

How and what should we teach novice geoscientists about geoethics?

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<slide 1> My thanks to Jesse White, Paula Sanchez, Impac Exploration Services, and everyone else who made my visit today possible.

<slide 2> My job, most days of the week, is to teach college students about the Earth, and to do geological research that involves undergraduate and graduate students. I was hired by Baylor as their structural geologist, primarily to help students who want to work in the oil business. I've been a member of the AAPG for almost four decades. I am a doctoral graduate of the Center for Tectonophysics at Texas A&M University, which was founded and run by the core of John Handin's structural geology research group at the Shell Development Company. My wife's little family oil company owns and operates wells in the East Texas Basin. So I consider myself a member of the petroleum geoscience tribe.

I interned as a field geologist with Phillips Uranium for a summer, so I consider myself at least a minor member of the energy-minerals tribe.

I was also an engineering geologist for a couple of years, working on landslides, debris flows, floods, subsidence due to groundwater withdrawal, fault investigations, development geology, and a lot of legal cases with Jim Slosson. I am a member of the environmental, engineering geology, and hydrogeology tribes as well.

I suppose my principal tribal affiliation these days is with the researchers and teachers of the academic tribe. But please don't hold that against me.

Some might say that my geologic experience is a mile wide and an inch deep, although I would contend that there are a few deeper spots here and there. Let's just say that I have *some* understanding about a broad spectrum of geoscience professions and activities – enough so that I am aware of the diversity of viewpoints within our community. We are all members of the geosciences community, although our tribal affiliations may differ.

Last summer, I mentioned to a friend that I was working on a talk about professional ethics that I was going to deliver to the WTGS in October. Without hesitation, my friend commented, “I would rather go to the dentist's office and have him drill and poke me than listen to a talk about professional ethics.” And that's a *friend* talking.

The daunting thing about this subject is that talking about it provides us with an excellent opportunity to expose ourselves as **<slide 3>** *hypocrites*, and perhaps even **<slide 4>** *sanctimonious hypocrites*. Perhaps even **<slide 5>** *useless, ignorant, sanctimonious hypocrites*. To say nothing of being **<slide 6>** *scolds*.

<slide 7> A hypocrite is someone who says one thing and does another. Of course, we all talk about telling the truth and abiding by the golden rule, but we don't always follow through. We aren't perfect, but we try to be good. Nobody wants to be called a hypocrite.

<slide 8> Our tendency to make snap judgments about others is probably part of our hardwired human defense mechanism, allowing us to quickly assess threats so that we can take appropriate steps to avoid or counteract the threat. There are a lot of potential problems with our tendency to make snap judgments. First among them is that we don't always have all of the relevant facts. For a full understanding of the truth of a situation, we need to recognize the many layers of truth that typically exist in any non-trivial situation.

For example, here is a true statement. "I once paid a man to slit my wife's throat." I admit that. This shocking admission might color the way you think of me, and might even cause you to find your phone and call the police. You are aware of the act, but you have no knowledge of the context or the motivation. So does your understanding of the truth change when I tell you that my wife's thyroid gland had stopped working properly, and that organ's failure endangered her life. And so I paid a surgeon to remove her thyroid gland, and today she is in good health.

<slide 9> When you are inclined to make a snap judgment about the words or actions of someone else, remember that you might lack critical knowledge of context, motivation, and the availability of alternative choices that might result in a dramatically different perception of the situation. You are also assuming that even without any of this additional information, *you* are a better judge of the situation than that other person.

Perhaps I could prescribe a strong dose of *humility* for you. Humility is an important virtue to cultivate. It helps guard against the unhelpful assumption that you know more than anyone else.

<slide 10> Nobody likes to be called a hypocrite, and nobody likes to be called unethical. In fact, calling someone unethical is one of the most direct ways of alienating them and earning their animosity, perhaps permanently. So here is the first important point for today: Avoid judging a *person* based on your perception of their *actions*. Disagree with and discuss the *action*,

but don't be quick to condemn the *person*. Because you know that none of us is perfect.

Avoid using language that does violence to personal and professional relationships. Yes, some people seem to consistently make what you consider to be bad choices. Go ahead and question those bad choices, but be very reluctant to condemn the *person*. Better to put your energy into the possibility of redemption and friendship by helping that person to see your perspective on their actions. If you can engage in open conversation that is respectful, you just might come to understand that there is more than one valid way to look at the situation. You might even change your mind. These situations are common, and present us with a fork in the road. One way affords the potential for growth and positive change, while attacking a person's character leads to the death of that relationship.

What I want to talk with you about has more to do with our shared aspirations for being more truthful, more positive, more constructive, and ultimately more useful in the real world that we actually occupy, rather than in some ideal world dreamt-up by an academic. My goal is to help you think about the ethical content of your actions and to encourage you to do what's right for you and for the community of interests around you. I am not here to be a scold.

<slide 11> Most people give no formal thought to ethics, and still manage to lead a good life. Under routine circumstances, they simply move from one task to the next, making small decisions along the way until the day is done. They fulfill their responsibilities. They feed the cat, go to work, and do what they are asked to do. Occasionally, circumstances cause a more consequential decision to be made, and they do what seems best at the time without much prior thought or subsequent examination. My sense is that many lives are led simply. We don't need to ask a philosopher what we should do next. The motivation is simply the need to feed, clothe, shelter, and care for yourself and help do the same for the ones you love, while humbly seeking happiness and fulfillment within that small local community.

At its simplest, ethics can be seen as the need to seek happiness, to avoid suffering, and to be mindful of the needs of others.

<slide 12> In his thinking about the nature of ethics, moral philosopher Anthony Weston observed that "ethics asks us to pay attention to something beyond ourselves." He suggests

<slide 13> "that to think or act ethically is to take care for the basic needs and legitimate expectations of others as well as our own." To him, a moral person might simply follow the customs and traditions of the community, but an *ethical* person is engaged in questioning and

challenging those moral values, "systemizing and criticizing and possibly even revising our moral values, as well as more consciously embracing them" [Weston, 2013].

<slide 14> The situation is different for professional geoscientists. To be called a *professional* means, obviously enough, that you are part of a profession, which is a very special type of job. Professions require specialized knowledge and extensive advanced academic training to develop the skills and requisite background knowledge to undertake certain tasks and responsibilities on behalf of society. Professions are generally recognized formally by the legal system and are often self-governed, at least in part, by professional societies. The most visible examples of professions include medicine, law, and engineering. An important and perhaps essential feature of professions is that their principle purpose is service to the public. It is our professional responsibility to use our expertise for the public good.

<slide 15> As geoscientists, we are part of a large professional community of *scientists* that has its own customs and standards. Science is the best way we know to discover reliable information about the physical world. Scientists learn about the world through reproducible observation – the collection of scientific facts – and the testable explanation of the relationships of those facts to one another. Ethics is central to science, because ***only truth has meaning***. Unlike the absolute truths of believers, ***uncertainty*** is an essential, always-present part of scientific knowledge.

Society depends on professional geoscientists to provide reliable information and unbiased expert advice about some of the most vexing challenges involving our interactions with the natural world: climate change, water supply, pollution of all kinds, waste management, energy resources, acquisition and reclamation of mineral/chemical resources, and soil conservation to name a few. Each of these challenges involves issues of government, public economics and private wealth, labor, national sovereignty and political will. Only *reliable information* has any value as we face these major challenges. Biased or intentionally distorted information is not helpful, and might even be dangerous in some cases.

It is an ethical imperative to provide reliable information about Earth and its processes, resources, history, and hazards to society. By doing so, geoscientists help society to manage these vital problems in a sustainable manner.

<slide 16> I have been told by several experienced geoscientists, in one way or another, that all you need to know about professional ethics can be summed up in three principals: the

golden rule, tell the truth, and do good work. This is a reasonable beginning, at least at the microethical level involving our interactions with each other. But it is not enough.

<slide 17> What do you do when you are confronted with a difficult ethical dilemma? How do you resolve a situation in which standing-up for what you strongly feel is right is likely to result in real danger to you – personally, professionally, economically, or maybe even physically? How do you deal with people whose words and actions are *intended* to cause you harm?

No one key unlocks all of these issues.

- It is important to educate yourself about the intellectual toolkits that have been developed to support practical or professional ethics. They provide a framework that can be useful in working your way toward reasonable ethical choices.
- It is important to make your ethical choices in light of all available relevant information. Gathering and processing that information takes time, so the toughest of ethical choices cannot be made quickly.
- It is important to fully consider the likely effect of your potential choices on other people.

<slide 18> • It is important to act with integrity. Integrity involves "[1] *discerning* what is right and what is wrong, [2] *acting* on what you have discerned, even at personal cost, and [3] *saying openly* that you are acting on your understanding of right from wrong" [Carter, 1996; Benjamin, 1990].

Integrity is the *opposite* of hypocrisy. It is the *antidote* to hypocrisy.

- It can be very helpful to discuss the matter, along with all available relevant information and *after* you have thought deeply about the problem, with an experienced professional geoscientist who has no personal or professional connection to the problem. Different perspectives can generate useful insights.

I am not so naive as to imagine that everybody is basically good, or that all ethical problems amount to misunderstandings. Each of us has the capacity for significant good **and** for significant evil. When you encounter folks who mean to do you harm and who don't feel constrained to behave ethically, the right and rational first thing to do is to protect yourself. Let your survival instincts work to your advantage, and take care not to make matters worse by retaliating or escalating the situation.

The best way to survive a dangerous situation is to avoid it in the first place. And if you can't avoid it, try to escape it. And if you can neither avoid or escape, do your best to confront it with dignity and integrity.

<slide 19> As a community, we have developed some common understandings of how geoscientists should function in this world. One of the more recent efforts in this regard is the set of *Guidelines for Ethical Professional Conduct* that a group from the American Geosciences Institute put together after more than a year of study, dialog, and consultation with member societies. The American Geosciences Institute, or AGI, is an umbrella organization of about 50 geoscience organizations in the US and abroad, including the GSA, the AAPG, the AGU, American Institute of Hydrology, Association of Environmental and Engineering Geologists, National Association of State Boards of Geology, and both SEGs. AGI represents around 250,000 geoscientists worldwide. I have brought a copy of those guidelines for each of you, and they can be found at your table. I'll have more to say about them in a few minutes. Of course, there is nothing there that you don't already know; however, it is worthwhile to reaffirm our understanding that our community of geoscientists believes that these are important points. I think it's important to reaffirm our group identity as geoscience professionals who practice in the public interest.

But merely stating and restating our ethical aspirations is not enough. Each of us needs to accept, adopt and internalize those ethical standards. A personal commitment is needed, even though the follow-through will not always be perfect. As Paul Newman said in the climax of the film *The Verdict*, "Act as if you have faith, and faith will be given to you." Without that personal commitment, we are just hypocritical, sanctimonious purveyors of baloney. For the record, I detest baloney.

<slide 20> When I was eleven, I joined the same Boy Scout troop that my brothers had been members of. Both of them became Eagle Scouts, as did my son and I. During the opening ceremonies of every troop meeting, and at some point every day of our campouts and service projects, we took the time to reaffirm our understanding of our group identity. We said, "On my honor, I will do my best to do my duty to God and my country, and to obey the Scout law, to help other people at all times, and to keep myself physically strong, mentally awake, and morally straight." That is an expression of *duty ethics*, scaled for the cognitive level of an adolescent boy. And then we would recite the Scout law, which is really a short list of important ethical

virtues. “A Scout is trustworthy, loyal, helpful, friendly, courteous, kind, obedient, cheerful, thrifty, brave, clean and reverent.”

The mission of the Boy Scouts is to help boys develop their ability to discern right from wrong, and the courage to choose to do what is right. We work with boys who are in a challenging age group from about 10 to 18. This is a time when they can make decisions that affect their entire lives, even though they lack the cognitive development of an adult. They can choose petty crime, drugs and alcohol, irresponsible sexual activity, gang membership. They can choose to nullify all efforts to educate them. But in the Scouting organization, as in other ethical organizations that try to serve this age group, we are trying to lead young people along a path that will help them grow into healthy and productive adults.

<slide 21> We, in the geoscience community, have this same challenge in developing healthy and productive young geoscientists. Virtually all of us begin the process of becoming geoscientists in college, and yet in American colleges there is virtually no discussion of the ethical dimension of our work. I would like to change this silence. It is the responsibility of each generation of mature geoscientists to act ethically and to help subsequent generations develop as ethical geoscientists.

<slide 22> We are part of an ethical continuum that began long before our time here and will continue long after we are gone. We stand in the middle of this ethical continuum, and have an effect on it just as it affects us. Through our choices, we determine the ethical standards of our profession now and in the future.

Socrates would say that the only thing that he knows for certain is that he doesn't know anything. When I was a young man, I simply thought that was a bunch of baloney. Now that I have lived more, experienced more, interacted more, I am beginning to understand. I have read about, thought about, struggled over, and written about ethics for years; however, I am not certain that I know anything with certainty. What I think I know is challenged frequently by experience in the actual world, where the range of human behavior is so extreme.

I fully understand that there is often a broad gulf between the view of reality from behind a tenured professor's desk and the view from any professional geoscientist's perspective as someone who can be fired or laid-off at any time. And so I am here today to talk with you about ethics, but also to ask for your help.

As a practical matter, what, if anything, does “professional ethics” mean to a professional geoscientist? That isn't a rhetorical question – it is a question that I would like you to answer for me. I can read the codes of our professional organizations as easily as you can. What I want to know from *you* is what “professional ethics” *means* to you, from *your* perspective as a working geologist.

Why do I care what you think? Aren't professors supposed to know it all? Well, I am a professor, and I can assure you (and my wife can verify) that I do *not* know it all. And so I would very much like to hear what you think about the meaning of professional ethics, and about the specific issues that you think are most prevalent and important.

<slide 23> Every semester, I teach or advise 75 to 100 geoscience students. Perhaps 15 to 20 of these want to pursue geoscience as a profession. They are typically 18 to 23 years of age, so they are somewhere in the range of late adolescence and early adulthood. Neuroscience tells us that their brains will not attain full adult development until they are around 25 years old. So I am working with them while they are very adaptable, while they are learning a fantastic amount of information, while they are still forming into the persons they will become. I try to include some practical information about professional ethics in the material I teach them in geoscience courses.

<slide 24> The thought is that if we can discuss ethical issues with geoscience students, and give them the tools they need to work through these issues and make mistakes while they are still in the safe learning environment of college, these novice geoscientists will be better able to deal with similar issues they will confront in their professional lives.

There are two principal challenges to implementing this plan, in my view. The first is that professors are not out there working in the world of commercial or professional geology. Because of our ignorance, we need to involve professional geologists, early and continuously, in the process of defining the ethical issues to be addressed in the college environment. That is the part I need your help with.

The second challenge, in my view, is that the college environment is not exactly free of its own ethical issues that might inhibit the promotion of professional ethics among students. I would love to discuss the ethical issues within academia, but that would be a waste of our time here. And I might not have a job when I return to the university tomorrow.

<slide 25> I have taught engineering geology courses that make heavy use of case studies. I find that this approach is very fruitful because it allows me to weave together technical issues within their economic, social, legal, and ethical contexts. Our work as professional geoscientists affects others in society, so this is an approach that allows students to understand that interconnectedness.

The idea is that we would like students to consider ethical problems in the safe environment of a college curriculum before they have to confront them in the working world. We want them to learn how to work through these problems. We want them to make mistakes, and learn to recognize those mistakes.

Let me tell you about one case, as an example. After the disaster of the San Fernando earthquake in 1971, the State of California began to enact statutes and policies to better protect its people from earthquake-related hazards. The first of these, usually called the Alquist-Priolo Act, established special study zones around the ground-surface trace of faults that are known to have caused surface rupture during the Holocene, within the last ~11,000 years. Development within a special study zone requires a detailed site investigation by a geologist licensed in the State of California, and a plan that would ensure that no habitable structures would be built across an active fault.

(Talk about initial location maps and end with B&W photo, <slides 26-28>)

A developer wanted to build houses on a small undeveloped area within the special study zone of the San Andreas Fault in an area that experienced ~4 m (13 feet) of right-lateral shear during a single M ~8 earthquake in 1906.

The developer's consulting geoscientist **<slide 29>** carefully mapped the property, **<slide 30>** logged trenches across suspected fault traces, and **<slide 31>** located the main trace of the active fault as well as some minor fault splays. A design was developed that **<slide 32>** established a ~15 m (50 foot) setback from the mapped main trace, and a ~9 m (30 foot) setback from the minor splays. Using the average size of other houses in the area as a guide, the developer created **<slide 33>** a design that maximized the number of new houses that could be built on the property without intruding on the setback zones around the fault traces. The access roads were all located along the faults, and all of the utility lines (gas, water, sewer, electricity, telecommunications) were buried under the roadways. The design could be implemented

profitably, met all legal requirements, and was submitted for review and approval by the appropriate regulatory agencies.

(Discussion: What do you think?)

Let me tell you a little bit more. (*ad libitum*, <slides 34-43>)

The development was built as designed <slide 44>, and now people live in those houses.

A case like this might generate a variety of responses, and a lot of questions. Those questions might lead students to investigate the applicable laws and building codes, the potential danger associated with proximity to a seismogenic fault during an earthquake, the actual experiences of people whose houses are located near a seismogenic fault that generated a recent earthquake that was strong enough to cause damage, and so on. <slide 45> Perhaps the students will consider the question of whether we *should* build certain projects that are consistent with all applicable codes, but yet seem to expose innocent people to significant potential harm. <slide 46> Does the developer have an inviolable right to realize a profit on a real estate investment through the legal construction of a development that meets all relevant code requirements? In the context of ethics, we want students to learn how to set their initial emotional reactions aside to analyze the situation [after *GWU*, 1998]. <slide 47>

- Who are the stakeholders in this case?
- What is the social context of this case? For example, how would building this development impact society (a) if no serious damage, injury or death ever occurs due to its proximity to an active fault, and (b) if serious damage, injury or death occurs due to its proximity to an active fault? What level of loss related to an earthquake would it take to negate the positive impact of this development?
- What are the ethical issues involved in this case? [e.g., *Cronin and Sverdrup*, 1998]
- What pertinent evidence do we have, and what evidence that we would like to have is missing. (In a real situation, recognition that you do not have all the facts would lead to additional research.)
- What governmental restrictions (laws, statutes, codes, policies) apply?
- What rights are endangered, if any, (a) if the development is built, and (b) if the permits for the development are denied and the land remains undeveloped?
- What part(s) of relevant professional ethics codes apply to this case?

- What alternative actions could be (or could have been) taken to protect the safety and wellbeing of the public?

<slide 48> People like me who are asked to talk about professional ethics often fill the air with lovely phrases describing our aspirations for a better world, while people like you sit back with your coffee and think “what a bunch of useless rubbish.” I don’t have time for useless rubbish. I would like to know from each of you about the ethical issues you confront in the world of commercial or academic geoscience. I would like to enlist each of you as a collaborator as I work on the problem of teaching novice geoscientists about ethical practice. The question that I need your help with is “what should we teach them.”

<slide 49> So my questions to you are these:

- What ethical problems or issues should we introduce to geoscience students who will pursue careers in the oil business?
- What ethical problems or issues should we introduce to geoscience students who will pursue careers in the production of energy-related materials like coal and uranium?
- What ethical problems or issues should we introduce to geoscience students who will pursue careers in economic minerals?
- What ethical problems or issues should we introduce to geoscience students who will pursue careers in environmental or engineering geoscience and hydrogeology?
- What ethical problems or issues should we introduce to geoscience students who will pursue careers in academia?

An engineer can only mitigate problems that are recognized or reasonably predicted. And a geoscience educator like me can only work on curricular resources to promote geoethics if the community helps me understand what the practical ethical issues are. There is no point in preparing students for a world that does not exist. I will be grateful if each of you would help me learn about the ethical issues and challenges you face.

<slide 50> I want to touch briefly on the *scope* of geoethics. We spend most if not all of whatever time we devote to thinking about geoethics in the microethical domain of our own work, our interactions with colleagues or team members or bosses, our interactions with clients, and the project that is on our desk. I want to challenge you to think at least a little bit about the relationship of geoscience, specifically of your work in geoscience, to society as a whole. That is what we call the macroethical domain.

My friend Bob Tepel talks about the “primacy clause” in codes of professional ethics, namely that the professional has an ethical duty to the public, and that in our professional work the health, safety, and wellbeing or welfare of the public are paramount. This concept is prominent in engineering codes. Geoscientists can be thought of as the scientific liaison between society and the geological environment. We are society’s experts on the Earth: its history, dynamic processes, resources, hazards, and life-supporting environment. With this knowledge comes responsibility to provide this expertise ethically, truthfully, for the benefit of society.

<slide 51> We have a unique responsibility for the stewardship of our home.

<slide 52> We bear our special knowledge, our intellectual riches, in trust for all humanity.

<slide 53> We are the intellectual interface between humanity and Earth's resources, hazards, and vulnerabilities.

<slide 54> As modern humans, we are all part of a story that has spanned thousands of generations since we emerged from the underbrush of hominin evolution. We are part of organized societies that have developed over hundreds of generations, since humans learned to grow our own food. **<slide 55>** As members of the geosciences, we are part of a community that extends only a couple of hundred years – a mere handful of generations in the past – and will extend into the future in a manner that is based in part on our actions. Our responsibilities are to those in the past whose work enables our own success, as well as to those whose future work depends on the technical and ethical foundations we build for them.

<slide 56> An ad hoc committee of representatives from twelve member societies developed the *AGI Guidelines for Ethical Professional Conduct*, approved by the AGI executive committee and published in 2015. Copies of those guidelines are provided for you at your table. The guidelines include 10 points of ethics for individual geoscientists in day-to-day activities, and an additional 7 points that we should contribute toward as members of a professional and scientific community. You can read these for yourselves, but I would like to highlight a few.

<slide 57> *As members of a professional and scientific community, geoscientists should promote greater understanding of the geosciences by other technical groups, students, the general public, news media, and policy makers through effective communication and education.*

<slide 58> The world we live in is awash in marketing and baloney. We have become used to companies, politicians, and other people lying to us, misleading us, telling us half-truths, and so forth. Each of us can make the personal decision to add to this relentless background noise by feeding the public another helping of useless baloney, or we can choose to be a source of reliable information about Earth and the geosciences. Our role as scientists is to start with reproducible data, evaluate testable hypotheses, and develop reliable information about the physical world. That is what the public needs from us. We can't control what other people do, but you and I can choose to be truth-tellers.

<slide 59> *As members of a professional and scientific community, geoscientists should use their technical knowledge and skills to protect public health, safety, and welfare, and enhance the sustainability of society.*

<slide 60> This is Bob Tepel's "primacy clause." The professional geoscientist has an ethical duty to the public, and in our professional work the health, safety, and wellbeing or welfare of the public are paramount. In this context, doing a poor job is not an option. Neither is ignoring geological evidence that might adversely impact the health, safety or wellbeing of the public. AGI has added the idea that enhancing the sustainability of society is part of this primary professional responsibility.

<slide 61> *As members of a professional and scientific community, geoscientists should responsibly inform the public about natural resources, hazards, and other geoscience phenomena with clarity and accuracy.*

<slide 62> The public needs reliable information and unbiased expertise from us if it is to manage resources and mitigate the risk associated with geologic hazards. And occasionally, the public needs to hear from us that something that they might want to do, like build a road across a pre-historic landslide, is probably not a good idea. It is not sustainable, and wastes precious public and private resources.

<slide 63> *As members of a professional and scientific community, geoscientists should support responsible stewardship through an improved understanding and interpretation of the Earth, and by communicating known and potential impacts of human activities and natural processes.*

<slide 64> The responsibility for our ethical development rests with each of us alone. We geoscientists must accept, adopt, and internalize the imperative to act in an ethical manner every day of our academic and professional careers. I can't make you do this -- you have to decide that this is important, and you have to make the affirmative decision every minute of your professional life to do what is right.

I urge you to be intentional about your professional ethical life.

Every morning, resolve to do your best throughout the day, in everything you do. As Garrison Keillor would say, "Do good work."

Commit yourself to being a truth-teller, because *only truth has meaning*. The world is already filled with people who live by half-truths, artful misdirections and outright fabrications. *You* should be different. *You* should be a truth-teller.

Be trustworthy. Be someone that others can rely on.

Treat others the way you want to be treated: with respect, courtesy and kindness. We are all engaged in a great struggle, so don't make anyone's life harder than it already is.

Try to think less about yourself and your concerns, and take advantage of any opportunity you find to help others. Because a life of humble service is a *good* life.

Find the strength to forgive others, because you know that none of us is perfect. But understand that knowledge of our imperfection does not furnish us with an excuse for failure. Do your best every day to be a good person.

Keep your focus on what is important.

<slide 65> And finally, choose to be happy. Yes, there are always reasons to be in the dumps, but choose happiness and hope instead. Every day is a gift, so have fun.

<slide 66> I am working with an international group of geoscientists who are trying to develop educational resources for teaching geoethics to novice geoscientists in college. We can't do this work well without a lot of help from the broader geoscience community.

<slide 67> I have placed several of my business cards at your table, so please find one at this time if you haven't already done so. <wait a moment> On that card you will see my name, a couple of email addresses, and web addresses. When you get back to your hotel rooms, homes or offices, I invite you to go to that web address and look at some of the resources I have collected for you. A copy of this presentation will be there, along with a draft copy of a paper

that will be published by the American Geophysical Union around New Years, giving some initial ideas about facilitating the development of ethical geoscientists.

I would like you to use the resources, suggest new ones that you might be aware of, and communicate with me about geoethics. You have my email address. Please let me know about the ethical problems you have encountered in your work, so that we can help prepare students to address these problems when they enter the workforce.

Thanks very much for your time, your contributions to professional geoscience, and your patience.

***How and what* should we
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about geoethics?**

Vince Cronin

International Association for Promoting
Geoethics (www.geoethics.org)
and Baylor University

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hypocrites

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sanctimonious
hypocrites

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useless ignorant
sanctimonious hypocrites

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useless ignorant
sanctimonious hypocrites
and scolds

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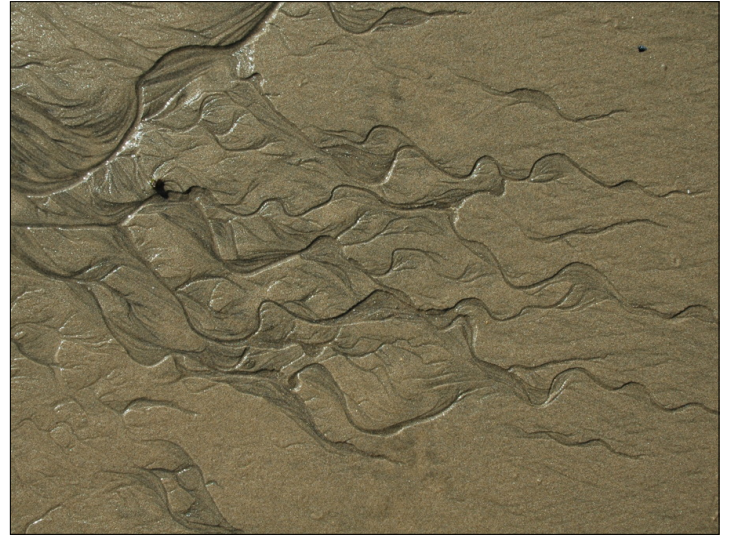
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about being
judgmental

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Ethics is related to the
need to seek happiness,
to avoid suffering, and to
be mindful of the needs
of others

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Ethics asks us to pay
attention to something
beyond ourselves

Anthony Weston

12

Ethics asks us to pay attention
to something beyond ourselves

To think and act ethically is to
take care for the basic needs
and legitimate expectations
of others, as well as our own.

Anthony Weston

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Society depends on
professional geoscientists to
provide reliable information
and unbiased expert advice
about the natural world.

15

- Golden Rule
- Tell the truth
- Do good work

16



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Integrity involves...

- [1] *discerning* what is right and what is wrong,
- [2] *acting* on what you have discerned, even at personal cost, and
- [3] *saying openly* that you are acting on your understanding of right and wrong.

Stephen Carter

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23



24

A case study with an ethical dimension

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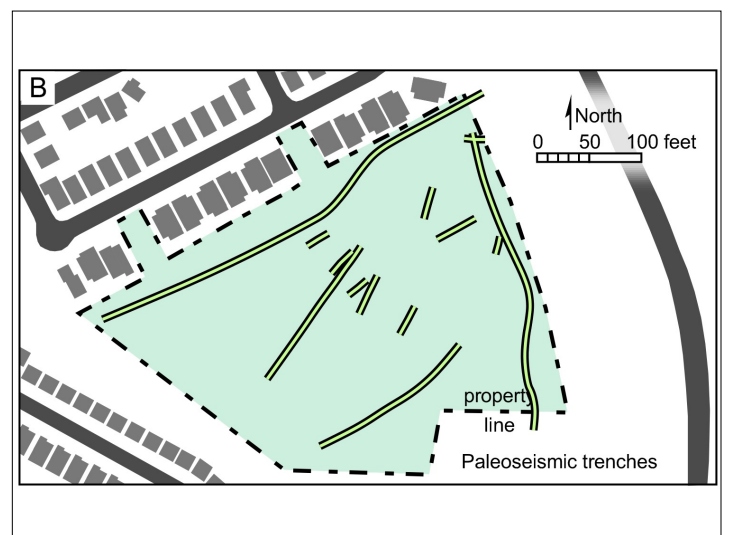
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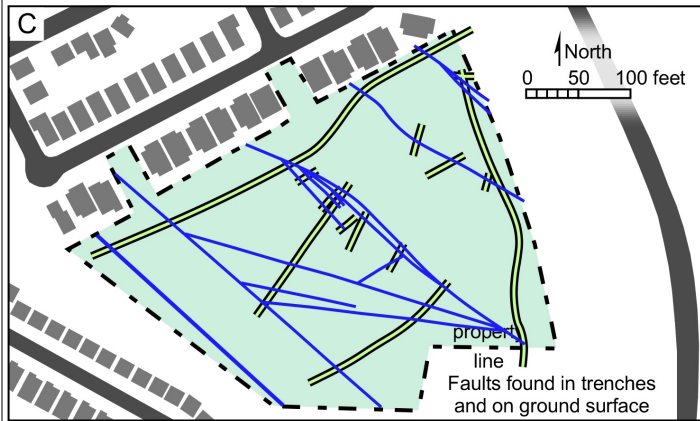
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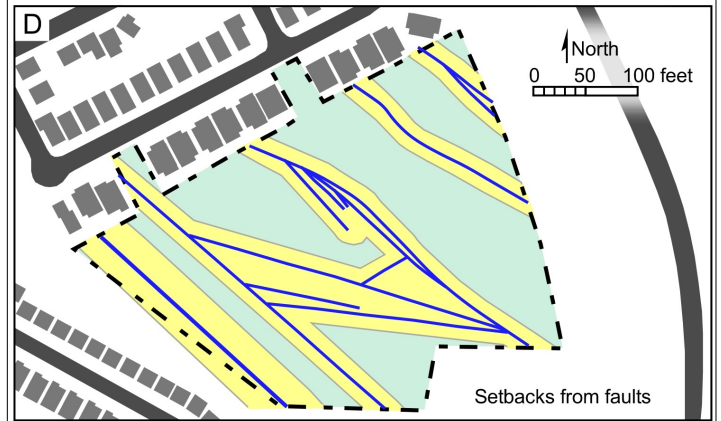
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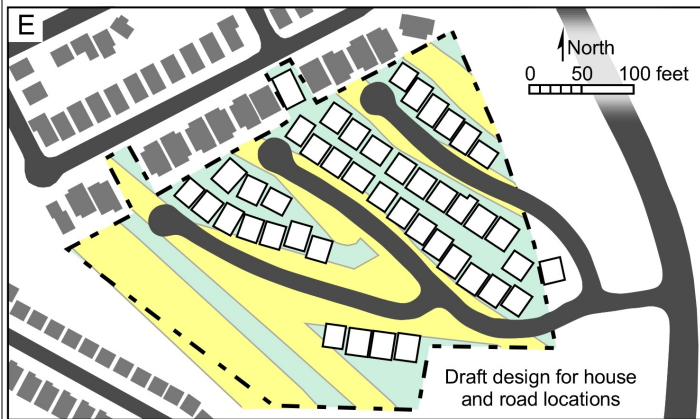
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2014 Napa earthquake,
M 6, \$400 million damage

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2014 Nepal earthquake,
M 7.8, >4,200 deaths,
~\$10 billion damage

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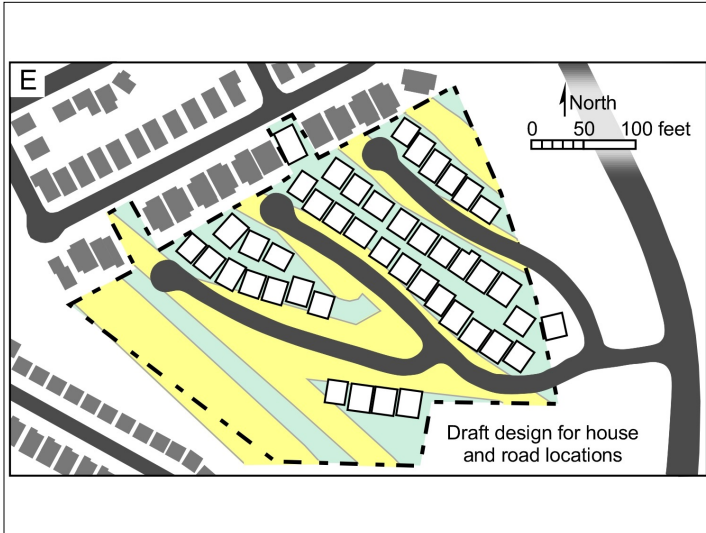


Bhaktapur, Nepal, 2015

41

1906 San Francisco earthquake
M 7.8, ~3,000 deaths
~\$10.5 billion damage (2015 \$)
**~12 feet of right-lateral offset
near development site**

42



43



44



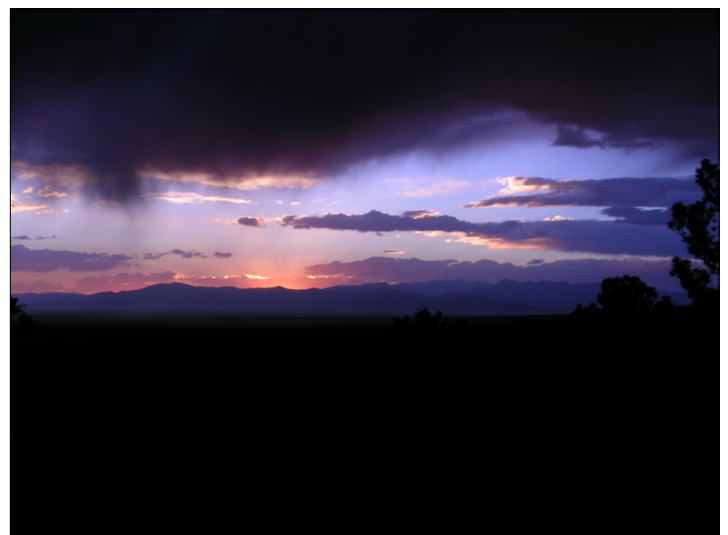
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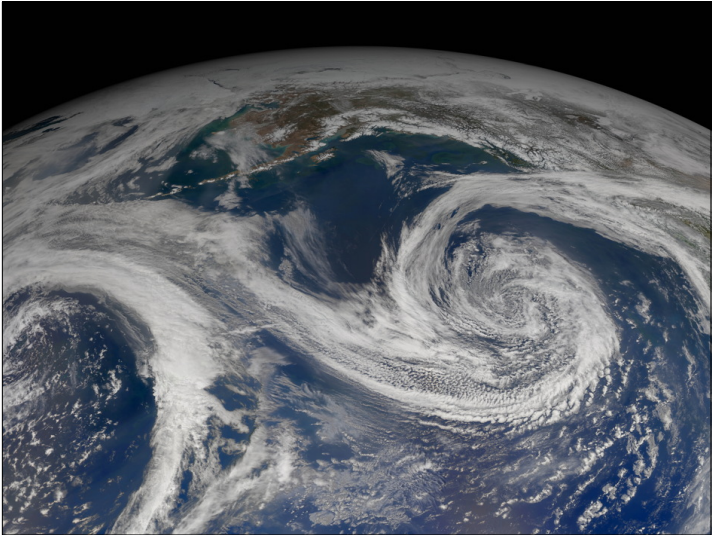


48



What ethical problems or issues should we introduce to geoscience students...?

49



50

The ultimate domain of GeoEthics



Geoscientists have a unique responsibility for the stewardship of our home.

51

The ultimate domain of GeoEthics



Geoscientists have a unique responsibility for the stewardship of our home.

We bear our special knowledge in trust for all of humanity.

52

The ultimate domain of GeoEthics



Geoscientists are the intellectual interface between humanity and Earth's resources, hazards, and vulnerabilities.

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56

As members of a professional and scientific community, geoscientists should promote greater understanding of the geosciences by other technical groups, students, the general public, news media, and policy makers through effective communication and education.

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58

As members of a professional and scientific community, geoscientists should use their technical knowledge and skills to protect public health, safety, and welfare, and enhance the sustainability of society.

59



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As members of a professional and scientific community, geoscientists should responsibly inform the public about natural resources, hazards, and other geoscience phenomena with clarity and accuracy.

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As members of a professional and scientific community, geoscientists should support responsible stewardship through an improved understanding and interpretation of the Earth, and by communicating known and potential impacts of human activities and natural processes.

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