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Project # 2

Noisy Displaced Elliptical Dots

Rib File

```
##RenderMan RIB
version 3.03
Declare "Height" "uniform float"
Declare "Ramp"   "uniform float"
Declare "Width"  "uniform float"

Display "second.tiff" "file" "rgb"
Format 500 500 -1

LightSource "ambientlight" 1 "intensity" [0.25]
LightSource "distantlight" 2 "intensity" [0.75] "from" [5 8 -10] "to" [0 0 0]

ShadingRate 1
Projection "perspective" "fov" [70]

WorldBegin
        Attribute "bound" "displacement" [1.5]

        Surface "seconds"  "Width" 0.10
                                        # specify the surface shader
        Displacement "secondd"  "Width" 0.10  "Height" 0.2  "Ramp" 0.20
                                        # specify the displacement shader
        Color   [1 1 1]                 # Cs
        Opacity [1 1 1]                         # Os
        TransformBegin
                Translate 0 0 6         # move away from the eye
                Rotate 90  1. 0. 0.     # rotate so don't see north pole
```

```
        Sphere 3 -3 3 360          # a full sphere
    TransformEnd
WorldEnd
```

Second.sl

```
displacement
secondd(
    float   Width = 0.10,                   // square width
            Ramp = 0.1,                     // fraction of square used in the ramp
            Height = 0.2,                   // displacement height
            Ad = 0.50,
            Bd = 0.35,
            NoiseAmp = 0.00,
            DispAmp = 0.10;
)
{
    float TheHeight = 0.;           // how much displacement to apply

    float up = 2. * u;
    float vp = v;
    float numinu = floor( up / Ad ); //Ad
    float numinv = floor( vp / Bd ); //Bd

    point PP = point "shader" P;
    float magnitude = 0.;
    float size = 1.;
    float i;
```

```
        for( i = 0.; i < 6.0; i += 1.0 )
        {
                magnitude += ( noise( size * PP ) - 0.5 ) / size;
                size *= 2.0;
        }

        float uc = Ad *numinu + (Ad/2);
        float vc = Bd *numinv+ (Bd/2);
        float r = Width/2.;
        float Ar = Ad/2.;
        float Br = Bd/2.;
        float du = up - uc;
    float dv = vp - vc;
    float oldrad = sqrt( du*du + dv*dv );
        float newrad = magnitude + oldrad;
        float factor = newrad/oldrad;
        du *= factor;
        dv *= factor;

        float d = pow((du)/Ar, 2.) + pow((dv)/Br, 2.);//pow((up - uc)/Ar, 2.) + pow((vp - vc)/Br,
2.);
        if (  d <= 1.)
        {
                float umin = numinu*Ad;       // square boundaries in u
                float umax = umin+Ar;
                float vmin = numinv*Bd;       // square boundaries in v
                float vmax = vmin+Br;
                float distu = min( up-Ar, umax-Ar );  // dist to nearest u boundary
                float distv = min( vp-Br, vmax-Br );  // dist to nearest v boundary
```

```
                float dist = min( distu, distv )/r;          // dist to nearest boundary

                float t = 1. - d; //smoothstep( 0., Ramp, dist );          // 0. if dist <= 0., 1. if dist >=
Ramp
                //float t = smoothstep( 0., Ramp, dist);
                TheHeight = t*Height;                              // apply the blending
        }



#define DISPLACEMENT_MAPPING

        float disp = 1. - d;
        if( disp != 0. ) //disp
        {
#ifdef DISPLACEMENT_MAPPING
                P = P + normalize(N) * TheHeight;
                N = calculatenormal(P);
#else
                N = calculatenormal( P + normalize(N) * TheHeight );
#endif
        }
}
```

Seconds.sl

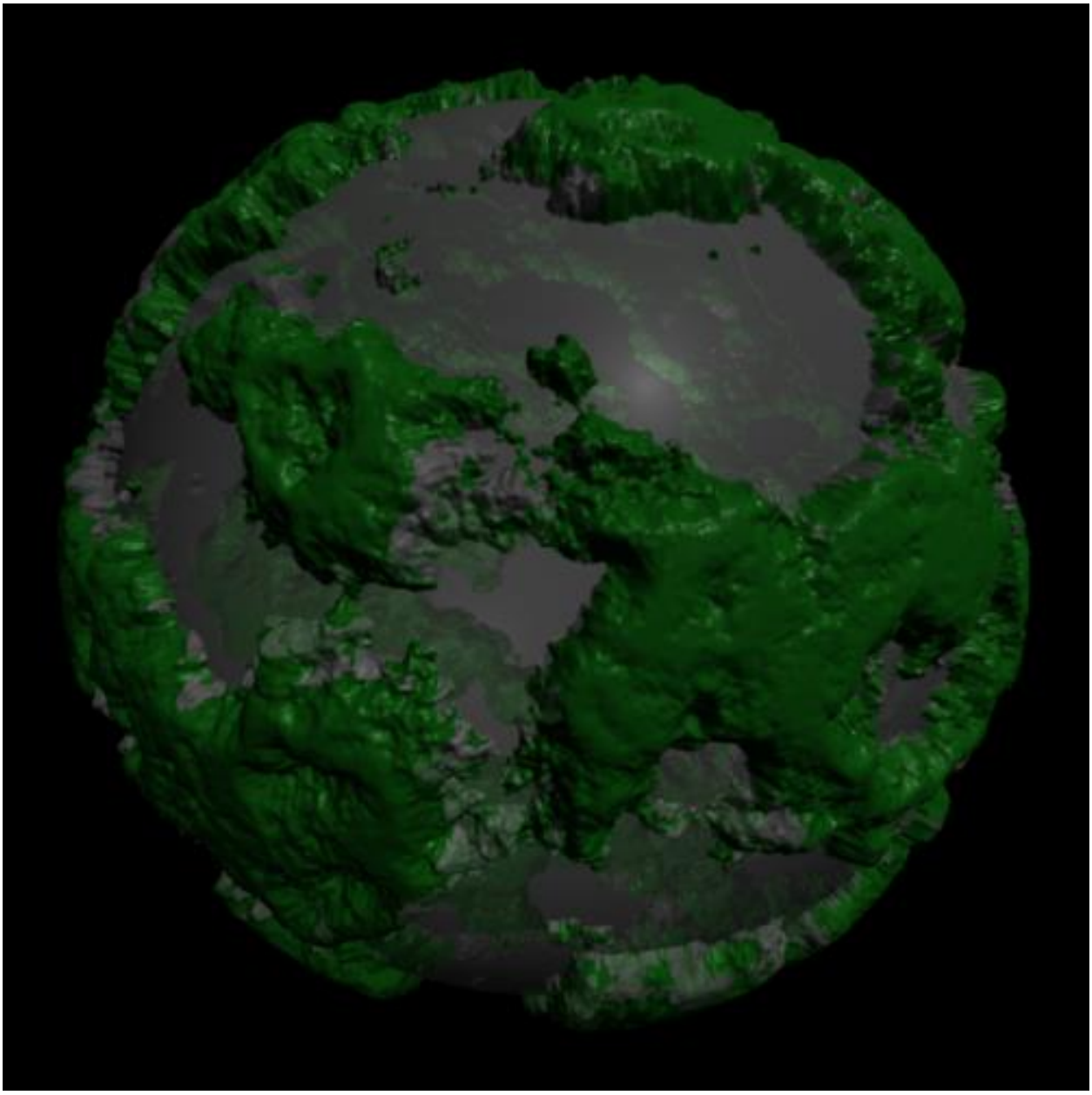
```
surface
seconds(
        float   Width = 0.10,                   // square width
                Ks = 0.4,                       // specular coefficient
                Kd = 0.5,                       // diffuse  coefficient
                Ka = 0.1,                       // ambient  coefficient
```

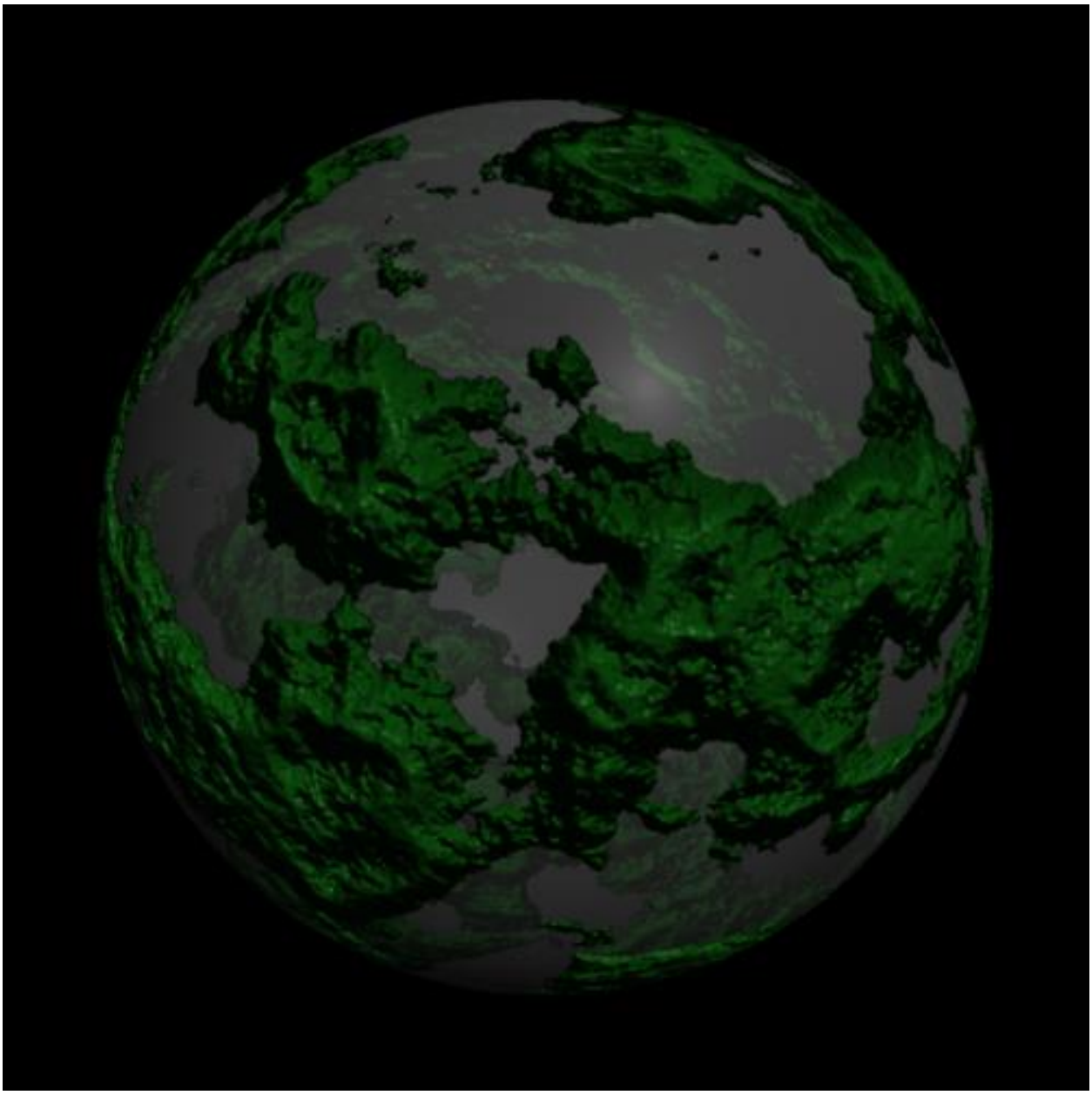
```
                Ad = 0.50,
                Bd = 0.35,
                Roughness = 0.1;                    // specular roughness
        color   SpecularColor = color( 1, 1, 1 )    // specular color
)
{
        color ORANGE = color( .1, .7, .1 );

        varying vector Nf = faceforward( normalize( N ), I );
        vector V = normalize( -I );

        float up = 2. * u;
        float vp = v;
        float numinu = floor( up / Ad );
        float numinv = floor( vp / Bd );

        Oi = Os;        // use whatever opacity the rib file gave us

      color TheColor = Cs;
                //float d =
        //if( mod( numinu+numinv, 2. ) == 0 )
        point PP = point "shader" P;
        float magnitude = 0.;
        float size = 1.;
        float i;
        for( i = 0.; i < 6.0; i += 1.0 )
        {
                magnitude += ( noise( size * PP ) - 0.5 ) / size;
```

```
            size *= 2.0;
        }
        float uc = Ad *numinu + (Ad/2);
        float vc = Bd *numinv+ (Bd/2);
        float r = Width/2;
        float Ar = Ad/2.;
        float Br = Bd/2.;

        float du = up - uc;
        float dv = vp - vc;
        float oldrad = sqrt( du*du + dv*dv );
        float newrad = magnitude + oldrad;
        float factor = newrad/oldrad;
        du *= factor;
        dv *= factor;

        if (  pow((du)/Ar, 2.) + pow((dv)/Br, 2.)<= 1.)
                TheColor = ORANGE;
         else
                Oi = color( 0.6, 0.6, 0.6 );
        Ci =        TheColor * Ka * ambient();
        Ci = Ci  +  TheColor * Kd * diffuse(Nf);
        Ci = Ci  +  SpecularColor * Ks * specular( Nf, V, Roughness );
        Ci = Ci * Oi;
}
```

Explanation

Essentially what happens is that I create ellipses and then add noise. The seconds file is just adding noise to the surface. The second file adds on the displacement. I changed the displacement if statement to do bump-mapping. I could also add noise in the negative direction to make it look like the ocean of my world also has different heights but I did not like the way it looked. There was too much noise. I tried to fix the little gray parts that were displaced but I wasn't entirely sure what was causing it to begin with.





For bump-mapping

```
#define DISPLACEMENT_MAPPING

float disp = 1. - d;
if( disp != 0. && disp > 0 ) //disp
{
#ifdef DISPLACEMENT_MAPPING
//P = P + normalize(N) * TheHeight;
//N = calculatenormal(P);
normal n = normalize(N);
N = calculatenormal( P + disp * n );
#else
N = calculatenormal( P + normalize(N) * TheHeight );
#endif
```

```
}
}
```