GO THERE—THE TAKLAMAKAN DESERT—BECAUSE YOU "CAN'T GET OUT!!"

Using the coordinates. *37° 44' N, 81° 49'E*, ***FLY TO*** the *Taklamakan Desert*, the largest desert of its kind in the world (based on percentage area covered with a typical desert material), and ***ZOOM OUT*** slowly to an ***EYE ELEVATION*** about 12 to 14 miles high above the surface of the desert. Can you describe the beautifully strange patterns that are repeated across this view in the box below? Have you ever seen anything in nature like this pattern before? If so, how does it compare in size and scale and origin? Please ***PRINT*** this view and attach to the appropriate page at the end of this exercise.
Describe the repetitious pattern of these remarkable structures in the box below. Although they are pointed in the same direction, are they randomly arranged across the landscape; aligned in crude, parallel sinuous rows across their longitudinal axes; aligned in crude parallel columns with their longitudinal axes? Does the orientation of these landforms suggest a common origin, or that each was made separately. Were the processes that formed each the same or different? Any ideas?

Do the landforms viewed here appear to be hard or soft, do you think they are solid surfaces of hard rock or soft surfaces made of sediment? Elaborate your answer in the box below, based on your observations.

The landforms here in the Taklamakan are an extremely large type of ripple, a body of sediment that accumulates and is shaped by fluids that transport it across a surface. Large ripples are usually referred to as dunes or megaripple. The shape of a ripple can give clues about the nature of the fluids that formed it. Many megadunes are often blanketed with a secondary overprint of smaller dunes or ripples.

Pay close attention to the distribution and colors of the sand that so fully blankets the Earth's surface here in Asia. The color pattern you observe on these landforms is definitely regular, but is probably a byproduct of the shadows across this landscape in satellite images probably taken in the afternoon of a midsummers day, because the northernwestern sides of their surfaces are intensely illuminated and the southeastern sides are darkened by shadow. The color patterns are probably neither related to particulate size nor to their mineralogic or chemical composition.

Describe the general surface of the darker slope of the large dunes and their general orientation in the box below. Is it smooth, rough, pitted, ropy, intensely fractured, polished, flat, etc? On which side of the megaripples (i.e. north, northeast, east, southeast, south, southwest, west, northwest) does the surface have the most shadow-producing features (use the ***NAVIGATIONAL COMPASS*** on the ***NAVIGATIONAL TOOLS*** in the upper right-hand corner of the ***VIEW WINDOW***)? How do those large, darker surfaces compare to their lighter neighboring surfaces?

This view is somewhat deceiving because of its scale. You should probably make sure to turn on the ***SCALE LEGEND*** in the ***VIEW MENU*** to help determine the dimensions of these dunes. You may also use the ***SHOW RULER TOOL*** to determine the average width and average length of the average dune in this view. Record you measurements in the table below.

Dune Dimensions	Darker Areas (in feet)	Lighter Areas (in feet)	Darker Areas (in miles)	Lighter Areas (in miles)
Average dune length (along axis)				
Average dune width (across axis)				

To get a sense of the size of these dunes, compare your measurements with the American football field. An American football field is an area (including end zones) about 360 feet long and 160 feet wide (57,600 ft^2), just slightly larger than one acre of land (43,560 ft^2). One square mile is exactly 640 acres, or just about the same number of football fields. Are any of the light colored areas large enough on which to build an American football field (assuming the use of artificial turf, etc.)? Explain your comparisons in the box below.

The sense an observer gets of which parts of the dune field (darker or lighter) are elevated, is also somewhat deceiving. To get a sense of the difference in elevation of these landforms, first ***ZOOM IN*** to between 40,000 and 50,000 feet ***EYE ALTITUDE***. Carefully sweep the ***HAND CURSOR*** across the dune field to determine the average elevation of the darker and lighter parts of the dune field. The elevation of the landscape of the point covered by the ***HAND CURSOR*** is documented in the ***STATUS BAR*** along the lower center boundary of the ***VIEW WINDOW***. Remember that ***GOOGLE EARTH®*** uses an averaging mechanism of regularly spaced coordinates to generate elevations, and that the apparent elevation of feature is affected by neighboring elevations.

The height of the dunes (or relief (i.e. difference in elevation)) is about the same for all of them in this area. Determine the relief by subtracting the average elevation of the lower areas from the average elevation of the higher areas, and record your calculations and observations in the space below. Comment about how the real relief is different than what it appeared to be without determining the elevation differences.

Dune Height	Darker Areas	Lighter Areas	Average Height of Dunes (Relief)
Average elevation (in feet)	+	-	

Make sure the ***TERRAIN*** is ***CLICKED ON*** in the ***LAYERS WINDOW***. ***ZOOM IN*** to a lower ***EYE ALTITUDE*** between 20,000 and 30,000 feet. Using the ***TILT/ROTATE*** feature associated with the middle button/depressible scroll wheel (see http://earth.google.com/intl/en/userguide/v4/), or the ***NAVIGATION CONTROLS*** in the ***VIEW WINDOW***. ***TILT*** your view at least 50-60°off the horizontal, keeping the orientation of the view essentially north-south.

The steepest slope of the ripples in this area is a fairly low sharp break in slope that links each dune with its lateral neighbor. Dune and ripple morphology usually defines the less steep of the two slopes as the *stoss* or *windward* face or slope; whereas the steeper of the two slopes can be designated as either the *lee* or *slip* face. In the box below, explain in which direction the *slip* or *lee*-slopes face (i.e. north, northeast, east, southeast, south, southwest, west, northwest).

PRINT this view, and label a couple of representative *stoss* and *lee* faces, and attach it to the appropriate page at the end of this exercise/exploration.

Sketch a representative profile in the box below of the outline of a typical dune's surface in this area as if you dug a trench along its axis, basically from northeast to southwest. Label the dark and light areas, the stoss and lee faces. Remember a profile is essentially a section through the dune along its axis that represents its surficial morphology. If you have an artist draw your profile, you are being sketched from the side, not from the top. Use the ***TILT/ROTATE*** tool if needed to assist you, by rotating the view to the northeast. Then use the ***SHOW RULER*** tool and make a yellow line from one slip face to the next along the dune. The yellow line (with accompanying measured distance) will follow the profile of the dune. Repeat this measuring/line-drawing with ***SHOW RULER*** tool to get a good feeling for the profile of the average dunes in this area.

SW	***NE***

Dunes usually migrate in the direction the wind blows when the wind blows strongly enough. The migration is dependent on wind velocity, duration, and average clast (i.e. grain) size. The direction the wind blows causes dune ablation (sediment removal and transport) on the *stoss* or windward face, which faces the wind and is generally not very steep. The slip or lee face is the steepest side of the dune and grains transported up the windward face to its apex generally cascade down the slip face, which for sand is usually 30-34°.

For more information on how dunes migrate, how they are classified, and aeolian processes of their formation go to ***WIKIPEDIA***, search for *sand dune* (http://en.wikipedia.org/wiki/Sand_dune). The *United States Geological Survey* has a related web page/graphics on the mechanics of dune formation in *Death Valley National Park* (http://www.nature.nps.gov/geology/usgsnps/deva/ftdune1.html).

Based on the dune profile you generated in the step above, in which direction does the prevailing wind blow in this area (from ______ to _______)? Also draw an arrow showing the general direction of wind flow in this area across the profile you sketched in the box above.

Based on the description of dunes in ***WIKIPEDIA*** (http://en.wikipedia.org/wiki/Sand_dune), to which dune shape do the dunes in this part of the Taklaman Desert belong? Explain your answer in the box below.

Over greater lengths of time, in which direction will these dunes of the *Taklaman* shift (i.e. north, northeast, east, southeast, south, southwest, west, northwest), assuming wind directions remain constant?
Assume that you were on a plane that had to make an emergency landing in this area. Based on the overall texture and pattern, you observe in the dunefield, on which parts of the dune field would you attempt to land, and from which direction would you approach the landing? Explain why you suppose that it would make a difference.
If the average person could walk one mile per hour in sand across this dunefield, at best, how long would it take to reach the nearest occupied town, road, or permanently occupied site? Based on the relative desolate nature of the dunefield, the chance of becoming disoriented and the relative scarcity of ponded/flowing water in the landing area, which route would you take to get to a civilized point (e.g. well traveled road, occupied outpost, telephone etc.). Your best bet would be to find a waterway/road if possible, because without fresh "not saline" water, not only would you die but also no one can survive for any length of time, let alone grow sufficient crops etc for sustenance. Walking at a normal speed of 3 miles per hour, you could follow such a waterway/road, but usually not for any distances greater than 20 miles per 24 hour period. To determine this distance you may have to zoom in to about 20-25 miles ***EYE ALTITUDE*** and pan around using the ***HAND CURSOR*** to see the names of named small hamlets/villages in the area. Pick the closest hamlet/village to the coordinates you entered in at first, and then determine a logical path. Include the time it would to take walk, assuming that you could not walk for more than eight hours straight with sufficient rest (between four and eight hours).

Look up *Taklamakan Desert* in ***WIKIPEDIA*** (http://en.wikipedia.org/wiki/Taklamakan_Desert). According to ***WIKIPEDIA***, the word *Taklamakan* literally means _____________ (write the meaning in the box below). How does the meaning of the word compare with your discoveries thus far of the *Taklamakan* you observed and interpreted from ***GOOGLE EARTH***®?
ZOOM OUT to an 'eye-popping' ***EYE ALTITUDE*** of between 750 and 1000 miles. Use the ***SHOW RULER*** tool to document the length and width of the main basin of the *Taklamakan Desert* in the box below. Also comment on its overall shape.
Now ***ZOOM OUT*** into outer space to an astronaut's ***EYE ALTITUDE*** of between 5000 to 6500 miles. Is the *Taklamakan* a significantly visible feature on our planet? How does it compare with the overall size of *Nepal* (which houses the *Himalaya*, the tallest mountains in the world) to the south? Explain your interpretations in the box below.
The Arabic word "*erg*" is used to designate large areas of Earth's surface covered with sand, and connotes the concept of a "sand sea". Even though it is ranked 15th in area for deserts (extremely arid regions) on Earth, should the *Taklamakan* be classified as an "*erg*"? If so, would it be the largest on the planet? Explain your thoughts in the box below. You should probably ***ZOOM IN*** and ***PAN*** around the *Taklamakan* at a lower ***EYE ALTITUDE*** to look for evidence of sand covering the desert floor.

ATTACH PRINT VIEW #1 HERE

ATTACH PRINT VIEW #2 HERE