

## **Google Earth recommendations and ideas:**

### **Outline:**

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**highlighted ideas** are ones I think could be particularly useful and novel. **Hyperlinks** too.

### **Google Earth streaming audio:**

This may come off as totally cheesy, or very cool... but I think it has some potential. One of the other speakers at our Urban Sensing Tech Talk noted how viscerally most people reacted to the live audio stream of singing birds during my Google Earth demo; the addition of audio seemed to make the experience altogether different. It got me thinking that, though most of the media on the internet is video and audio, you guys are completely lacking the later in Google Earth.

I think that adding streaming audio to the program would greatly enhance the user's experience, and enable a whole new angle for user content contribution. I'm thinking of some system where people can choose a variety of different audio 'channels', or sound types that they are interested in. A user-defined (but bandwidth-limited) number of these could be playing simultaneously, varying in volume according to spatial proximity and user-defined maximums (what they want as background noise, and foreground sounds).

Although placemarkers can provide a visual queue to what is below/near the viewer, putting too much visual information on the screen leads to cluttering. Not to mention that you are missing everything that is right behind you. Why not use an auditory queues for things people are interested in?

Here is a little 30-second demo I threw together quickly to give you a rough idea of what I'm talking about: <http://media.putfile.com/GE-with-audio>

Granted, there are a whole suite of copyright issues, and technical challenges (buffering multiple streaming audio sources, finding media sources, mp3 streams vs. realmedia streams, etc.). But I really think that it's something that could deeply enrich the Google Earth experience, and offer new money-making vehicles (a la radio advertisements!).

I can think of at least three different audio source that could be included in Google Earth: 1) Live streaming audio, 2) Recorded streaming audio, 3) downloaded and locally cached audio. Examples of each to follow:

#### 1. Live Streaming Audio:

- a) streaming radio stations (live105.com, radioalice.com, etc)

- b) ambient audio feeds from urban, nature locations
- c) air traffic control, police scanners streams
- d) live musical events, concerts, clubs with feeds
- e) User-supplied sources via the bbs: ambient sound sources, etc. After a month of approval, added to the Community Layer as a streaming source.

2. Recorded audio streams:

- a) Foreign language conversations as you approach other countries (maybe harvest audio from Google Video?)
- b) Music, audio books, famous speeches, spoken word recordings as you approach the hometowns of musicians, authors, and historical figures
- c) Local bands and sound clips from MySpace.com
- d) Streaming bird songs, based on the most prevalent or beautiful songs from birds of that area
- e) User-supplied streaming sources, via the bbs. (shoutcast/podcast streams)
- f) Other relevant nature sounds (wind through trees, calls of savannah animals, rivers, waterfalls, Old Faithful in Yellowstone Nat. Park, etc).

3. Downloaded and locally cached sounds

Provide canned sound bytes for specific, common features (such as those found in the “Layers” panel: lodging, banks, clubs, coffee, schools, railroads, etc). You could limit the numbers of times ambient sounds would play for each location and type per time period, as not to become annoying...

a) *Ambient/untargeted sounds:*

- **low elevation ambient:** traffic from freeways, music from concert halls/clubs, ocean sounds at the coastline, trains, animals from zoo, children playing at park, basketball games from stadiums, birds, singing from churches, etc.
- **low to mid elevations:** streaming radio stations, weather conditions (rain, wind), airplanes from airports, active volcanoes, etc.
- **high elevations:** wind from jet stream, the occasional jet flying by (using some of the dynamic data layers already created for that), and maybe if you are high enough, the occasional passing satellite, “solar wind”, cosmic radio waves.

b) *Low elevation, targeted sounds for businesses using human voices: (maybe a bit cheesy)*

- In addition to ambient sounds, perhaps actual recordings of people can be used to draw attention to features. I'm thinking of little snippets of people's conversations like, “Let's go to the movies”, “I need to stop by the bank”, “Do you want to get some Mexican food?”, “We're almost out of gas”, etc.
- You could get multiple recordings of different voices for the same basic feature, as to prevent them from getting old, or sound totally artificial. You could also limit the

number of times a sound byte can play for a given location, and a given feature type. I guess you could recruit volunteer voice actors from Google's offices to get a wide variety... after it's played a few times on a person's computer, it gets deleted and new ones are downloaded.

- I could see this leading into advertising revenue as well, ie. Little audio “commercials” in addition to ads for the unpaid version of GE. Radio commercial snippets, or specific sound bytes for specific businesses (“Do we need groceries?” vs. “I'm going to Ralphs to get some milk”).
- Support for end-user sound bytes could come into play too... via the bbs. Perhaps some sort of trust network or approval system to prevent abuse... then users record a very short clip, upload, and have it play as people visit or fly by specific areas.

**Other random thoughts:** You might want a moving circle or sphere to visually show the user their hearing “range”. Users might set three to five desired channels (birds, radio station, ambient sounds, conversation snippets, etc.) and as they fly within a certain extended range of a new object, GE starts pre-buffering preferred streaming audio streams. As they get within “earshot” the sounds are actually played, mixed at volumes appropriate for proximity and the user's desired foreground and background levels.

**Audio playlist:** For each 'channel' there would be a playlist in GE, so if they pass by something of interest (upcoming music concert, radio station, park, etc) they can click on it, and have GE jump to that location and display a placemaker with more information.

## KML ideas:

### 1. <description> suggestions

#### a) support/emulation of external CSS stylesheets

- I'm sure you've already had a million requests for this.
- Not sure if the Qt libraries you use support this, but it would be fantastic

#### b) How about support for XSLT for description content?

(for those reading that don't know what it is [and not that I'm an expert!] xml stylesheets (XSL) can Transform (hence XSLT) xml into other types of xml, text... ie. HTML.)

- Given the largely repetitive, thematic nature of our placemaker descriptions, it would be great to code the description content as XML and use XSL to transform to (Qt-friendly) HTML for display
- (+) Keeps the kml much cleaner, separating the html presentation (and lots of in-line CSS) from the content/information itself.
- (+) Ability to target different audiences with same kml by using different XSL style sheets. Selectively display subsets of total description content, and control how it's presented in HTML.

- (+) Might be a work-around if there isn't support for external CSS stylesheets in QstyleType... you could load different XSL stylesheet for different classes of placemarkers, and use the XSL to add the in-line CSS in the HTML
- (-) Allowing the average end user to edit the xml descriptions in GE would be problematic... It would require either a permanent conversion to HTML for that placemark, making the description read-only, or finding some XSLT wizards to include in GE.

c) Allow GE to grab HTML from a live URL for display (<descriptionURL>?)

- Another thing that's probably crossed your minds...
- You grab and cache image displayed in descriptions, why not also grab html from a URL? Server-side scripting languages can provide custom description content depending on the request URL and GET query string.
- Developers should be providing GE/Qt compliant HTML, but you could also parse out unsupported HTML tags as a precaution.
- Allow for control over the caching of the html in kml. This would alleviate dependence of refreshing on network links to deliver new description content, even though the location of placemark remains the same.

**2. More kml-based cache control over <icons> and <descriptions>**

- ie. within the description tags, add a <cache>[none] / [timeperiod]</cache> so that webcams images within descriptions would update every time the description is accessed, or if the cached version is over a specified age.
- Also, for the use of webcams and other streaming images as placemaker icons it would be nice to force a periodic reload of the icon, without having to use a network link refresh.

**3. <placemark> suggestions**

a) Adding <keywords> to allow for client-side filtering and searching of placemarks

- This could provide a way, other requesting new kml with search criteria, to be filtered or searched for selective display.
- Current search function only looks at the descriptions and jumps to the next match.
- I'd like to define custom keyword classes in kml, which are presented in GE as drop-down filtering menus, max/min range filters, or as a text search box. Then I can selectively display placemarks without having to uncheck folders or individual markers.
- ie. We have a kmz with 2000 sensor deployments. What if... "I just want to see sensor nodes deployed between 2003 and 2004?" "I just want to see sensor systems deployed installed by research group A?" "I just want to see sensor installations with temperature sensor type X (as they are defective and need replacement)."

**4. KMZ passwords for security, making content read-only**

- What about adding support for read-only kmz's?

- b) Allow people to open and view content in kmz's, but don't allow them to move items out of the base folder, save only as KMZ, not KML, etc.
- c) Not so much a robust security option, but allow the content creators a little more control over how the kml is used.

#### 5. <multipleGround&ScreenOverlays>

- a) Especially when stitching together several hi-res overlays that need to act as one unit, it would be nice to group them together, and have them appear in 'My Places' as one unit.

#### 6. HTML-based screen overlays

- a) Allow text and hyperlinks to be displayed, instead of just images
- b) Use same rendering engine as the placemark descriptions, just in a fixed location?

#### 7. URI for interaction with other GE layers, placemarkers, overlays, etc.

- a) I would love some way to interact with the API via the hyperlinks in Description bubbles
  - Click on a hyperlink in a description bubble, and have it turn on/off an overlay
  - Clicking a link in the description takes user to another placemark and bring up that description bubble
  - Links to change current view, etc.
- b) Maybe something reminiscent of 'onClick' javascript events for hyperlinks...
  - <a href="geURI://My Places/Overlays/GIS\_layer?vis=1">turn on GIS layer</a>
  - <a href="geAPIcall: setLayerVis("GIS layer", 1);">turn on GIS layer</a>

#### 8. BBOX query string, <time>, # of refreshes

maybe this already exists for the GE Enterprise client?

- a) Include the client's current time frame in BBOX query string. ie.
 

```
<viewFormat>BBOX=[bboxWest],[bboxSouth],[bboxEast],[bboxNorth],[current_time]</viewFormat>
```

 . Would be useful to help retrieve time-relevant data.
- b) For network links, in addition to view-based refreshes, something with a 'timescale change' refresh ('Time-based refresh' already in use for periodic refreshes)
- c) *Refresh counter*: Send the number of times a network link has been refreshed along with BBOX:
  - In trying 'animate' overlays, I thought it would be helpful for GE to to send the number of times a refresh has happened. Ie. I have 10 overlays I want to cycle through. If the network link updates at some time interval (every 10 seconds) and the request from with a GET variable ?request\_num=3, I could have our server return the appropriate frame for the animation. Also useful for huge geologic timescales that you don't want to support in GE's upcoming Time features (animate plate tectonics over millions of years).
  - This could also help a server limit the number of times any one client can make refresh requests in a given time period.

## GE user interface ideas:

### 1. Global icon and label scaling and transparency

- a) How about a slider bar (like the transparency slider for folders containing overlays) that allows you to increase/decrease the relative size of icons or labels for entire folders, or everything in 'My Places'
- b) I would also like a global and folder transparency slider bar for labels (and maybe icons) so I can 'dim' or hide the label text for specific folders of placemarkers.

### 2. Level-of-Detail/dynamic scaling and multi-resolution icons for large scale changes

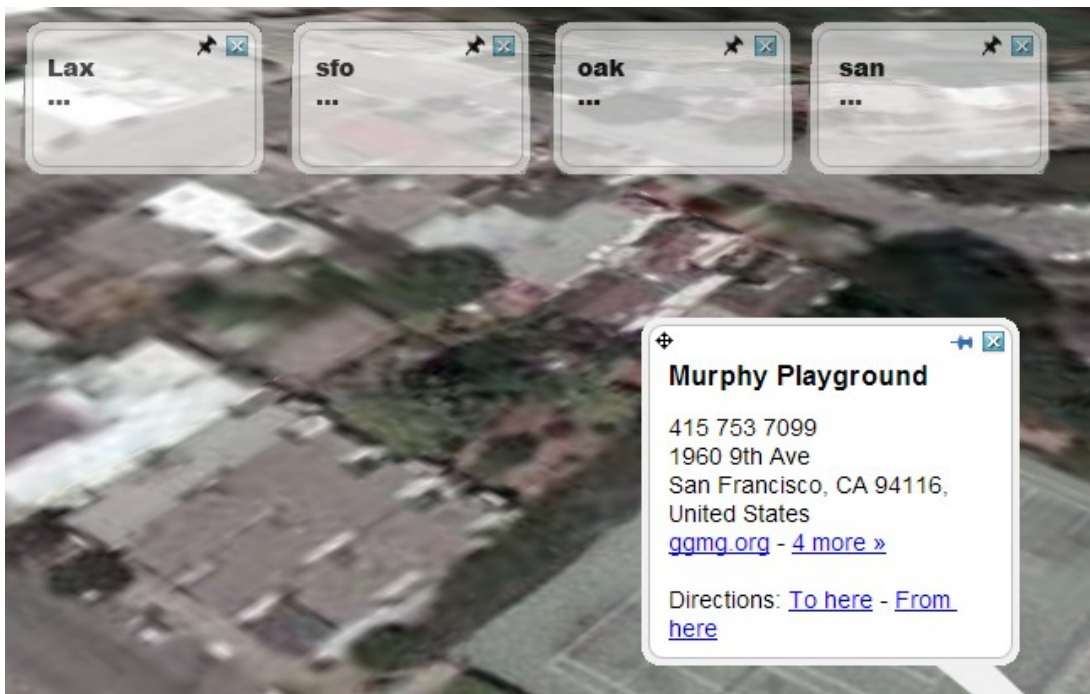
From the bbs, looks like you guys are working on LOD, so that certain features don't appear until the viewer is within a certain range. Would be great!

- a) Much like icons sets for Windows, what about *support for multiple resolutions of icons*? I'm thinking about this specifically in dealing with the above global scaling. For the use of actual webcam images as "icons" it would be nice to be able to have a high/low resolution of the icon available. That way, when images are used as icons, and the user wants to 'up' the global scale, or use a highlighted style that dramatically increases the icon scale (2-3.0), it would look a bit better than a super pixelated image.

### 3. Description Bubble behavior

I would like far more control over the description bubbles...

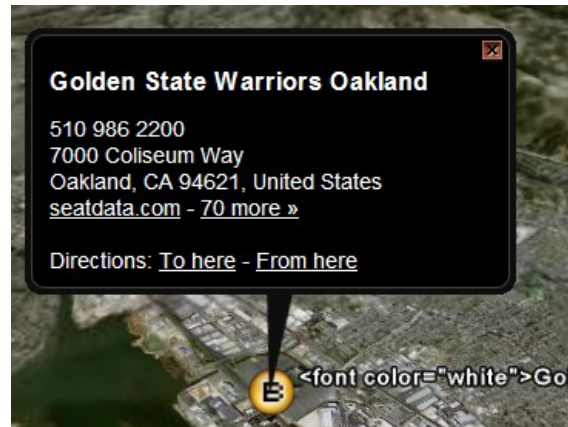
- a) What about being able to **'pin-down' the bubbles**, so they stay open, despite clicking away? I would like to compare the values/descriptions of to bubbles side-by-side.
- b) Using an **OS X "Dock" style approach**: for those bubbles that I want to remain open for easy access, perhaps they can be scaled down, and moved into fixed positions along the side, top or bottom, sort of like the OS X Dock.



- c) **“Exposé” type feature** like in Mac OS X, where if you have multiple description bubbles open and 'pinned open' at the same time, you can bring them all into view side-by-side.
- d) What about being able to **move the bubbles**? I frequently find myself wanted to make screenshots, but the bubble I want to display is sitting over the terrain I also want to show. Current I click and drag on the non-html rendered portions of the bubble (on the descrip\_\*.png bubble edges), which allows some movement of the map while the bubble stays in place. But actually being able to put the bubble where I want it would be great.
- e) **Resizing the bubbles**: Would it be possible to allow resizing of the bubbles? Perhaps the text and images in the description could be dynamically scaled too.
- f) **More transparency options**: it would be nice to have control over the description bubbles such that their backgrounds (and the pngs that make up the borders) can be transparent to show terrain underneath.

#### 4. **Description Bubble styling**

- a) I posted something to this effect in the bbs  
<http://bbs.keyhole.com/ubb/showthreaded.php/Cat/0/Number/368123/an/0/page/1#368123>)



- b) It would be nice to style each placemarker bubble in the kml with custom descrip\_\*.png's, instead of just changing the basic colors in <BubbleStyle>.
- c) Also, the descrip\_\*.png's for the top/bottom and sides are stretched to the bubble width and height. If they were tiled instead, it would allow better control over the appearance.

#### 5. **Gray-checkmarks for folders with some visible items:**

Currently, if a folder contains multiple items, and any one of them is unchecked (invisible), then the parent folder is also unchecked. This is deceptive, as people think that an unchecked, collapsed folder is completely turned off, when in fact there might only be one child item turned off. This is also really bad for some of our folders, which contain lots of large raster overlays. I disable most by default, but the unsuspecting user mistakenly 'checks' the parent folder and starts downloading all child items (sometimes crashes GE).

- a) How about a gray checkmark, or something for folders with partially visible child elements?

## 6. Customize fonts and clicking behaviors in 'My Places'

When dealing with many layers and items in My Places, it gets difficult to navigate back and forth during demos, because you often have to scroll up and down.

- a) How about user-defined font size for My Places to squeeze more or less in there?
- b) Double clicking on a folder both expands/collapses it and moves to the “Snapshot” view. Separating these functions would be helpful.
  - perhaps single click opens, but double click moves to view?
  - Or how about the to configure the actions of the middle or right mouse button?
  - How about Windows-style folder tree? With (+) and (-) next to folders to open/collapse, and double clicking on the folder itself moves to view?

## 7. My Places thumbnails

Currently, when using custom icons, GE makes a mini-thumbnail to display next to the item in 'My Places'. When doing a very large number of photo-based icons (for example webcam images in a large icon palette), it seems like GE hangs... I assume it's trying to create all those mini-thumbs.

- a) How about style control over what icon, if any appears in My Places... perhaps different from the one actually displayed in the 3D window?

## 8. Custom compass-rose

- a) Along the lines of custom bubble borders, how about kml to specify a custom compass rose? It would allow the content creators a little more control over creating “skins” or themes for their kmz's.
- b) Also, how about a 3D rendered compass rose? The current one remains 'flat' despite changes in viewing angles. As the viewing angle goes to more horizontal, it would be cool if the compass rose tilted a bit too, giving a more accurate sense of compass directions in a 3D world.

## 9. Daylight, Moon, Sun, stars rendering (also suggested in more detail in 'Data acquisition sugg')

- a) I think it would be very cool to add/tweak the atmosphere and lighting rendering to simulate night and day in realtime, based on geographic location.
- b) Also add in an accurate star map, with constellation lines, current phase of the moon, planets, etc. Granted you would have to allow the user to “look up”, instead of just down and out.
- c) Using some of the night light pollution satellite images, you could even account for the visibility of stars, given coarse levels of urban light pollution.

## 10. Add the ability to turn on/off overlays, open/close <description> bubbles on tours

- a) Tours are great, but have to be stopped in order to click on a placemark to view the description of turn on/off an overlay.
- b) What about some way to automatically turn on/off such things, and control for how long they are visible?

### 11. Coordinate conversions

- a) It would be nice to have some built in tools for coordinate conversion, allowing placemarkers to use more than just lat/long in WGS-84.
- b) Also the option to display the current location in more than just lat/long (UTM, etc).

### 12. Sort the list of items in 'My Places' by drawOrder, item type

Changing drawOrder on several items is very tedious

- a) How about sorting all the 'My Places' items by drawOrder, in a flat hierarchy, and allow drag-n-drop re-ordering?
- b) Also, sort/list all items by item type (path, polygon, overlay, placemark, etc) for a quick look through items

### 13. Web browser window pane: add bookmarks?

- a) When displaying web pages in the internet browser pane, how about a bookmark button?

### 14. Direct X, OpenGL screen cloning

- a) Especially when doing a demo on a projector, I find that so much of the screen is taken up by the 'My Places' and various control panels.
- b) Some applications, like VideoLAN (an open source media player) supports hardware cloning of DirectX output. Something like this, to clone GE to another window (minus all the extra stuff) would be great for presentations

### 15. Auto-hide Left Panel ('My Places' sidebar) and Navigation Panel

- a) I find these tool panels suck up a lot of screen real-estate, and it would be great if there was some sort of auto-hide ability (like Windows taskbar/OS X dock). Not quite the same as F11 – Fullscreen... which is more distracting as it changes the dimension of the 3D rendered area. Rather something that actually overlays the tools on the 3D rendered area, and quickly disappears when the mouse returns to the 3D area.
- b) Maybe quick access to unhide all the panels with single keyboard stroke, or moving mouse to the hot spot corner.
- c) Perhaps ability to transparently superimpose these auto-hide panels over the 3D output, so people can still use the panels, without completely losing touch with what is happening underneath.

### 16. Ability to turn on/off overlays and select Description bubbles in tours:

- a) This is the biggest weakness of tours. Perhaps coupled with the suggested URI for access to GE API functions, there should be some way do this during a tour, so it doesn't have to be stopped, requiring user interaction.

### 17. Ability to control viewing direction while following a path

- a) I don't like be restricted to a specific angle and altitude when following a path.
- b) Doing a tour with placemarks and specific "LookAts" works, but it always slows down or stops momentarily at each placemark's view
- c) What about setting desired camera angles/bearings/altitudes for certain segments of a path,

which are smoothly panned between while touring? Something like being on a real tour bus! “And to your left is City Hall, to the right Grand Central station, and up behind you the top of the Empire State Building” while never slowing down.

**These are more goofy ideas for nifty 'gee-whiz' features:**

18. Orienteering tools/overlays

- a) Especially for people working with traditional topo maps in the field, it would be cool to have a compass bearing needle or digital bearing overlay (magnetic and true north) in GE.
- b) Something that would allow you to take bearings off mountain peaks, and perhaps a custom line tool that would easily attach to a targeted mountain peak, and when moving to a bird's eye view of the terrain, would stay fixed at that end, while giving the compass bearing as the free end is rotated... I'm thinking of old school bearing intersections to find location.
- c) Would be a great tool for teaching people transitional, non-GPS navigation!

19. Line of Sight tool

- a) Perhaps develop some intuitive line-of-sight tool that would create a snapshot polygon surface or a series of lines that would show people what can be seen from a specific location and altitude.
- b) Generally useful for things like cell-tower reception, long distance point-to-point wireless bridges, “what my view will be like if I buy this house?”, etc.

20. Sextant tools and stargazing

- a) If you guys use an accurate star map and constellation lines for the sky (a la Celestia: <http://www.shatters.net/celestia/>), add in the sun & moon's current position, and allow the user to “look-up”, you could provide assisted star-gazing functionality. This would allow users to find constellations, stars, planets, etc. the night sky, using their surrounding terrain and compass bearings as a guide.
- b) You could also create a little sextant tool that would allow people to find their position in the world using old-school methods :P

21. Adventure racing game idea

- a) With the above orienteering and sextant tools, and the ability to lock the viewer's altitude, and restrict movement speed by hill slope (and eventually vegetation types using Remote Sensing data), you could make a fun little “Adventure Racing” game.
- b) People would be dropped off in random locations, and using on-screen topo maps, star charts, would have to find their way home, or to a specific location...
- c) Could create polygons surfaces to define restricted areas and paths from ports to cross oceans.
- d) Cheesy, I know, but if you added a “3D vegetation” to the “Layers” section using Sketch-up models to simulate ground vegetation (based on Remote Sensing data), I think it could be pretty cool :P

## **Data Acquisition suggestions:**

### **1. Bathymetric / Underwater topography and ocean rendering**

#### a) Underwater topography

- Not only for the 'gee-whiz' factor, I'm sure a lot of oceanographers and scientists would love to see the ocean floor rendered in 3D along with the boundaries of tectonic plates. (After all, Mauna Kea in Hawaii is the tallest mountain in the world, topping Everest by ~2500 feet!)
- Places like the Great Barrier Reef, Marianas Trench, mid-Atlantic ridge, underwater volcanoes, forming new islands, famous shipwrecks, paths of underwater telecommunications cables... would all be very interesting to users

#### a) Ocean rendering (like atmosphere)

- You could render the ocean much like the atmosphere. That way you could completely expose the ocean floor, or render a water 'atmosphere' providing reduced light as you got deeper.
- Sea-level Rise: you could also let the users alter the sea-level and see what happens to all their favorite beaches :P

### **2. Star Maps, Constellations, Moon and the Sun (mentioned above in lesser detail)**

- a) Would be great to know the real-time locations of the moon, sun and planets as objects in the sky... maybe with the support for <time> in future version, this can be dynamically calculated (find eclipse events and projected shadow paths across the globe!).
- b) Show the various phases of the moon in real-time...
- c) Allow for virtual stargazing – helping people find stars and constellation in relation to compass bearings and their local topographical features (mountains, etc). “When is Orion going to disappear behind that mountain/ridgeline?”
- d) Granted, you have to add provisions to users to “loop up.” To avoid getting confused, maybe it should be a setting to toggle between the regular “looking down” and “looking up” (maybe with an altitude ceiling).

### **3. Day/Night**

- a) Another thing I imagine you guys are working on. Would be very cool to vary the amount, color and opacity of the atmosphere rendering to simulate day and night, depending on geographic location.

### **4. 3D rendering of ocean and wind currents**

Would be very cool to represent ocean currents and winds in 3D with directional lines, or even some moving 3D textures. Show some of the 3D cycling of cold air and water around the tropics/poles, the trade winds, jet stream, etc, etc.

### **5. World vegetation maps**

.... that would allow dynamic rendering of 3D modeled plants from Sketchup as users get closer to the ground :)

## Cross Google integrations with Earth:

In case someone hasn't already thought of these cross-Google integrations...

### 1. Google Video / TV & Movies

a) Placemarks where TV shows, movies, video clips take place or where they were filmed (LOTR - NZ, CSI Miami, Law and Order - NYC, etc), and links to Google Video to view/buy

- **TV shows:** [http://en.wikipedia.org/wiki/List\\_of\\_television\\_programs](http://en.wikipedia.org/wiki/List_of_television_programs)
- **movies:** [http://en.wikipedia.org/wiki/Category:Lists\\_of\\_films\\_based\\_on\\_Location](http://en.wikipedia.org/wiki/Category:Lists_of_films_based_on_Location)  
<http://www.imdb.com/LocationTree?USA>

b) Georeference closed captioning indexes from shows for places mentioned in TV episodes, etc.

### 2. Google Answers

a) Georeference existing Google Answers where questions have some geographic relevancy

b) Have new questions include a location field, if relevant, for future inclusion

### 3. Gmail, Google Chat, Google Talk

a) Map your buddies, see who's online, chat with a random person from somewhere in the world

### 4. Google Finance

a) Show stock gains/loses/graphs for companies in GE using arrows & sparklines as icons, based on the locations of their headquarters (granted, most big businesses have multiple locations!).

a) Would be interesting to see, at least for local or regional businesses, how companies in various geographic regions are doing on the stock market. Maybe have regional gains and losses for specific sectors.