

# Saguaro Astronomy Club

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## *SACNEWS*

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### **Mt. Graham** by Richard Pogge

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*The details behind what's going on with Mt. Graham have always seemed one-sided. I've seen next to nothing published in defense of Mt. Graham and everything else relatively neutral reporting of those actions against it's construction. Well I have finally found something to fill in the previously even larger gaps of my knowledge on the history of the selection of the Mt. Graham site. Although it is definitely not objective, this article has a lot of facts not commonly known. —Paul Dickson, SACNEWS Editor*

I am a research astronomer associated with The Ohio State University, a major partner in the Columbus 11.3m Telescope sited for Mt. Graham. However, as a postdoctoral research fellow whose appointment expires in 1992, about 2–3 years before the projected first light of the project, I have no direct involvement with the Columbus Project, nor with elements of any other projects which are targeting Mt. Graham as a potential site. The statements that follow were not obviously personal opinions or observations are excerpted or distilled from documents at my disposal, and in no way represent the opinions of The Ohio State University, The University of Arizona, any local, state, or federal agencies, The American Astronomical Society, the Astronomical Society of the Pacific, or any groups in support or opposition to the Mt. Graham International Observatory.

While as an astronomer I have an interest in seeing new large telescopes built, and would directly or indirectly benefit from them professionally, I've tried my best to state the facts as I see them.

I would like to first point out that media coverage has hardly been fair on this issue. As public institutions, The University of Arizona and The Ohio State University are specifically prohibited by law from mounting the kind of intense media campaign we have seen from the anti-observatory groups. It would constitute a political use

of public funds. The opposition groups have purposely distorted the issues in their bitter media campaign, and beyond answering specific queries from the press, the universities involved are powerless to respond with their own media campaigns. As one colleague of mine at U. of A. has put it (and I paraphrase): 'They can say anything they want, and unless asked by the press, we can't answer them. If we officially try to use the media to say anything in reply on our own, we open ourselves up to accusations of misuse of public funds. And they know it.'

In particular, the opposition groups have claimed that their concern is for the Mt. Graham Red Squirrel, an endangered sub-species of the North American Red Squirrel that is found only on Mt. Graham (though the *species* itself is found all over). Another claim is that Mt. Graham is one of a rare set of "sky islands"; isolated, pristine ecosystems left over from the last Ice Age, which are inhabited by rare species. They also claim that the U. of A. has done a "rush job" in an attempt to circumvent federal environmental law, involving "millions" in lobbying money.

These claims are patently false.

The *real* issue is a turf battle mounted by those who view development of any kind — astronomical or otherwise — in wild areas as bad, no matter how benign or even beneficial to the local environment. For the Sierra Club chapters behind the current rounds of lawsuits, astronomical sites on any *Arizona* mountaintops seem to be a particular bee in their bonnet. They have publicly stated that if they could work their will, they would see to the closings of Kitt Peak, Mt. Hopkins, and Mt. Lemmon after shutting down Mt. Graham.

The groups involved are not representative of the broad spectrum of environmental concerns — most sincere and which I generally support — in Arizona or the US in general. They are simply unusually vocal. In particular, this one rather small group seems bent on a misinformation campaign.

As far as I can tell, a little over \$2 million has been spent by U. of A. on the effort to get the Mt. Graham site approved. For one, environmental impact surveys cost money, pure and simple, and interested parties must pay for them. A fair fraction has also been spent on lobby-

ing. It is a simple fact of political life that to get anywhere near the federal legislature for anything these days requires that one go through lobbying channels. Unless you have a personal relationship with key members of Congress, you can't even get in the front door (so much for government "for the people"). For the environmental groups to complain about this is hypocritical; they're masters at lobbying techniques themselves. Any project that wishes to use public lands for any purpose has to get the approval of the Congress, and lobbying is standard operating procedure; part of the cost of the project.

As a result of the anti-observatory campaign (which includes, unfortunately, the extremist "Earth First!" group which most reputable environmental groups have distanced themselves from), a serious misconception has arisen that the U. of A. has somehow failed to follow the environmental procedures laid down by law in regard to the Mt. Graham project. The "law" in this case is both the National Environmental Policy Act (NEPA) and the Endangered Species Act (ESA). Most of the opposition literature has accused the U. of A. of trying to railroad approval by the Congress through intense lobbying.

Nothing could be further from the truth.

In reality, a long and rather involved process has been followed, begun in 1980, which has so far included two environmental impact studies (EIS), two biological assessments, and two biological opinions, and now a federal court injunction, a successful appeal, and a pending Congressional hearing. In fact, a complete chronology of events and actions runs some 7 single spaced type pages.

I summarize the key events below:

In July 1980, the University of Arizona began cooperative efforts with the US Forest Service and the US Fish and Wildlife Service to find a suitable site for a new generation of astronomical telescopes in Arizona. In 1981, site surveys found that Mt. Graham, in southeastern Arizona, meets the requirements of a good site for astronomical research, citing in particular its relative isolation from interference from urban lighting, number of clear nights, steadiness and dryness of the air above the mountain, and accessibility of the mountain top. This began a round in informal discussions with federal and local officials.

In 1983, Mt. Graham was selected for direct testing and a permit was issued to the Smithsonian Institution to conduct the study. In 1984, a formal proposal for an observatory was made by the U. of A. and a "Preliminary Analysis Actions" document was filed. As a result, the Office of Arid Land Studies was commissioned, with Forest Service approval, to conduct the first Environmental Impact Survey (EIS). Further, an allowance was made in the Arizona Wilderness Act [of 1984] to establish a 65,000 acre wilderness study area on Mt. Graham. Ironically, this action was supported by the Grand Canyon Chapter of the Sierra Club and other environmental groups which have led the opposition ever since.

In 1985, the Forest Service initiated a second, independent EIS, before the completion (in November 1985) of the first EIS. This "draft" EIS was used as part of the input data for the second Forest Service EIS, and formally published in 1986. The draft EIS put forward 7 alternative site plans for the 3500 acre area and a "Preferred Alternative" with telescopes on what is called "High Peak." After publication, this document was subject to an extensive round of public hearings and comments, all in accordance with strict federal guidelines.

In June 1987, as a result of the biological studies initiated by the U. of A. interest in Mt. Graham as a potential astronomical site, the population of Mt. Graham Red Squirrel (a sub-species of the rather common North American Red Squirrel which it was still legal to hunt) was found to have greatly decreased, and was subsequently declared an endangered species (even though it is only a sub-species and the "species" of red squirrels as such is not in general in danger) in accord with the guidelines established in the Federal Endangered Species Act. As a result, the Forest Service, in accordance with federal environmental law, prepared a "Biological Assessment" of the impact of the "Preferred Alternative" on the red squirrel.

Here the path gets a bit torturous.

The U. of A. requested that the Forest Service consider an alternative which met the university's actual requirements in terms of a minimum number of telescopes and the necessary space. This alternative was much reduced from the original grand concept that would have included up to 17 telescopes and related facilities, making Mt. Graham in a sense another Kitt Peak. This new proposal was the same as "Alternative E" in the original draft EIS, and was to place telescopes on High Peak and Emerald Peak, connected by *existing* roads, and making use of areas already cleared by foresting.

This led to a second biological assessment, called the "Expanded Biological Assessment" prepared by the Forest Service in February 1988, and a further "Biological Opinion" entered by the US Fish and Wildlife Service in July 1988. The latter gave 3 "Reasonable and Prudent Alternatives", the first with 4 telescopes on High Peak and one with 3 telescopes at first, eventually leading to a total of 7 telescopes, on Emerald Peak. The U. of A. elected to accept the Emerald Peak alternative in view of the better astronomical conditions, and the fact that Emerald Peak provided adequate space for the minimum telescope plans ("Reasonable and Prudent Alternative #3" in the biological opinion).

None of the professionals who carried out the biological and environmental studies were directly connected with the project and some were in fact personally opposed to it. The bottom line of all the reports, despite some philosophical opposition, was that no significant adverse effect of the observatory on the Mt. Graham ecology was demonstrated, provided certain precautions and a cutback in the scope of the original proposal be accepted. U. of A.

and its partner institutions have accepted these precautions and cutbacks.

The reason for going to Congress was that there was an effort by individuals in opposition to the project within the Fish and Wildlife agency to use an unusually rigid interpretation of federal environmental law to delay the project for their own purposes. Had a request for Congressional intervention not been made, the project could have been delayed for 4 or more years. Essentially, the U. of A. went to Congress and said ‘Look, we’ve just spent more than 4 years following all of the legally prescribed procedures and got a compromise result that we accept, but certain employees of the agency are refusing to budge. Please do something.’ In other words, U. of A. went over the heads of the footdraggers to their ultimate bosses, the Congress. In a sense, such footdragging represented individuals within the Fish and Wildlife Service acting outside their legal jurisdiction. Their Fish and Wildlife superiors asked them to prepare a fair and unbiased report, and even if they were opposed to the project. If their scientific findings supported the project they were to report those findings regardless of personal feelings. Anything else would be a serious breach of professional and scientific ethics. This sounds less like “pressure to find a positive result,” than a reminder that their public and scientific mandate is to be fair. However, that is exactly how it has been portrayed to the media by two Fish and Wildlife Service biologists. It was this supposed pressure that led to the recent federal court injunction against construction issued by Judge Alfredo Marquez which was successfully appealed by the U. of A. a few weeks ago.

Mt. Graham is far from pristine. For decades, Mt. Graham has been a popular recreational site; with a paved highway all the way to the summit providing access to communications antennas, hunting lodges, camp sites, (including a Bible camp) and a fishing lake. Areas around the summit ridge have been forested since the late 1800s. As a consequence of the interest in Mt. Graham as an observatory site, all development on the mountain and surrounding areas, hunting of the red squirrel, and logging which had deforested 10,000 acres, has halted. Only observatory development would be allowed. The presence of an observatory, backed by Arizona “dark sky” statutes would inhibit commercial development for a fairly large radius around the Mt. Graham area.

In 1985, OSU began considering joining a consortium with U. of A. to build the “Columbus Telescope”, a twin 8-meter telescope that when completed would be an effective 11.3m telescope — the largest then planned. At this time a letter was sent from the Grand Canyon Chapter of the Sierra Club to the Chairman of the Astronomy Dept at OSU, Eugene Capriotti. This letter stated in no uncertain terms that they would use any means in their power to block the development of a new observatory site on *any* mountain in Arizona. That it was Mt. Graham in particular made no apparent difference to them. This group

has been at the forefront of all subsequent legal action to block the observatory.

There was no mention in this letter of the red squirrel. Probably for good reason. Before 1987, when the sub-species was listed as “endangered” by the US Fish and Wildlife Service, it was legal to hunt the red squirrel in season. The “bag limit” being 5 squirrels per hunter. In addition, to make hunting more attractive, the Fish and Wildlife Service artificially introduced the Abert squirrel onto Mt. Graham, where, in the absence of its usual predators, it has thrived and competed with the red squirrel for food and other resources. Given nearly 4 years of dry winters in the Western and Southwestern US, this enhanced competition has not helped the red squirrel much. All this time, between 1980 and 1986 — SIX YEARS — the environmental groups so concerned about the squirrel now did not say a single word.

As an environmentally concerned individual, I am most appalled by the alacrity with which opponents to the Mt. Graham project have stooped to distortion and outright lies. If they have a truly valid complaint, then they have no need to resort to such tactics. I am even more distressed by those groups that have used and/or threatened violence against both property and individuals (it is a fact that the heads of the three major astronomy departments have all received death threats in association with their involvement in this project).

So far as biologists and ecologists can determine, the only scopes that have ever killed red squirrels have been attached to hunting rifles.

### **Congressional Hearings on Mt. Graham**

On June 26th, select subcommittees of the House Committee on Merchant Marine and Fisheries, and the Committee on Interior and Insular Affairs will review the establishment of an astronomical observatory on Mt. Graham. The General Accounting Office (GAO) has been investigating claims by the Sierra Club and its co-plaintiffs versus the Forest Service and the Fish and Wildlife Service that the University of Arizona and their collaborators in the Mt. Graham International Observatory are attempting to circumvent federal environmental protection statutes. These hearings, in view of the recent round of court injunctions and appeals regarding construction on Mt. Graham, will decide the ultimate fate of an observatory on Mt. Graham.

As a result, an intense lobbying and letter writing effort has been initiated by certain environmental groups — primarily the Sierra Club — opposed to an observatory on Mt. Graham. Notably, the Environmental Defense Fund has remained neutral, even going so far as to publicly distance itself from the more extreme anti-development groups.

Similar efforts were made to block the establishment of an observatory on Mauna Kea (unsuccessful) and Junipero Serra (successful, but because it turned out to be a

site of significance to the religion of coastal Native Americans, not for environmental reasons). If the effort to block an observatory on Mt. Graham succeeds, it is unlikely that any future site will be developed in the continental US again.

What is at stake is the future of astronomy on Mt. Graham, and with it the future of the further development of ground-based astronomy in the continental United States.

I'm passing on a call from my astronomical colleagues to ask for the support of all those interested to try to offset the anti-observatory effort with one of our own. While as an astronomer I have a vested interest, we need others concerned about the future of astronomy in general (not just in the US) to express their support for this project. So, cut this out and spread it around to astronomical societies and the like. We have to act soon.

Here are the principal players:

The Honorable Gerry E. Stubbs, Chairman  
 Subcommittee on Fisheries and Wildlife  
 237 CH Office Building  
 Washington, DC 20515

The Honorable Bruce F. Vento, Chairman  
 Subcommittee on National Parks/Public Lands  
 2304 RH Office Building  
 Washington, DC 20515

Arizona congressional delegation

The Honorable Jim Kolbe  
 410 Cannon House Office Building  
 Washington, DC 20515

The Honorable Morris K. Udall  
 235 Cannon House Office Building  
 Washington, DC 20515

## Comet Comments by Don Machholz

One new comet has been discovered recently, it may become fairly bright in our summer sky. Comet Austin continues to dim in our evening sky. A third object, Periodic Comet Honda-Mrkos-Pajdusakova passes to within 27 million miles from earth in late July, then it continues to brighten in the morning sky as it nears its Sept. 12 perihelion.

Comet Levy (1990c): David Levy discovered this, his sixth comet, on the morning of May 20. At magnitude ten, it was near the north side of the Great Square of Pegasus. David was using his 16" reflector, and had been searching for 60 hours since his previous find last August.

A very preliminary orbit (IAU Cir. 5023) shows the comet closest the sun at 0.94 AU in early November. It should brighten over the next few months as it passes through opposition and into our evening sky.

Comet	Austin		(1989c <sub>1</sub> )		
Date	RA-1950-Dec		RA-2000-Dec		Elong Sky Mag
06-23	15h42.2m	-34°01'	15h45.4m	-34°10'	148° E 8.9
06-28	15h32.2m	-34°42'	15h35.4m	-34°52'	142° E 9.4
07-03	15h25.7m	-35°09'	15h28.9m	-35°19'	135° E 9.9
07-08	15h21.8m	-35°29'	15h24.9m	-35°40'	130° E 10.3
07-13	15h19.7m	-35°45'	15h22.9m	-35°55'	125° E 10.7
07-18	15h19.1m	-35°58'	15h22.3m	-36°09'	121° E 11.0
07-23	15h19.7m	-36°10'	25h22.8m	-36°21'	116° E 11.3
07-28	15h21.1m	-36°21'	15h24.3m	-36°32'	112° E 11.6
08-02	15h23.3m	-36°32'	15h26.5m	-36°43'	108° E 11.9
08-07	15h26.1m	-36°43'	15h29.3m	-36°54'	104° E 12.2
08-12	15h29.4m	-36°55'	15h33.6m	-37°05'	100° E 12.4

Comet	Levy		(1990c)		
Date	RA-1950-Dec		RA-2000-Dec		Elong Sky Mag
06-23	00h07.1m	+29°12'	00h09.6m	+29°29'	78° M 9.2
06-28	00h07.2m	+29°24'	00h09.8m	+29°40'	82° M 9.0
07-03	00h06.6m	+29°33'	00h09.1m	+29°49'	87° M 8.8
07-08	00h05.0m	+29°38'	00h07.6m	+29°55'	91° M 8.5
07-13	00h02.4m	+29°39'	00h05.0m	+29°56'	96° M 8.2
07-18	23h58.9m	+29°33'	00h00.9m	+29°50'	101° M 7.9
07-23	23h52.6m	+29°18'	23h55.1m	+29°34'	106° M 7.6
07-28	23h44.6m	+28°48'	23h47.1m	+29°05'	112° M 7.3
08-02	23h33.8m	+27°58'	23h36.2m	+28°14'	119° M 6.9
08-07	23h19.2m	+26°37'	23h21.7m	+26°53'	126° M 6.5
08-12	22h59.9m	+24°28'	23h02.3m	+24°44'	134° M 6.1

Periodic	Comet	Honda-Mrkos-Pajdusakova			
Date	RA-1950-Dec		RA-2000-Dec		Elong Sky Mag
07-03	23h12.7m	-11°05'	23h15.3m	-10°48'	115° M 11.9
07-08	23h35.2m	-09°44'	23h37.8m	-09°28'	114° M 11.3
07-13	00h03.8m	-07°57'	00h06.3m	-07°40'	112° M 10.8
07-18	00h40.8m	-05°28'	00h43.4m	-05°11'	107° M 10.2
07-23	01h29.5m	-02°01'	01h32.0m	-01°45'	99° M 9.6
07-28	02h31.3m	+02°29'	02h33.9m	+02°42'	88° M 9.1
08-02	03h42.7m	+07°23'	03h45.4m	+07°32'	74° M 8.7
08-07	04h53.6m	+11°28'	04h56.3m	+11°33'	61° M 8.5
08-12	05h54.3m	+14°05'	05h57.2m	+14°05'	51° M 8.4

## Bits and Pieces Deep Sky Meeting

The Deep Sky meeting will take place at the McGrath's on Thursday, July 12 at 7pm. Directions are in the directions section below.

### Minutes of the June Meeting

President Pete Burggraaf brought the meeting to order at 7:30 PM. Steve Coe announced the next novice meeting at his house, the following Sunday. Harold Moorin presented an updated on the progress for a "Arizona Astronomy Center." Gene Lucas gave a short report on Riverside. Virginia Campbell then announced Phoenix Parks and Recreation is having a backpacking hike on Mt. Graham over the July 4th weekend. Pete Burggraaf then read the Treasurer's report. For the Show-and-Tell

session, Rick Rotramel showed slides from the Riverside Telescope Maker's Conference.

During the break David Levy signed copies of his book and afterward, gave a talk "Comet, Nova, Comet" describing Comet Halley, Clyde Tombaugh's discoveries and Comet 1990C — Comet Levy. —*Phil Dahl, SAC Secretary*

<b>1990 SAC Meetings</b>
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July 6
August 10
September 7
October 5
November 2
December 8

<b>1990 SAC Star Parties</b>
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July 14
August 18
September 15
October 13
November 10
December 15

## Directions to SAC Events

**SAC General Meetings** 7:30 PM at Grand Canyon University, Fleming Building, Room 103 — 1 mile west of Interstate 17 on Camelback Rd., north on 33rd Ave., second building on the right.

**SAC Star Parties** at Buckeye Hills Recreation Area — Interstate 10 west to Exit 112 (30 miles west of Interstate 17), then south for 10.5 miles, right at entrance to recreation area, one-half mile, on the right. No water and only pit toilets. Please arrive before sunset; allow one hour from central Phoenix.

**SAC Deep Sky Subgroup Meeting** at John & Tom McGrath's, 11239 N. 75th St., Scottsdale, 998-4661 — Scottsdale Rd. north, Cholla St. east to 75th St., southeast corner.

## Adventures in Wide Field Astrophotography

by Chris Schur  
Part 1

In this first of a series of lecture articles on wide field astrophotography, I will cover the concepts of wide field work, applications, suitability of lenses and their aberrations so that you can select a good lens from many inferior ones out there.

Skyshooting with a wide field camera is astrophotography in its purest form. Here, in a single frame it is possible to capture dozens of deep sky objects, along with their relative positions at a casual glance. Probing the sky with such a system will reveal many fine details that even the best charts lack. Also, we can use wide field photographs as observing tools to help pin down many of the elusive objects which can be challenging visually.

Many useful projects can be accomplished with a simple 35mm camera, such as charting a favorite region for later study, nova patrols, seeking comets and recording

their motions in the sky, or perhaps mapping hundreds of dark nebula along the plane of our galaxy. Also remaining to be discovered is the large scale structure of star clouds, chains of bright emission nebula, and knots of star clusters, along with aurora and meteors.

The concept of wide field astrophotography is simple: A small camera with either a wide angle or telephoto lens, is secured to the tube of the telescope in some fashion. While the clock drive in the mounting moves the tube at the same rate as the stars, the camera's field of view will remain fixed, and time exposures can be made. In reality this task is not so simple, however with a little care and patience any determined individual will be able to produce acceptable results. While in theory, any type of camera will suffice for the job, the variety of films and lenses available for 35mm cameras make them most suitable for the job. This allows us to choose the three most common formats: wide angle, normal and telephoto. The only other requirements to begin skyshooting are clear skies and a tracking equatorial mount.

### Applications for Wide Field Astrophotography

Wide angle astrophotography is the first step for most at seeing more of the universe than can be normally seen with the naked eye or telescope. Because of the accumulative effect of light during extended exposures on film, your camera is far more sensitive than the human eye at seeing faint objects and subtle colors in the sky. Often invisible objects such as dark nebula, strongly colored stars, and extended faint emission nebula are clearly revealed.

### Suitability of lenses

A quality lens can make the difference between an average shot and a superb one. But how do we evaluate a good lens for astrophotography? All too often, many of the name brand lenses offered for 35mm cameras are unsuitable for skyshooting due to various aberrations or distortions. A lens that may be perfectly suited for terrestrial photography may be useless for sky mapping. The type of subjects you will be shooting will for the most part, determine the type of optics you will need. For example, a large aperture is essential for recording the faintest stellar images such as might be needed in nova patrols or star mapping. However a fast focal ratio is the only choice for recording dim diffuse objects such as emission nebulas, or dark nebulas in the Milky Way. In short, the diameter of the objective lens determines the faintest stars reached, while the focal ratio limits the faintest extended objects recorded. Fortunately, telephotos and wide angle lenses are more suitable for photographing extended objects which are too large and faint for the telescope to record.

No lens system is perfect. All lenses are plagued by various defects, some more important than others which can limit their performance in deep sky photography. Probably the worst distortion is coma. This aberration is usually seen as comet or parachute shaped images near

the edges of the field, that gets worse as you go further off-axis.

Another type of distortion is chromatic aberration, and is caused by the inherent curves in the glass itself. It is characterized by swollen star images in the center of the field, and possibly a blue halo around bright star images. The inability of lenses to bring all colors to a common point of focus is the cause of this condition.

Vignetting is the third most common defect in lenses. This can be seen as a falling of in the intensity of the light striking the film near the edges of the frame. This can in extreme cases, cause the photo to look like we are looking out of a porthole! The fourth difficulty with wide field systems, and one of the more difficult to remedy is field curvature. This occurs when the center of the field is at a different focal point than the edges of the frame. Often this may not be distinguishable from the coma in off-axis images, but in severe cases, the lens may have to be rejected for use in astrophotography.

It is hoped that some insight to wide field work has been successfully conveyed here. In future articles, I will touch on some of the many additional aspects of the purest form of astrophotography.

## Another Astronomy BBS by Paul Maxson

For those of you who use your computers with modems to telecommunicate, I am a Co-Sysop of an Astronomy sub-board on a BBS on the west side of Phoenix. The name of this BBS is the JCCS BBS. It is run by Dale Williamson and been in business since August 1986. Dale has allowed me to be Sig-op of the astronomy board. The JCC features 2 phone lines (582-3643 and 943-9318, 2400bps, 8N1) and nearly 500 Megabytes of on-line storage. Dale has given me an upload/download directory so we can exchange our files there. The board is a pay board ranging from \$5 a year to \$50 a year depending on how much time and downloads you desire daily. A non-paying user can scan and read the message base (we usually have over 100 new messages per day) and scan the file areas, but you will not be able to leave messages or download files. You are, however, allowed to leave a message to Dale, if you do, please mention my name.

In addition to Astronomy, we also discuss Windows 3.0, Politics, and other items. One of our users is a Microsoft beta-tester and we have a very large bulletin section on Windows and related applications. I invite each one of you to come on over and try out JCCS and get involved in the Astronomy sub-board. I think you will enjoy it.