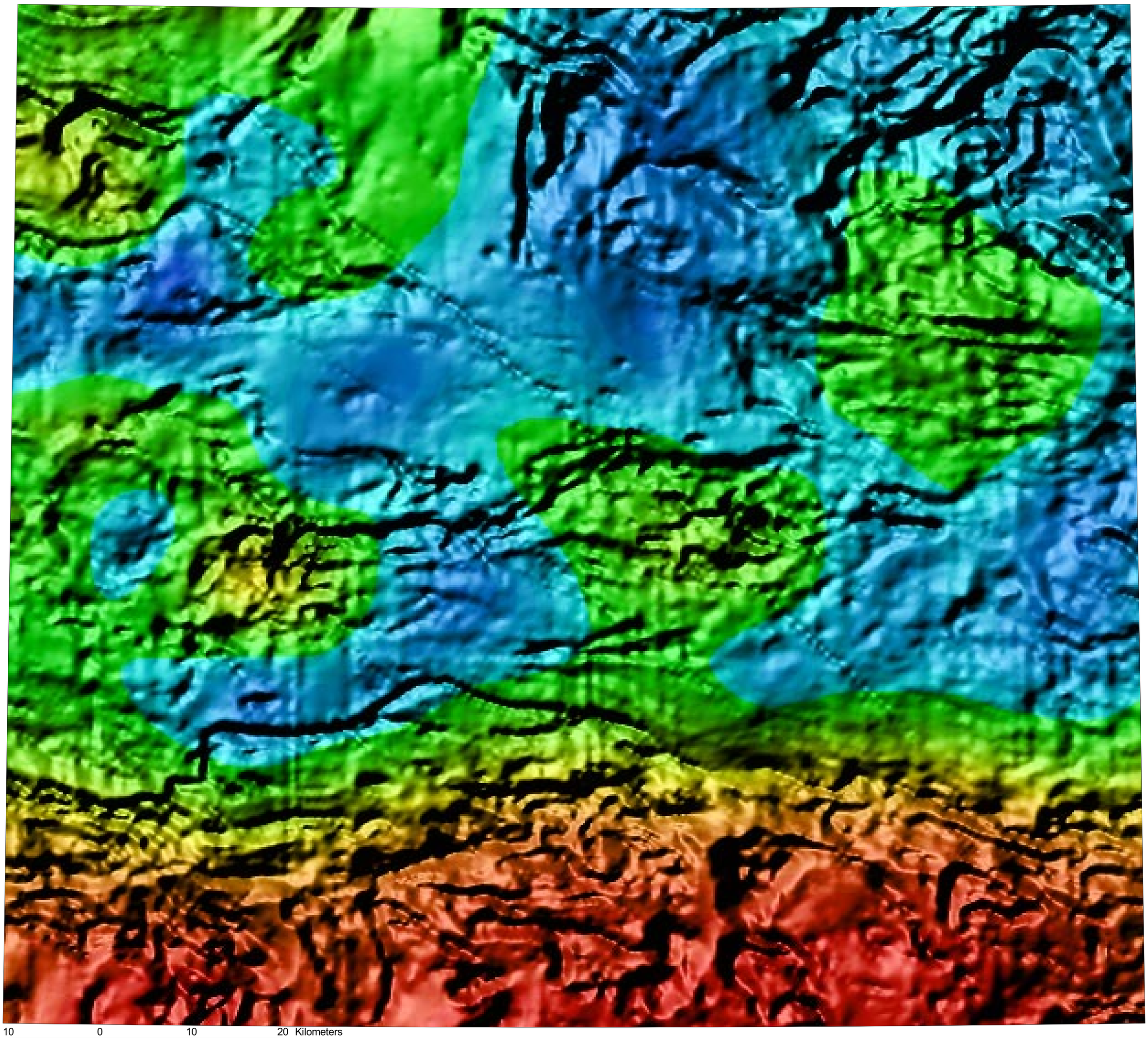
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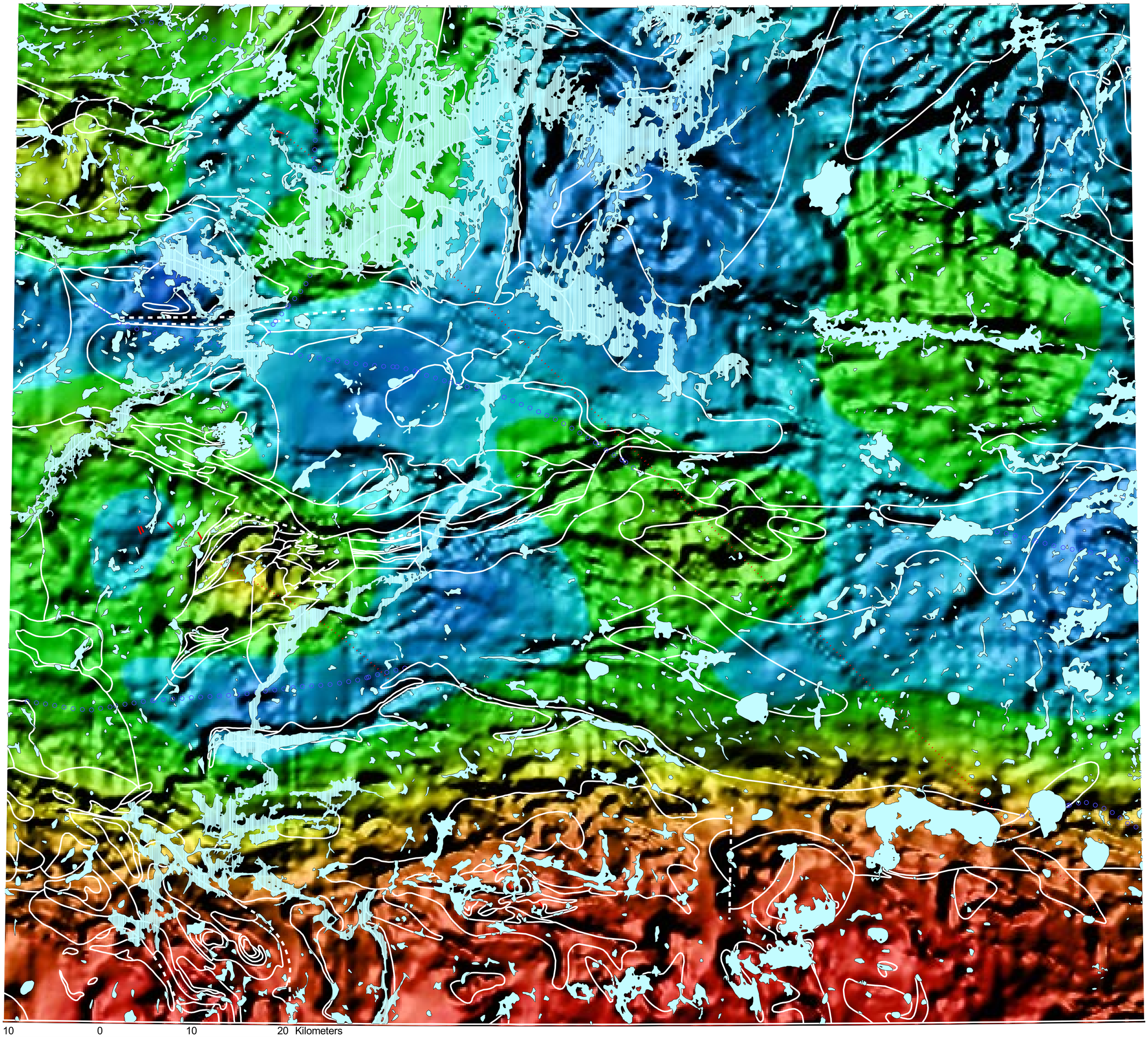
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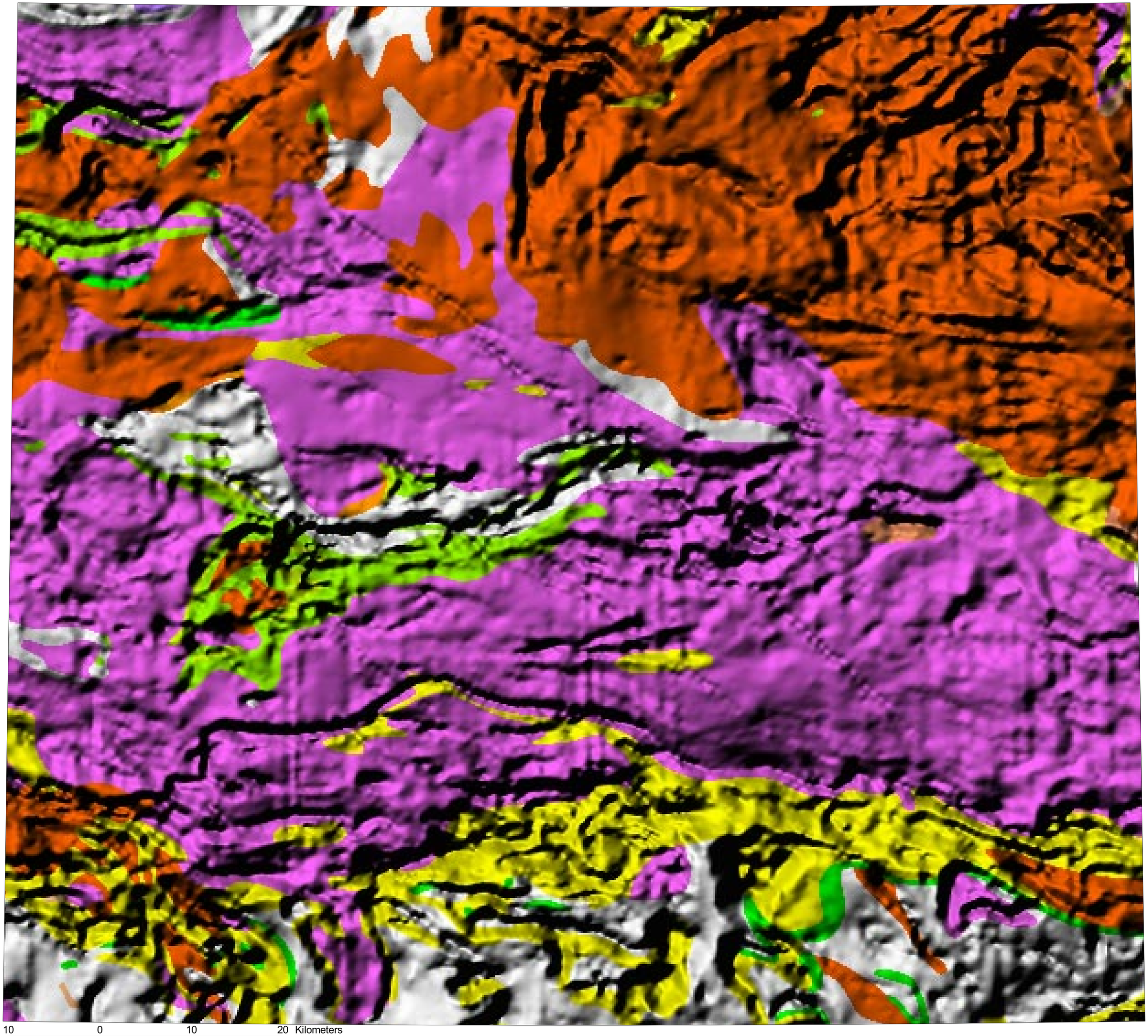
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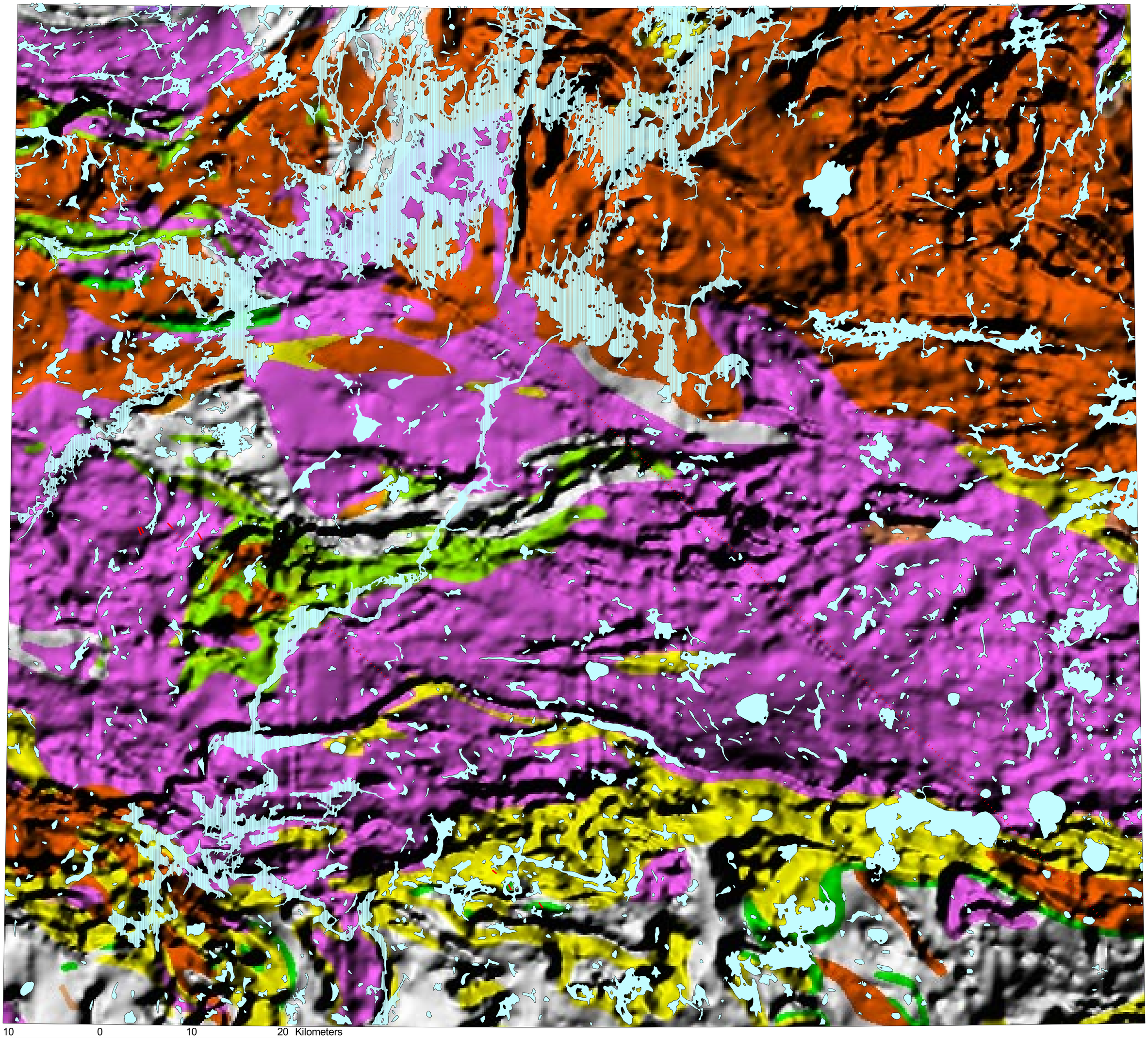
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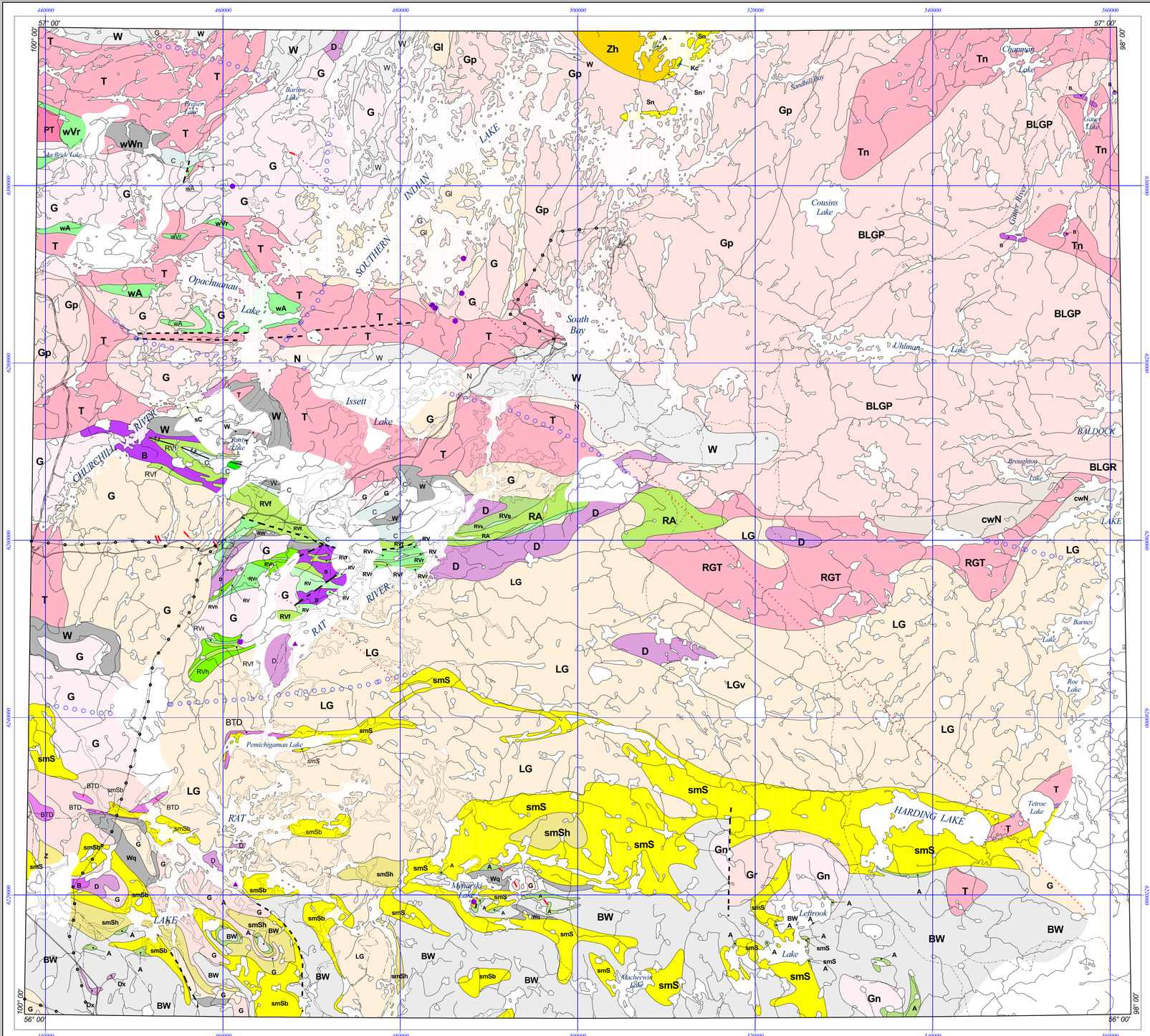

LEGEND

PRECAMBRIAN

Late Proterozoic

Diabase dyke - Mackenzie swarm; magnetic linear (possible diabase dyke)

Early Proterozoic

Younger Plutonic Rocks

- Zh — Hornblende-bearing monzogranite
- Z — Hornblende syenite
- G — Granite; Gp - megacrystic granite; Gr - seriate-porphyritic granite; BLGr - seriate-porphyritic granite; BLGp - megacrystic granite (BL - Baldock granite)
- G — Granodiorite; Gl - leucocratic granodiorite; IG - granodiorite, tonalite, granite IGv-muscovite-bearing granodiorite-granite (IG and IGv - Livingston granodiorite)
- BTD — Diorite, quartz diorite - Black Trout diorite
- B — Gabbro

Plutonic Rocks of Uncertain Age

- G — Granite
- G — Granodiorite, granite; Gn - gneissic granodiorite
- T — Tonalite, quartz diorite, granodiorite; Tn - gneissic tonalite; RGT - Ridge tonalite
- D — Quartz diorite, diorite, amphibolite; Dx - pyroxene diorite
- ● ▲ — Ultramafic rocks (exposed; submerged or encountered in diamond drill holes)
- B — Gabbro

LYNN LAKE DOMAIN

Metamorphic Rocks of Uncertain Age

- C — Polymictic conglomerate, minor greywacke

Older Plutonic Rocks

- PT — Tonalite - Poole Lake intrusive suite 1878 ± 3 Ma

Wasekwan Group (medium to high metamorphic grade)

- WWn — Paragneiss, metagreywacke, amphibolite
- WA — Amphibolite (derived from mafic volcanic rocks)
- WVr — Aphyric and porphyritic basalt, related volcaniclastic rocks

LEAF RAPIDS DOMAIN

Sickle Group

- SC — Polymictic metaconglomerate, metasandstone

Older Plutonic Rocks

- B — Gabbro

Unnamed Metasedimentary and Metavolcanic Rocks

- W — Greywacke, calc-silicate rock, iron formation (mainly sulphide facies)(dotted lines)
- C — Polymictic conglomerate and interbedded sandstone
- V — Aphyric pillow basalt

Ruttan Group (low to high metamorphic grade)

- RV — Redeposited pyroclastic rocks (including debris flows); RVf - volcaniclastic rocks (interbedded conglomerate, sandstone and siltstone); RVs schist derived from RVf
- RV — Rhyolite (including pyroclastic rocks)
- RA — Mafic volcaniclastic rock, flows; RA - amphibolite derived from RVf, minor quartz diorite
- RVr — Basalt (aphyritic and porphyritic)
- RW — Volcaniclastic greywacke, conglomerate and siltstone
- RVH — Basalt (with pyroxene phenocrysts altered to hornblende)

KISSEYNEW DOMAIN

Sickle Metamorphic Suite (migmatite)

- SMS — Quartzofeldspathic gneiss derived from sandstone (undivided) SMSb- feldspar-rich biotite gneiss
- SMSh — Hornblende-bearing quartzofeldspathic gneiss ± diopside

Metamorphic Rocks of Uncertain Age

- Nd — Cordierite-sillimanite-anthophyllite gneiss
- Wq — Quartzofeldspathic biotite paragneiss
- A — Amphibolite, calc-silicate rock, hornblende-biotite gneiss

Burntwood River Metamorphic Suite

- BW — Greywacke-mudstone-derived gneiss, migmatite

SOUTHERN INDIAN DOMAIN

Metamorphic Rocks of Uncertain Age

- N / CWN — Quartzofeldspathic gneiss ± hornblende, may include metasandstone; CWN - quartzofeldspathic gneiss, migmatite (derived from sandstone), amphibolite - Campbell-Waskaiowaka gneisses
- Sn — Quartzofeldspathic gneiss, migmatite derived from sandstone
- A — Amphibolite
- Kc — Calc-silicate rock
- W — Quartz-biotite gneiss (greywacke-derived), migmatite, amphibolite

Symbols

- Contact (approximate)
- Fault
- Domain boundary
- Syncline (overturned)
- Flooded area
- Powerline
- Gravel road
- Paved road
- Winter road
- Trail

STRATIGRAPHIC NOTE

The lithologies within the major stratigraphic divisions are not in stratigraphic order.

Synoptic geology by D.A. Baldwin, M.T. Corkery, H.P. Gilbert, P.G. Lenton, W.D. McRitchie, D.C.P. Schledewitz and H.V. Zwanzig

Deposits and important mineral occurrences compiled by D.A. Baldwin and K. Ferreira

Compilation by J.S.D. Parker

Digital compilation by P.G. Lenton

This compilation is based on Manitoba Energy and Mines, 1986; Bedrock Geology Compilation Map Series, 1:250 000, NTS 64B - Uhlman Lake.

Scale 1:250 000

10 0 10 20 Kilometres

5 0 5 10 15 Miles

UHLMAN LAKE

NTS Area 64B