Precollege Earth Science Education in Brazil

Brazil is a country with very little earth science education, at any level, notwithstanding a surface area of 8.5 million s km, a significant mineral production (US$7.3 billion), and abundant natural resources. This scientific area does not have a subject dedicated to it, at any level of precollege education in Brazil. Some items are covered as part of the subject of science, and a few others in geography. The causes for this deporable condition are many. The precollege educational system in Brazil is divided into preschool (for students aged under 7), first level (7 to 14) and second level (15 to 17). Teachers working up to the fourth year of the first level graduate in technical second-level schools and have no scientific training. Science teachers for the last four years of the first level can graduate in junior college courses (3 years of study) or, like the science teachers for the second level, in college science courses, majoring in biology, chemistry, or physics. All these courses have very few classes of earth science related subjects, if any. Geography teachers graduate in college level courses. Since the University Reform (1968), geography courses have progressively fewer physical geography subjects, favoring human geography. Since the Law of Directives and Bases of Brazilian Education (1961), schools and teachers have freedom to organize curricula. Teachers and educational planners drop earth science topics from science and geography curricula, favoring others best suited to their training. College admission examinations are another important factor in shaping precollege curricula in Brazil, as second-level students and teachers are inclined to drop all subjects not included in the examinations. Since 1968 very few earth science topics enter these examinations. As a logical result, earth science is completely absent in second-level curricula. Not even the recent interest in the environment could reverse the process. The environment is treated almost always from a biological point of view. Another trend in the curriculum is its exceedingly urban character. Textbooks and exercises, in all subjects, have an urban vision, considering nature an alien object, external to the normal, urban, life. Another is the separation between "pure" science, taught in normal schools, and applied science, taught in professional schools, a negligible portion of the school system. This trend is aggravated by the lack of means, physical as well as monetary, for all levels of the school system. The result is an almost totally academic teaching, with very few contacts with practical subjects. The case is even worse for professions dealing with nature and as agriculture and geology. The situation is absurd to the point that it would be much more probable to find a commercial technical second-level course in little rural town than an agricultural on. Hardly anyone knows what geologists and geographers are and what they do. This ignorance plus low wages combine in making it difficult to recruit students for these courses.

Some attempts were made in Brazil to prompt more and better earth science education. Since 1968 two versions of the Earth Science Curriculum Project (ESCP) were translated and adapted by a group led by Nabor R. Ruegg and Ivan A. Amaral. Teacher's training programs were organized that, although devised for elementary and secondary level teachers, had as their most durable product college teachers. The lack of an independent subject for earth science in precollege curricula hindered the complete application of new techniques at this level. At Geoscience Institute, Sao Paulo University, new techniques, partly based in ESCP material, were applied to introductory geology courses, with good results, from 1973 to 1978. The same group transferred to Campinas University, doing research and teaching, at graduate and undergraduate levels relating earth science education with broader fields of education and scientific methodology. Professors of Campinas University contributed to the new science curriculum for first-level courses in the State of São Paulo (1988) that associates methodological and political concerns with a well-balanced selection of topics, including earth science. The same group executes a training program for earth science college teachers. Geoscience Institute of São Paulo University has a Precollege Geology Education Group working in teacher's training, offering short courses aimed at introducing precollege teachers to geological knowledge needed for implementation of the new science curriculum; organization of museum and science fair geological exhibitions, with displays of geological specimens and practical activities; and diffusion of earth science and the geological profession to precollege students and the general public.

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Mobilization of Metals by Organic Complexation During Clastic Diagenesis

Carboxylic acid anions have been experimentally demonstrated to complex aqueous transition, base and alkali metals, as well as some non-metals, in solutions approximately sedimentary formation waters. Organic complexation has been called upon to explain the genesis of base-metal and Mississippi Valley-type ore deposits, as well as transportation of Al and Si from the site of aluminosilicate silicate dissolution during clastic diagenesis.

The complexation and transportation of Al and Si away from the site of aluminosilicate dissolution in clastic sequences has been amply demonstrated petrographically. However, to date, analyses of formation waters from active diagenetic environments do not show anomalously high Al and Si values. Certainly large amounts of Al and Si must be mobilized to account for the large amount of dissolved aluminosilicate minerals observed in the subsurface. Dissolution experiments designed to replicate conditions in active diagenetic systems using whole core material, natural formation waters and crude oil have produced dissolution textures in mineral grains similar to that seen in the natural system. However, post experimental analyses of the formation water is contact with the crude oil phase show little increase in dissolved Al or Si, whereas formation waters from experiments without a crude oil phase are orders of magnitude oversaturated with Al with respect to the inorganic solubility of kaolinite. Analyses of crude oils from these experiments show concentrations of Al in the oil increased over 100 ppm. XRD analysis of the $>0.20\,\mu$ fraction filtered out of the oil after the experiments document the presence of aluminosilicate gels. From these observations it is suggested that the organometalic complexes formed during coupled organic/inorganic diagenesis are hydrophobic and will partition into an organic (petroleum) phase, where possible.

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Tectonic Structures of The Late Proterozoic Dom Feliciano Belt in Uruguay and Southern Brazil

The Dom Feliciano Belt (Upper Proterozoic of Southern Brazil and Uruguay) has been affected by four regionally penetrative phases. The first three are homoaxial with north-northeast–south-southwest to northeast-southwest trends and the last has a northwest-southwest trend. These phases are divided into two early (DP1 and DP2) and two late phases (DT1 and DT2).

The early phases are characterized by divergent nappes, evolving from thrust nappes to fold nappes structured by big sheath folds. These are also responsible for the regional xistosity (mylonitization in granitic nappes) and mineral stretching lineation indicative of the tectonic movement. During these phases, the following nappes were formed: (1) granitic nappes, (2) basement nappes, (3) carbonatic platform nappes, and (4) flysch nappes.

The late phases refolded the early xistosity, and the nappes were restructured to a "dome and basin" model (FT1 × FT2). These are associated with late and post tectonic granitic (S and A-type) intrusions, and the infilling of the fore deep basin between the Dom Feliciano Belt and the Rio de La Plata Craton during the deposition of marine terrigenous flysch and continental molasse deposits.

In the context of a plate tectonic model, the early phases are related to a continental collision, while the late phases are related to post collisional events.

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Large-Scale Explosive Volcanism in Japan and Adjacent Areas During Past 130,000 Years: Frequency, Nature, and Magnitude

This paper demonstrates that characterization of tephra layers and determining their ages can provide a valuable guide to the size and nature of past explosive events and how frequently they have happened.

In Japan and adjacent areas, more than 300 tephra layers have been documented and a catalog of Late Quaternary marker-tephra is used in volcanological studies as well as chronological ones. Identification of tephra is best achieved if, in addition to the stratigraphical position and radiometric age, several physical and chemical parameters can be used. An extensive research of tephra has been carried out not only on land but also in deep-sea sediments around Japan, disclosing a number of volcanic eruptions of extraordinarily great magnitude.

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