

TEACHING AND LEARNING COMMUNITIES THROUGH ONLINE ANNOTATION - Ben van der Pluijm, University of Michigan

Public, Group & Private Annotation

Activity Record

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Ever wonder what colleagues do with textbook material, or what they say about it? Want students to be more engaged in their learning experience? If so, online materials that support standard lecture format provide new opportunity through managed, online group annotation that leverages the ubiquity of internet access and enables personalized learning.

The annotation concept is illustrated with the online textbook “Processes in Structural Geology and Tectonics”, which includes a platform for sharing of experiences, supplementary materials and approaches; for example, readings, mathematical applications, exercises, challenge questions, quizzes, alternative explanations, and more.

The annotation framework used is **Hypothes.is**, which offers a free, open-platform markup environment for annotation of websites and PDFs. The annotations can be public, grouped or individualized, as desired, and includes export and download of annotations. A teacher group, hosted by a moderator/owner, can limit access to members of a user group of teachers, so that they can use, copy or transcribe annotations for their own lesson material. Likewise, an instructor can host a class group that encourages sharing of observations, questions and answers among students and instructor. Or, the instructor can create one or more closed groups that offers study help and hints to students. Options galore, all of which aim to engage students and to promote greater responsibility for their learning experience.

Beyond new capacity, the ability to analyze student annotation can identify and support individual learners and any special needs. For example, student notes can be analyzed for key phrases and concepts, and identify misunderstandings, omissions or problems with the material. Also, example annotations can be shared by the instructor to improve critical thinking, notetaking skills, and to help with studying. Lastly, online annotation allows active use of posted PowerPoint lecture slides, supporting real-time notetaking during lecture presentation.

Experiences and practices of annotation could benefit teachers and learners alike, and does not require software, coding skills or special hardware environments. Give it a try!

LINKS:

Hypothes.is: <https://hypothes.is/>
Processes in SG&T: <http://psgt.earth.lsa.umich.edu/>

CONTACT:

procsgt@gmail.com (Ben van der Pluijm)

DOWNLOAD POSTER:

<http://psgt.earth.lsa.umich.edu/0/2016GSAposter.pdf>

Processes in Structural Geology and Tectonics

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Units

Preface [open access] - Organizational philosophy; Information for users; Design and online annotation (personal and PS&T users); Search; About the authors; Supporting materials.
Table of Contents [open access] - Access to chapter text requires a UserID and Password that are obtained by paying relevant charge (see details below).

Lecture Presentations [open access] - PDF versions of lecture PowerPoint presentations. Users of all or parts agree to appropriately reference this resource. Course instructors can request access to PPT originals after text adoption.
Lecture Recordings [restricted access] - Access to recordings requires UserID and Password that is different from that of text adoption. Course instructors can request access for private sharing after text adoption.
Frequently Asked Questions (FAQ) and **2016 Flyer**.

- Geologic Structures and Deformation Regimes** - Depositional structures; Unconformities; Salt structures; Volcanic structures; Impact structures; Deformation regimes (Frictional regime, Plastic regime).
Supplementary Material - Concept summaries, Reading.
Lecture Presentation - Structures (2016)
- Force and Stress** - Force and Units; Newtonian and continuum mechanics; Trigonometry; 2D and 3D stress; Normal stress and shear stress; Mohr construction for Stress; Stress states; Measurement of stress (At surface, at depth); Lithospheric stress states.
Supplementary Material - Terminology, Units and conversions, Stress tensor, Reading.
Lecture Presentation - Force & Stress (2016)
- The Frictional Regime** - Processes of brittle deformation; Tensile cracking; Axial deformation experiments; Formation of shear fractures; Failure criteria; Faults and stress; Andersonian theory; Frictional sliding; Byerlee's law; Stress and sliding; Role of fluids.
Supplementary Material - Terminology, Reading.
Lecture Presentation - Frictional Regime (2016)
- Joints and Veins** - Surface features; Elasticity; Joint arrays; Joint spacing; Origin of joints; Origin and history of veins; Syn- and anti-taxial veins; En echelon veins; Lineaments.
Supplementary Material - Terminology, Reading.
Lecture Presentation - Joints/Veins (2016)
- Faults** - Fault types and geometries; Fault systems; Fault bends; Dimensions; Fault surfaces; Fault rocks (Cataclastites, Mylonites, Pseudotachylites); Fault character; Faults and stress; More on mechanics of (reversed) faulting; Thrust paradox; Thrust wedges; Faults and Society.
Supplementary Material - Fault Types, Reading.
Lecture Presentation - Faults (2016)
- Deformation and Strain** - Deformation concepts; Strain ellipse (and ellipsoid); Coaxial and non-coaxial strain; Superposed strain; Strain quantities; Representations of strain; Finite strain analysis (Spherical objects, Angular changes, Length changes).
Supplementary Material - Types of strain, Strain activity, Mohr construction for strain, Reading.
Lecture Presentation - Deformation & Strain (2016)
- The Plastic Regime** - Strain rate; Viscosity; Creep defects (Point defects, Line defects/Dislocations); Crystal plasticity; Dislocation creep; Glide; Climb; Microstructures; Twinning; Recovery; Recrystallization; Diffusional processes and microstructures; Deformation mechanism maps; Confusing Terminology?
Supplementary Material - Terminology, Slip systems, Summary table, Calcite twinning analysis, Deformation mechanism map activity, Reading.
Lecture Presentation - Plastic Regime (2016)
- Folds** - Fold Description; Fold Classification; Dip Isograds; Fold systems; Fault-related folds (Fault-bend folding, Fault-propagation folding, Detachment folding); Elements of fold style; Superposed folding; Bending and buckling; Fold mechanics and fold math; Fold strain.
Lecture Presentation - Folds (2016)
- Fabrics and Fabric Elements** - Foliations (By Metamorphic grade, Morphology, Strain); Shear zones (Shear sense indicators, Strain); Lineations; Boudinage.
Supplementary Material - Terminology, Crystallographic fabrics, Reading.
Lecture Presentation - Fabrics (2016)
- The Lithosphere** - What is rheology? Insights from rock deformation experiments; Characteristics stress-strain behaviors; General rock creep; Elastic, viscoelastic and composite linear rheologies; Maxwell relaxation time and Earth behavior; Non-linear rheologies; Plastic flow stresses; Crust and upper mantle strength curves; Defining lithosphere and asthenosphere; Lithologic vs rheologic layering.
Supplementary Material - Terminology, Creep parameters, toostasy, Reading.
Lecture Presentation - Lithosphere (2016)
- Plate Tectonics** - Earth's layers; Earth's topography; The crust; The mantle; The tenets of plate tectonics (Today's plates, Plate boundaries); Kinematic of plate tectonics (Linear and angular velocities, Absolute and relative motions); Mechanisms of plate tectonics; Tectonic cycles (Wilson Cycle, Supercontinent Cycle).
Supplementary Material - Studying Earth's Interior, Vectors and Plate Velocities, Reading.
Lecture Presentation - Plate Tectonics (2016)
- Extensional Tectonics** - Today's divergent plate boundaries (Ocean Ridges, Lithologies); Failed rifts; Structural Styles (Pure shear systems, Simple shear systems); Stretching factor; Metamorphic core complexes (and isostasy); Rift evolution (Passive margins); Causes of rifting and extension.
Supplementary Material - Today's plates and boundaries, Terminology, Reading.
Lecture Presentation - Extensional Tectonics (2016)
- Contractual Tectonics** - Convergent plate margins (Downgoing slab, Trench, Accretionary wedge, Forearc basin and volcanic arc, Backarc region); Stages of collision (Convergence, Subduction, Thickening, Collapse, Delamination); Structures of collision (Fold-thrust belts, Fold-thrust kinematics); Related processes (Extrusion tectonics, Terrane accretion); Organic architecture (Synorogenic cross-sections, Curved orogens); Speculations on orogenic style.
Supplementary Material - Terminology, Terminology of fold-thrust belts, Balanced cross-sections, Reading.
Lecture Presentation - Contractual Tectonics (2016)
- Wrench Tectonics** - Classes of strike-slip faults (Transfer faults, Transcurrent faults); Strike-slip systems (Transpression, Transistension, Restraining and releasing bends, Strike-slip duplexes); Continental Strike-slip faults; Oceanic strike-slip faults (Transform faults, Fracture zones).
Supplementary Material - Terminology, Reading.
Lecture Presentation - Wrench Tectonics (2016)

Additional Material:
A Global View and North American Perspectives
Lecture Presentation - Time, Place and Tectonics (2016)

Processes in Western North America (Cenozoic-Mesozoic) - Geologic today convergent margin setting with terraces, accretionary wedges, variably exhumed arc and foreland FTB (Sevier), Early Cenozoic transition to basement-cored uplift (Laramide), Middle Cenozoic and younger continental extension (Basin-and-Range) and Late Cenozoic subduction of ridge (San Andreas Transform) in continuous Alaska-N Mexico segment.
Lecture Presentation - Western North America (2016)

Processes in Eastern North America (Paleozoic) - Opening and closing of the Proto-Atlantic (Iapetus and Rheic Oceans) based primarily on paleogeography from fossil biomes and paleomagnetism. The Appalachians preserve Laurentia (N America) and Gondwanaland (Africa) margins, separated by a belt with ocean remnants (ophiolites, arcs, islands/plateaus, subduction complexes), illustrated in the northern segment. The southern segment is dominated by Late Paleozoic deformation from final ocean basin closure, resulting in large overthrusts that are occasionally exposed in tectonic windows. The concepts of oroclines (curved mountain belts) and salients/recesses (irregular margin) are also explored.
Lecture Presentation - Eastern North America (2016)

Processes in Central North America (Paleozoic-Precambrian) - Regional geology of the Interior in the context of multiple supercontinent cycles culminating in the "United States of America". Precambrian orogenic structure of the Grenville orogen (remnants of once giant mountain range underfolded) and the Midcontinent rift (thick volcanic and sels with Michigan "gold"). Km-scale, Paleozoic, intracratonic basins (Michigan Basin) and arches are evidence of vertical tectonics ("Michigan") possibly linked by far-field plate boundary activity.
Lecture Presentation - Central North America (2016)

Hands-on Activities - A set of 3-hour laboratory activities are used in conjunction with lecture material, focusing on spatial skills (maps, sections, projections, etc.) and applications of major concepts (stress/strain, strain, tectonics, etc.). The activities are derived from multiple sources (old and new) and are only shared with instructors as an example set. They are not part of the PS&T offering. Contact: vdpluijm@umich.edu.

Credits

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Note to Instructors: Unlimited-time examination access is available for potential class adoption; annually-renewed access is given upon adoption. Please email procsgt@gmail.com from a university email account with relevant info on your class(es), and, if available, weblink to course catalog.

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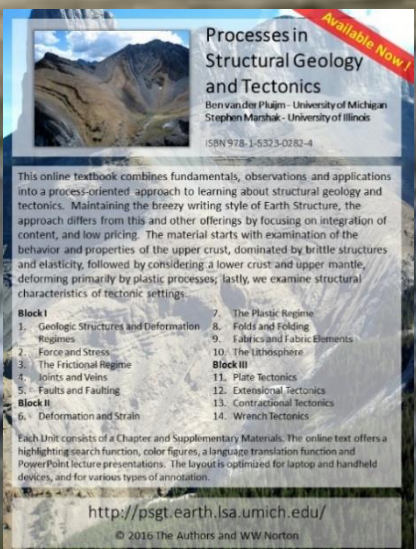
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