

## A Google Map mashup for hydrogeochemical data of Emilia-Romagna Region

*Un Google map Mashup per i dati idrogeochimici della Regione Emilia-Romagna*

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**ABSTRACT** - The present paper illustrates the Web 2.0 technology for the presentation of analytical data and results of the speciation calculation in groundwaters of the plain area of Emilia-Romagna region. Geographic data are viewed by means of a Web-GIS based application with Google map mashup technology, utilizing the functions offered by WEB 2.0. technology. The information content, consisting of hydrogeochemical data collected within the SINA (National Environmental Information System) network, while demanding in terms of IT resources, is nonetheless easily accessible. The dataset, comprising chemical analyses and speciation calculations, represents one of the few examples of data elaboration pertaining to sedimentary environments. The data is made available on the web in kmz format.

**KEY WORDS:** G.I.S, Google Map, hydrogeochemistry, KMZ, Emilia Romagna

**RIASSUNTO** - Il presente lavoro illustra la tecnologia Web 2.0 utilizzata per la rappresentazione dei dati analitici e dei risultati del calcolo di speciazione nelle acque sotterranee della zona di pianura della Regione Emilia-Romagna. I dati geografici sono stati messi su internet per mezzo di un Web-GIS, applicazione basata su tecnologia mashup con Google map, che utilizza le funzionalità offerte dalla tecnologia Web 2.0. Il contenuto informativo, costituito da dati idrogeochimici raccolti nell'ambito della rete SINA (Sistema Informativo Nazionale Ambientale), pur essendo esigente in termini di risorse IT, risulta comunque facilmente accessibile. Il set di dati, che comprende le analisi chimiche e calcoli di speciazione, rappresenta uno dei pochi esempi di elaborazione dati relativi agli ambienti sedimentari. I dati del sistema informativo Web 2.0 adottano il formato KMZ.

**PAROLE CHIAVE:** G.I.S, Google Map, Idrogeologia, KMZ, Emilia Romagna

### 1. - INTRODUCTION

The computer technology for the representation of geochemical data in a Web-GIS environment which began to appear at the end of the '90s, has to date developed in two different directions: chronologically, the first utilized standard proprietary products, while the second more recent technology availed of Open Source technology (i.e. WILLIAMS S., 2002). Looking at the cost/advantages relationship, proprietary products offer higher reliability and costs, while Open Source technology (i.e. openlayer, mapserver) requires greater investments in human resources. Both, in any case, require significant investments in terms of hardware (data and web servers, firewalls, etc.) and suitable premises for the necessary infrastructure. In more recent times (2005) the appearance of Web 2.0 has enabled a new approach which does not use specific hardware for network data management, instead using services offered virtually free of charge by Web 2.0 for storing, viewing and managing information, thus enhancing the investment in human resources. An additional benefit is that this latest approach is unaffected by physiological ageing of hardware technology; on the contrary the volume of data and management methods become through Web 2.0 progressively more efficient and effective. This present work has the dual purpose of studying Emilia Romagna

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groundwater, applying in these speciation calculations with a view to studying the protection of aquifers, and, from a computational point of view, in consideration of the large volume of data processed, the possibility of using Web 2.0 technology for presenting results and maps in G.I.S..

## 2. - GEOCHEMISTRY

### 2.1. - THE UTILIZED DATA SET

Adopting a G.I.S approach, 395 wells characterized by depth in the range 60-400 m and by the presence of one filter only along the well tube were selected. The adopted criteria allows reliable representativity of groundwater geochemistry for mainly non-phreatic aquifers hosted in the Emilia-Romagna plain sediments. Each well has been sampled and analyzed for chemical and isotopic purposes. Available information allowed us to identify the hydrostratigraphic (REGIONE EMILIA-ROMAGNA-ENI, AGIP, 1998) localization of each well. In this way both hydrostratigraphic and technical characteristics may reduce uncertainties in geochemical data interpretation. Thus mineral-chemical equilibrium of groundwaters has been studied. The package adopted for the database and G.I.S mapping was ESRI ArcGis 9.2.

### 2.2. - DATA ELABORATION: SPECIATION CALCULATION

Speciation calculations were applied to the chemical analyses of 395 wells. This represents the most effective method for determining conditions of chemical equilibrium in aquifers. As established, for this type of data elaboration, for the dissolution of the mineral phase  $m$ , present in a rock, we consider the activity quotient  $Q_m$  expressed by the relationship

$$Q_m = \prod_i \frac{\alpha_{i,m}^{v_{i,m}}}{\alpha_m}$$

where  $\alpha_{i,m}$  is the activity and  $v_{i,m}$  is the stoichiometric coefficient of the mineral phase.

The free energy  $\Delta G$ , of the chemical reaction associated with the dissolution of the solid species is given by

$$\Delta G_m = \Delta G_{m,r}^0 + RT \ln Q_m$$

in conditions of equilibrium  $\Delta G_m = 0$

Since the relationship between the free energy of a standard partial molar reaction and the equilibrium constant  $K_m$  is

$$\ln K_m = \frac{\Delta G_{m,r}^0}{RT}$$

it follows that  $Q_m = K_m$  and  $\log \left( \frac{Q_m}{K_m} \right) = 0$  in

conditions of equilibrium. Conditions  $\log \left( \frac{Q_m}{K_m} \right) < 0$  and  $\log \left( \frac{Q_m}{K_m} \right) > 0$  correspond to conditions of

below and above saturation respectively for the phase examined. The general preference is to use  $\mathcal{SI} = \log(Q/K)$  or the saturation index to indicate the state of equilibrium of the phase (i.e. REED & SPYCHER, 1984).

For the speciation calculation, the package SOLMIN.88PC/Shell (KHARAKA *et alii*, 1988; TALMAN, 1992) was adopted.

The large volume of data generated by the calculation is in itself a problem in terms of transfer and organization within a database. To computerize this procedure, an application called Chipmunk (fig. 1) was created in Microsoft Access: this enables the optimization of the procedure and slims down the data transfer process. A macro excel procedure enables spreadsheet data to be transformed into an input file for SOLMIN88. The package generates a verbose output of equilibria of solid phases and aqueous species which needs to be rearranged as records for a database. Chipmunk enables this process.

### 2.3. - SPECIATION RESULTS

The speciation calculation highlighted several unique characteristics of the sedimentary basins and revealed the limitations of this type of calculation. From a geochemical point of view, the sedimentary basins are significantly conditioned by the presence of clay and sand. From a mineralogical point of view, this is evident for types of mineral phases approaching equilibrium and aqueous species involved. The speciation calculation was therefore repeated in the case of variations in pH and Eh conditions so as to highlight the behaviour of water in conditions of water stress and/or in proximity to the coast with sea water ingress. The results allow us to describe hypothetical situations and therefore have a purely speculative value. In any case, the fact that the study focuses on wells of the SINA network, which are large-scale abstraction wells, highlights the fact that the chemical composition represents an average value based on the surrounding area; consequently this value cannot be used specifically, unless to pinpoint areas affected by certain processes and/or evolutive behavior.

For this reason the data was represented using two methods: a vector method, referring to the specific sampling point, and a range method using Thiessen polygons that extrapolate the punctual information to a surrounding area. THIESSEN (1911) polygons mathematically defined by the perpendicular bisectors of the lines between all



Fig 1 - Chipmunk (Microsoft Access application): in the background main mask of the application, on right resulting tables.  
 - *Chipmunk (applicazione in Microsoft Access): sullo sfondo maschera principale dell'applicazione, a destra le tabelle risultanti.*

points, define individual areas of influence around each of a set of points. Thus, in terms of both the quantity and granularity of information generated, the cartographic representation of geochemical information is specifically suited to a G.I.S oriented environment. Geochemical evidence from speciation calculations confirms expected results.

The examples reported in figure 2 are a sort of paradigm of significance to the approach: both illustrate features of geology of Emilia-Romagna. Figure 2a represents the equilibrium condition of halite resulting from leaching phenomena by sediments enriched in marine ions and by possible saline intrusion phenomena. Figure 2b describes  $\text{SO}_4^-$  abundance chiefly mobilized from evaporitic deposits of the Apennines and sometimes attributable to pollution phenomena.

The origin of halitic and evaporitic bearing groundwater in the Po sedimentary basin was reviewed by REGIONE EMILIA-ROMAGNA, ENI-AGIP (1998), by MARTINELLI *et alii* (1998) and by CONTI *et alii* (2000). Representation tools allow further control of geochemical data and multiply interpretative options.

## 2.4. - DATABASE MANAGEMENT

The obtained results were imported into the database of the Geological Survey of Emilia Romagna-Region and, purely as a prototype, a portion of the latter became part of a Google map mashup in order to explore the full potential of WEB 2.0.

Data available for Mashup were generated adopting KML format. The conversion the G.I.S package and KMZ (KML compressed) format was realized using the free package SHP2KML ([www.zonums.com](http://www.zonums.com)). This software allows the conversion from ESRI shapefile format to KML, a specific XML Google format for geographic information. KMZ files were stored on a Web 2.0 free area. This procedure has been adopted instead of a traditional client-server approach that entails the presence of a server and the activation of WMS (Web Map Service) for information management raster and/or WFS (Web Feature Service) to allow server and client dialogue.

This approach delivers easier data streaming on the net but can be critical with large dimension KMZ files.

This criticality was tested with the significant amount of hydrogeochemical data analysis and speciation results studied.

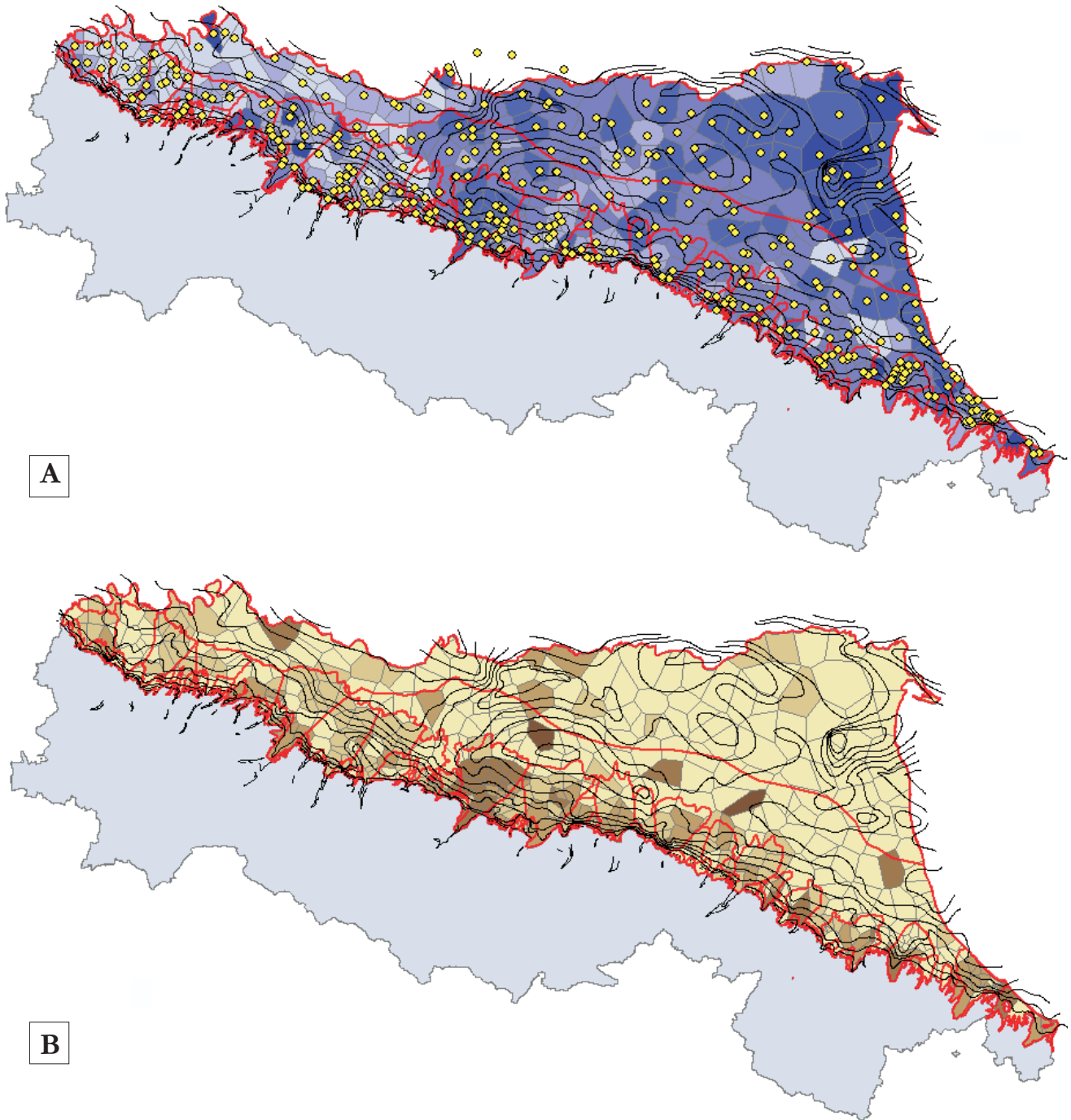


Fig. 2 - Speciation map results from SOLMIN88 (A) equilibria conditions ( $\log Q/K$ ) for halite solid phase (B) abundance of  $SO_4=$  specie. The gradation of colours in both figures indicates in the case of darker values, areas close to equilibrium while light colours are more distant.  
 - Mappe che illustrano i risultati della speciazione con SOLMIN88 (A) le condizioni di equilibrio ( $\log Q/K$ ) per la fase solida Halite (B) abbondanza della specie  $SO_4=$ . La gradazione dei colori in entrambe le mappe indicano con i valori più scuri, le aree prossime all'equilibrio, mentre i colori chiari le aree distali.

### 3. - WEB 2.0

#### 3.1. - WEB 2.0 TECHNOLOGY: AN INTRODUCTION

The term "Web 2.0" was coined by DI NUCCI (1999) to describe web development and web design that facilitates interactive information sharing, interoperability, user-centered design and collaboration on the World Wide Web. In essence, while

the traditional World Wide Web (retroactively referred to as Web 1.0) is based simply on availability of data from different sources, Web 2.0 allows utilization of resources and applications built specifically for collaborative purposes among Internet users and other users, content providers and enterprises. The Google search engine was a forerunner of these technologies first with an online translator and later with google docs (spreadsheet,

word editor) on line. A myriad of applications were subsequently built with programming languages such as Ajax and Ruby, specific for interoperability. There is no precise boundary that separates Web 1.0 from Web 2.0. but rather, a sort of progressive migration. One of the earliest Web 2.0 applications implemented in the geological geochemical field was the site created by <http://isobordat.jimdo.com/> Andreani, Adorni-Braccesi, Pennisi, Sciuto in 2007 when a collection of literature relating to isotopes of boron was managed entirely on the web adopting a free provider ([www.jimdo.com](http://www.jimdo.com)). In this case, database functionalities were encapsulated from [www.zoho.com](http://www.zoho.com), a suite of web-based programmes for small applications. The introduction of this technology grants numerous advantages in terms of saving resources, time and costs. It does not require specific hardware or operating systems, or people dedicated solely to the maintenance of the IT structure and there is no need to have dedicated server and firewall areas.

### 3.2. - GOOGLE MAP MASHUP

Mashup is a Web application that combines data or functionality from two or more sources into a single integrated application, hence realization of this Web 2.0 product requires familiarity with HTML, JavaScript, and the structure of Google API. The most common types of mashup use cartographic data from Google Maps, creating a new and distinct Web service not originally provided by either source (i.e. BROWN, 2006). Figure 3 illustrates the simple Google mashup proposed (the appendix details the source code). It is an AIO (all in one) application because it includes all the code necessary for its working in a single listing without external routines. The data are located on a Web 2.0 server in the Google kmz format and can be made available with a pop-up menu in the figure at the top right hand side. Viewing mode is full screen in order to offer maximum map area. We can see (also in figure 3) the controls for positioning (top left), place name search (bottom left), general view (bot-

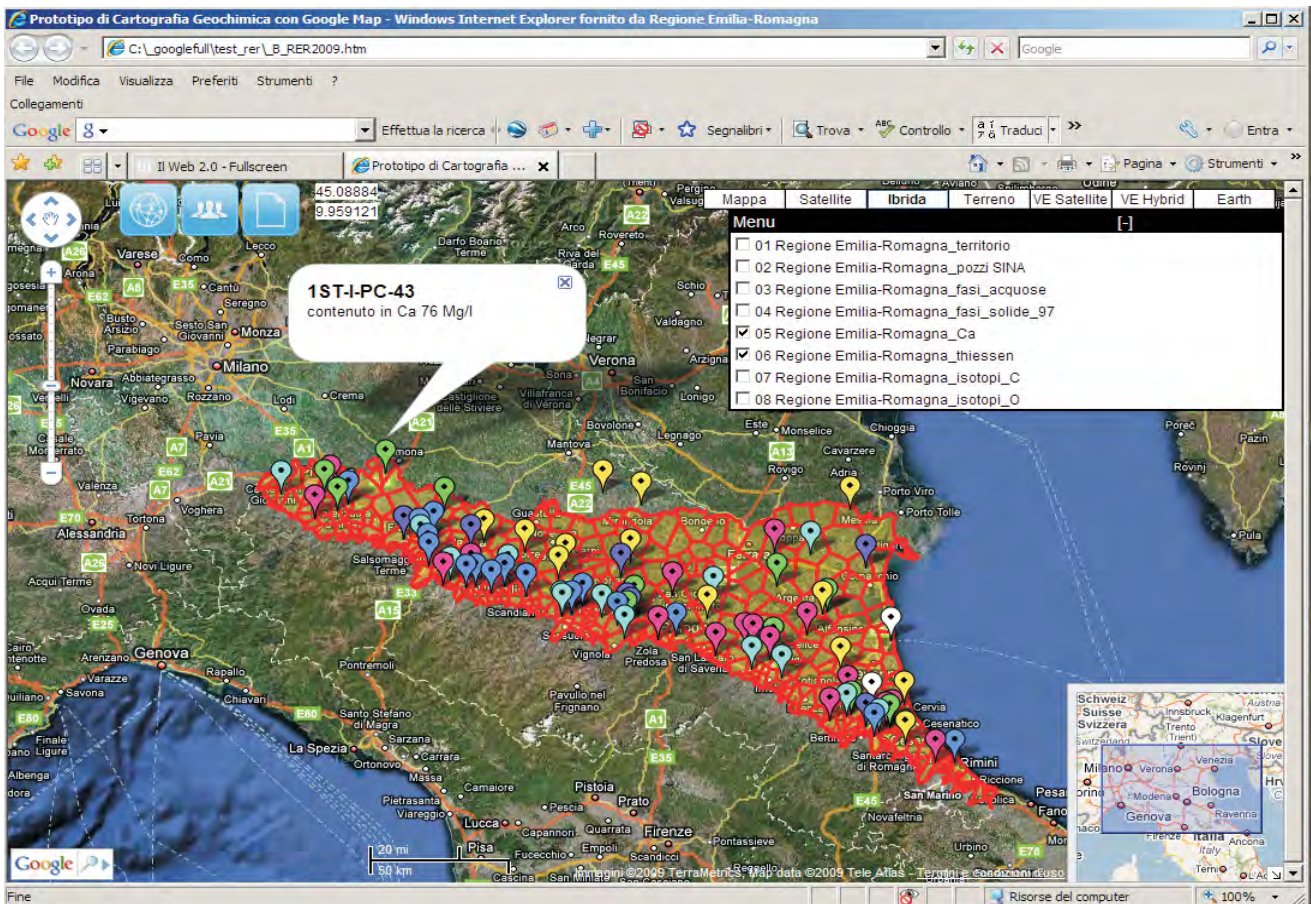


Fig. 3 - On top left: zoom controls of google map and hyperlink buttons to other applications, pages and pdf documents. On bottom left place name search. On top right management of google maps, google earth for google map, Virtual Earth controls and management of information layers with popup menus. On bottom right: general view map control.

- In alto a sinistra: controlli di zoom della mappa di Google e pulsanti di collegamento ad altre applicazioni, pagine e documenti PDF. In basso a sinistra Ricerca nome della località. In alto a destra: gestione di Google Maps, Google Earth per google map, Virtual Earth controlli e la gestione dei strati di informazioni con i menu popup. In basso a destra il controllo generale mappa.

tom right) and map (top right). The popup menu, together with the 3 buttons at the top right and the controls for the Microsoft Virtual Earth map (rival Google Map product) constitute the personalization available in this current prototype.

The prototype can be viewed with main browsers currently in use (Microsoft Explorer 7, Opera 9, Firefox 3, Google Chrome). The accuracy of the positioning of points resulting from the adopted map type and the degree of precision cannot in any case reflect the exact position attainable with commercial products. Nonetheless, discrepancies are being reduced thanks to progressive technological alignment of tools. Access to data is sufficiently rapid but depends in any case on available bandwidth. The mashup source code is detailed in the appendix.

#### 4. - DISCUSSION AND CONCLUSIONS

Hydrogeochemical data and speciation calculations for the 395 SINA network wells represented an excellent opportunity for studying groundwaters located in sedimentary basins and testing the potential of Web 2.0 for cartographic purposes.

The Thiessen approach constitutes an opportune representation of geochemical information because intrinsically it denotes information and its limitations. The volume of data elaborated provides a further boost to the already vast amount of geochemical information available in the Emilia-Romagna region. The provisional approach, considering not only measured pH Eh but also proximal range conditions, allows us to hypothesize different scenarios, emphasizing possible critical aspects of the hydrological environment. The use of Web 2.0 and Google mashup for viewing IT system data represents an increasingly valid alternative for the distribution of data within the technological network. In particular, we have observed that for functional management of the mashup with a network speed of 100 Mbps, the optimum size of each kmz files must be less than 1 Mb. Considering that the Google Map mashup has a size of 16 Kb and the total amount of all data is approximately 3 Mb (10 layers), data streaming is fluid. As regards data administration, the kmz format consists of layered information, so it does not

have the peculiarities of geodatabase which not support structured queries. This physiological limit, the result of a disproportionate use of KML standard for multitemporal meteorological data management, would appear to be circumvented by the imminent introduction of new Google API which allows greater flexibility. The chance to combine geochemical study with Web 2.0 proved to be a significant experiment, heralding new prospects for representation of geochemical, petrographic and geological data with low costs and high usability, making it a highly promising technology. Further technical data applications and source codes are available at the address <http://sciuto.yolasite.com>.

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## APPENDIX – MASHUP CODE

```

<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="content-type" content="text/html; charset=UTF-8"/>
<title>Prototipo di Cartografia Geochimica con Google Map</title>
<script src="http://maps.google.com/maps?file=api&v=2.x&key=xxxxx"
type="text/javascript"></script>
<!--<script src="java.js" type="text/javascript"></script>-->
<script type="text/javascript">
var ie4 = false; if(document.all) { ie4 = true; }
function getObject(id) { if (ie4) { return document.all[id]; } else { return document.getElementById(id); } }
function toggle(link, divId) { var lText = link.innerHTML; var d = getObject(divId);
if (lText == '+' ) { link.innerHTML = '-'; d.style.display = 'block'; }
else { link.innerHTML = '+'; d.style.display = 'none'; } }
</script>
<!-- flooble Expandable Content header end -->
<!-- Make the document body take up the full screen -->
<style type="text/css"> v\:* {behavior:url(#default#VML);} html, body {width: 100%; height: 100%;}
body {margin-top: 0px; margin-right: 0px; margin-left: 0px; margin-bottom: 0px}
</style></head><body>
<!-- Declare the div, make it take up the full document body -->
<div id="map" style="width: 100%; height: 100%;"></div>
<div style="top:25px; left:600px; position:absolute; background-color:white; border:2px solid black;">
<table border="0" cellspacing="0" cellpadding="2" width="100%" style="background: #000000; color:
#FFFFFF;FONT-FAMILY: arial;font-size:14px">
<tr><td>Menu</td><td align="left">
[<a title="show/hide" id="exp1231839082_link" href="javascript: void(0);" onclick="toggle(this,
'exp1231839082');" style="text-decoration: none; color: #FFFFFF; ">-</a>]</td></tr></table>
<div id="exp1231839082" style="padding: 0px;FONT-FAMILY: arial;font-size:12px;">
<input type="checkbox" id="box1" onclick="boxclick01(this,'geolog')"/>01
Regione Emilia-Romagna_pianura_schema_semplificato<br />
<input type="checkbox" id="box1" onclick="boxclick02(this,'kmzC97')"/>02 vuoto<br />
<input type="checkbox" id="box1" onclick="boxclick03(this,'kmzA97')"/>03 vuoto<br />
<input type="checkbox" id="box1" onclick="boxclick04(this,'kmzS97')"/>04 vuoto<br />
<input type="checkbox" id="box1" onclick="boxclick05(this,'kmzC98')"/>05 vuoto<br />
<input type="checkbox" id="box1" onclick="boxclick06(this,'kmzA98')"/>06 vuoto<br />
<input type="checkbox" id="box1" onclick="boxclick07(this,'kmzS98')"/>07 vuoto<br />
<input type="checkbox" id="box1" onclick="boxclick08(this,'kmzI98')"/>08 vuoto<br />
<input type="checkbox" id="box1" onclick="boxclick09(this,'ceolog')"/>09
Regione Emilia-Romagna_anomalie_regionali<br />
<input type="checkbox" id="box1" onclick="boxclick10(this,'cmzC97')"/>10 vuoto<br />
<input type="checkbox" id="box1" onclick="boxclick11(this,'cmzA97')"/>11 vuoto<br />
<input type="checkbox" id="box1" onclick="boxclick12(this,'cmzS97')"/>12 vuoto<br />
<input type="checkbox" id="box1" onclick="boxclick13(this,'cmzC98')"/>13 vuoto<br />
<input type="checkbox" id="box1" onclick="boxclick14(this,'cmzA98')"/>14 vuoto<br />
<input type="checkbox" id="box1" onclick="boxclick15(this,'cmzS98')"/>15
Regione Emilia-Romagna_Isotopia_pioggia<br />
<input type="checkbox" id="box1" onclick="boxclick16(this,'cmzI98')"/>16 vuoto<br />
<input type="checkbox" id="box1" onclick="boxclick17(this,'geolot')"/>17 vuoto<br />
<input type="checkbox" id="box1" onclick="boxclick18(this,'kmlC97')"/>18 vuoto<br />
<input type="checkbox" id="box1" onclick="boxclick19(this,'kmlA97')"/>19 vuoto<br />
<input type="checkbox" id="box1" onclick="boxclick20(this,'kmlS97')"/>20 vuoto<br />
<input type="checkbox" id="box1" onclick="boxclick21(this,'kmlC98')"/>21 vuoto<br />
<input type="checkbox" id="box1" onclick="boxclick22(this,'kmlA98')"/>22
Regione Emilia-Romagna_grafici_a_torta <br />
<input type="checkbox" id="box1" onclick="boxclick23(this,'kmlS98')"/>23
Regione Emilia-Romagna_grafici_a_barre<br />

```

```

<input type="checkbox" id="box1" onclick="boxclick24(this,'kmlI98')"/>24
  Regione Emilia-Romagna_grafici_a_cruscotto<br />
</div></div>
<!-- flooble Expandable Content box start -->
<div style="border: 1px solid #000000; padding: 0px; background: #EEEEEE;">
<table border="0" cellspacing="0" cellpadding="2" width="100%" style="background: #000000; color:
  #FFFFFF;">
<script language="javascript">toggle(getObject('exp1231839082_link'), 'exp1231839082');</script>
</td></tr>
</table>
<noscript><b>JavaScript must be enabled in order for you to use Google Maps.</b>
However, it seems JavaScript is either disabled or not supported by your browser.
To view Google Maps, enable JavaScript by changing your browser options, and then
try again.
</noscript>
<script type="text/javascript">
//<![CDATA[
//virtual earth tiles
var msnVeTileA = function(a, b) {
var sTile = '000000';
sTile += (parseInt(a.y.toString(2) * 2) +
parseInt(a.x.toString(2)));
sTile = sTile.substring(sTile.length - b, sTile.length);
s = 'http://a'
s += sTile.substring(sTile.length-1, sTile.length);
s += '.ortho.tiles.virtualearth.net/tiles/a'
s += sTile;
s += '.jpeg?g=1';
return s; };
//virtual earth tiles
//http://h0.ortho.tiles.virtualearth.net/tiles/h2100102010.jpeg?g=1
var msnVeTileH = function(a, b) {
var sTile = '000000';
sTile += (parseInt(a.y.toString(2) * 2) +
parseInt(a.x.toString(2)));
sTile = sTile.substring(sTile.length - b, sTile.length);
s = 'http://h'
s += sTile.substring(sTile.length-1, sTile.length);
s += '.ortho.tiles.virtualearth.net/tiles/h'
s += sTile;
s += '.jpeg?g=1';
return s; };
//virtual earth oblique
var msnVeTileO = function(a,b) {
var sTile = '000000';
sTile += (parseInt(a.y.toString(2) * 2) + parseInt(a.x.toString(2)));
sTile = sTile.substring(sTile.length - b, sTile.length);
s = 'http://c'
s += sTile.substring(sTile.length-1, sTile.length);
s += '.ortho.tiles.virtualearth.net/tiles/h'
s += sTile;
s += '.jpeg?g=77';
return s; }
//virtual earth tiles
var msnLayerA = new GTileLayer(new GCopyrightCollection(""),1,17);
msnLayerA.getTileUrl = msnVeTileA;
msnLayerA.getCopyright = function(a,b) {return 'MSN Virtual Earth';}
var msnLayerH = new GTileLayer(new GCopyrightCollection(""),1,17);
msnLayerH.getTileUrl = msnVeTileH;
msnLayerH.getCopyright = function(a,b) {return 'MSN Virtual Earth';}
//end virtual earth tiles

```



```

var map;
function doGenerateMarkerHtmlCallback(marker,html,result) {
html.innerHTML+="<b>Result Coordinates: "+result.lat+" "+result.lng+"</b><br>";
html.innerHTML+="<b>Marker Location: "+marker.getLatLng().toUrlValue()+"</b>";
return html;}
if (GBrowserIsCompatible()) {
map = new GMap2(document.getElementById("map"),{googleBarOptions:
{onGenerateMarkerHtmlCallback:doGenerateMarkerHtmlCallback}});
//{googleBarOptions:
//{onGenerateMarkerHtmlCallback:doGenerateMarkerHtmlCallback}
//});
map.setCenter(new GLatLng(44.310038, 11.040072), 8);
GEvent.addListener(map, 'click', function(overlay, point) {
if (point) {
document.getElementById('lat').innerHTML = "lat: "+point.y;
document.getElementById('long').innerHTML = "long: "+point.x; }});
GEvent.addListener(map, 'click', function(overlay) {
if (overlay) {
if (overlay instanceof GMarker) {
var point=overlay.getLatLng();
document.getElementById('lat').innerHTML = point.lat();
document.getElementById('long').innerHTML = point.lng();}}});
map.addControl(new GLargeMapControl3D());
map.addControl(new GMapTypeControl());
var topRight = new GControlPosition(G_ANCHOR_BOTTOM_LEFT, new GSize(300,7));
map.addControl(new GScaleControl(), topRight);
map.setMapType(G_SATELLITE_MAP);
map.addMapType(G_PHYSICAL_MAP);
map.setMapType(G_HYBRID_MAP);
var msnMapA = new GMapType([msnLayerA], G_SATELLITE_MAP.getProjection(), 'VE Satellite', {errorMessage: ""});
var msnMapH = new GMapType([msnLayerH], G_SATELLITE_MAP.getProjection(), 'VE Hybrid', {errorMessage: ""});
map.addMapType(msnMapA);
map.addMapType(msnMapH);
map.addMapType(G_SATELLITE_3D_MAP);
map.enableScrollWheelZoom();
map.enableContinuousZoom();
map.addControl(new GOverviewMapControl(new GSize(180,180)));
map.enableGoogleBar();
map.getDragObject().setDraggableCursor("crosshair");
var geolog = new GGeoXml("http://sciuto.yolasite.com/resources/xpianura_schema_semplificato.kmz");
var kmzC97=new GGeoXml("http://sciuto.yolasite.com/resources/vuoto");
var kmzA97=new GGeoXml("http://sciuto.yolasite.com/resources/vuoto");
var kmzS97=new GGeoXml("http://sciuto.yolasite.com/resources/vuoto");
var kmzC98=new GGeoXml("http://sciuto.yolasite.com/resources/vuoto");
var kmzA98=new GGeoXml("http://sciuto.yolasite.com/resources/vuoto");
var kmzS98=new GGeoXml("http://sciuto.yolasite.com/resources/vuoto");
var kmzI98=new GGeoXml("http://sciuto.yolasite.com/resources/vuoto");
var ceolog=new GGeoXml("http://sciuto.yolasite.com/resources/xanomalie_regionali.kmz");
var cmzC97=new GGeoXml("http://sciuto.yolasite.com/resources/vuoto");
var cmzA97=new GGeoXml("http://sciuto.yolasite.com/resources/vuoto");
var cmzS97=new GGeoXml("http://sciuto.yolasite.com/resources/vuoto");
var cmzC98=new GGeoXml("http://sciuto.yolasite.com/resources/vuoto");
var cmzA98=new GGeoXml("http://sciuto.yolasite.com/resources/vuoto");
var cmzS98=new GGeoXml("http://sciuto.yolasite.com/resources/xIsotopia_pioggia.kmz");
var cmzI98=new GGeoXml("http://sciuto.yolasite.com/resources/vuoto");
var geolot=new GGeoXml("http://sciuto.yolasite.com/resources/vuoto");
var kmlC97=new GGeoXml("http://sciuto.yolasite.com/resources/vuoto");
var kmlA97=new GGeoXml("http://sciuto.yolasite.com/resources/vuoto");
var kmlS97=new GGeoXml("http://sciuto.yolasite.com/resources/vuoto");

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var kmlC98=new GGeoXml("http://sciuto.yolasite.com/resources/vuoto");
var kmlA98=new GGeoXml("http://sciuto.yolasite.com/resources/torta.kmz");
var kmlS98=new GGeoXml("http://sciuto.yolasite.com/resources/quadrato.kmz");
var kmlI98=new GGeoXml("http://sciuto.yolasite.com/resources/cruscotto.kmz");
// display a warning if the browser was not compatible
else {alert("Sorry, the Google Maps API is not compatible with this browser");}
function doGenerateMarkerHtmlCallback(marker,html,result) {
html.innerHTML+="<b>Result Coordinates: "+result.lat+" "+result.lng+"</b><br>";
html.innerHTML+="<b>Marker Location: "+marker.getLatLng().toUrlValue()+"</b>";
return html;}
function showCoordinates(x, y) {
var coords = document.getElementById("_coords");
var google_map = document.getElementById("wmsMap");
google_map.appendChild(coords);
coords.style.zIndex = 100;
coords.style.position = 'absolute';
coords.style.top = y + "px";
coords.style.left = x + "px";
coords.style.visibility = 'visible'; }
function updateCoordinates(lon, lat) {var coords = document.getElementById("_coords");
coords.innerHTML = "Lon: " + lon + "&deg;W Lat: " + lat + "&deg;N"; }
function boxclick01(box,kml) {if (box.checked) {map.addOverlay(geolog);} else {map.removeOverlay(geolog);}}
function boxclick02(box,kml) {if (box.checked) {map.addOverlay(kmzC97);} else {map.removeOverlay(kmzC97);}}
function boxclick03(box,kml) {if (box.checked) {map.addOverlay(kmzA97);} else {map.removeOverlay(kmzA97);}}
function boxclick04(box,kml) {if (box.checked) {map.addOverlay(kmzS97);} else {map.removeOverlay(kmzS97);}}
function boxclick05(box,kml) {if (box.checked) {map.addOverlay(kmzC98);} else {map.removeOverlay(kmzC98);}}
function boxclick06(box,kml) {if (box.checked) {map.addOverlay(kmzA98);} else {map.removeOverlay(kmzA98);}}
function boxclick07(box,kml) {if (box.checked) {map.addOverlay(kmzS98);} else {map.removeOverlay(kmzS98);}}
function boxclick08(box,kml) {if (box.checked) {map.addOverlay(kmzI98);} else {map.removeOverlay(kmzI98);}}
function boxclick09(box,kml) {if (box.checked) {map.addOverlay(ceolog);} else {map.removeOverlay(ceolog);}}
function boxclick10(box,kml) {if (box.checked) {map.addOverlay(cmzC97);} else {map.removeOverlay(cmzC97);}}
function boxclick11(box,kml) {if (box.checked) {map.addOverlay(cmzA97);} else {map.removeOverlay(cmzA97);}}
function boxclick12(box,kml) {if (box.checked) {map.addOverlay(cmzS97);} else {map.removeOverlay(cmzS97);}}
function boxclick13(box,kml) {if (box.checked) {map.addOverlay(cmzC98);} else {map.removeOverlay(cmzC98);}}
function boxclick14(box,kml) {if (box.checked) {map.addOverlay(cmzA98);} else {map.removeOverlay(cmzA98);}}
function boxclick15(box,kml) {if (box.checked) {map.addOverlay(cmzS98);} else {map.removeOverlay(cmzS98);}}
function boxclick16(box,kml) {if (box.checked) {map.addOverlay(cmzI98);} else {map.removeOverlay(cmzI98);}}
function boxclick17(box,kml) {if (box.checked) {map.addOverlay(geolot);} else {map.removeOverlay(geolot);}}
function boxclick18(box,kml) {if (box.checked) {map.addOverlay(kmlC97);} else {map.removeOverlay(kmlC97);}}
function boxclick19(box,kml) {if (box.checked) {map.addOverlay(kmlA97);} else {map.removeOverlay(kmlA97);}}
function boxclick20(box,kml) {if (box.checked) {map.addOverlay(kmlS97);} else {map.removeOverlay(kmlS97);}}
function boxclick21(box,kml) {if (box.checked) {map.addOverlay(kmlC98);} else {map.removeOverlay(kmlC98);}}
function boxclick22(box,kml) {if (box.checked) {map.addOverlay(kmlA98);} else {map.removeOverlay(kmlA98);}}
function boxclick23(box,kml) {if (box.checked) {map.addOverlay(kmlS98);} else {map.removeOverlay(kmlS98);}}
function boxclick24(box,kml) {if (box.checked) {map.addOverlay(kmlI98);} else {map.removeOverlay(kmlI98);}}
//]]> </script>
<a target=new href='http://pfsciuto.googlepages.com/Gis2v5.htm' target='_blank' title='link' style='position: absolute; left: 93px; top: 2px'></a>
<a target=new href='http://www.regione.emilia-romagna.it/geologia' target='_blank' title='authors' style='position: absolute; left: 144px; top: 2px'></a>
<a target=new href='http://www.unisi.it' target='_blank' title='references' style='position: absolute; left: 195px; top: 2px'></a>
<span id="lat" style='position: absolute; left: 256px; top: 2px;font-size:12px;background-color: white;FONT-FAMILY: arial'>lat</span>
<span id="long" style='position: absolute; left: 256px; top: 20px;font-size:12px;background-color: white;FONT-FAMILY: arial'>long</span>
</body> </html>

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