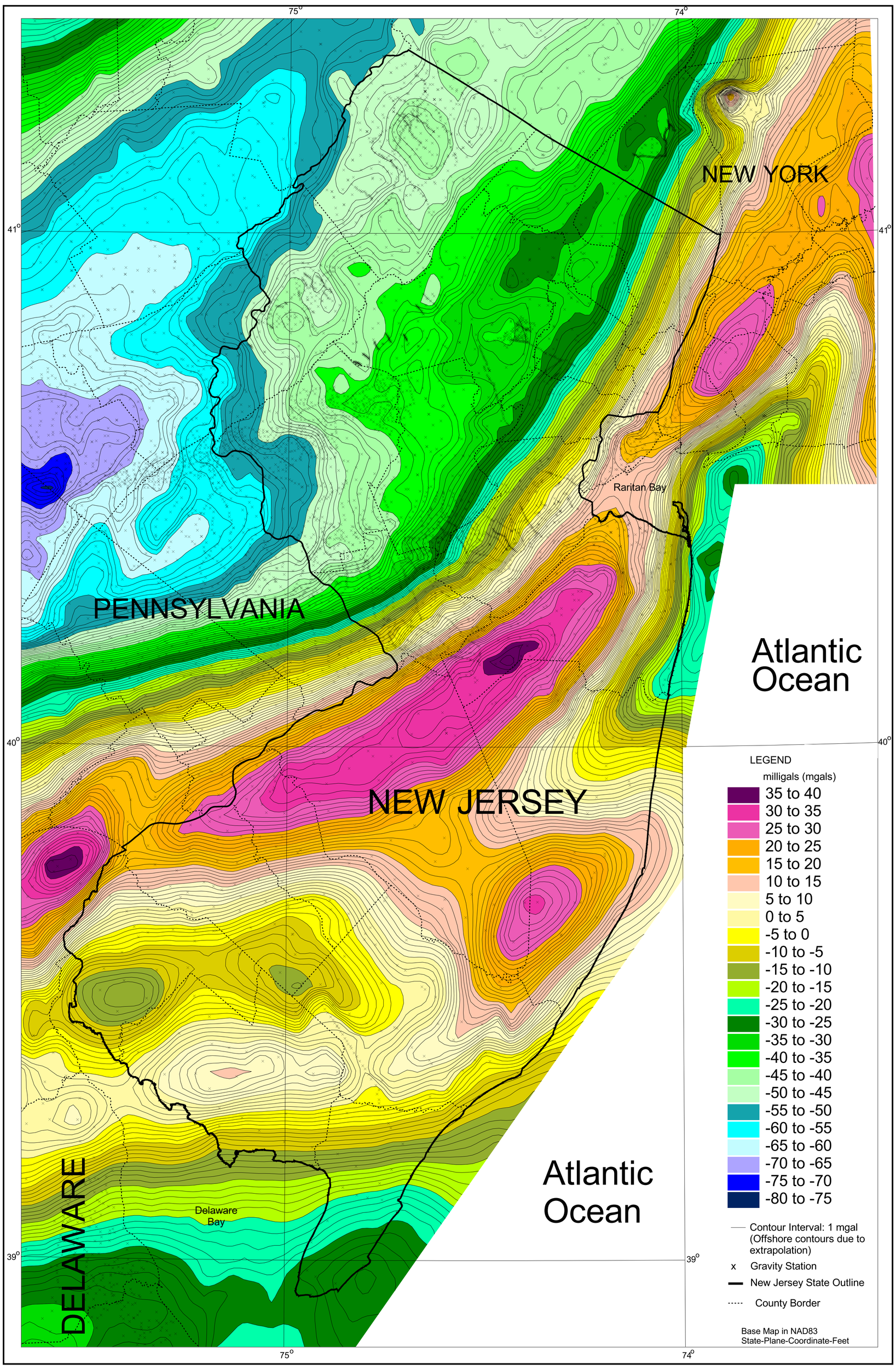

Definitions and Explanations:

This is a revision of the Bouguer Gravity Anomaly map of New Jersey by Bonini (1965). This colored map is created based on 8030 gravity stations, 1 milligal contour interval (5 milligal color intervals) and at a scale of 1:500,000.

1. Milligal (0.001gal) is a unit of acceleration used with gravity measurements. Abbreviated mgal.

2. Observed (or measured) Gravity is the value of gravity at the station location. All values have been adjusted to the International Gravity Standardization Net of 1971.

3. Theoretical (Normal) Gravity is the reference gravity value obtained from the gravity field of the World Geodetic System (WGS 84) reference ellipsoid of revolution.

4. Atmospheric Gravity Correction is a correction that is added to observed gravity. It is necessary because the WGS 84 earth's gravitational constant includes the mass of the atmosphere.

5. Vertical Gradient of Normal Gravity is the rate of change of gravity in a vertical direction.

6. Simple Bouguer Anomaly is the difference between observed gravity reduced to the geoid and normal gravity. The observed gravity is reduced to the geoid using the vertical gradient of normal gravity, the elevation of the observed point, and the vertical attraction of an infinite Bouguer plate. The vertical attraction of the Bouguer plate is modeled using the simplifying assumption that the material is of uniform density. The procedure for computing the simple Bouguer anomaly is:

a. Reduce the observed gravity value to the physical surface of the earth if it is not already there.

b. Remove the attractions of any mass layers above sea level from the surface point.

c. Reduce the point to the sea level surface (if it is not already there) using the vertical gradient of normal gravity.

d. Restore any mass layers below the sea level point that are needed to bring voids or water layers to normal crustal density (assumed to be 2.67 grams/cc).

e. Subtract the theoretical gravity at the corresponding point on the surface of the ellipsoid from the reduced gravity observation to get the simple Bouguer anomaly.

7. Free-Air Anomaly is the difference between the observed value of gravity on the physical surface reduced to the geoid using the vertical gradient of normal gravity, the height above the geoid, and normal gravity on the ellipsoid. The procedure for the free-air anomaly computation is:

a. Reduce the observed gravity value to the physical surface of the earth if it is not already there.

b. Reduce the surface value to sea level (if it is not already there) using the vertical gradient of normal gravity.

c. Subtract the theoretical gravity at the corresponding point on the ellipsoid surface from the reduced gravity observation to get the free-air gravity anomaly.

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Scale: 1:500,000

10 0 10 20 Miles

10 0 10 20 Kilometers

Bouguer Gravity Anomaly Map of New Jersey and Vicinity

by

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2004

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NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION