Empty Music:

Eliane Radigue's *L'île re-sonante*

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In 2006 the Paris recording label shiiin released a CD recording of *L'île re-sonante*, a fifty-five minute composition by French electronic music pioneer Eliane Radigue. A student of electro-acoustic composers Pierre Henry and Pierre Schaeffer in the 1950's, Radigue has been relatively well-known in the U.S. since she presented her piece *Adnos I* at Mills College in 1974. *L'île re-sonante* features the instrument Radigue has worked with since the early 1970's, the ARP 2500 modular synthesizer and her medium of choice, analog multitrack tape. The piece is characteristic of her work in that is a tapestry of long, gradually evolving drones created with oscillators on the ARP synthesizer and with tape loops.

According to Daniel Caux's liner notes, "For *L'ile re-sonante*, Eliane Radigue drew her inspiration from an image: an island in the waters of a lake that reflect her face. It is both a 'real' image and an optical illusion" (Caux). For the purposes of this analysis, it is worth noting that for over thirty years Radigue has practiced Tibetan Buddhism, a central tenet of which is the concept of *sunyata* or "emptiness." In Buddhist doctrine this concept can be ascribed to a teaching known as the Heart of Prajna Paramita Sutra, often referred to simply as "The Heart Sutra." The following is a version of the text translated by noted Buddhist scholar Edward Conze:

> *Here, O Sariputra,*
> *all dharmas are marked with emptiness ;*
> *they are not produced or stopped, not defiled or immaculate, not deficient or complete.*
> *Therefore, O Sariputra,*
> *in emptiness there is no form nor feeling, nor perception, nor impulse, nor consciousness ;*

> *No eye, ear, nose, tongue, body, mind ; No forms, sounds, smells, tastes, touchables or objects of mind ; No sight-organ element, and so forth, until we come to:*
> *No mind-consciousness element ; There is no ignorance, no extinction of ignorance, and so forth, until we come to : There is no decay and death, no extinction of decay and death. There is no suffering, no origination, no stopping, no path.*
> *There is no cognition, no attainment and no non-attainment (Conze).*

Radigue discovered Buddhism shortly after, and as a result of, the Mills concert in 1974. Writer Neill Strauss describes the sequence of events as follows:

> After a concert at Mills College in 1974, a group of people came up to composer Eliane Radigue and told her, "You're not doing your music yourself." This blow left an indelible impression on her. She felt that she was getting inspiration then, but didn't know where it came from. The people, it turns out, were studying Tibetan Buddhism and they gave Radigue the address of a center in Paris which she instantly visited upon returning home. Soon afterwards, she left her musical and material world to pursue a spiritual life dedicated to Tibetan Buddhism. (Strauss)

Radigue stopped making music for several years. When she finally returned to her ARP at the urging of her lama, she began exploring the same sonic territory in which she had worked during the 1970's. But now her compositions were inspired by the story of historical Buddhist master and poet Jetsun Milarepa. She also spent most of the 1980's working on a trilogy of pieces that address the Buddhist concept of Intermediate States, or *bardos,* as described in the Tibetan Book of the Dead. During the process of creating this *Trilogie de la Mort* Radigue suffered the deaths of her guru Pao Pan Rinpoche and her son Yves Arman.

A casual listener might perceive Radigue's music as static and monotonous, but in fact it is harmonically rich and always in a state of flux. As such, it lends itself quite well to spectral analysis. There are several software tools capable of doing spectral analysis by using a mathematical operation

known as Fast Fourier Transform, or FFT. FFT is a highly efficient method for revealing the inner structure of complex sound that is based on a theory published in 1822 by French mathematician Jean Baptiste Joseph, Baron de Fourier (Roads 1075). Illustrative examples in this paper were generated using a free FFT analysis program developed by the Cornell Lab of Ornithology called Raven Lite. Originally developed as a tool for visually analyzing bird songs, Raven Lite generates spectrograms that show frequency information in the vertical axis and time in the horizontal axis, with amplitude corresponding to brightness of color.

Apropos to our consideration of the ideas of *emptiness* and *form* is the fact that FFT analysis involves an inherent compromise between accurate representation of information in the frequency domain and of that in the time domain. In order to see high resolution in the time domain, frequency resolution is sacrificed. And in order to see accurate frequency information, resolution in the time domain is sacrificed (Roads 557). Thus, the images captured by analysis software can only hint at or suggest *form.* This tradeoff serves as an analogy for the *form/emptiness* paradox and elucidates the impossibility of accurately knowing the contents and nature of a sound in any given moment.

Compositional Methods

In an interview with the French online magazine *Prism Escape*, Radigue had this to say about her relationship with her ARP 2500:

> It is a very emotional relationship. You probably need this relationship so as to make it work properly. I was in New York where I was considering all the different possibilities available. Then I came across this instrument, which I found absolutely amazing. The only slight problem I had was that it was conceived to be connected to a keyboard, and for various reasons I didn't want any. For instance, when I was disheartened, it would have been extremely tempting to allow myself to choose the easy way in using a keyboard. I decided to forget about it so as to only have this direct contact with potentiometers. (Prism Escape)

Radigue plays the ARP by setting up patches and shaping the sounds with potentiometers. And although the nature of her music would lead one to believe that the material might suggest a structure and lend itself to improvisation, Radigue actually plans a composition thoroughly before she records it. The mixing process is meticulous and labor-intensive. Radigue only uses analog media for recording and mixing and she typically spends at least a year completing a piece.

> *It is said that even Saraswati, goddess of wisdom and learning and music, when she enters the Nada Brahma, the ocean of sound, feels that it is so impenetrable, so profound, and is concerned less she, the goddess of music may be lost, inundated by it. So she places two gourds around her, in the form of Veena, and then she is guided by them into it.*
>
> - *Indian devotional singer Sri Karunamayee* (Boon)

Structure

Transitions in Radigue's music often subtle and unfold over long durations, and the effect can be a distortion of the listener's perception of time. Sound events fade in and out very gradually and even with attentive listening it can be difficult to perceive structure. Although *L'ile re-sonante* is no exception, the piece can be viewed as consisting of six discrete sections or movements - each of which is essentially an intermediate state within the cycle of the composition. Because the transitions between sections are gradual, the following time specifications should be considered approximations.

1	0:00 - 9:00	Synthesized low frequencies, difference tone beating
2	9:00 - 23:30	Tape loops of organs, operatic singing, choir
3	23:30 - 30:00	Low frequencies similar to section 1
4	30:00 - 34:00	Mid-range synthesized drones, with transients and reverb
5	34:00 - 45:00	Tibetan chant sounds and filtered noise
6	45:00 - 55:03	Return to oscillator drones, but with more harmonics and filtering

L'île re-sonante opens with a sound familiar to listeners of Radigue's music: a low frequency drone generated by her ARP synthesizer with a gradual vibrato. The fundamental frequency is at around 100 Hz and audible signals can be heard at the first seven harmonics. It sounds as though this section was created by using sine waves, so the harmonics are likely the result of additive synthesis rather than filtering. The vibrato around the fundamental pitch is actually a beating pattern caused by two closely-tuned pitches. Figure 1 shows a visual representation of the first minute of the piece. A sinusoidal beat pattern with a period of approximately two seconds can be seen over the fundamental of 100 Hz.

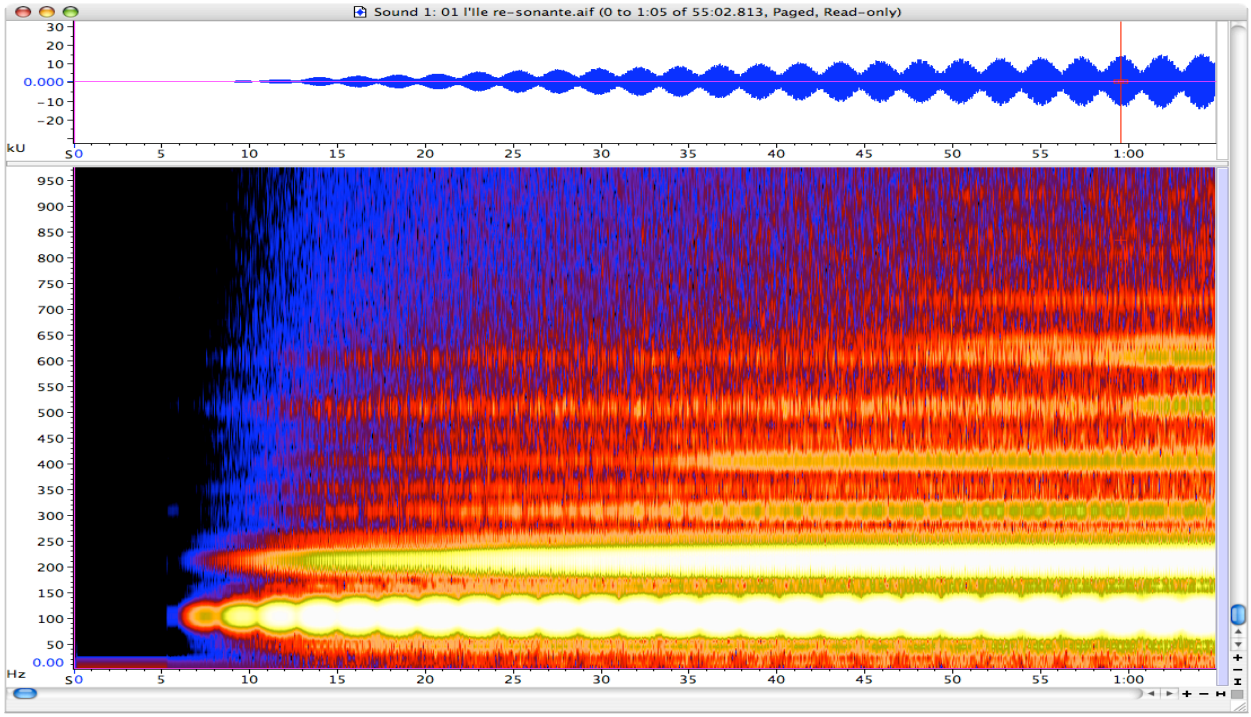

Figure 1 - (0:00 - 1:00) - left channel

At 0:58 the fifth and sixth harmonic (approximately 500 Hz and 600 Hz) emerge with increased amplitude in the left channel and a different vibrato pattern is audible in this register. Composer and electronic musician Maggi Payne, a long time friend of Radigue's, suggests that this vibrato is likely the effect of a voltage controlled amplifier (VCA) modulation created by Radigue on

a VCA module of her ARP 2500 rather than a beat pattern (Payne). During this section Radigue uses hard panning, so the events that occur in the frequency domain differ considerably between left and right channels. For example, a tone of 400 Hz fades in gradually (2:25 - 3:00) on the right channel but is barely detectable on the left. Figures 2 and 3 depict left and right channel spectrograms of the third minute of *L'ile re-sonante.* Notice the differences in frequency emphasis between the two channels. At this point there is still much more amplitude in the left channel.

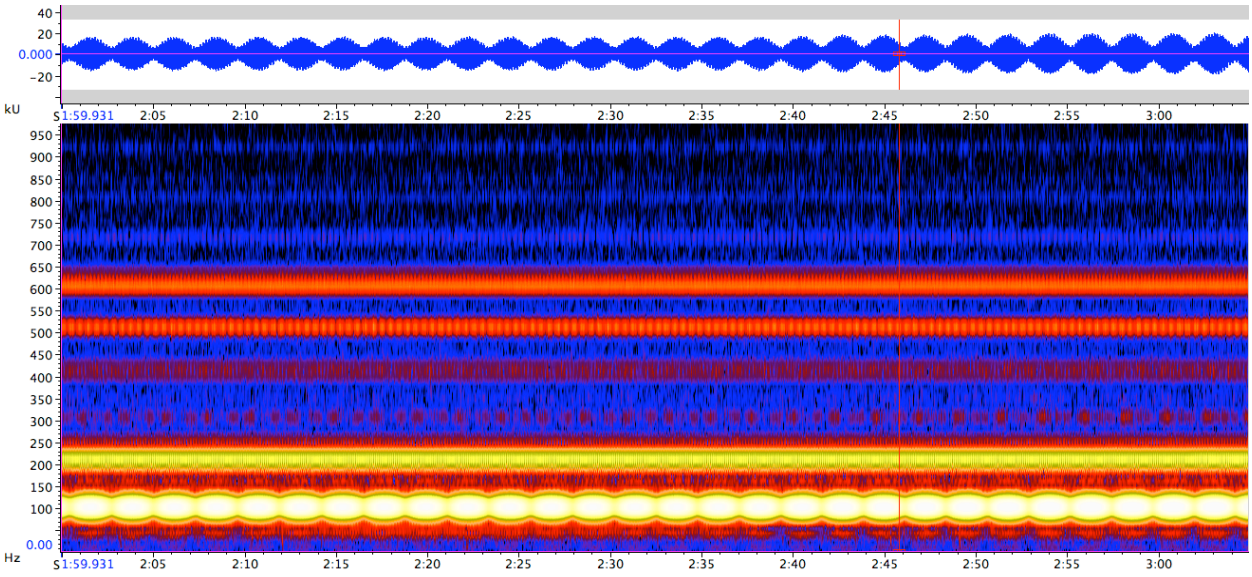

Figure 2 (2:00 - 3:00) - left channel

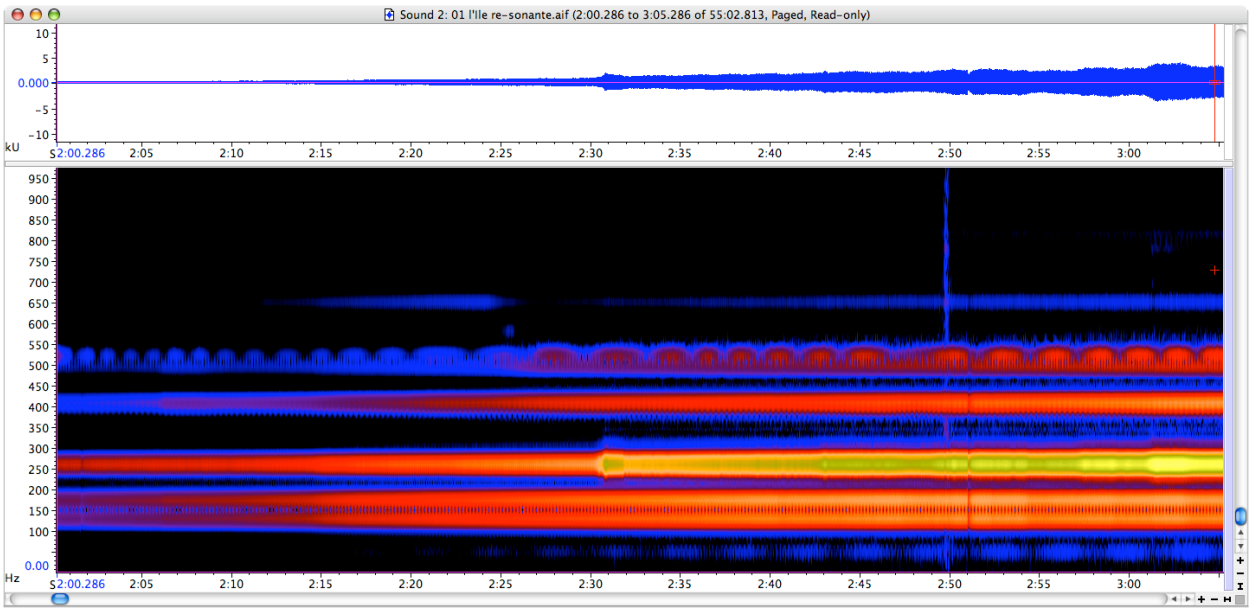

Figure 3 - (2:00 - 3:00) - right channel

The harmonic content steadily becomes more complex over the next few minutes. At around 4:30 we begin to hear another familiar aspect of Radigue's music, her virtuosic manipulation of the ARP 2500 voltage controlled filter (VCF). This new element is primarily audible in the right channel while the left channel maintains the stack of first, second, fifth and sixth harmonics (100 Hz, 200 Hz, 500 Hz, and 600 Hz) and difference tone vibrato modulating the fundamental that have been present since 2:00. The harmonic complexity of the first section reaches a peak between 5:25 and 5:50. During this duration the frequencies in the left channel are still fairly stable but there is a lot of activity in the right channel. There are strong indications in the right channel of 125 Hz and 175 Hz (a perfect major third and harmonic seventh relative to the fundamental at 100 Hz) as well as 250 Hz and 280 Hz. There is also a wide band of amplitude in the range of 360 Hz to 440 Hz and some energy at around 820 Hz, the highest prominent frequency to appear in the piece thus far. Radigue's VCF movements are quite pronounced in the right channel during this stretch, slowly sweeping through the organ-like textures created by the harmonic density. From here the complexity subsides for the next two minutes as the first section begins to transition into the second section.

At around 9:00 the second and most dramatic section begins to emerge from the synthesized drones of the first. In the right channel we begin to hear a faint hint of a woman's voice singing, accompanied by what sounds like distant organ swells. The operatic vocal begins to form an ostinato melodic arch that crests and folds back in on itself and then crests again without ever resolving. The organ chords swell up around the voice. By 10:40 we hear what sounds like several tape loops of the same vocal melody of slightly different durations and spread across the stereo field. Generous amounts of reverb create the effect of great height and distance. One cannot help but to listen to this section from a programmatic perspective. Recalling Radigue's image of the island surrounded by reflective waters, we can view the piece at this juncture as having finished gliding across the smooth, reflective waters of the first section and now the tall peaks of the island begin to reach toward the

clouds. A spectrogram of this section looks very different than the first (see Figure 4). The frequency information is blurred by harmonic and melodic complexity and reverb.

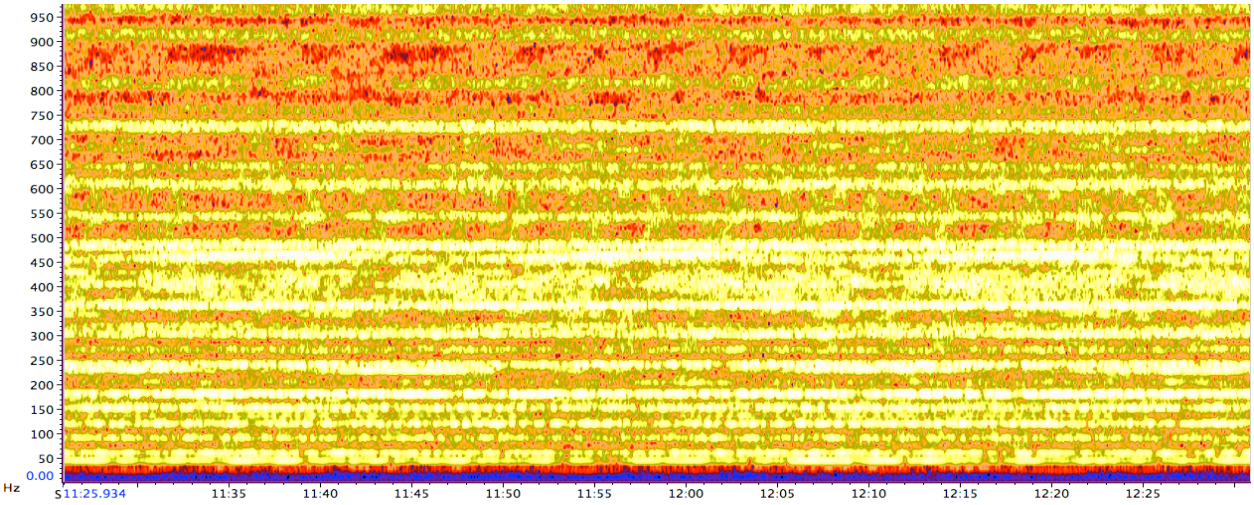

Figure 4 - (11:25-12:30) - left channel

Over the next several minutes the vocal and organ loops continue to build in intensity. The extent to which she uses melodic material and repetition in this section is actually somewhat uncharacteristic of Radigue's music. At 13:40 a loop of a choral melody is present in the mix, but it's place in the mix is so understated that it is hard to distinguish from the organ wash and the main operatic loop. By 17:00 the organ is the dominant element, and only the crests of the vocal loop melodies peak through the dense clouds of organ chords. At 18:55 the tape loops are fading from the left channel and the familiar 100 Hz fundamental drone reemerges (see Figure 5).

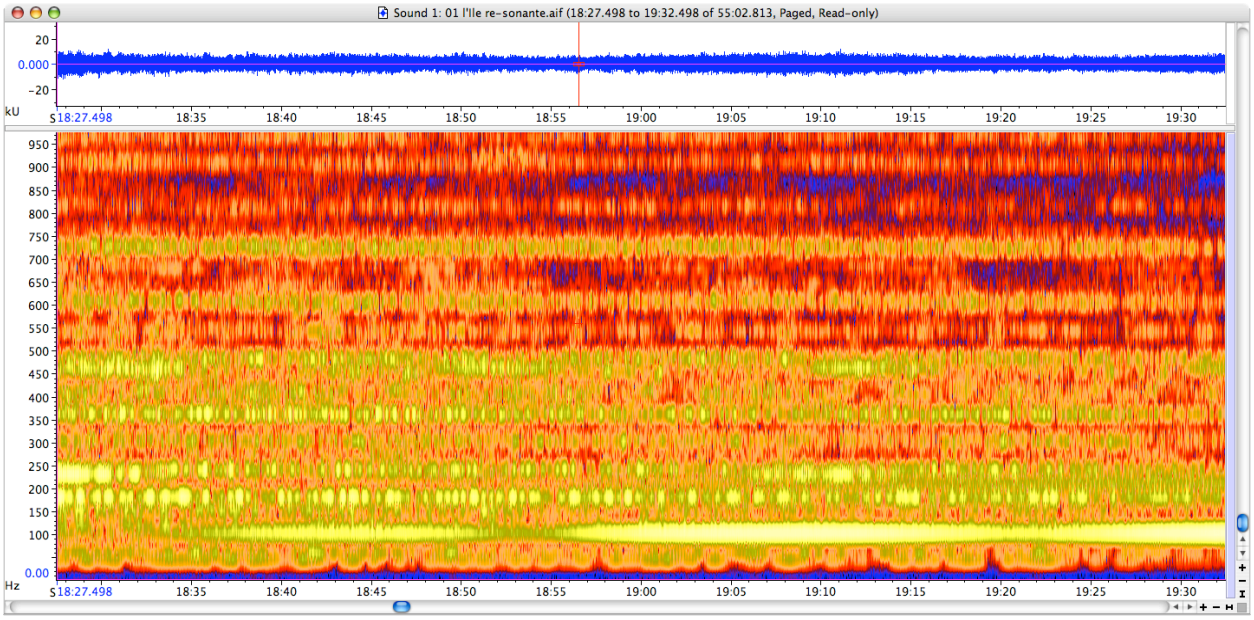

Figure 5 - (18:27 - 19:30) - left channel

By 19:40 the tape loops are completely out of the left channel and they begin to fade out of the right channel over the next four minutes. By 23:50 the piece sounds and looks much like it did before during the first section and the piece. Figure 6 shows the tape loops fading out in the right channel.

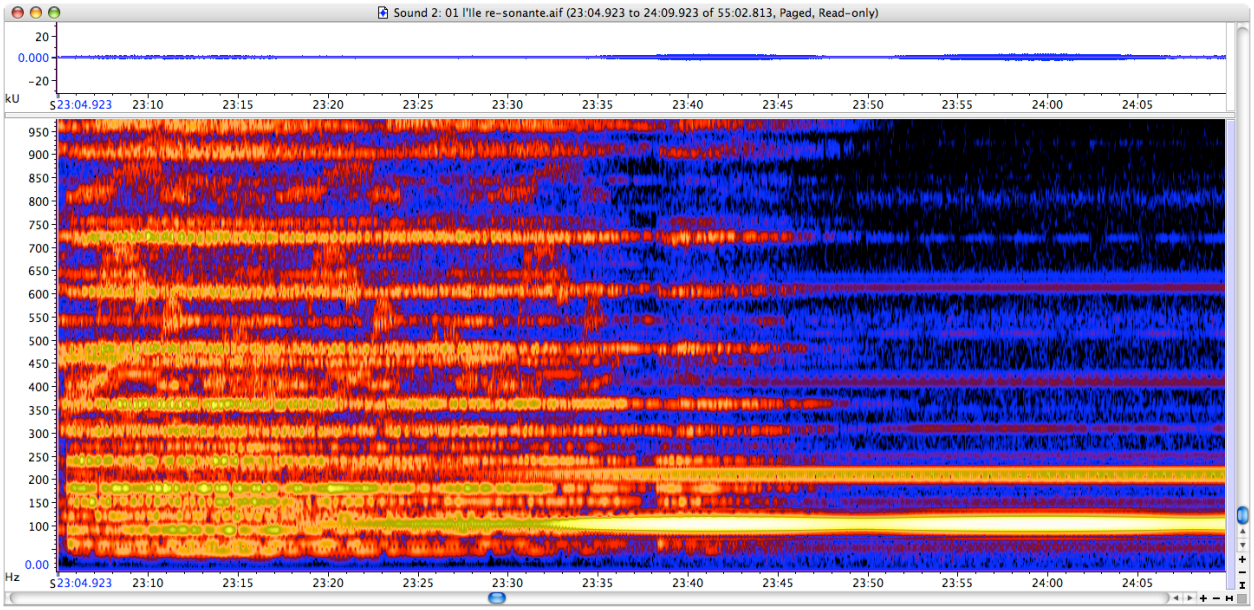

Figure 6 - (23:05-24:05) - right channel

Although the third section lasts nearly seven minutes and has even less harmonic complexity than the first section, there is a sense of motion and flux. In many ways this section could be perceived as the most static, as having the most stable *form,* but the spectrogram reveals the inner instability of the piece. In Figure 7 we see fluctuating harmonics and the slowly modulated fundamental 100 Hz tone fading out from the left channel at around 28:50.

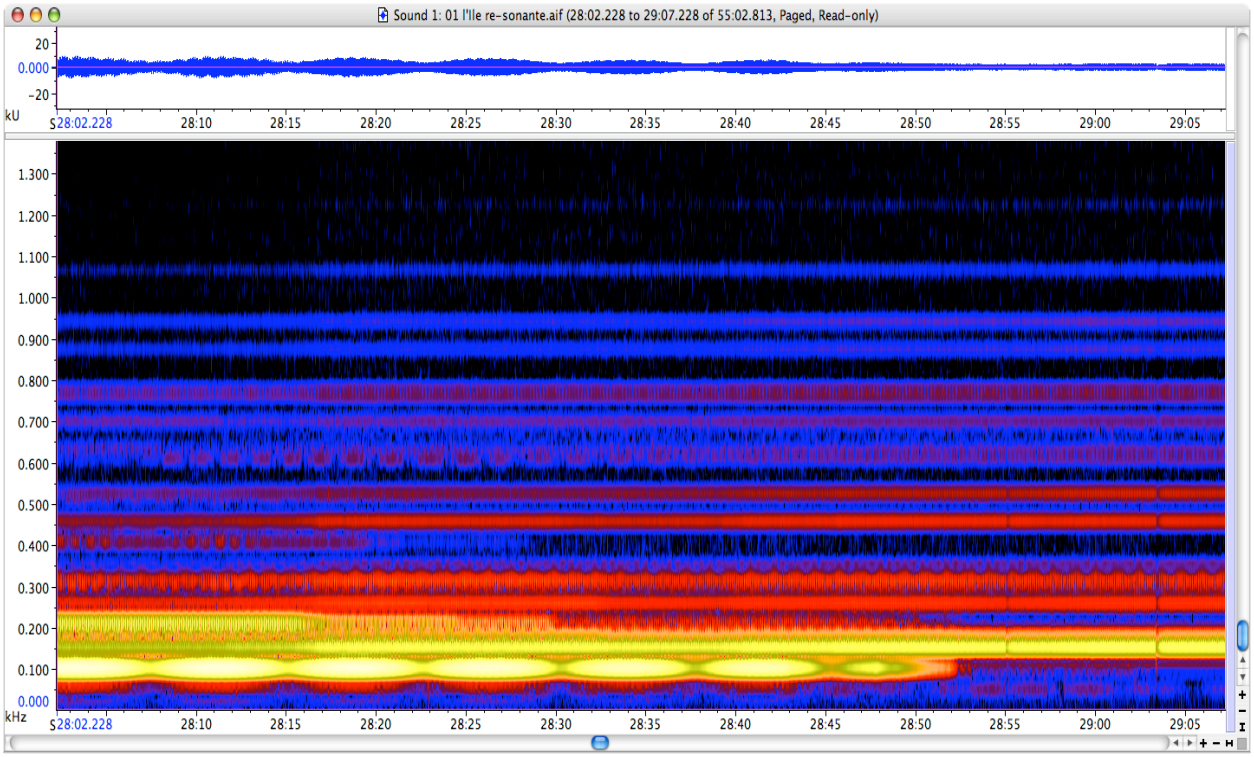

Figure 7 - (28:00 - 29:05) - left channel

The fourth section is the shortest and the most transitional. It begins with barely perceptible and sparsely placed transient sounds, first in the left channel and then in both channels. The source of the sounds is difficult to determine - they sound like distant claps or shots and are drenched in reverb. These transient signals are visible in Figure 8 as vertical smears interrupting the horizontal, stable frequencies. If we return to the original image this section could be interpreted as an entry into the depths of the water surrounding the island. As the section develops the sound has a very submerged

quality. Filtered noise begins to build in intensity, and the sine waves of the third section give way to more complex, heavily filtered forms.

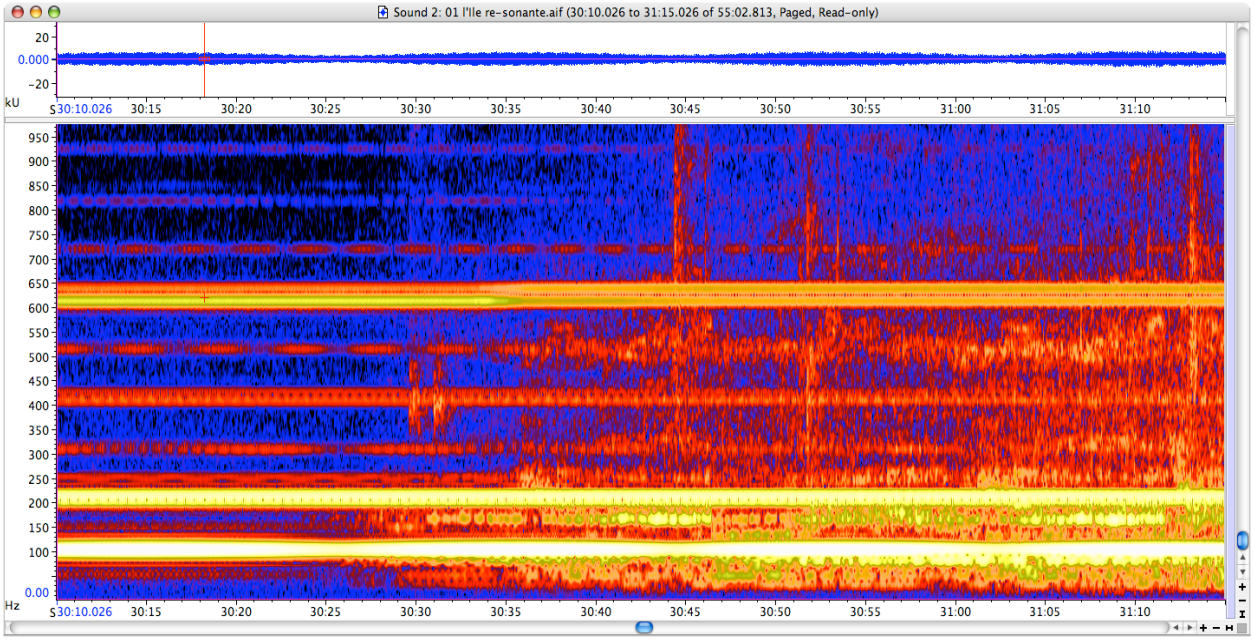

Figure 8 - (30:10 - 31:10) - right channel

By the end of the fourth section, at around 34:00, a new element has become discernible, if not recognizable. Radigue deftly transforms the filtered noise of the section four into what sounds like overtone-rich, guttural Tibetan chants. The enigmatic sound builds, swells, and becomes dense but its source is never easily identifiable. The sound could be a processed tape loop of Tibetan monks but it could also be purely synthesized on the ARP using noise-modulated, heavily filtered oscillators. At around 42:30 Radigue begins to process these sounds further in a way that is remarkable to hear as well as to see in a spectrogram. Using a filter - either manually or slowly swept by a low frequency oscillator - she shapes the "chant" sounds into graceful timbre glissandi. They appear unmistakably as yellow-orange arcs in Figure 9.

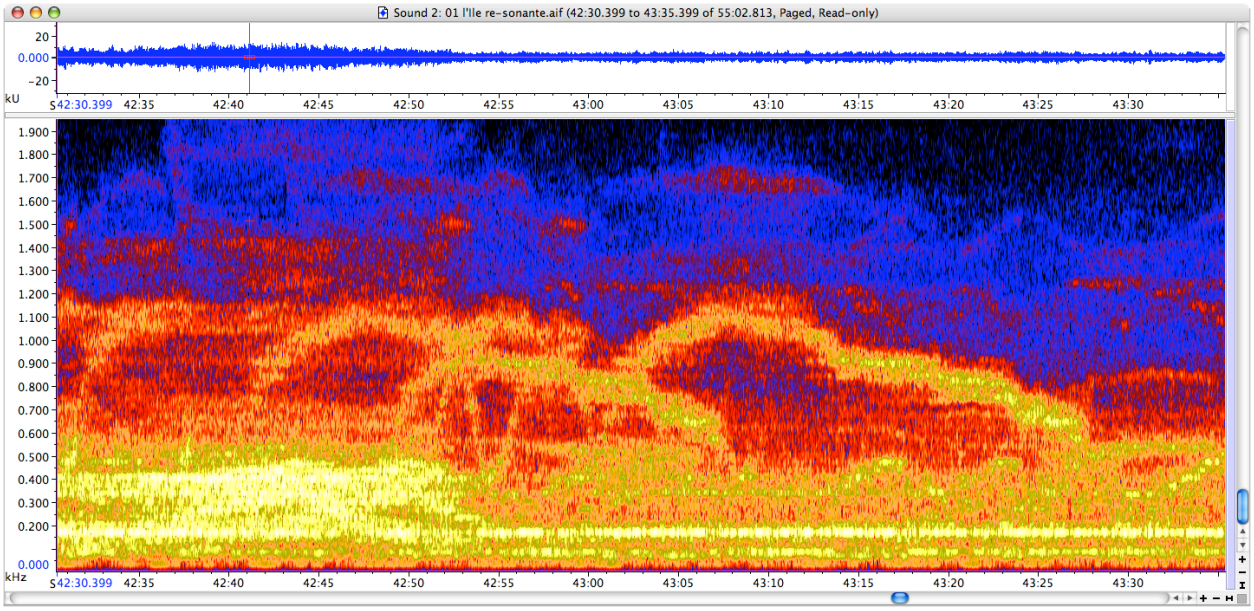

Figure 9 - (42:30 - 43:30) - Right channel

By 44:30 this event has subsided back into the filtered wash from which it surfaced. And by 46:00 all traces of section five have faded away.

The sixth and final section of *L'île re-sonante* is characterized by a return to the oscillator drones. The 100 Hz fundamental is present again, but now it has a dirtier sound and the frequencies of the beating patterns are less defined. Radigue's filtering is much more active now than in previous sections and the resonant frequencies in the right channel move around restlessly, alternating between approximately 300 Hz, 518 Hz, 620 Hz and 725 Hz. Higher harmonics are present, but not dominant, and the form here has a blurry quality. It sounds like a complex wave form, perhaps a triangle or saw, and the harmonics probably result from filtering rather than additive synthesis. The FFT analysis seen in Figure 10 was performed with higher frequency resolution than previous examples in order to display the painterly movements of Radigue's VCF.

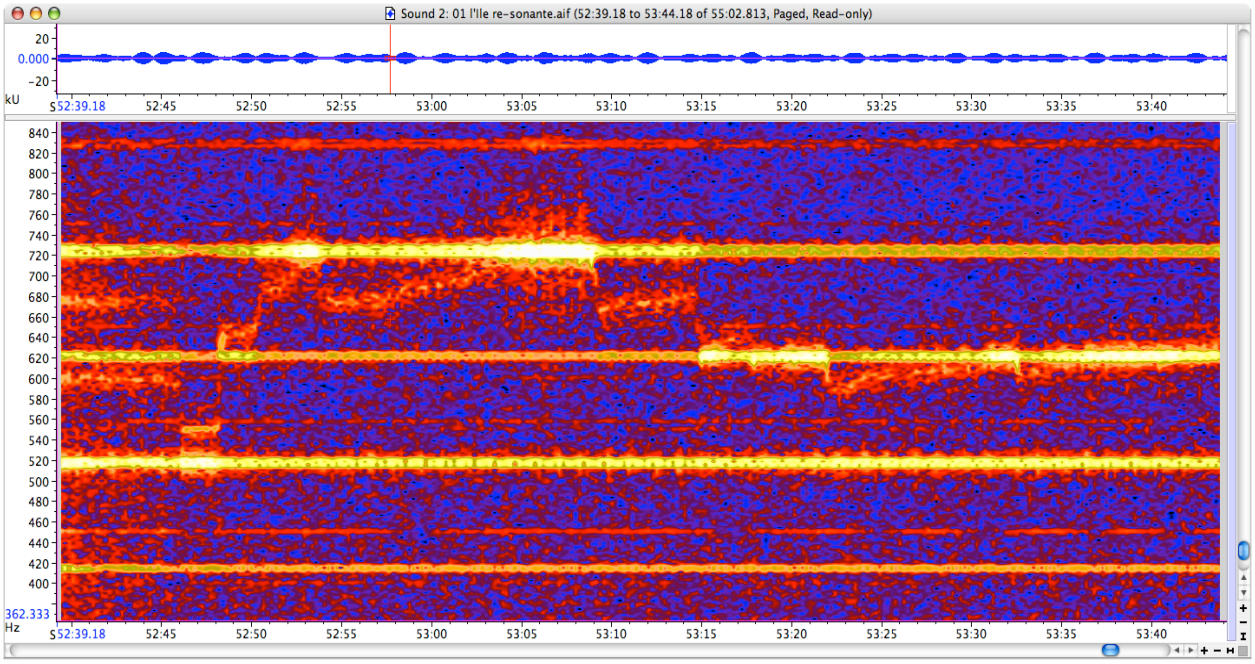

Figure 10 - (52:40-53:40) - right channel

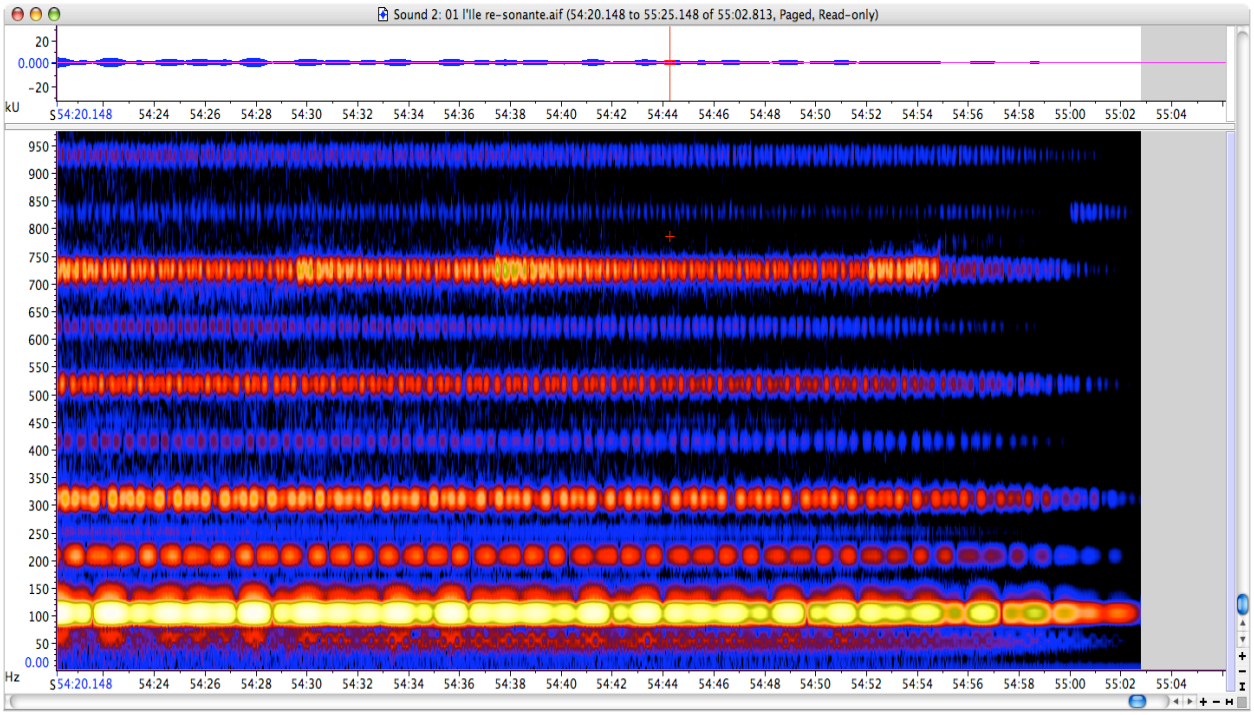

Figure 11 - (54:20 - 55:03) - right channel

Like every moment in *L'île re-sonante,* this passage only serves as another transition, another intermediate state. The graceful dance of the filter comes to rest on the 725 Hz tone and leads us to the end of the piece. The drone frequencies begin to lose energy at around 54:30 and by 55:03 the piece has completely faded out (see Figure 11). The image of the resonant island has withdrawn and returned to the *sunyata* that was both its source and its essence.

> *Form depends mostly upon reflection; it is the reflection of the sun in the moon that makes the moon appear round like the sun.*
>
> - *Hazrat Inayat Khan* (Khan)

Conclusion

Like all of her work of the past forty years, Eliane Radigue's *L'île re-sonante* is a work of deeply personal vision and tremendous scale. Despite it's purely electronic production and minimal pallete, her hand can be heard at work throughout the piece and the result exists within a sound world that is manifestly hers. It can be listened to in a number of ways, but I prefer to think of *L'île re-sonante* in the context of the image of the resonant island, to listen to it from within its monumental yet fleeting structure and allow the image to rise up, suspend time for a while and fade away into the timeless pleroma.

> Things that always fascinated me in classical music are the two or three, sometimes four bars or modulations - when a key switches to another - and when there is a little accident that intervenes, when at a certain instant, the ear experiments with uncertainty. The key that preceded is still not the key that is about to come. When analysing my work musically speaking, these intermodulations - that is to say, these moments when it is absolutely impossible to give the ear a real tonal or modal reference - can be found in most of it
>
> - Eliane Radigue (Prism-Escape)

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