**Tool Kits**

**Virtual Tool Kit**

* [USGS Texas Geology Web Map Viewer](https://txpub.usgs.gov/dss/texasgeology/)
* The [Mancos](https://itunes.apple.com/us/app/mancos/id541570878?mt=8/) app ($2.99) brings the geology of the United States and beyond to your iPhone. Tap the map, search by name, or use GPS to instantly locate yourself, show state-level geological maps, the geological formation and the regional stratigraphic column.
* [Flyover Country®](http://fc.umn.edu/) is a National Science Foundation funded offline mobile app for geoscience outreach and data discovery. Flyover Country® is ideal for learning about the world along the path of your flight, hike, or road trip with GPS tracking. Offline geologic maps and interactive points of interest reveal the locations of fossils and georeferenced Wikipedia articles visible from your airplane window seat, vehicle, or hiking trail vista.There is a tutorial for entering field trip content into our database to get an idea of the process of entering your content.
* HHMI's [Earthviewer](http://www.hhmi.org/biointeractive/earthviewer/). is an interactive tool for exploring the science of Earth's deep history. From molten mass to snowball earth, EarthViewer lets you see continents grow and shift as you scroll through billions of years. Additional layers let learners explore changes in atmospheric composition, temperature, biodiversity, day length, and solar luminosity over deep time.
* HHMI's [MassExtinctions](http://www.hhmi.org/biointeractive/mass-extinctions-interactive/) interactive allows learners to learn about the five major five extinction events in Earth's history.
* Strike and dip

**Field Tool Kit**

* iPad with Apps (2 per team)
* 1 set laminated 8.5 X 11" maps (state parks, BEG Tectonic map, BEG Geologic map, BEG Rivers, BEG Aquifers, topo map of Pedernales Falls)
* Rite in the Rain field notebook
* Pens
* Highlighter
* Infrared thermometers
* Sketch pads (1 per team) need these
* Clipboards (1/ team)
* Dry erase boards
* Drone kit (1 per 2 teams)
* 6 Field backpacks (1 / team) with
	+ Hand lens
	+ Hardness kit
	+ Silva compass
	+ 2 clipboards per student team
	+ Geologic time scale
	+ Grain size charts
	+ Dilute HCl in plastic bottle with eye dropper (need dilute HCl from Department)

**Classroom Tool Kit**

* 2 iPads per team for members to work on collaboratively
* 6 resource binders for each member of the GeoFORCE and STEMFORCE instructional team to be used with student teams.
* 6 tubes for the Geologic Time Tube (1 tube per team)
* Notebooks
* Fossil guide (available from BEG)
* Maps (one set of large maps to be set up in classroom each day)
* Transparencies (for students to overlay on maps and write on with china marker)
* 12 plastic boxes with
	+ *Ruler (metric)*
	+ *Colored pencils or crayons*
	+ *China marker*
	+ *Post-it notes*
	+ *Tape*
	+ *Gluestick*
	+ *Scissors*
	+ *Dry-erase markers*
	+ *Paper clips*
	+ *Rubber bands*

**Supplies for Learning Activities**

**3 set-ups to demo the Gelatin Intrusive vs. Extrusive IRIS activity [Gelatin Intrusive vs. Extrusive Model](https://www.iris.edu/hq/inclass/video/gelatin_model_of_magma_intrusion_intrusive_vs_extrusive/)**

For each set up, need

* + 2 bowls: 1 bowl for gelatin mold (big plastic bowl) and a larger bowl for hot water
	+ Packs of gelatin (**DO NOT USE Jello**) 1 pack per cup of water
	+ 1 Bottle Hersey Chocolate syrup
	+ 1 squeeze bottle
	+ Support (3 paper towel rolls or 3 equal lengths of 3 X3 or small plant stand)
	+ Large cookie tray
	+ 1 package marshmallows to soak up excess chocolate syrup

Weiss – Martindale, Death and Fossilization TM Board Game

Afternoon Activities (1:00 - 5:30 PM)

**Stop 3. PRC. Drone workshop. 1:00 - 3:00 PM.** (2.0 Hours)

**INSTRUCTORS MUST PRINT OUT 6 COPIES OF THE UCAR LEARNING ACTIVITIES IN ADVANCE (1 PER TEAM): LEARN TO FLY & FIRST FLIGHT**

The workshop is adapted from from Olds, Shelley, LouAnn Dahlman, and Margaret Mooney, Using Recreational Drones for STEM Explorations, 2017 Earth Educators Rendezvous, <https://serc.carleton.edu/earth_rendezvous/2017/program/morning_workshops/w4/index.html>. Seeing the world from above can stimulate curiosity and give students a reason to engage in many facets of STEM (Science, Technology, Engineering & Math) learning. Later in the week, student teams will have opportunities to collect aerial data at selected field sites. The aerial imagery can be used to help them to address their challenge.

**Learning Objectives:**

* Use technology applications to collect data (in this case, aerial photos and video imagery)
	+ Assemble a drone and learn how it can be used as an instrument for data collection
	+ Become familiar with FAA regulation and drone flight protocols
	+ Practice flying and manoeuvering a drone
* Work collaboratively to carry out an investigation

Note: There are 6 teams and 3 drone kits. Instructors will determine how best to organize teams for the workshop since two teams will share a drone. We recommend that that the instructors give the introduction inside to the entire group, following relevant parts of the Learn to Fly activity. This includes going over the parts of the drone, terminology, and the organization of the drone operations team. Then half the group goes outside for 45 minutes to practice flying their drones while the other half of the group works on their Geologic Time Tubes and EarthViewer. After 45 minutes, the groups switch.

***Drone Operations Team***

Each drone team has 6 or 7 members:

* 1. Flight Operations Manager (knows the regulations, reads instructions and makes sure everyone understand job and is on task during the flights)
	2. Pilot (operates the drone)
	3. Navigator assisted by 1 - 2 Spotters (scan the area to ensure that the operator does not fly into restricted airspace and avoids obstacles such as people, wildlife and other drones, etc.)
	4. Data Recorder (scribe/ note taker)
	5. Engineer (ensure all equipment is working properly and makes repairs when drone crashes, which it will)
	+ Introduction. Using Recreational Drones in STEM (Olds and Dahlman, 2016) [eer-using-recreational-dron.pdf.pdf](https://serc.carleton.edu/admin/private_download.php?file_id=160140) (Acrobat (PDF) 17.7MB May24 18). Permission pending.
	+ Activity 1. [Learn to Fly](https://scied.ucar.edu/activity/uav-flight-school/), UCAR Center for Science Education. Time Required is 1/25 hours.
	+ Activity 2: [First Flight](https://scied.ucar.edu/activity/uav-flight-school/). UCAR Center for Science Education. Time Required is 45 minute

Skills to master:

* + Take off, hover (adjust fine tuning for stationary hovering), and land.
	+ Fly forward and back, left and right.
	+ Spin clockwise and counterclockwise.
	+ Taking photos and videos with your drone
	+ Flight and photo practice.
	+ Follow a set flight path.