Science & Math CESE Education

The BEACON

News from
The Coalition for Excellence in Science and Math Education

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In this issue: The CESE annual meeting – Teaching teachers science content – Teaching math concepts – Moy speaks on science and religion – What are the creationists up to now? – Tectonics and sprinting plates: surely you jest? – News from the State School Board – Nonprofit, tax-exempt status – Science fair awards, and more. Try www.CESAME-NM.org!

ANNUAL MEETING NOTICE

The 3rd annual meeting of CESE will be held on Saturday, June 26, 1999 at the Unitarian Church, 3701 Carlisle Blvd., NE (same place as the first two meetings). This is across the street from the KOAT TV station on the southwest corner of Carlisle and Comanche. The meeting will start at 2:30. It will last approximately 2 to 3 hours, with snacks being served afterwards. Activities through the year will be reviewed and officers will be elected for 1999/2000. If you are interested in becoming a board member, please let one of the current board members know. The current board, as per the bylaws, must propose a slate. Please plan to attend. Your participation is needed. Please RSVP Nancy Shelton at 296-1467 (Albuquerque). Please leave your name and number of attendees.

DR. TIMOTHY MOY SPEAKS AT NMSU/ALAMOGORDO

On February 26 CESE member Dr. Timothy Moy presented a talk titled "Science and Creationism: Seeking Uncommon Ground" at the Alamogordo campus of New Mexico State University. Dr. Moy is a professor of history specializing in the history of science and technology at the University of New Mexico. The presentation was part of a series of lectures being sponsored by the College Teaching Committee at NMSU-Alamogordo.

CESE's Don Neidig, a scientist at the National Solar Observatory at Sunspot, NM, explained that part of the motivation in asking Dr. Moy to speak was in response to a recent lecture given at NMSU-Alamogordo by a flood geologist, though that particular talk was sponsored by a local religious organization and not by the NMSU campus. Moy's talk emphasized the distinctions between religion and science suggesting that the disciplines seek their "uncommon ground" mentioned in the title rather than inappropriately extending their reach into one another's appropriate domain. To illustrate his idea, Moy explained that science provides one lens by which to understand the world, specifically to explain natural phenomena through natural forces without appeal to supernatural intervention. Moy emphasized that, though the scientific process is atheistic in that it does not appeal to or search for supernatural explanations of natural processes, it is not in conflict with theistic beliefs or disciplines, which are outside the scope of scientific inquiry. In an attempt to annoy all parties, Moy chided scientists for lazily wandering into the realms of religion and philosophy without acknowledging that a boundary between disciplines had been crossed while simultaneously pleading with religious believers to cease championing hare-brained "technical" arguments in a fruitless effort to convince people that religious texts are actually science texts.

Neidig described the talk as, "superb, fair and overall a first-class presentation." He went on to say that the talk was well received by the community. Moy described the question and answer session after the talk as extremely cordial though several creationists from the Alamogordo community were in attendance.

SECOND GRADERS' THINKING ABOUT FRACTIONS

By Cindy Chapman

For many people, mathematics is a secret club which only a few, by birth, are entitled to join. The rest of us, they think, forever must puzzle as to what mathematics really means. In our quest to improve teaching and learning, many teachers are working hard to dispel this sad myth. In my second grade class, this means that I work to help my students understand mathematics and am not satisfied with their only memorizing facts and procedures. Because mathematics is highly intuitive in nature, it is not difficult for young children to build understandings of what may seem to be more advanced mathematics. This foundation of understanding greatly helps to prepare students for the math work they'll do later.

We have been working on a fraction unit in my class for the past few weeks. After demonstrating the relationship between third-cups and whole cups, I began pouring 1/3 of a cup of beans into a jar each day to see how many cups of beans would fill the jar. For many days we kept track of the amount of beans in the jar each day by writing equations to match what had been put into the jar and what amount was now there. The second day I asked the children to tell me how many cups of beans were in the jar. The class quickly responded that we didn't have a cup yet because we'd only put in two third-cups and we would need three third-cups to make a whole cup.

I asked Maggie to come to the board and write an equation that would show what we had done with the beans. Connecting the abstract (an equation) to the concrete (our work with the beans) enhances a child's ability to communicate mathematical thinking more accurately. Maggie quickly wrote 1/3 + 1/3 = and then stopped. She knew she wanted to

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The Coalition for Excellence in Science and Math Education (CESE) is composed of interested citizens throughout New Mexico and the nation, including scientists, engineers, educators, university faculty, members of the clergy, and parents. CESE is nonpartisan and non-sectarian, and welcomes members of all religions and political philosophies. This coalition works to improve science education and science literacy for all citizens. The organization also provides support to teachers, students, the public, and state officials who deal with education issues. We want to ensure that the beacon of the Enlightenment is not extinguished in 21st century America.

Membership Information: please contact any of the above officers. The only requirement for CESE membership is the acceptance of our mission, above, as a statement of the organization's purpose. The CESE annual dues are currently $25 for an individual, $35 for a family membership, and $10 for students. This is to help defray costs of postage, insignia, envelopes, etc. No members will be asked to do anything more than they wish to do on behalf of the common cause. Please make checks payable to CESE and mail to 11617 Snowheights NE, Albuquerque, NM 87112.

represent two-thirds, but wasn't sure how to do so. How we write numbers is a social convention (something everyone "agrees" to) and social conventions must be taught, but I was able to help Maggie use the fraction she'd already learned how to write (1/3) figure out how to write 2/3. I asked her how she knew how many thirds were in each of the fractions she'd written and she quickly saw the connection between the numerator and the amount of parts. She took a deep breath and wrote 1/3 + 1/3 = 2/3.

Everyone agreed this made sense and not one student in our class suggested that Maggie write 2/6. When working in context, mathematical concepts are much clearer. It made just as much sense to my students that 1/3 plus 1/3 would be two thirds as it does that 1 apple plus 1 apple equals 2 apples.

A subsequent problem required students to figure out how to write 5/3 as whole and third cups. I started a T-table on the board for the class to use, perhaps to find a pattern that might help answer the question. Through our previous daily work we had already figured out all the information on the T-table except for the missing Whole Cups number.

Third-Cups	Whole Cups
1/3	1/3
2/3	2/3
3/3	1
4/3	1 1/3
5/3	?

Teo suggested that we should write 1 1/4 for the amount of whole cups that corresponds to 5/3. I didn't tell Teo that he was wrong. In our class mistakes are called "opportunities to learn." We miss rich experiences for thinking if we don't allow children to make mistakes. Annie soon waved her hand in the air.

"Well, you see, " she said, " it can't be 1 and 1/4 because thirds will always be bigger than fourths."

I was delighted with her answer, but surprised since we hadn't talked about anything other than thirds and halves. I asked her how she knew that thirds are always larger than fourths.

"Because if you take something and cut it into three pieces and you take the same thing and cut it into four pieces, each of the three pieces is going to be bigger than each of the four pieces."

Annie had made an important connection between models of fractions. We'd been working on a volume model with the beans, but she described the area model such as in cutting pizza or candy bars. She also was able to move to a new way of thinking about numbers – away from quantity (3 things are fewer than 4 things) and into the denominator, a "namer" of a part. (Something divided into 3 pieces has bigger pieces than the same thing divided into 4 pieces – 3 as a denominator is bigger than 4 as a denominator).

Later I posed a problem based on a true story which required my students to think of fractions in the context of yet another model – a set of discrete members. We attended a play in which 7 of our 22 students performed. I asked if at least half of our class had been in the play. "No," Steve replied right away. "It's only 7 and you have to have 11 to have half." I asked Steve how he knew that 11 was half of 22.

"Because 11 + 11 is 22." I then asked him how knowing that 11 + 11 makes 22 means that 11 is half of 22. Steve was stuck. Many students in my class can tell me what is half of a given even number, but explain-

ing why that's so is more difficult. Steve did tell me that 7 is half of 14 and 14 is less than 22, so 7 students couldn't be half of our class. (Steve was showing that he knew that any number can only be half of one other number—a good bit of number sense!)

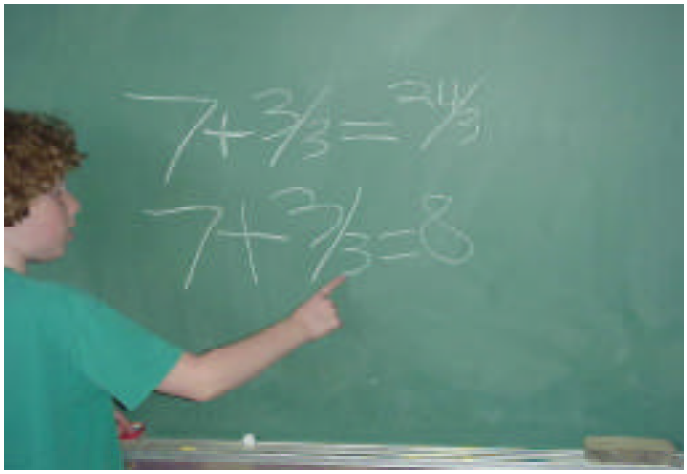
It wasn't until we'd wrestled with this problem for a day or two more that Pete came up with an answer that showed more understanding of half. "The reason I know that 11 is half of 22 since 11 + 11 is 22 is that halves have to have the same amount of stuff in them. 11 is the same as 11, and 11 + 11 makes 22. 11 is half of 22." I was pleased to hear Pete's own words echoing what I'd been saying throughout the several weeks we'd worked on fractions—fraction parts must be the same size. Teachers and other adults sometimes have a hard time understanding that just because we tell children something doesn't mean they learn it! It took us weeks of experiences, talking, and thinking for Pete to finally express for himself (and the rest of the class) an important truth about half. (I was also pleased to know that Pete won't grow up to be one of those adults you sometimes hear who say, "Here, you take the bigger half.")

Cindy Chapman is an award winning teacher at Inez elementary school in Albuquerque. In 1995 she won the Presidential Award for Excellence in Mathematics Teaching, elementary level.

One more exciting insight came with our play problem. Sarah told the class that she thought the 7 kids in the play made up 1/3 of our class. She showed us how she counted by sevens and got to 21. Even though we have 22 kids in our class, Carrie was absent that day. Sarah said, "I said: 7, 14, 21. We had 21 kids in our class that day and we had three groups of 7, so I think 7 is 1/3 of 21 and that means 7 is 1/3 of our class."

Sarah had made many important connections. She had used skip counting, number relationships, multiples, groupings, and fractions to solve the problem. Because we were working with a context, she was able to use her strong intuitive knowledge and her prior understandings to reach a reasonable solution.

Later we discussed how 7 is very close to but not exactly 1/3 of the entire amount of our class – 22.



"But we can't divide people up into little parts, " contributed Tara, "so we probably won't be able to get closer than 7 to what is 1/3 of our class."

You can see the power in my students' thinking. When we work with understanding, mathematics isn't just for the few. Mathematics is power for everyone!

WHAT'S HAPPENING AROUND THE NATION REGARDING CREATIONISTS AND SCHOOLS?

The impetus behind the founding of CESE was the state Board of Education's mangling of the science standards, and in particular, its (mis)treatment of evolution. Most of us are still quite interested in that topic. Some of the many ongoing creationist thrusts around the nation are summarized below. This information is a few months old, but is still topical and should remind us that the battle is still going on. Not just here, but in many places. This is a battle that might not have to be fought if the nation had a good, healthy dose of science and math education for breakfast. (Some of this will give you a feeling of *deja vu* all over again.)

(Reprinted from the "Reports of the National Center for Science Education (RNCSE), Volume 18, Number 6, Nov/Dec 1998, with permission)

UPDATES

Georgia: Two anti-evolution bills have been introduced in the state's house of representatives. One bill, HB 117, is nearly identical to another that was introduced in Ohio in 1996. The bill calls for teaching "evidence not supporting evolution" whenever evolution is taught. The model bill on which this was based was written by John Hansen, founder of Wisconsin-based Operation TEACH. Hansen has described his plan to have legislators in every state introduce his bill.

Idaho: On November 13, 1998, The Idaho School Boards Association rejected a resolution stating that, "Mankind appearing on the earth, in his [sic] present form, shall not be taught …as a result of evolution …as fact …[but] may be presented as theory" (RNCSE 1998; 18[4]:6-7). The Idaho Statesman reported on November 14 [1998] that "attempts by creationists to influence curriculum are having a chilling effect on how some Idaho science instructors explain the origins of life" (p1A). The article quotes one teacher as commenting that she omits mention of human evolution in some classes, but does describe evolution of other organisms.

Kansas: In early February 1999, the State Board of Education held several meetings for public comment on draft science content standards. NCSE members and friends report that early meetings, which were not well-publicised, were dominated by opponents of evolution. [CESE members: please contact Board Member Mark Boslough for additional updates to this continuing saga.]

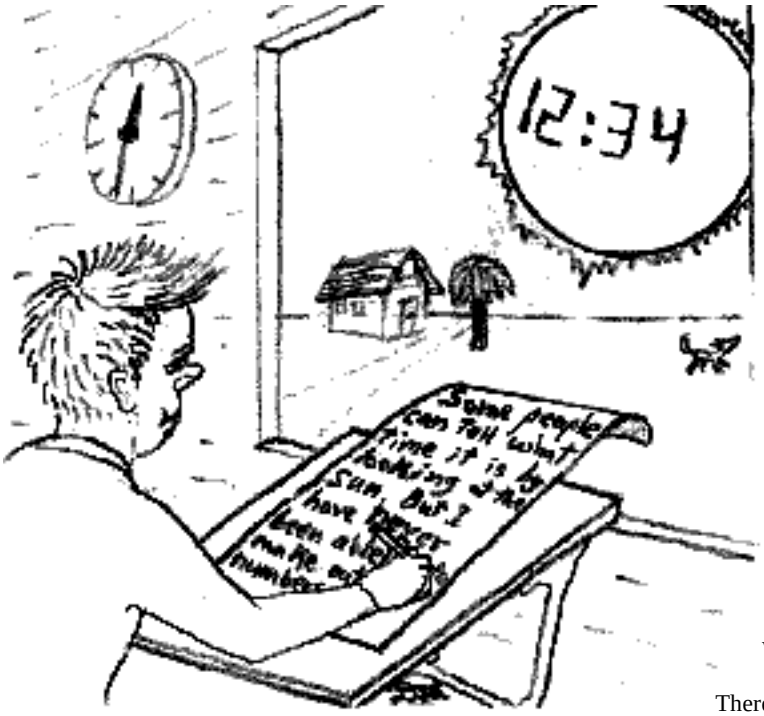
Kentucky: Representatives of the young-earth creationist organization Answers in Genesis express optimism that there will be an out-of-court settlement of a lawsuit against Boone County, which has denied a zoning variance for their projected "creation science" museum. Meanwhile, the museum has purchased exhibits such as a walk-through model of a cell.

Michigan, Melvindale: On Monday, February 8 [1999], the board of this Wayne County area school district voted to place in public school libraries 19 books described as offering "scientific criticisms" of evolution. This vote followed another one which voted not to use these books in classrooms. At the request of the school district personnel, the books had been evaluated by NCSE. Although an earlier board resolution had specified that no religious books, including religion "in disguise" could be adopted, NCSE found that many of the books are explicitly religious (see reviews at <http://www.natcenscied.org/mianal.htm>). Others are out of print, out of date, or too technical for middle school students. NCSE members and other opponents attended the board meeting and still hope to alter its decision in the future. A spokesman for the state ACLU has said the organization might bring suit.

New Jersey, Metuchen: NCSE member Al Barron has announced his

candidacy for the Board of Education. Barron has been actively involved in the introduction of new technology into district classrooms. He decided to increase his participation in the schools partly because he worried about "scientific creationism" sentiments expressed by incumbent members. Barron told NCSE, "I plan to visit every house in the district during my campaign."

[The last item in the article is not topical. The RNCSE gave thanks to Hal Banks, David Caplan, John C. English, Karl Fezer, Barbara Forrest, Keith B. Miller, Wes McCoy, Arthur Newburger, Dan Phelps, and Charles Reich, Jr.]



THE TECTONIC FOLLY OF SPRINTING PLATES

By Steve Getty

A theory of drifting continents was a radical idea, but most pieces of the puzzle fit — literally. It was about 1912 when Alfred Wegener, a German scientist, suggested that the continents slowly drift over the Earth's surface, sometimes converging, and at other times, slowly move apart. In addition to the impressive geometric fit between adjacent shorelines of South America and Africa, other compelling evidence includes the striking similarities in shared parts of the animal and plant fossil record, the continuity of mountain chains across the Atlantic Ocean, and the record of synchronous glacial sheets.

After about 50 years geologists awakened again to the theory proposed by Wegener. Only then did the scientific community discover many additional, striking lines of evidence for the slow and steady movement of continents over the globe, and how such movements created vast ocean basins in the wake of the drifting continents. The theory of plate tectonics is now a foundation of education in the earth sciences, and a key concept for students to more comprehensively understand many elements of the life sciences (e.g., development of ecosystems, niches, climate patterns, soils, etc.).

However, some folks have very different, and completely unscientific notions regarding plate tectonic movements. The problem arises when they want their beliefs taught as science in science classrooms. Such attempts have occurred at both the local and state levels. Fortunately, CESE members and other concerned citizens have been able to refocus attention on real science content. CESE recognizes that good science has to be the foundation for good science education.

The Problem for Science Education

The problem lies in the mistaken belief that plates can move rapidly, or "sprint" over the surface of the Earth. Advocates for sprinting plates are typically young-earth creationists, those who believe that the Earth and Solar System were created about 6,000 years ago. Because the evidence for plate tectonic movement in general is so overwhelming, they accept this premise. However, the young-earthers insist upon forcing an entire history of plate tectonics and the geologic record into a time framework of no more than 10,000 years.

The young-earth notion of plate tectonics harkens to a time when all continents were originally joined together in the super-continent – Pangaea. They argue that the continents then rifted apart and "sprinted" thousands of kilometers over the surface of the Earth to their current positions, progressively slowing down to current plate velocities of about several inches per year. In such a scenario, it is difficult to imagine that the planet would NOT have been consumed with fits and seizures of cataclysm of biblical proportions, and that in turn, the geologic record would be replete with evidence of catastrophic floods and volcanic eruptions. Indeed, such plate tectonic cataclysm is now viewed as a driving mechanism for a "Noah's flood," as oceans swashed and whirled across "sprinting" plates.

There are two problems with the scenario above – not a shred of geological evidence that this has ever happened, and the physics makes absolutely no sense. Many writers, educators, and scientists have eloquently described the geologic record and evidence for slowly drifting tectonic plates. While that record does preserve abundant evidence for flooding and volcanism, these events are often widely separated in time, and they are accompanied by long periods of geologic quiescence. This is particularly true within ocean basins, where sedimentation is slow and steady for millions and millions of years.

But I'd like to outline below just one, and perhaps a new argument against the faulty notion of sprinting plates. To make their ideas work, not only would young-earth creationists have to completely alter the geologic record, but even worse, they would have to change the values of what we believe are well-defined, **measurable** physical constants, in particular the rate of movement of heat through solids. Young-earth creationists do not envision merely modifying or adjusting this physical constant; they need to completely redefine heat movement through solid rock (e.g., heat diffusion) by a factor of at least 10,000. This is akin to changing constants such as the speed of sound by a factor of 10,000 times greater than what we observe it to be. Showing how this works involves a little tectonics, and then a little physics.

Plate Tectonics – Some Basics

A fundamental distinction in plate tectonics lies between the rigid material covering the surface of the Earth, the lithosphere, and the hot, slowly flowing, gooey material residing beneath, the **asthenosphere** (Figure 1). Coherent blocks of **lithosphere** drifting across the asthenosphere

are then called **lithospheric plates**, or more commonly, **tectonic plates**. These typically comprise the floating continents, as well as the rigid portions of the sea floor that are attached to parts of the continent perimeters. As an example, continental North America is a major part of the North American tectonic plate. You can search the web on "plate tectonics" and you should be able to find sites with plate maps and other info (e.g., can you find the Nazca Plate?). A neat animated plate reconstruction is at <http://www.odsn.de/odsn/services/paleomap/paleomap.html>.

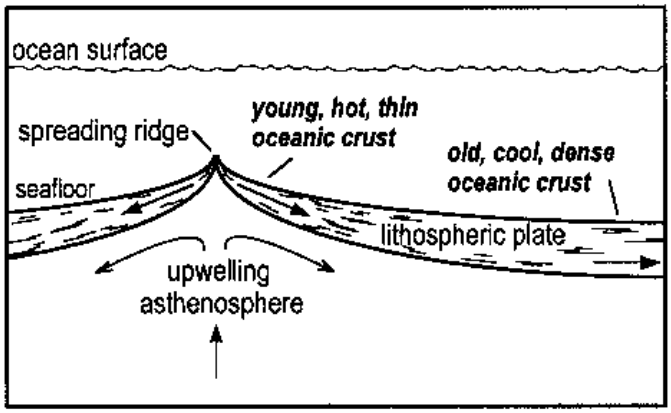


Figure 1. Schematic diagram of the production of oceanic crust at a mid-oceanic spreading ridge. The lithospheric plate is the rigid, mobile tectonic plate atop a ductile, flowing asthenosphere. As the plates move laterally from the spreading ridge in direction of arrows, upwelling magma within asthenosphere under the ridge continuously fills and seals the void that would have developed. After this magma hardens to begin forming ocean crust, the young ocean crust is initially hot, buoyant, and relatively thin. Further from the ridge, the ocean crust continues cooling, getting thicker and denser, and progressively sinking somewhat into the asthenosphere (e.g., like weighing down a rowboat with rocks). In the diagram, the oldest ocean crust is on the far right side of the figure.

Throughout Earth's history, lithospheric plates have collided, and the resulting mountain belts outline these plate collision zones. While examples of active plate collisions include the Alpine and Himalayan mountain chains, the record of ancient tectonic collisions lies within older mountain belts such as the Appalachians.

When clusters of lithospheric plates separate and rift apart, some distinctive features emerge as well. Between rifting continents, in particular, hot, ductile asthenosphere wells upward continuously to fill in the void produced. A significant portion of this material is melted rock, or magma, that literally fills-in and seals a progressively widening gap. This upwelling rock and magma that seals the gap, however, is also very dense, much more so than the relatively buoyant continents. As a, result, such zones where plates drift apart are topographic lows, eventually becoming submerged by the ocean in the process. Compared with the continents' **continental crust**, the portions of plates covered by ocean are typically composed of dense, **oceanic crust**.

One other important thing happens as continents spread apart, and asthenospheric material fills in behind them. That upwelling forms a linear, topographic ridge in map view, even though these **oceanic spreading ridges** are typically submerged beneath the ocean. As the plates separate, that newly formed ocean crust continues to cool and contract, thereby becoming even more and more dense the farther it is from the ridge where it was formed. Because oceanic crust is progressively older moving away from the ridge, it is cooler, denser, and progressively deeper under the ocean's surface (relative to the depth of the ridge). The Atlantic Ocean, for example, is deepest not in the middle, but laterally removed from the Mid-Atlantic Ridge running down its entire length. As shown in Figure 2, this profile of deeper ocean moving away from spreading ridges is repeated in other ocean basins as well.

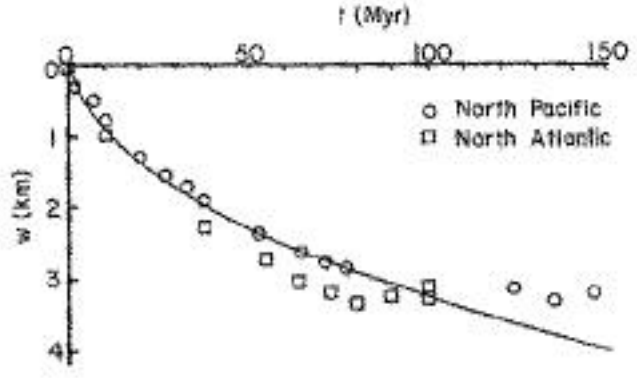


Figure 2. Actual measurements in squares and circles of depth to seafloor relative to the depth at the crest of the spreading ridge (parameter "w" in kilometers) compared with distance from the spreading ridge in the North Pacific and North Atlantic. Distance from ridge is shown as age of seafloor in millions of years at a given position. So, for oceanic crust formed at a spreading ridge 100 million years ago (i.e., 100 million years of moving away from the spreading ridge), subsequent cooling, contraction, and sinking of the plate leaves it about 3 kilometers deeper in the ocean than the crest of the ridge. The solid line is a theoretical prediction using accepted values of physical constants for thermal conduction from the ocean crust (reproduced from "Geodynamics" by Turcotte and Schubert)

Simple Physics and Heat Conduction

At the heart of cooling oceanic crust lie some simple physics, in that heat conduction defines precise relations between ocean depth above oceanic crust of a certain age (i.e., lateral distance from the spreading ridge), and cooling rates of newly formed oceanic crust from about 800° C. This ground-breaking work was eloquently described with the re-recognition of plate tectonics (e.g., Parsons and Schlater, 1977). While the original formulas and solutions embody concepts such as partial differential equations, error functions, similarity solutions, and semi-infinite half-spaces (and would be likely to result in motion sickness for most of us!), those complexities are largely due to geometry and boundary conditions. The physics of cooling remains simple, distilling to some relatively straightforward equations.

To illustrate, the distance, L, that a wave of heat moves through a rock in a given amount of time, t, is related to heat diffusion, k (mm^2/s), by the close approximation

$$L \approx \sqrt{\kappa t}.$$

Similarly, the progressive cooling and sinking of a part of the ocean's crust as it gets older, and moves farther and farther from a spreading ridge is also dictated by heat diffusion out of that initially hot crust. The relation for the cooling oceanic crust is

$$d \approx c\sqrt{\kappa_r t_r},$$

where d is the depth to the sea floor (relative to the ocean depth at the spreading ridge), c is a constant, k is the thermal diffusivity through rock solid oceanic crust (m^2/s), and t is the oceanic crust age (i.e., elapsed years since the oceanic crust was produced at the mid-oceanic ridge).

The subscript "r" refers to the recognized framework of modern earth sciences.

The next step is comparing the framework above with one for a 6,000 year-old Earth and "sprinting plates." Presuming that the physics of heat conduction is the same in both the young-Earth and regular scenarios (I don't think that young-Earthers would deny this!), one would also have to define the cooling and sinking of "sprinting" plates through an analogous relation,

$$d \approx c\sqrt{\kappa_{ye} t_{ye}},$$

where subscript "ye" indicates young-Earth. Because the d's and c's are the observable and equivalent for either time reference frame, one can equate (d/c) in each equation, combine the two, and cancel the square roots for the relation

$$\kappa_r t_r = \kappa_{ye} t_{ye}.$$

By rearranging this to the useful form,

$$\left(\frac{t_r}{t_{ye}}\right) = \left(\frac{\kappa_{ye}}{\kappa_{yr}}\right),$$

one shows that a "modification" in time scales for the history of plate tectonics on Earth must be accompanied by a proportional "adjustment" in the physical constant of thermal diffusion. There's no way getting around it.

We can illustrate easily the magnitude of that proportional "adjustment" in a young-Earth scheme. From the profile in Figure 2, there is a good correspondence for ocean depth from both Atlantic and Pacific Oceans for oceanic crust dated to at least 100 million years. In other words, ocean crust at that position formed at a spreading ridge 100 million years ago at roughly 800° C, then spread laterally, cooled, and sunk from the ridge to the current position. This is the same as t_r=100,000,000 years. Using the equation above and compared with a maximum allowable young-Earth age of, say, t_{ye}=10,000 years, we get the relation

$$\kappa_{ye} = 10{,}000 \cdot \kappa_r.$$

For the conservatively chosen parameters above, therefore, heat diffusion through solid rock in a young-Earth context must be at least a factor of 10,000 times greater than the value that we measure in laboratories today. Other reasonable parameters readily increase the factor of 10,000 to much greater values, but no reasonable combinations decrease that factor for heat diffusion and improve matters in favor of a young Earth and Solar System. The problem is that by using the observed physical constants of heat conduction in rock, there is no mechanism during several thousand years by which to remove heat from oceanic crust, thereby cooling it to presently observed temperatures. For a young Earth and without changing the physical constant, the rock just beneath all oceans would remain absurdly hot, much more so than boiling, virtually everywhere.

Remarks

Notions of a young Earth and Solar System are all too often touted as viable alternatives that, in all "fairness," deserve equal consideration, if not equal time. While an appeal to "fairness" may appear to have some allure, the point usually lost in the fray is that notions of a 6,000 year-old Earth and Solar System are based not upon science, but upon a particular interpretation of biblical writings. As such, CESE will not support teaching that interpretation, or other non-scientific interpretations, as science in science classrooms. The thoughts sketched out above hopefully show one approach demonstrating why the notion of a 6,000 year-old Earth, or sprinting tectonic plates for that matter, have no basis or substance in a modern understanding of science and math.

I don't expect many advocates of a young Earth and Solar System will lose sleep trying to reconcile their religion with modern science, or with the thermal diffusion notes above. They should not really have to, because religion and science are independent realms, one involving personal beliefs and faith, and the other relying upon observation and testing hypotheses. While we may use science and math to learn about our world, we can still, independently, use personal belief systems as a context to try to make sense of that world.

Dr. Steve Getty is CESE President, and a geochemist at the University of New Mexico. He has been involved in Earth Sciences education at a variety of levels, and was a committee member for writing the Performance Standards for K-12 science education in New Mexico.

APRIL MEETING OF THE STATE SCHOOL BOARD

Christine Trujillo, State School Board Member

The Board met at Eastern New Mexico University and considered the following issues:

The renewal of the only charter school that reapplied, Broad Horizons High School was approved and the board was treated to a tour of the school. The focus of that school is to address the needs of at risk and returning non traditional students. Its programs are based on literacy and vocational training. It succeeds because of the excellent leadership and management skills of principal Alta Elder and staff, and because it works so well with the public school system in Portales and ENMU. We also had a nice cafeteria lunch at Valencia Elementary School and had an opportunity to observe briefly in some classrooms.

Election of officers was held. Our new State Board of Education President is Flora Sanchez from Albuquerque. John Darden from Las Cruces is Vice President; Peggy Davis from Taos is Secretary. The Executive Committee was expanded to include two more at-large members. Marshall Berman was elected to serve on that committee as well as Lynn Medlin (out going president), Catherine Smith and Eleanor Ortiz.

The issue of quorum at meetings was addressed. With the exception of the Executive Committee, nonvoting members may sit in and observe in committees of interest. This allows members to receive more information about an issue in committee before it is brought to the full board for a vote.

The Strategic Planning Committee was made a standing committee. Again, Marshall Berman is a highly active member of that committee and has taken the lead in helping design that format.

The Educational Standards Commission appointments were approved. The Instructional Committee heard about the guidelines for the implementation of the Bilingual-Multicultural Programs in public schools. We had an update on the schools in need of improvement, and discussion was held about how best to deal with the release of the next list. There was strong debate on the recommendations for the new Social Studies standards. The committee is working with our recommendations and we will hear more in the future. Updates on the Standard Setting for N.M. Teacher Assessments were given and the new tests are ready.

Finally, very strong and emotional discussion was held regarding the issue of vouchers. Enough said about that!!!! The School Board's role

in the Special Session was also discussed. Honestly, the outcome of that discussion was in essence an opportunity for the newer board members to learn about the issues that drive us. It was a fascinating and draining experience to say the least. I commend my fellow board members for their commitment to children and their efforts in making public schools a better place to learn.

UPDATE TO 501(C)(3) STATUS FOR CESE

It has been almost a year since we formally started the search for tax exempt status with the IRS. We are now pretty close to a determination. First, we had to incorporate in the state as a nonprofit corporation. Then, we had to apply to the IRS for a determination. This involved filling out a stack of paperwork and including Articles of Incorporation and By-laws, purpose, finances, etc. Next, we responded to a round of questions involving expansion on intended activities, finances, procedural details about how we are going to run a scholarship program (our original input said we "might" set up a scholarship program in the future), and amended the Articles of Incorporation to account for new wording required by the IRS. The last round included responding to another set of clarifying questions, including providing expanded details on exactly what our activities are, when they happen, and who does what to whom (about four pages of 10 point type).

Actually, our lawyer, Mr. Wayne Chew, says that this is one of the more cooperative IRS agents he has dealt with. He *believes* (not promises) that the determination will be for a permanent 501(c)(3) status, rather than provisional. Basically, this is pretty good news. We should have the final determination no later than (about) August. If we are really lucky, we will know something by the annual meeting. Cross your fingers!

REMEMBER, WE ARE APPLYING FOR TAX EXEMPT STATUS

1. As an organization, we cannot endorse politicians or legislation.
2. As an organization we can provide information and analysis to the public on the effect of laws, rules, proposed legislation, etc., as long as it is apolitical.
3. We can provide testimony and research results to a public official (elected or otherwise), a legislative body, or to the executive branch **at their request**.
4. As individuals, we can participate in the political process. In fact, CESE urges you to do just that.
5. If you are interested in organized participation in the political process separate from CESE, you may contact Dr. Mark Boslough at (505)-857-0794.

SCIENCE FAIR AWARDS

CESE, along with the New Mexicans for Science and Reason (NMSR), presented 2 awards at the state science fair in April. Judging were Harry Murphy, Dave Thomas, John Geohegan, Jesse Johnson, Tom Manaster, and Kim Johnson. Awards of $250 savings bonds were given in both the Junior and Senior divisions. The awards were based on those projects which best demonstrated how the scientific method (observe, hypothesize, and test) can be applied to a real life situation in helping individuals make rational decisions. The Junior Division winner was Alida Hunt from Cliff NM. She demonstrated that the presence of cattle in a riparian environment actually decreased the nitrate levels in the water, contrary to her initial hypothesis. In the Senior division, Jeffrey Stroh of Los Alamos observed that specifications and reviews regarding automotive performance were often contradictory. He devised a way to measure performance parameters, using basic physics principles, and tested the method. Our congratulations to both of these students.

We would also like to thank Harry Murphy for the excellent job he did in organizing judges for the various science fairs. A number of CESE members participated, and we wish to thank them, also.

A motley crew of science fair judges. From the left: Dave Thomas, Tom Manaster, John Geohegan, and Jesse Johnson.

With many thanks to Harry Murphy who coordinated the CESE science fair judges. He is off to Maine for the summer. It must be a hard life when you retire. Con muchas gracias.

Coalition for Excellence in Science and Math Education
11617 Snowheights
Albuquerque, NM 87112-3157

Return Service Requested

The CESE annual meeting will be held on June 26, 1999 at the Unitarian Church on the corner of Comanche and Carlisle in Albuquerque. The meeting will begin at 2:30 PM. See inside for details.

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Now that we have your attention, we have been experiencing a condition in which more money has been leaving our bank account than has been coming in. And, there is every reason to believe that we will want to spend more money on such things as science fair awards, grants, more frequent communication with members, etc., in the future. First, we need you. Also first, we need for you to pay dues.

Dues are $25 per year for individuals, $35 for families, and $15 for students. The date through which you are paid-up appears on the mailing label. Please check your label, and if you are in arrears or have never paid dues (“no record”), please send a check payable to Nancy Shelton to 11617 Snowheights Blvd. NE, Albuquerque, NM 87112. (If you are having a money crisis in your life, please speak with one of the officers about special dispensation.)

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