ventional base map sources, each of which may show accurate
internal spacial distribution, but be inaccurately located
relative to the true coordinate geometry of the earth.

Problems ensue when attempts are made to display various
data from different sources. Wells, leases, seismic, etc., may
not be properly located with respect to each other or with
respect to the digital base used.

One solution is to store the digital base in conventional coor-
dinates and locate all other data as offsets to known points in
the digital base such as the closest section corner. This is an
adaptation of the so-called “Legal Description” that is used to
locate wells. Pseudo-Legal Descriptions can be computer-
calculated (where not already available). Boundary data can be
processed as a series of connected points that can accurately
overlie the digital base map data. Compatibility for all data
thus located is achieved regardless of the source or digital base
from which the data is acquired. Revisions of the digital base
do not require re-registration of other data.

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Terrestrial Influence and Bioturbation Effects on Composition
of Organic Matter in Middle Cretaceous Shale and
Limestone Sequence near Pueblo, Colorado

Soluble organic matter (chloroform), pyrolytic hydrocarbon
yield (Rock-Eval), and carbon isotope ratios of insoluble
organic matter were determined on core samples of the
Hartland Shale and overlying Bridgecreek Limestone of the
Greenhorn Formation. Trends in the organic geochemistry
 correlate with clay mineral content and sedimentary structures
of the sediment, suggesting that (1) terrestrial input and (2)
bioturbation are dominant influences on the composition of
preserved organic matter.

(1) The Hartland clay shales are organic matter-rich (organic
carbon contents 2.3 to 4.5%) but have lower ratios of pyrolytic
hydrocarbon yield- and extractable hydrocarbons-to-organic
carbon, and lower kerogen δ13C values (from -27 to -28
pp) than the Bridgecreek calcareous shales (organic carbon
contents 1.8 to 5.4% and δ13C values from -24.5 to -26.2
ppm). The laminated Hartland shales contain abundant ter-
restrial detritus (up to 70% quartz, illite, and mixed-layer clays).
The laminated to partly bioturbated Bridgecreek shales contain
minor terrestrial detritus (less than 20%), indicating a
reduction in terrestrial influence on the basin after deposition
of the Hartland clay shales.

(2) Within the Bridgecreek member, the types of organic
matter preserved in the laminated calcareous shales, partly
bioturbated calcareous shales and bioturbated limestones are
different, and are thought to result from increasing biotura-
tion and availability of oxygen in the bottom water. As biotur-
bation increases, the organic matter remains isotopically con-
stant, but decreases (from about 5 to less than 1%) and is
altered chemically as shown by decreasing ratios of pyrolytic
hydrocarbon yield- and extractable hydrocarbons-to-organic
carbon, and increasing ratios of pyrolytic carbon dioxide to
organic carbon.

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Micropaleontologic Analysis of Navarin Basin, Bering Sea,
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Navarin basin, a large structural basin filled in places with
more than 12,000 m of sediment, underlies the Bering Sea con-
tinental shelf about 100 km from the Koryak coast, U.S.S.R.
The shelf in this region is relatively flat with a pronounced
shelf-slope break at about 200 m. In contrast, the continental
slope is incised by three large canyons. Little is known about the sediment and microbiota in the
Navarin basin province because previous work in the Bering Sea has been concentrated in the eastern and southern areas.

More than 100 gravity cores and grab samples were collected
during the summer of 1980 from the basin, adjacent slope, and
nearby canyons in water depths ranging from about 80 to
3,300 m. Cores as long as 6 m contain predominantly elastic
mud and sand. This preliminary U.S. Geological Survey
sampling program is the first attempt in the Navarin province
in which the three microorganism groups—diatoms,
radiolarians, and foraminifers—are used to obtain
paleogeographic information and to establish age-datum planes.

Diatoms, the most abundant micro-organisms in the cores,
are useful for defining glacial events and sea level fluctuations,
and for establishing more depth of deposition. Radiolarians are
more abundant in the deeper shelf area, and are used to
delineate paleogeographical boundaries and biostratigraphic
events in the Navarin province. Calcareous foraminifers are
abundant in the cores from even the deepest stations, but
diversity is low. Shallow-water benthic foraminifers recovered
in deep water indicate downslope movement of sediment.

Study of these three micro-organism groups provides a more
complete picture of the benthic and planktonic communities
and thereby leads to a more accurate paleoecologic interpreta-
tion of Navarin basin.

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Melones µ: Clay Controlled, Inclined Oil-Water Contact
Reservoir, Orinoco Heavy Oil Belt

The Melones µ reservoir is the topmost petroleum bearing
sand of the Melones Field, which is located in the Eastern
Venezuela basin, within the Orinoco heavy oil belt.

This huge reservoir contains 1.5 billion bbl of 8.2 to 10.3°
API oil in situ. It is a shallow reservoir (1,900 ft or 579 m deep)
and has an average thickness of 80 ft (24 m). The uncon-
solidated sand, with a dip of approximately 1°, contains
variable amounts of dispered clay. The µ-sand is a
stratigraphic accumulation which has an updip closure con-
trolled by an increase in its clay content. The clastics of this
unit were deposited in an alluvial meander belt environment.

Even though the oil-water contact of this giant accumula-
tion is inclined, the reservoir is under hydrostatic conditions.
The inclination of the contact is controlled by the sands’ clay
content. It is postulated that during migration the oil and
water had similar densities resulting in the inability of the oil to
displace the water except in clay-free areas. The low dip of the
strata also did not aid the oil migration.

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Holocene and Ancient Hardgrounds: Petrographic Com-
parison

Subtle diastems or truncation surfaces in carbonate se-
quences can go unnoticed during core inspection when
mineralized coatings or encrusting fauna are absent. These