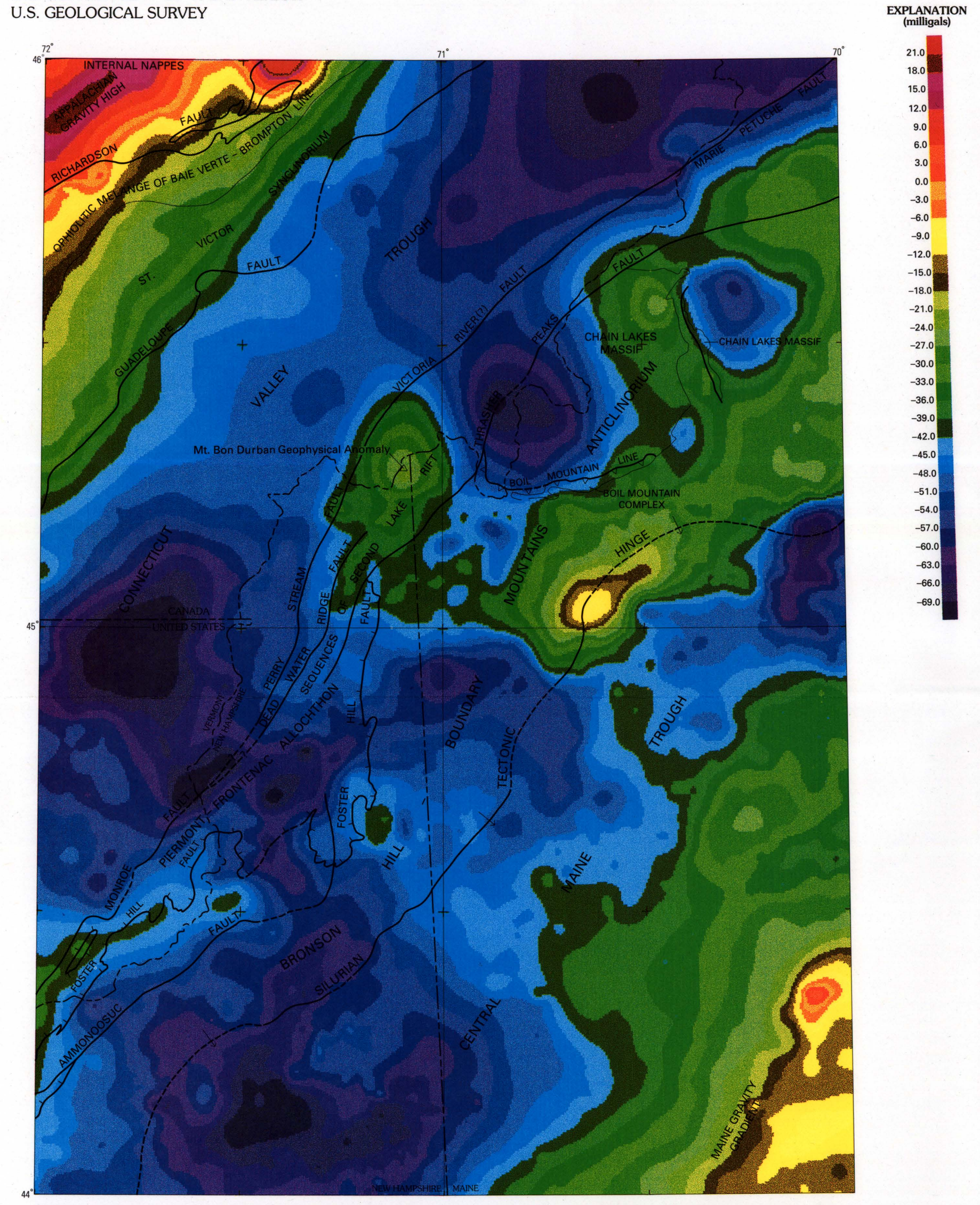
PREPARED IN COOPERATION WITH THE
MAINE GEOLOGICAL SURVEY AND THE NEW HAMPSHIRE GEOLOGICAL SURVEY


EXPLANATION (milligals)
21.0
18.0
15.0
12.0
9.0
6.0
3.0
0.0
-3.0
-6.0
-9.0
-12.0
-15.0
-18.0
-21.0
-24.0
-27.0
-30.0
-33.0
-36.0
-39.0
-42.0
-45.0
-48.0
-51.0
-54.0
-57.0
-60.0
-63.0
-66.0
-69.0
72°
71°
70°
46°
45°
44°
INTERNAL NAPPES
GRAVITY HIGH
RICHARDSON FAULT
OPHIOLITIC MELANGE OF BAIE VERTE–BROMPTON LINE
ST. VICTOR FAULT
SYNCLINORIUM
GUADELOUPE
CONNECTICUT VALLEY TROUGH
VICTORIA RIVER(?) FAULT
MAINE PETUCHE FAULT
CHAIN LAKES MASSIF
ANTICLINORIUM
Mt. Bon Durban Geophysical Anomaly
BOIL MOUNTAIN LINE
BOIL MOUNTAIN COMPLEX
HINGE
MOUNTAINS
BOUNDARY
TECTONIC
CANADA
UNITED STATES
PERRY STREAM
WATER RIDGE
SEQUENCES
DEAD
ALLOCHTHON
FRONTENAC
PIERMONT
FOSTER HILL
MONROE FAULT
AMMONOOSUC
BRONSON HILL
SILURIAN
CENTRAL MAINE TROUGH
MAINE GRAVITY GRADIENT
NEW HAMPSHIRE
MAINE

SCALE 1:750 000
20 0 20 40 60 MILES
20 0 20 40 60 KILOMETERS

Figure 4. Color-contoured complete Bouguer gravity map of the Lewiston and Sherbrooke 1° × 2° quadrangles, Maine, New Hampshire, and Vermont, United States, and Quebec, Canada, showing major regional gravity trends and relationship to identified tectonic elements. Long dashes indicate trends of White Mountain Plutonic-Volcanic Suite; short dashes indicate projections of structures through younger plutons. Contour interval 3 mGal.

MAP B. COMPLETE BOUGUER GRAVITY MAP

By

Wallace A. Bothner, Robert P. Kucks, Christian E. Jahrling, II, and Michael J. Carnese

SCALE 1:250 000
5 0 5 10 15 20 MILES
5 0 5 10 15 20 25 30 KILOMETERS

CONTOUR INTERVAL 100 FEET
WITH SUPPLEMENTARY CONTOURS AT 50-FOOT INTERVALS (SHERBROOKE QUADRANGLE)
NATIONAL GEODETIC VERTICAL DATUM OF 1929
1997 MAGNETIC DECLINATION FROM TRUE NORTH VARIES FROM 16 (280 MILS) WESTERLY FOR THE CENTER OF THE WEST EDGE TO 18 (320 MILS) WESTERLY FOR THE CENTER OF THE EAST EDGE

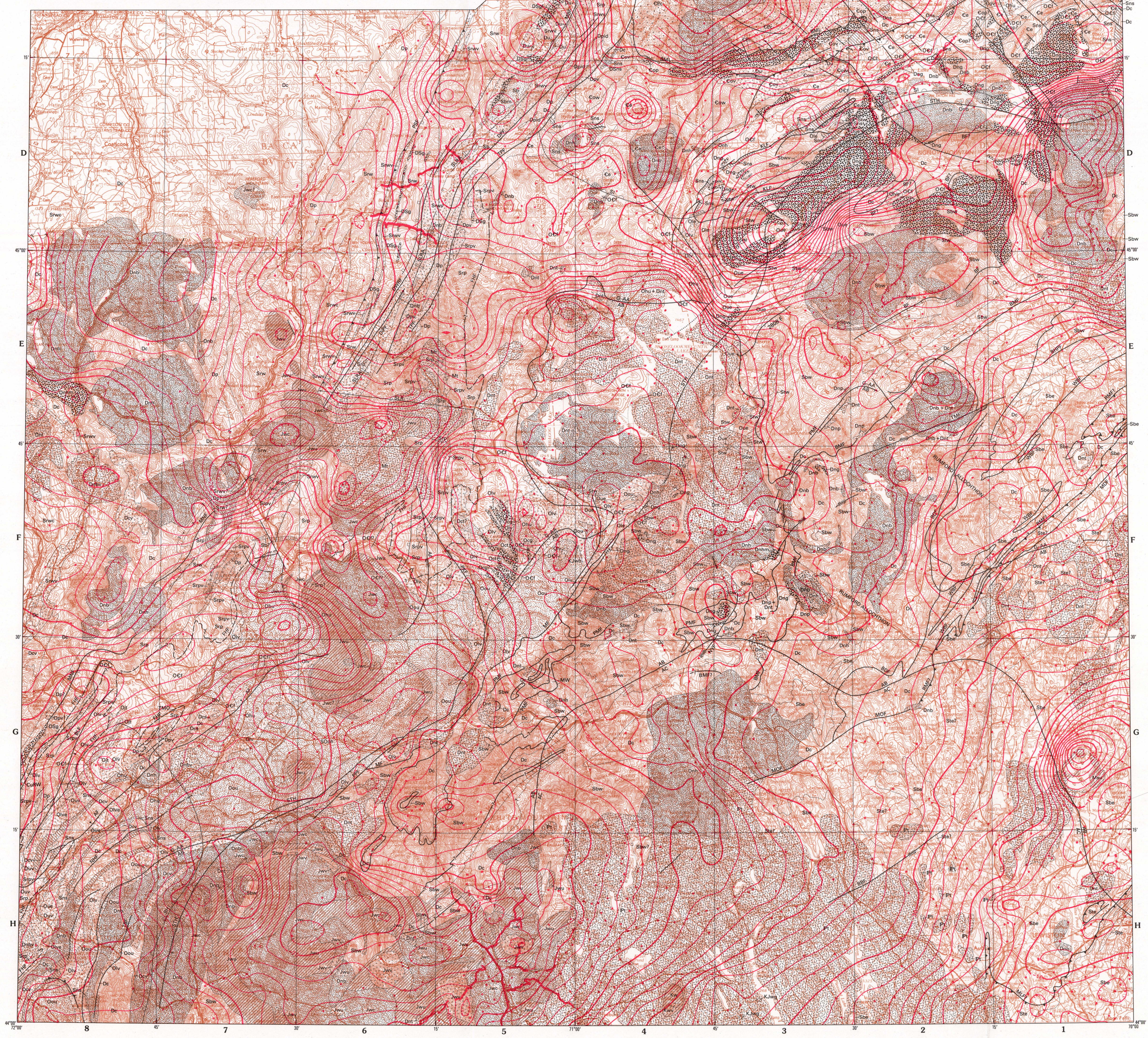
Geology from map A of this report
Edited by Alessandro J. Donatich
Color and graphic design by Patricia L. Wilber and William Sowers
Cartography by Henry Williams
Manuscript approved for publication March 13, 1997

Base from U.S. Geological Survey,
Lewiston, 1956, revised 1972; Sherbrooke, 1960
100,000-foot grid based on Maine coordinate system, west zone, New Hampshire and Vermont coordinate systems.
10,000-meter Universal Transverse Mercator grid, zone 19.
Transverse Mercator projection

EXPLANATION OF GRAVITY DATA

Gravity station—See pamphlet for sources of data

Gravity contours—Contour interval 2 mGal (milligals). Hachures indicate closed areas of lower gravity intensity. Contours of Bouguer anomaly values drawn by computer from a 2 x 2 km gridded representation of the data


A
B
C
D
E
F
G
H
8
7
6
5
4
3
2
1
72°00'
71°00'
70°00'
46°00'
45°00'
44°00'
45'
30'
15'

CONDENSED LIST OF MAP UNITS

[See Appendix I for "Description of map units," and figure 2 for index number and location of named plutons]

PLUTONIC ROCKS

	White Mountain Plutonic-Volcanic Suite (Early Cretaceous and Jurassic)
	Early Cretaceous rocks
Kw	Granite, syenite, and gabbro-diorite
Kwv	Trachyte
	Early Cretaceous or Jurassic rocks
KJwb	Basalt plug and volcanic breccia
KJwg	Gabbro or diorite
	Jurassic rocks
Jwc	Conway Granite and Conway-type granite
Jwu	Undivided felsic to mafic alkalic rocks
Jwv	Moat Volcanics
IPt	Two-mica granite (Pennsylvanian)
Msu	Syenite, quartz syenite, alkali gabbro, and ultramafic rocks (Mississippian?)
Mt	Two-mica granite (Mississippian)
Du	Diapiric ultramafic talc-carbonate rock and serpentinite (Devonian?)
	New Hampshire Plutonic Suite (Devonian)
Dnbv	Variably textured biotite granite (Late Devonian)
Dnt	Two-mica granite (Late to Early Devonian)
Dnp	Pegmatitic granite and pegmatite (Late and Middle Devonian)
Dnh	Hornblende-biotite granodiorite to diorite (Late to Early Devonian)
Dnhm	Hornblende-quartz monzodiorite to gabbro (Late? to Early? Devonian)
Dnb	Biotite granite, granodiorite, tonalite, and sparse trondhjemite (Middle to Early Devonian)
Dng	Gabbroic and hybrid rocks (Early Devonian)
	Mafic and bimodal dikes (Early Devonian? and Silurian)
DSg	Diabase and gabbro dikes, sills, and small plutons
DSsf	Sheeted diabase, gabbro, and intrusive felsite
Sb	Epizonal biotite granite (Silurian)
Sbm	Mafic to intermediate border facies of East Inlet pluton
	Oliverian Plutonic Suite (Silurian? and Ordovician)
SOoh	Hornblende-biotite syenite, quartz syenite, quartz monzonite, and granite (Silurian or Ordovician—Cincinnatian)
Oou	Undivided biotite granite, biotite granodiorite to quartz diorite and trondhjemite, and hastingsite granodiorite (Ordovician—Cincinnatian and Mohawkian)
	Highlandcroft Plutonic Suite (Silurian? and Ordovician—Cincinnatian, Mohawkian, and Whiterockian?)
SOha	Altered aplitic granite, granodiorite, and quartz porphyry (Silurian or Ordovician—Cincinnatian)
Ohu	Undivided biotite or hornblende granite to quartz diorite and local gabbro (Ordovician—Cincinnatian to Whiterockian?)
	Chickwolnepy intrusions Ordovician—Whiterockian)
Ocg	Massive to foliated gabbro and sheeted diabase dikes
Oct	Hornblende-biotite tonalite
Ojt	Tonalite of Joslin Turn pluton (Ordovician—Whiterockian)

STRATIFIED METAMORPHIC ROCKS

[Selected metamorphic boundaries are shown on map]

Connecticut Valley trough (CVT)

Tectonic belt lying mainly northwest of Foster Hill and Thrasher Peaks faults (FHF, TPF), and southeast of Guadeloupe fault (GF) (fig. 2)

Dc	Autochthonous metashale and metasandstone of cover sequence (Lower Devonian—Emsian to Gedinnian?)
Dcv	Metavolcanic-bearing facies
Dp	Parallochthonous metashale and local volcaniclastic metawacke (Lower Devonian—Gedinnian?)
Dpv	Metavolcanic facies
Dpid	Metamorphosed microgranite intrusions and domes
	Metasedimentary and metavolcanic rocks within and tentatively within the Second Lake rift (Silurian, Silurian?, and Ordovician—Cincinnatian)
	Western rift sequence (Silurian and Silurian?)
Srw	Predominantly siliciclastic turbidites (Silurian)
Srwc	Predominantly calcareous metasedimentary rocks (Silurian and Silurian?)
Srwv	Metavolcanic and mixed metasedimentary and metavolcanic facies (Silurian)
	Piermont sequence (Silurian, Silurian?, and Ordovician—Cincinnatian)
Srp	Upper formations (Silurian and Silurian?)
Srpv	Metavolcanic and mixed metasedimentary and metavolcanic facies
SOp	Lower formations (Silurian? (Llandoverian?) and Ordovician (Cincinnatian))

Bronson Hill–Boundary Mountains anticlinorium (BHBMA)

Tectonic belt lying mainly southeast of Foster Hill and Thrasher Peaks faults (FHF, TPF), and mainly northwest of the STH

Dcs	Shoal-facies metasandstone, metaconglomerate, and subaerial metavolcanic rocks of cover sequence (Lower Devonian—Emsian)
Dcsv	Subaerial metavolcanic member
Dcsi	Intrusive garnet metarhyolite
Dc	Metashale and metasandstone of cover sequence (Lower Devonian)
Dcv	Metavolcanic members
	Near-shore deposits (Lower Devonian and Silurian)
Dns	Lower Devonian (upper Gedinnian and upper Siegenian) deposits
DSns	Lower Devonian (Gedinnian?) or Silurian (Pridolian?) deposits
Sns	Silurian (Pridolian to upper Llandoverian) deposits
	Euxinic metasedimentary and metavolcanic rocks of Bronson Hill arc (Ordovician—Cincinnatian to Whiterockian)
	Upper sequence (Ordovician—Cincinnatian)
Oue	Euxinic metashale and metagraywacke
Ouv	Felsic and mafic metavolcanic rocks
	Lower sequence (Ordovician—Mohawkian and Whiterockian)
Ole	Euxinic metasedimentary rocks
Olv	Bimodal metavolcanic and related metasedimentary rocks
Olve	Bimodal metavolcanic and euxinic metasedimentary rocks, undivided
OЄf	Flysch sequence (Ordovician (lower Whiterockian) to Upper Cambrian?)
Єe	Euxinic melange (Cambrian?)
	Ophiolite (Cambrian?)
Єov	Bimodal metavolcanic rocks
Єow	Volcaniclastic metawacke member
Єop	Stratiform plutonic ophiolite
ЄPc	Clastic and plutonic rocks of Chain Lakes massif (Cambrian or Proterozoic)

Central Maine trough (CMT)

Tectonic belt lying mainly southeast of the Silurian tectonic hinge (STH)

Dc	Metashale, metasandstone, and associated deposits of cover sequence (Lower Devonian)
	Sequences of extensional basin (Silurian and Silurian?)
Sbw	Western siliciclastic sequence
Sbwv	Felsic metavolcanic facies
Sbe	Eastern siliciclastic and carbonate sequence
	Deposits of transition to underlying arc sequences (Silurian and Silurian?)
Stw	Western transition
Ste	Eastern transition

Contact—Dotted across water; queried where conjectural

Faults—Dotted across water; queried where conjectural

AF **Postmetamorphic brittle faults**—Bar and ball on downthrown side of known normal fault; opposed arrows indicate direction of displacement along known strike-slip fault. Named faults: AF, Ammonoosuc; BBF, Ben Barrows; BLF, Bill Little; MOF, Moll Ockett; NYF, Newry; PPF, Pine Peak; PKF, Pontook; RLF, Rangeley Lake; TMF, Tantrattle Mountain; TBF, Tunnel Brook

MDF **Late premetamorphic to locally postmetamorphic ductile to brittle faults**—Opposed arrows indicate direction of displacement along known strike-slip faults; sawteeth point toward hanging wall of known thrust faults. Named faults: BHPF, Black Hill Pond; DWRF, Dead Water Ridge; DPF, Deer Pond; DiPF, Diamond Pond; MDF, Madison; MPF, Marie Petoche; MLF?, possible Mesalonskee Lake; MNF, Monroe; MBF, Moose Bog; NHF, Northey Hill; PSF, Perry Stream; RMF?, possible Rowell Mountain; SQF, Squirtgun; TPF, Thrasher Peaks; VRF, Victoria River(?)

FHF **Premetamorphic Foster Hill fault (FHF)**—Ticks point toward the P-F allochthon. Marks east boundary and sole of allochthon, and bounds Coppermine Road window (CuRW) and Towns Mountain outlier (TMO)

BDF **Premetamorphic extensional faults of the Central Maine trough (CMT)**—Ticks point toward structurally higher sequences. Named faults: BDF, Bald Mountain; BF, Barnjum; BMF, Blueberry Mountain; KLF, Kennebago Lake; MF, Mahoosuc; PMF, Plumbago Mountain; WBF, Winter Brook; 2808F, hill 2808. MW, Mahoosuc window, bounded by the PMF

BML **Boil Mountain line**—Sawteeth point in direction of inferred original dip. Sharp, welded lower contact of the ophiolitic Boil Mountain Complex (Єop) and Jim Pond Formation (Єov, Єow) at southeast boundary of Boundary Mountains terrane of Boone and Boudette (1989)

STH **Silurian tectonic hinge**—Arrow points toward thicker Silurian deposits of the CMT

SLR **Second Lake rift**—Frontenac Formation and Piermont sequence southeast of Monroe fault (MNF) and its named extensions; tentatively includes Silurian rocks of the CVT exposed northwest of MNF

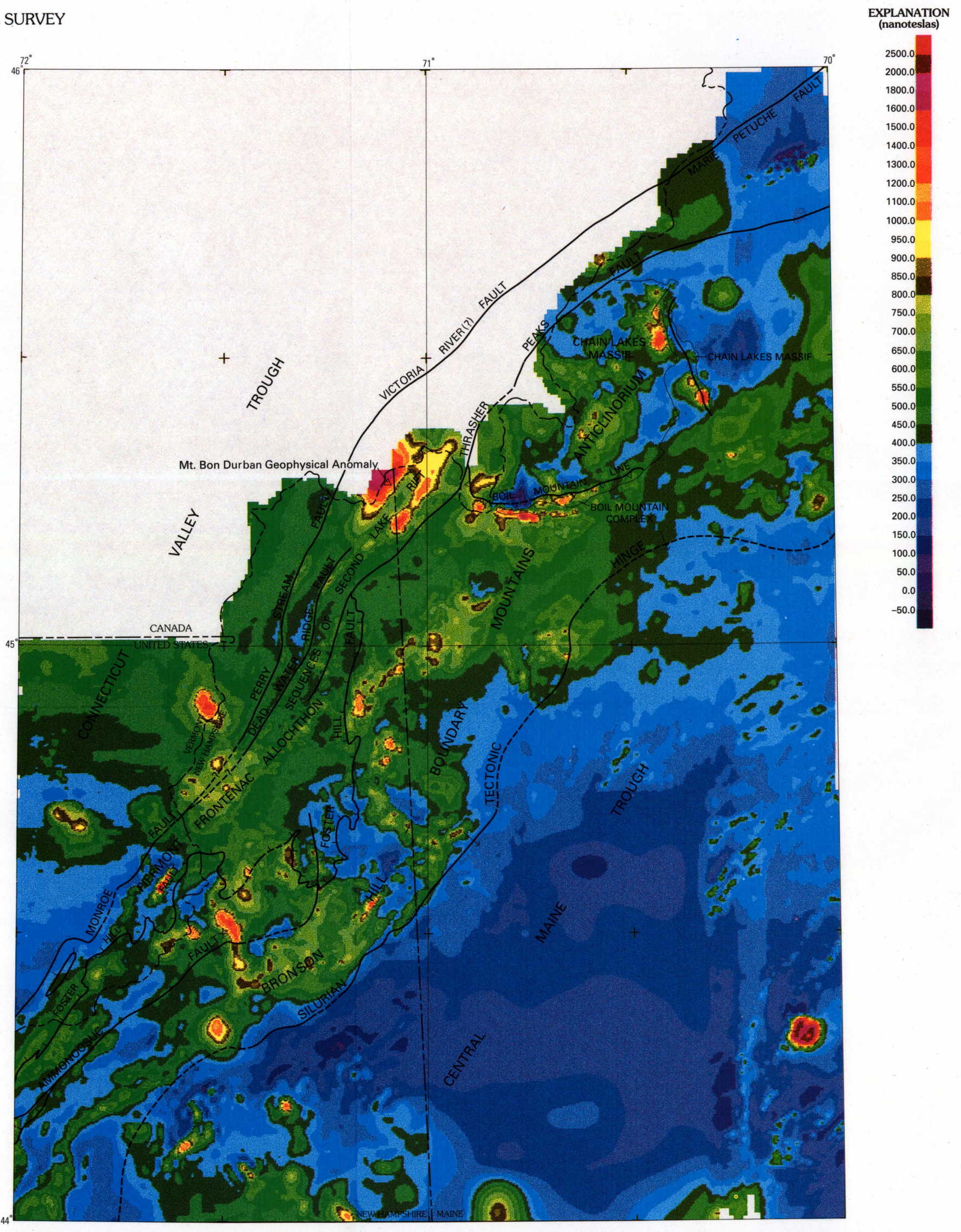
SLRA **Magmatic axis**—Queried where conjectural

SI **Approximate shore of inferred Silurian island**—Half circles on landward side; dashed across Devonian plutons. Based on distribution of Silurian near-shore deposits (Sns) having basal unconformity. SI, Somerset Island (modified from Boucot, 1968, fig. 6-3); BHI, Bronson Hill Island

AB / AC **Selected metamorphic zone boundaries**—Approximately located. Ticks point toward area of higher metamorphic grade. G–AA, Devonian greenschist to lower amphibolite facies (includes sub-greenschist facies in northern Maine); AB, Devonian middle amphibolite facies; AC, Carboniferous upper amphibolite facies

Approximate boundary of metamorphosed mafic and bimodal dike swarm—Squares on side of more abundant dikes. Abundantly intrude Silurian rocks of the SLR; locally intrude the Meetinghouse Slate Member of Gile Mountain Formation (of Dp?), and autochthonous rocks of the BHBMA

+++ **Premetamorphic schist-matrix breccia**—Shown where most extensively developed in Smalls Falls and Perry Mountain Formations (of Srp, Srpv), below lower contact of Ironbound Mountain Formation (of Dp, Dpv)


EXPLANATION (nanoteslas)
2500.0
2000.0
1800.0
1600.0
1500.0
1400.0
1300.0
1200.0
1100.0
1000.0
950.0
900.0
850.0
800.0
750.0
700.0
650.0
600.0
550.0
500.0
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
-50.0
72°
71°
70°
46°
45°
44°
MAINE PETUCHE FAULT
VICTORIA RIVER(?) FAULT
TROUGH
VALLEY
CONNECTICUT
PEAKS
THRASHER
CHAIN LAKES MASSIF
ANTICLINORIUM
Mt. Bon Durban Geophysical Anomaly
BOIL MOUNTAIN COMPLEX
HINGE
MOUNTAINS
BOUNDARY
TECTONIC
CANADA
UNITED STATES
BRONSON
SILURIAN
CENTRAL
MAINE
NEW HAMPSHIRE

SCALE 1:750 000
20 0 20 40 60 MILES
20 0 20 40 60 KILOMETERS

Figure 5. Color-contoured aeromagnetic map of the Lewiston and Sherbrooke 1° × 2° quadrangles, Maine, New Hampshire, and Vermont, showing major regional aeromagnetic trends and relationship to identified tectonic elements. Short dashes indicate projections of structures through younger plutons. Contour interval 50 nT.

MAP C. AEROMAGNETIC MAP

By

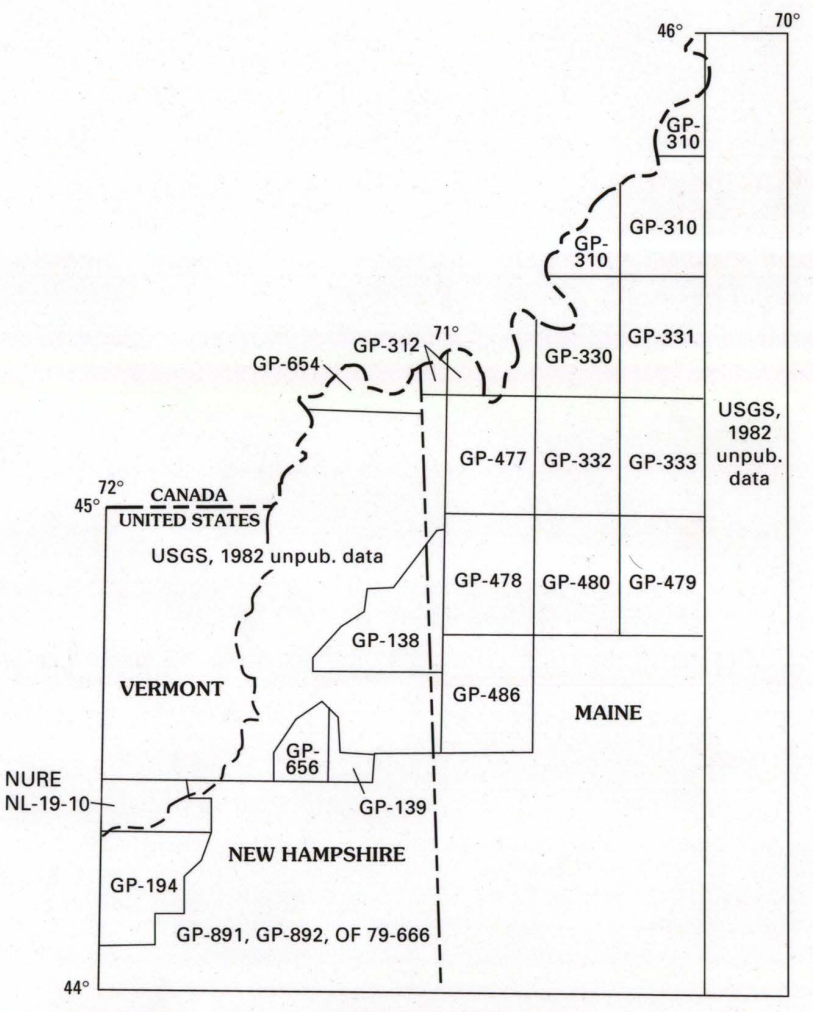
Wallace A. Bothner, Robert P. Kucks, Christian E. Jahrling, II, and Michael J. Carnese

SCALE 1:250 000
5 0 5 10 15 20 MILES
5 0 5 10 15 20 25 30 KILOMETERS

CONTOUR INTERVAL 100 FEET
WITH SUPPLEMENTARY CONTOURS AT 50-FOOT INTERVALS (SHERBROOKE QUADRANGLE)
NATIONAL GEODETIC VERTICAL DATUM OF 1929
1997 MAGNETIC DECLINATION FROM TRUE NORTH VARIES FROM 16 (280 MILS) WESTERLY FOR THE CENTER OF THE WEST EDGE TO 18 (320 MILS) WESTERLY FOR THE CENTER OF THE EAST EDGE

Geology from map A of this report
Edited by Alessandro J. Donatich
Color and graphic design by Patricia L. Wilber and William Sowers
Cartography by Henry Williams
Manuscript approved for publication March 13, 1997

Base from U.S. Geological Survey,
Lewiston, 1956, revised 1972; Sherbrooke, 1960
100,000-foot grid based on Maine coordinate system, west zone, New Hampshire and Vermont coordinate systems.
10,000-meter Universal Transverse Mercator grid, zone 19.
Transverse Mercator projection


46°
70°
71°
72°
45°
44°
GP-310
GP-312
GP-654
GP-330
GP-331
GP-477
GP-332
GP-333
USGS, 1982 unpub. data
GP-478
GP-480
GP-479
GP-138
GP-486
GP-656
GP-139
GP-194
GP-891, GP-892, OF 79-666
CANADA
UNITED STATES
USGS, 1982 unpub. data
VERMONT
MAINE
NEW HAMPSHIRE
NURE NL-19-10

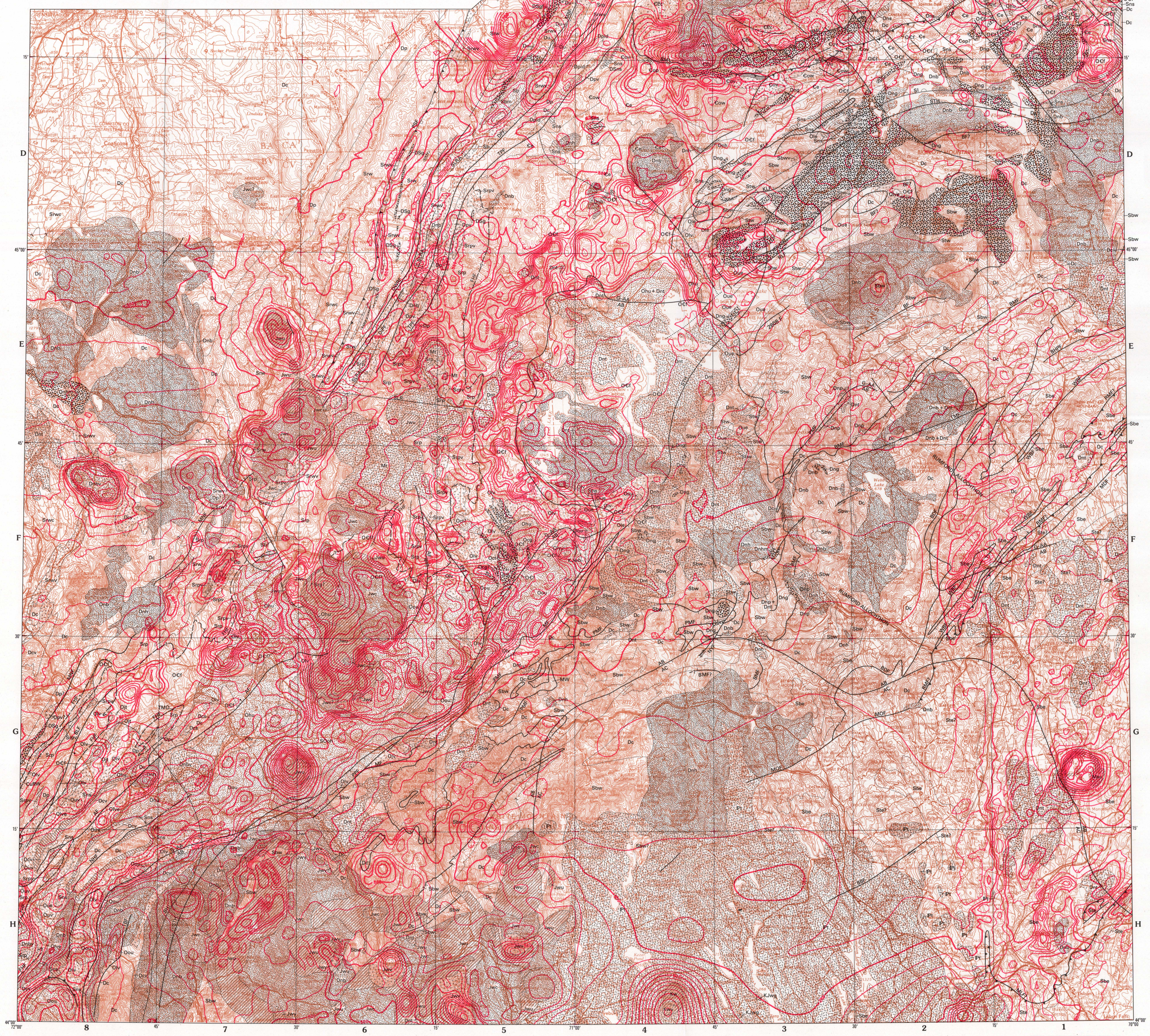
INDEX TO SOURCES OF AEROMAGNETIC DATA

SOURCES OF AEROMAGNETIC DATA

GP–138	Bromery and others (1957a)
GP–139	Bromery and others (1957b)
GP–194	Bromery and others (1958)
GP–310	Bromery and Gilbert (1962)
GP–312	Boucot and others (1964)
GP–330	Henderson, Gilbert, and others (1963a)
GP–331	Bromery, Soday, and others (1963)
GP–332	Henderson, Gilbert, and others (1963b)
GP–333	Bromery, Tyson, and others (1963)
GP–477	Boynton and Gilbert (1964a)
GP–478	Boynton and Gilbert (1964b)
GP–479	Boynton and Gilbert (1964c)
GP–480	Boynton and Gilbert (1964d)
GP–486	Henderson and Smith (1964)
GP–654	U.S. Geological Survey (1969a)
GP–656	U.S. Geological Survey (1969b)
GP–891	U.S. Geological Survey (1973a)
GP–892	U.S. Geological Survey (1973b)
NURE NL-19-10	Carson Helicopters, Inc. (1982)
OF 79–666	Hassemer and others (1979)

EXPLANATION OF AEROMAGNETIC DATA

Magnetic contours—Showing total residual-intensity magnetic field of the Earth in nanoteslas (nT) or gammas relative to an arbitrary datum. Contour interval 50 nt. Hachures indicate closed areas of lower magnetic intensity. Contours drawn by computer from a 0.5 x 0.5 km gridded representation of digitized analog or digital data. Main magnetic field of the Earth has been removed


A
B
C
D
E
F
G
H
8
7
6
5
4
3
2
1
72°00'
71°00'
70°00'
46°00'
45°00'
44°00'
45'
30'
15'

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1999

TECTONIC LITHOFACIES, GEOPHYSICAL, AND MINERAL-RESOURCE APPRAISAL MAPS OF THE SHERBROOKE-LEWISTON AREA, MAINE, NEW HAMPSHIRE, AND VERMONT, UNITED STATES, AND QUEBEC, CANADA

Compiled by
Robert H. Moench, Eugene L. Boudette, and Wallace A. Bothner
1999

USGS
science for a changing world
Printed on recycled paper
U.S. Department of the Interior 1849•1999

Any use of trade names in this publication is for descriptive purposes only and does not imply endorsement by the U.S. Geological Survey