

MFC下

基于OpenGL的三维地形开发

主要内容

- 1、开发环境的配置
- 2、数据的获取
- 3、地形的绘制
- 4、已完成基本的浏览功能
- 5、下一步工作

开发环境的设置

新建工程

.dll文件、.lib文件、.h文件

重载PreCreateWindow函数

```
cs.style |= WS_CLIPSIBLINGS | WS_CLIPCHILDREN;
```

添加WM_CREATE消息响应函数

调用InitializeOpenGL()函数，初始化OpenGL。

InitializeOpenGL()中创建一个DC，并通过调SetupPixelFormat()函数为这个DC选择一个像素格式，创建和这个DC相关的RC,然后选择这个RC。

添加WM_SIZE消息处理函数

调用glViewport对场景的窗口变换进行变更，调用gluPerspective等函数重置投影变换，使得当窗口的大小改变时，显示在窗口中的场景不会发生扭曲

添加WM_ERASEBKGN消息处理函数

重置窗口背景时，消除屏幕闪烁

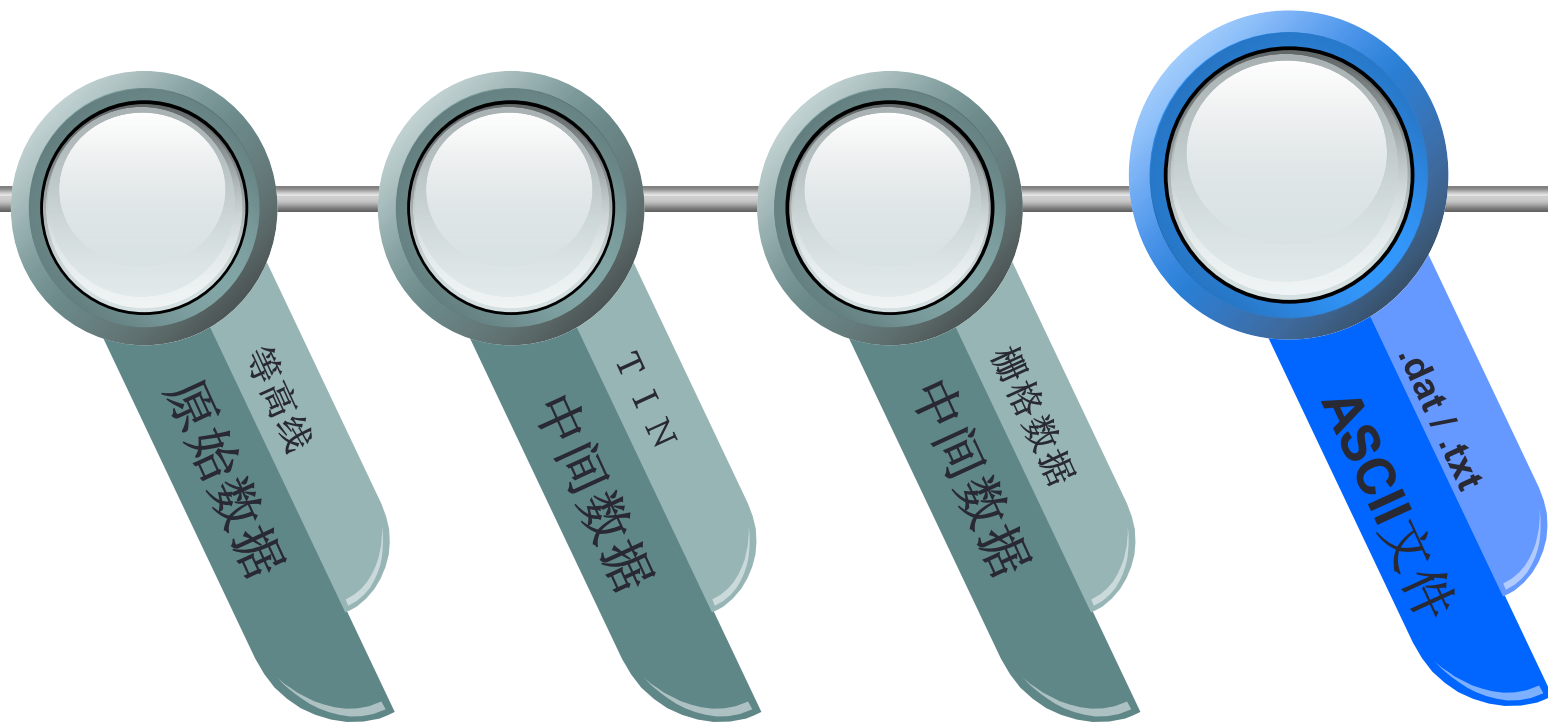
重载OnInitUpdate函数

视类对象接收文档类对象信息，适合做OpenGL绘制前的初始化工作

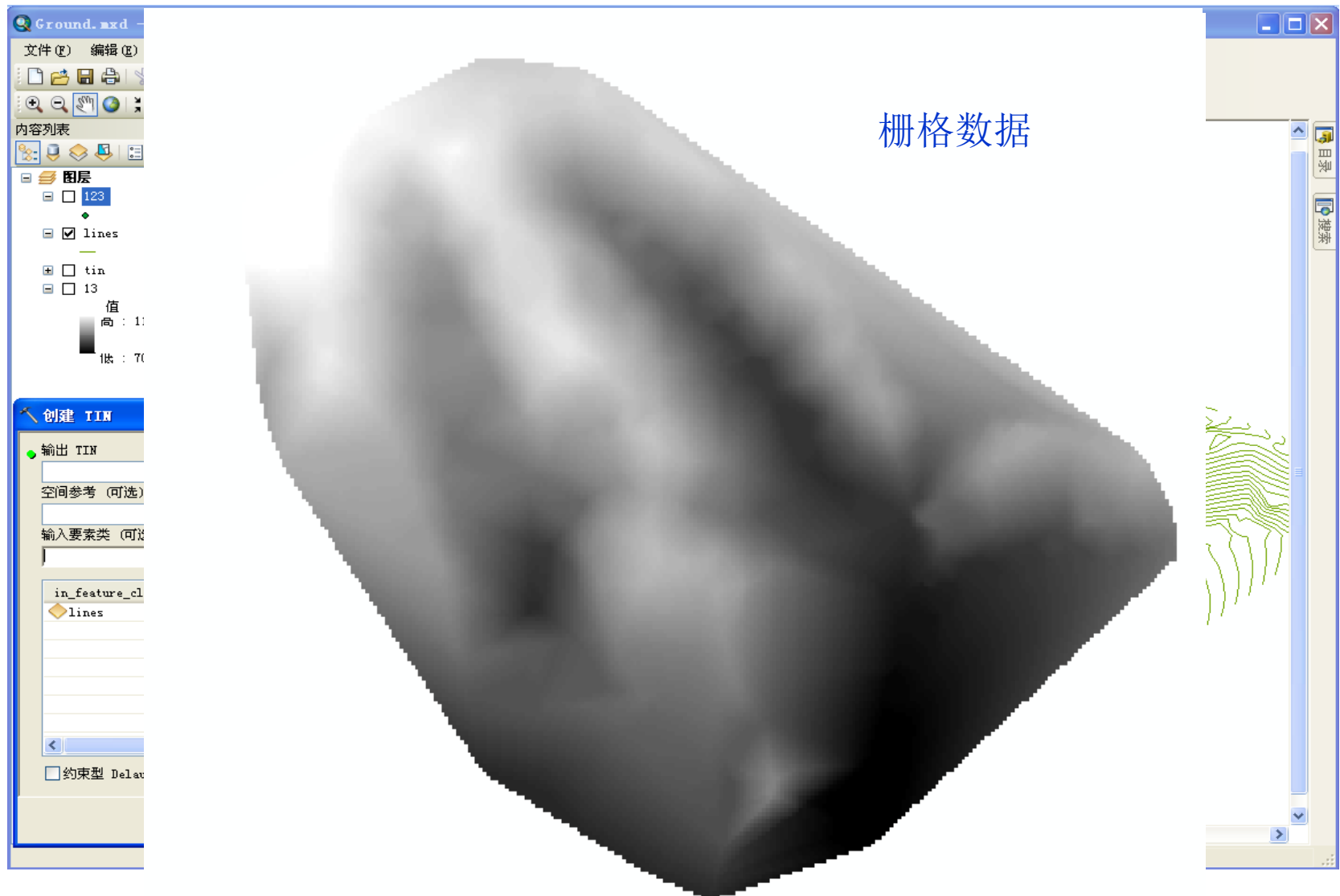
添加WM_DESTROY函数，编写OnDraw函数

释放RC和DC，添加绘制三维场景的代码

数据的获取



等高线→TIN



由栅格数据导出生成ASCII文件的文件头:

ncols	250
nrows	213
xllcorner	4751.2866697719
yllcorner	2807.5331140341
cellsize	2.2226040968915
NODATA value	-9999

```

ascii.txt - 记事本
文件(F)  编辑(E)  格式(O)  查看(V)  帮助(H)
ncols      250
nrows      213
xllcorner  4751.2866697719
yllcorner  2807.5331140341
cellsize    2.2226040968915
NODATA_value -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 103.0062
9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
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-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 103.5294 103.4488 103.
103 103 103.0192 103.1251 103.2005 103.2586
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999

```

地形的绘制

三维模型建立：设定视点位置、视线方向和地形模型的颜色

```
Void glTranslate(TYPE x,TYPE y,TYPE z)
```

```
Void glRotate(TYPE x,TYPE y,TYPE z)
```

```
Void glScale(TYPE x,TYPE y,TYPE z)
```

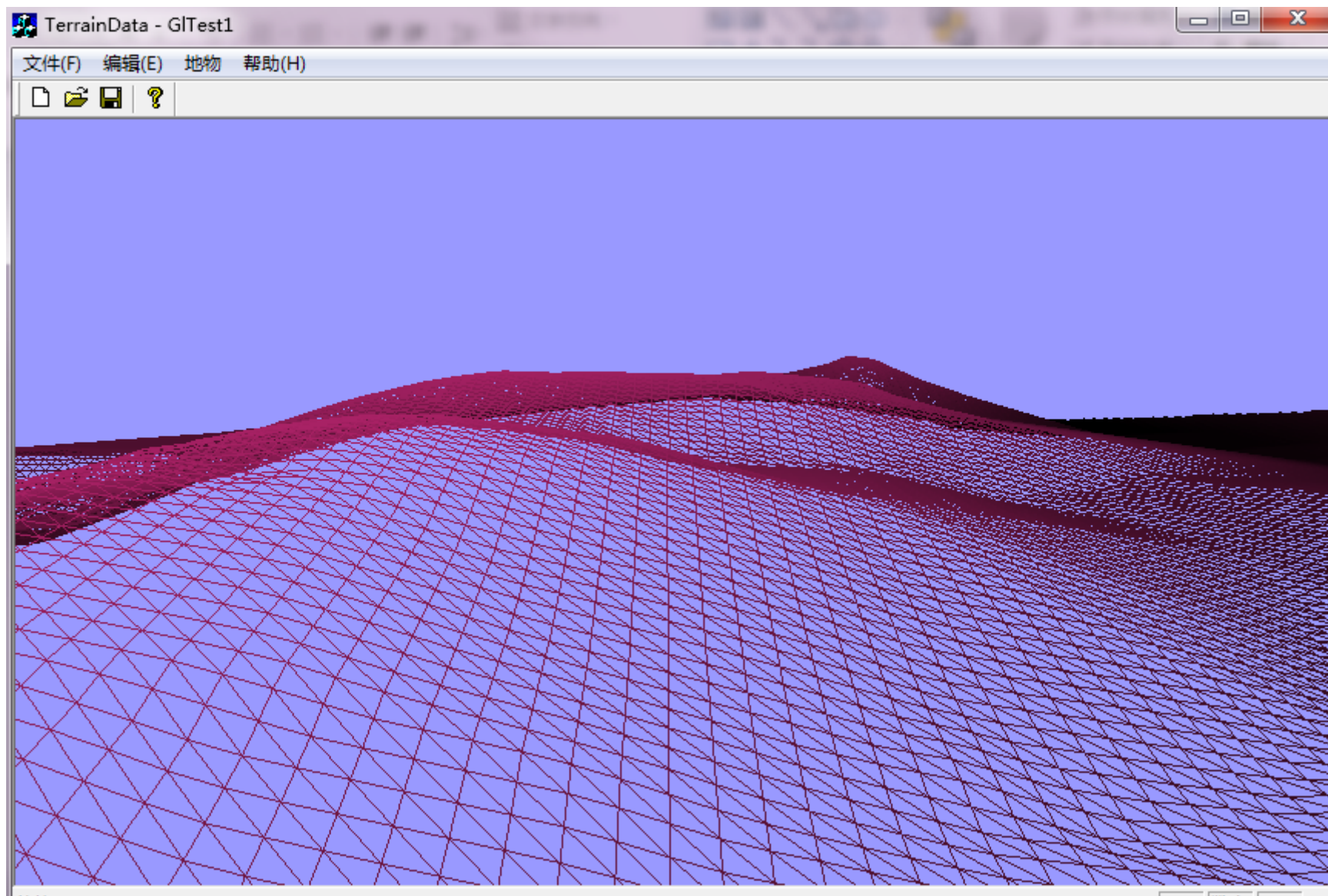
```
Void gluLookAt (Gldouble eyex, Gldouble eyey, Gldouble eyez,  
                Gldouble centerx, Gldouble centery, Gldouble centerz,  
                Gldouble upx, Gldouble upy, Gldouble upz)
```

```
Void gluPerspective (Gldouble fovy, Gldouble aspect,  
                    Gldouble near, Gldouble far)
```

```
glClearColor(0.6f, 0.6f, 1.0f, 1.0f);
glClear(GL_COLOR_BUFFER_BIT | GL_DEPTH_BUFFER_BIT);
glLoadIdentity();
    glTranslatef(m_viewx,m_viewy,-5.0f);
    glRotatef(m_xAngle, 1.0f,0.0f,0.0f);
    glRotatef(m_yAngle, 0.0f,1.0f,0.0f);
    if(m_isFILL)
        glPolygonMode(GL_FRONT_AND_BACK, GL_FILL);
    else
        glPolygonMode(GL_FRONT_AND_BACK, GL_LINE);

glBegin(GL_TRIANGLES);
glColor3f(a,b,c);
glVertex3f(x,y,z);
glVertex3f(x,y,z);
glVertex3f(x,y,z);
.....
glEnd();
```

三维地形效果

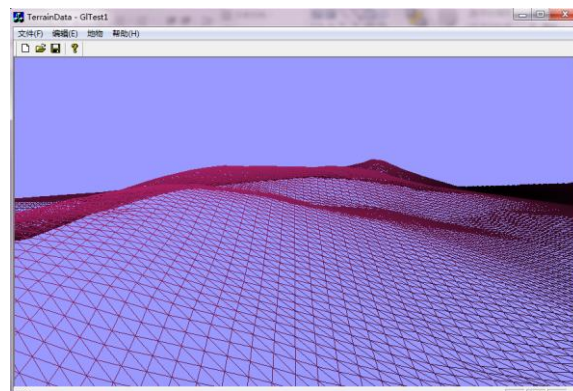
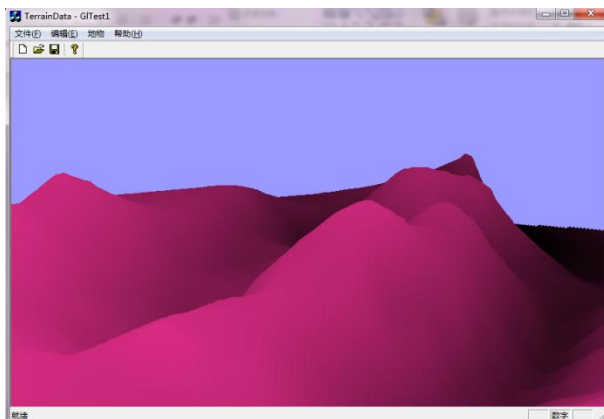


地形的绘制

放大、缩小、平移、旋转

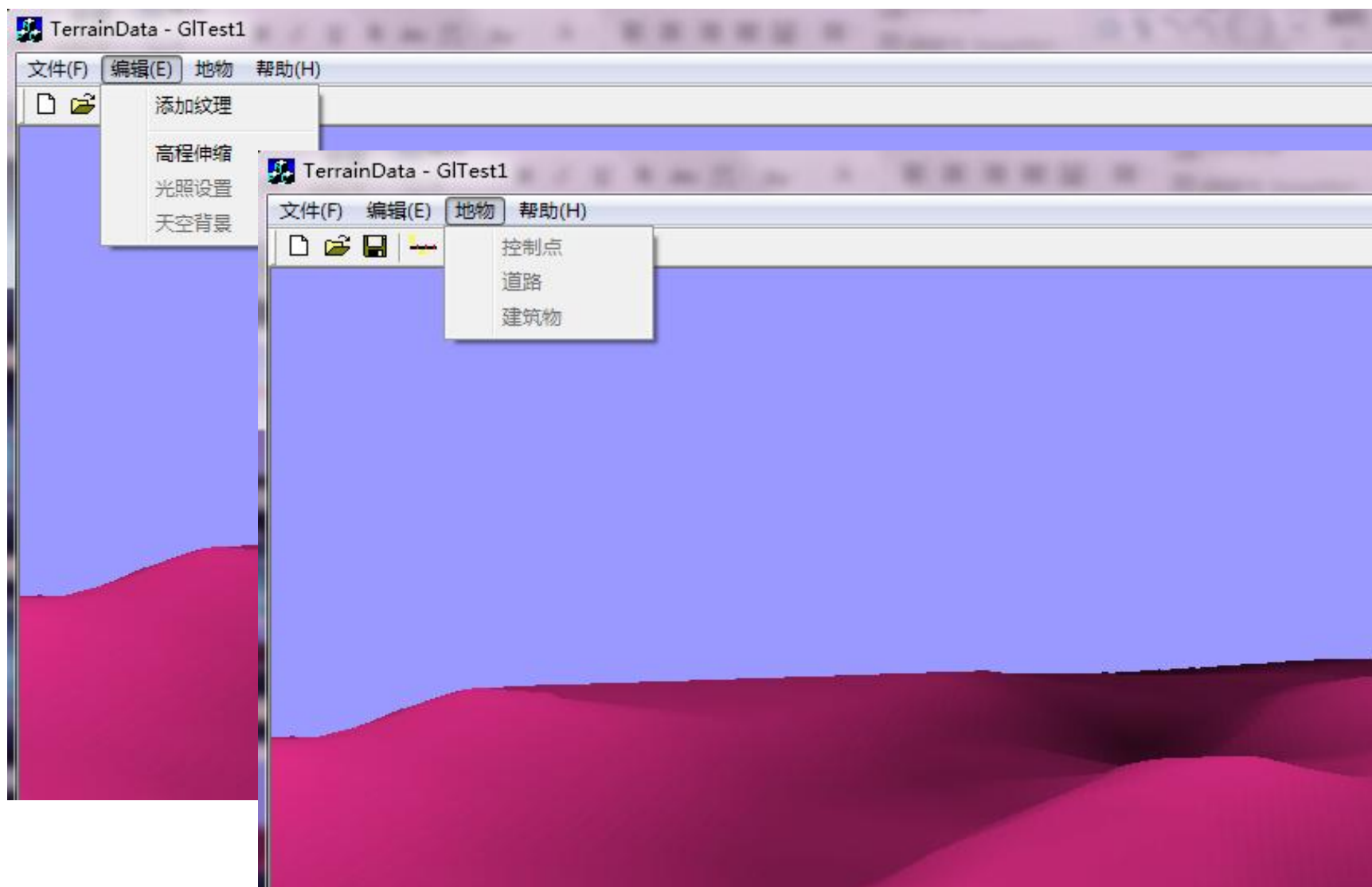
高程的伸缩

两种模式的地形展示



下一步工作

- 1、完善天空背景的渲染
- 2、实现地形纹理的映射
- 3、光照设置
- 4、地物（控制点、道路、简易建筑物等的）的添加
- 5、实现漫游



谢谢