New Year Brings Administrative Change

As January 1984 rolled around, so did a new management structure at the Geophysical Institute. The change was set in motion by the retirement of Albert E. Belon, associate director for operations at the Institute (see back page).

Several faculty meetings and retreats were held to develop alternatives for a management structure. After reviewing the opinions and recommendations of the Institute’s faculty and Advisory Board, three research divisions, each with an assistant research director, were established by the director of the Institute, Dr. Juan G. Roederer. They are: Space Physics and Aeronomy, Atmospheric Sciences and Glaciology, and Solid Earth Sciences.

The new structure is considered a flexible management scheme which increases delegation of responsibilities, facilitates communication with faculty, students and staff, and provides more effective support services to research projects and graduate student dissertation work.

Appointed from senior faculty, Professor Daniel W. Swift has assumed the duties of assistant research director for Space Physics and Aeronomy; Professor Gunter E. Weller has taken the helm of Atmospheric Sciences and Glaciology; and Professor David B. Stone is managing the Solid Earth Sciences Division.

In addition, Professor Weller is the Institute’s deputy director and is also deputy director of the Division of Geosciences. While Dr. Weller serves full-time in his new duties, Professors Swift and Stone are serving half-time in their administrative positions and will continue their teaching and research.

Professor Weller joined the Geophysical Institute in 1968. His experience as a meteorologist and glaciologist includes research both in Antarctica and in the Arctic, and the management of large science projects for the National Science Foundation and the National Oceanic and Atmospheric Administration. Professor Swift joined the Institute in 1963 and is an internationally recognized space plasma physicist, theoretician and computer expert. Professor Stone has been at the Institute since 1966. A geophysicist, he discovered the terrane collage of Alaska (see Encyclopedia Geophysica on following pages) and conducts research on the ancient magnetic field of the earth and the application of this information to understanding the geologic history of Alaska. He was head of the geology/geophysics instructional program at the University of Alaska-Fairbanks from 1976 to 1981.
PACIFIC “RIM OF FIRE”

For the last 200 years, geologists have been aware that the Pacific basin is surrounded by a belt characterized by earthquakes and volcanoes, the so-called Pacific “Rim of Fire.” These earthquakes and volcanoes are associated with the movement of massive plates about 100 km (about 62 miles) thick that compose the floor of the Pacific basin. These plates are born at various linear spreading centers in the Pacific, where material from the mantle rises to the surface, creating new ocean floor which migrates away from the spreading center toward the margins of the basin. As new sea floor is created, an equal area must be consumed (unless the earth is expanding) and the Pacific rim of fire marks the oceanic trenches where the old portions of the slowly moving plates are being resorbed back into the earth.

PLATE TECTONICS

The earth’s surface is broken up into large pieces, the so-called “plates.” These sections of the earth’s solidified crust “float” on the hot, molten rock of the earth’s interior the way ice floes float on the ocean. The Pacific plate, which covers most of the entire Pacific Ocean area, is moving north and west, so it is continuously colliding with the North American plate. Just as the collision of ice floes builds pressure ridges, this collision in Alaska has built the Alaska and Chugach mountain ranges. The collision also releases energy in the form of earthquakes. The Pacific plate is being forced under Alaska in the process; where the down-bending plate gets hot enough to melt, at about fifty miles’ depth, some of the molten rock seeks the surface in the form of volcanic eruptions. Professor David Stone of the Geophysical Institute and others have found that Alaska is really made up of many different plates and platelets, some having drifted to Alaska from south of the equator over millions of years.


ALASKAN VOLCANOES

Alaska has more than 40 active volcanoes, all located along the boundary where the Pacific plate subducts (is forced under) Alaska. Some of the world’s most powerful eruptions occurring in recorded history have taken place in Alaska. Such an eruption, for example, took place on Mt. Katmai in 1912 and created the Valley of Ten Thousand Smokes. Ash and debris layers up to 600 feet thick were deposited in that area from the eruption. This event had major effects on the earth’s climate since the dust clouds attenuated the sun’s radiation reaching the ground. Such repeated occurrences are being studied by Professor Juergen Kienle and colleagues of the Geophysical Institute.

A schematic illustration of volcano formation by the subduction of the North Pacific tectonic plate beneath the southcentral coast of Alaska. (From N. Davis, Energy/Alaska, University of Alaska Press, 1984, p. 401.)
The ancient land mass Pangaea as it may have looked 200 million years ago (left). World geography as it may look some 50 million years from now if present day plate movements continue (below). (From S. Uyeda, p. 202-203.)

CONTINENTAL DRIFT
About 300 million years ago, all the land masses on the surface of the earth were joined into one supercontinent that geologists call Pangaea. Scientists still do not know why Pangaea broke up but they do know it did so, first into larger pieces, called Laurasia and Gondwanaland, then into the plates we see today. Scientists are uncertain as to why the plates continue to move, and it has only been recently accepted as a scientific fact that they do move. Less than 50 years ago the hypothesis that continents are not immutably fixed was widely ridiculed. Partly this change of opinion came about as new testing techniques became available. From the scientific evidence that we can now collect, mainly from the orientation of the magnetic field preserved in magnetic minerals in rock samples, the drift can now be pieced together quite successfully.

ALASKAN TERRANES
Plate tectonics explains some of the geology observed in Alaska but leaves other questions unanswered. For example, rocks of similar ages were often observed near one another but they were of types which could not reasonably have been originally formed close together.

The recognition that rocks from different geological environments can be seen close together, but usually separated by faults, led to the concept of tectonostratigraphic terranes. These are defined as areas that are fault (tectonically) bounded and have internally consistent sequences of rocks (stratigraphies), the latter indicating a coherent geologic history within a block. Because some of these terranes are so different from their neighbors, it is obvious that considerable relative motion has to have taken place between them.

Alaska has currently been subdivided into more than 50 of these terranes. Professor Stone of the Geophysical Institute has used paleomagnetic studies (the study of the earth’s magnetic force as recorded by rocks when they were formed) to show that southern Alaska was far to the south, near the equator, about 200 million years ago.
From an auroral observer/graduate student to professor of physics and associate director of the Geophysical Institute, Al Belon's 27 years of service might graph as a steady ascent.

His career is highlighted with accomplishments and awards. A physicist, professor and administrator, Belon received a B.S. in physics from the University of Alaska in 1952. In 1954 he received an M.A. in physics from the University of California at Los Angeles. In addition to his teaching and research duties at the Institute, Belon served as program director of the Solar-Terrestrial Research Program of the National Science Foundation from 1968 to 1970, for which he received the Meritorious Service Award in 1970. He also received the Exceptional Scientific Achievement Medal from the National Aeronautics and Space Administration in 1974. He served as acting program director of the NSF’s Aeronomy Program from 1968 to 1969; U.S. Coordinator for the 1970 Solar Eclipse Program, NSF, from 1968 to 1970; and coordinator of the Remote Sensing Program at the Geophysical Institute from 1971 to his retirement. He was appointed associate director of the Institute as well as the Division of Geosciences in 1976 and worked in that capacity until his retirement in 1983. His scientific interests include the aurora and airglow, the magnetosphere, solar eclipses, and remote sensing of Alaska and the Arctic. He has authored or coauthored some 70 papers or reports.

Professor Belon has worked closely with all the directors of the Geophysical Institute since its inception — Stuart Seaton, William Wilson (acting), Chris Elvey, Keith Mather and Juan Roederer. Keith Mather puts it this way: "it is probably fair to say that no one else alive today has the total perspective on the Institute...and were he to choose to write personal memoirs, who knows what might be revealed! My respect for Al is immense. He is sensible, wise, restrained, and possessed of both a Gallic humor and a continental (and international) sagacity of a kind that the University needs these days, but lacks. His retirement presages a loss to us all."

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