

Magnesium plus Calcium to Bicarbonate

The areal distribution of the milliequivalent ratio of magnesium plus calcium to bicarbonate ($Mg+Ca/HCO_3$) in water from the middle Wilcox aquifer, based on the median $Mg+Ca/HCO_3$ ratio in each 100-square-mile area, shows that the ratio ranges from less than 0.01 to 158 (table 1). The $Mg+Ca/HCO_3$ ratio generally decreases from outcrop to midbay and increases from midbay to the downbay limit of the data (fig. 17).

The $Mg+Ca/HCO_3$ ratio generally ranges from 0.10 to 2 in the outcrop area extending from the San Marcos arch eastward to southwestern Alabama. The ratio generally ranges from 1 to 2 in the outcrop area between the San Marcos arch and the Rio Grande.

From outcrop to midbay the $Mg+Ca/HCO_3$ ratio generally ranges from 0.01 to 2 in the area extending from the Mississippi River eastward to southwestern Alabama and from 0.1 to 10 in the area extending from the Mississippi River westward to the Sabine uplift. From outcrop to midbay the $Mg+Ca/HCO_3$ ratio generally ranges from 0.01 to 10 in the area extending from the Sabine uplift to the San Marcos arch and from 0.01 to 2 in the area between the San Marcos arch and the Rio Grande.

From midbay to the downbay limit of the data the $Mg+Ca/HCO_3$ ratio ranges from 0.01 to 100 in the area extending from the Mississippi River eastward to southwestern Alabama and from 0.1 to 10 in the area extending from the Mississippi River westward to the Sabine uplift. From midbay to the downbay limit of the data the $Mg+Ca/HCO_3$ ratio ranges from 0.1 to 100 in the area extending from the Sabine uplift to the San Marcos arch and from 0.01 to 10 in the area between the San Marcos arch and the Rio Grande.

Magnesium plus Calcium to Sodium plus Potassium

The areal distribution of the milliequivalent ratio of magnesium plus calcium to sodium plus potassium ($Mg+Ca/Na+K$) in water from the middle Wilcox aquifer, based on the median $Mg+Ca/Na+K$ ratio in each 100-square-mile area, shows that the ratio ranges from less than 0.01 to 162 (table 1). However, most of the aquifer area has $Mg+Ca/Na+K$ ratios between 0.01 and 0.10 (fig. 18). The $Mg+Ca/Na+K$ ratio generally decreases from the outcrop area to the downbay limit of the data.

The $Mg+Ca/Na+K$ ratio ranges from 0.10 to 1 in the outcrop area extending from the Mississippi River eastward to southwestern Alabama and from 0.10 to 5 in the outcrop area extending from the Mississippi River westward to the Texas-Arkansas border. The $Mg+Ca/Na+K$ ratio ranges from 0.10 to 10 in the outcrop area extending from the Texas-Arkansas border southwestward to the San Marcos arch and from 1 to 5 in the area between the San Marcos arch and the Rio Grande.

From outcrop to midbay the $Mg+Ca/Na+K$ ratio ranges from 0.01 to 5 in the area extending from the Sabine uplift eastward to southwestern Alabama and from 0.01 to 1 in the area extending from the Sabine uplift southwestward to the San Marcos arch. From outcrop to midbay the $Mg+Ca/Na+K$ ratio ranges from 0.01 to 5 in the area between the San Marcos arch and the Rio Grande.

From midbay to the downbay limit of the data the $Mg+Ca/Na+K$ ratio ranges from 0.01 to 0.10 in the area extending from the Mississippi River eastward to southwestern Alabama and is about 0.01 in the area extending from the Mississippi River westward to the Sabine arch. From midbay to the downbay limit of the data the $Mg+Ca/Na+K$ ratio ranges from 0.01 to 0.10 in the area extending from the Sabine arch southwestward to the San Marcos arch and is about 0.01 in the area between the San Marcos arch and the Rio Grande.

Bicarbonate to Sulfate

The areal distribution of the milliequivalent ratio of bicarbonate to sulfate (HCO_3/HSO_4) in water from the middle Wilcox aquifer, based on the median HCO_3/HSO_4 ratio in each 100-square-mile area, shows that the ratio ranges from 0.03 to 9,520 (table 1). There appears to be no areal trend in the HCO_3/HSO_4 ratio across the aquifer area (fig. 19).

The HCO_3/HSO_4 ratio generally ranges from 1 to 50 in the outcrop area extending from the Mississippi River eastward to southwestern Alabama and from 5 to 100 in the outcrop area extending from the Mississippi River westward to the Texas-Arkansas border. The HCO_3/HSO_4 ratio generally ranges from 1 to 50 in the outcrop area extending from the Texas-Arkansas border to the San Marcos arch and from 1 to 10 between the San Marcos arch and the Rio Grande.

From outcrop to midbay the HCO_3/HSO_4 ratio generally ranges from 1 to 100 in the area extending from the Mississippi River eastward to southwestern Alabama and from 1 to 5,000 in the area extending from the Mississippi River westward to the Sabine uplift. From outcrop to midbay the HCO_3/HSO_4 ratio generally ranges from 1 to 100 in the area extending from the Sabine uplift southwestward to the San Marcos arch and from 1 to 10 between the San Marcos arch and the Rio Grande.

From midbay to the downbay limit of the data the HCO_3/HSO_4 ratio generally ranges from 1 to 100 in the area extending from the Mississippi River eastward to southwestern Alabama and from 1 to 1,000 in the area extending from the Mississippi River westward to the Sabine Uplift. From midbay to the downbay limit of the data the HCO_3/HSO_4 ratio generally ranges from 1 to 100 in the area extending from the Sabine arch southwestward to the San Marcos arch and from 5 to 20 in the area between the San Marcos arch and the Rio Grande.

Bicarbonate to Chloride

The areal distribution of the milliequivalent ratio of bicarbonate to chloride (HCO_3/Cl) in water from the middle Wilcox aquifer, based on the median HCO_3/Cl ratio in each 100-square-mile area, shows that the ratio ranges from less than 0.01 to 135 (table 1). From the Sabine uplift eastward to southwestern Alabama the HCO_3/Cl ratio generally decreases from the outcrop to the downbay limit of both data and aquifer in the area west of the Mississippi River (fig. 20). In the area east of the Mississippi River the ratio increases to a maximum between the outcrop and the Mississippi River except in southern Mississippi and Alabama where it generally decreases from outcrop to the downbay limit of the data. From the Sabine uplift southwestward to the Rio Grande the HCO_3/Cl ratio generally increases from outcrop to midbay and decreases from midbay to the downbay limit of the aquifer.

The HCO_3/Cl ratio generally ranges from 5 to 20 in the outcrop area extending from the Mississippi River eastward to southwestern Alabama and from 1 to 20 in the outcrop area extending from the Mississippi River southwestward to the San Marcos arch. The HCO_3/Cl ratio generally ranges from 1 to 5 in the outcrop area between the San Marcos arch and the Rio Grande.

From outcrop to midbay the HCO_3/Cl ratio ranges from 1 to 20 in the area extending from the Mississippi River eastward to southwestern Alabama and from 0.10 to 20 in the area extending from the Mississippi River westward to the Sabine uplift. From outcrop to midbay the HCO_3/Cl ratio generally ranges from 1 to 20 in the area extending from the Sabine uplift southwestward to the San Marcos arch and from 1 to 10 in the area between the San Marcos arch and the Rio Grande. From midbay to downbay limit of the data the HCO_3/Cl ratio ranges from 0.10 to 20 in the area extending from the Mississippi River eastward to southwestern Alabama and from 0.10 to 1 in the area extending from the Mississippi River southwestward to the Rio Grande.

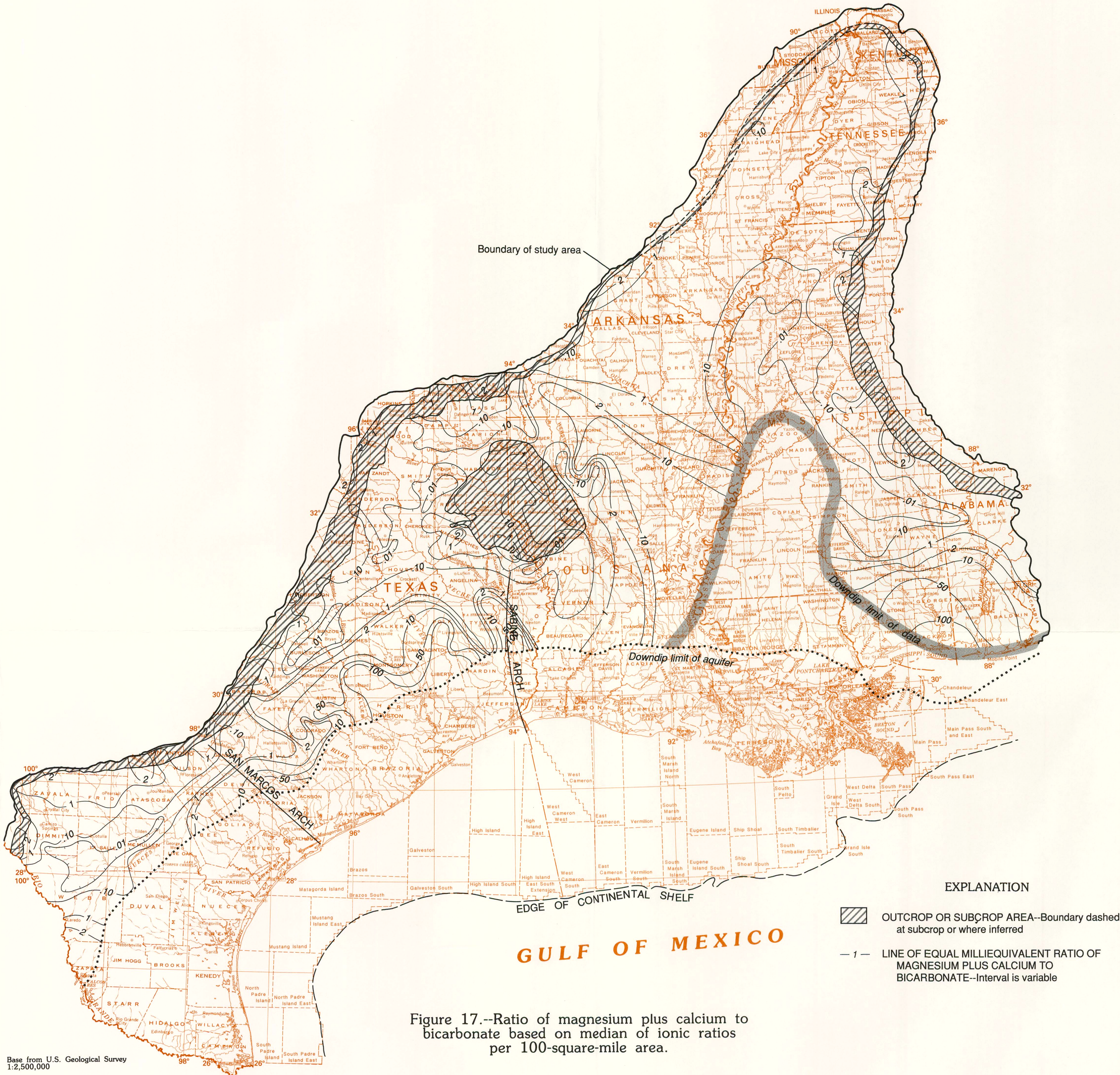


Figure 17.--Ratio of magnesium plus calcium to bicarbonate based on median of ionic ratios per 100-square-mile area.

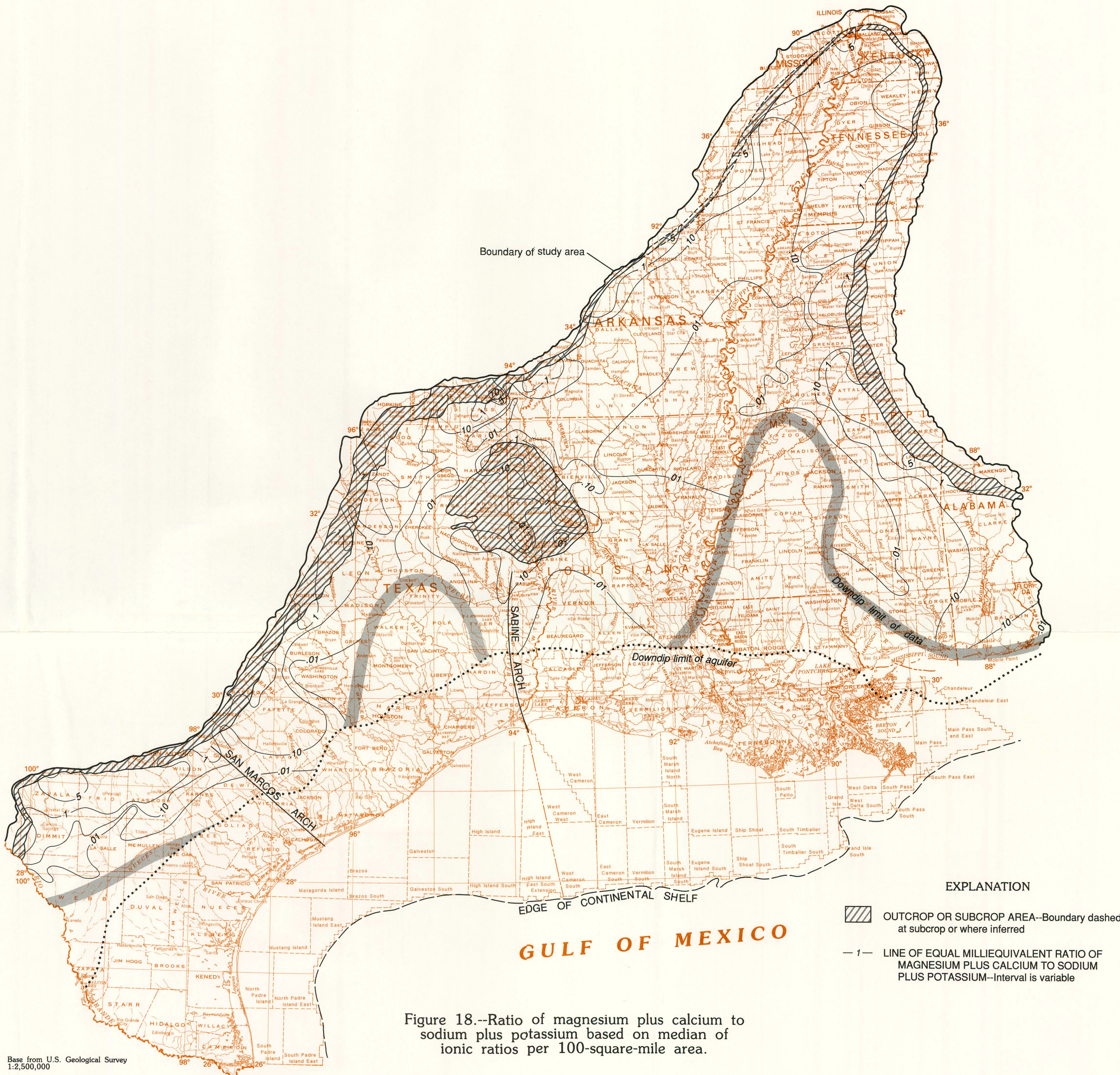


Figure 18.--Ratio of magnesium plus calcium to sodium plus potassium based on median of ionic ratios per 100-square-mile area.

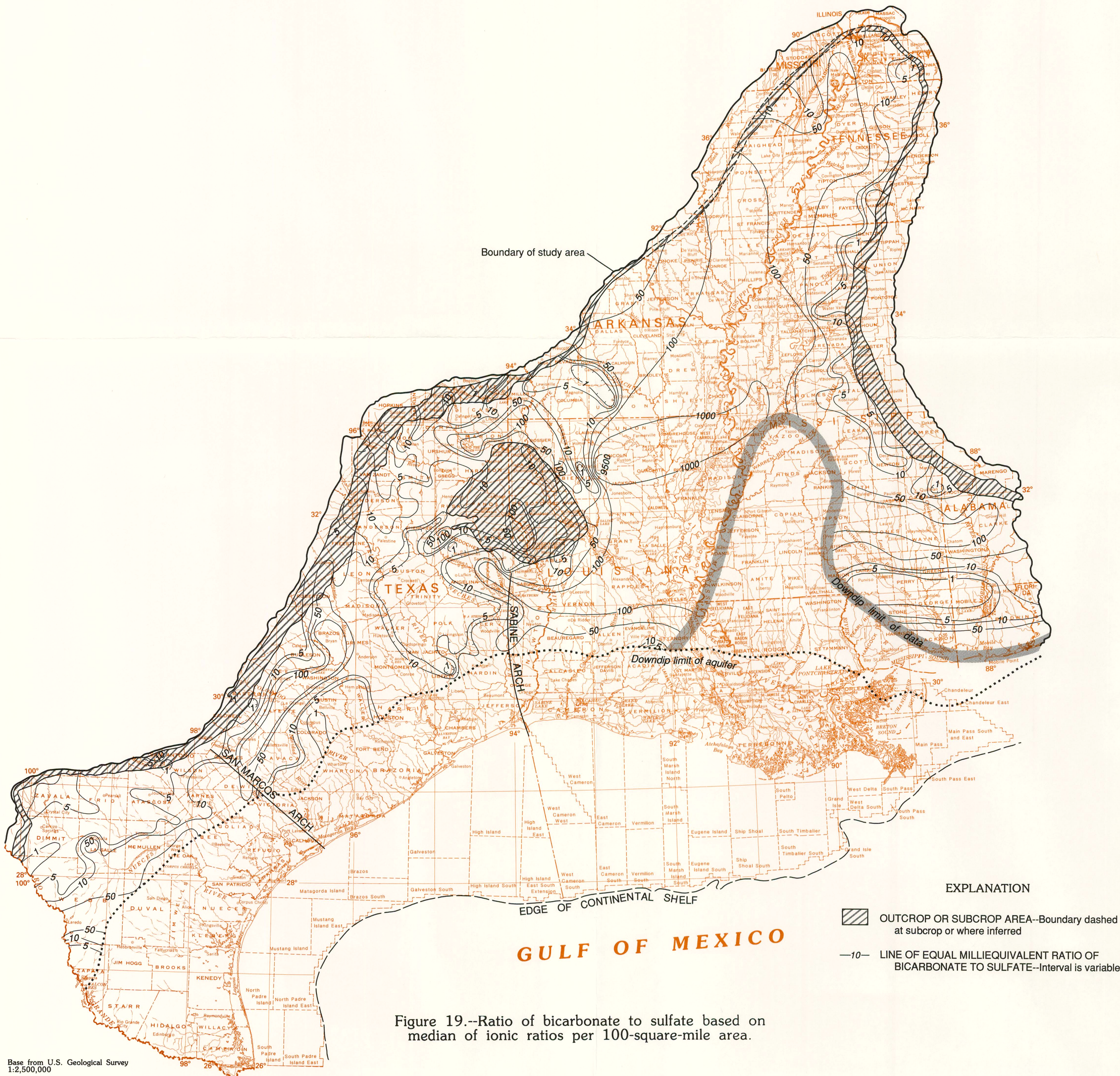


Figure 19.--Ratio of bicarbonate to sulfate based on median of ionic ratios per 100-square-mile area.

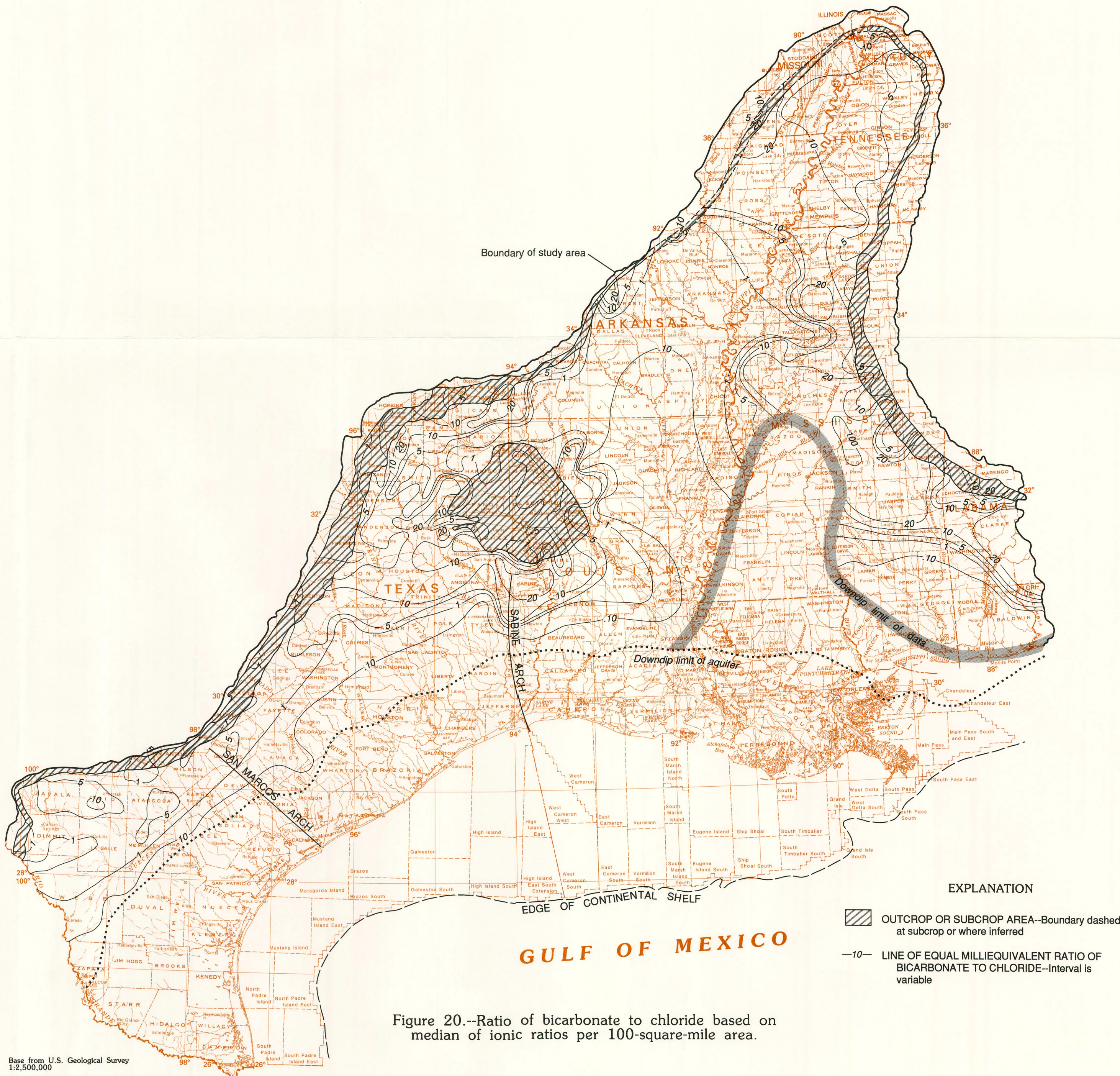
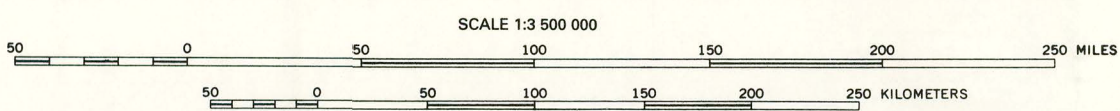


Figure 20.--Ratio of bicarbonate to chloride based on median of ionic ratios per 100-square-mile area.



PROPERTIES AND CHEMICAL CONSTITUENTS IN GROUND WATER FROM THE MIDDLE WILCOX AQUIFER,
GULF COAST REGIONAL AQUIFER SYSTEMS, SOUTH-CENTRAL UNITED STATES

by

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