

THE WATCH.

NEO Detection and Follow-Up



A Project of The Space
Frontier Foundation



Why do we need The Watch?

- It is a scientifically proven fact that asteroids and comets have had a great impact on our planets past and will continue to do so, albeit to a lesser extent, in the future.

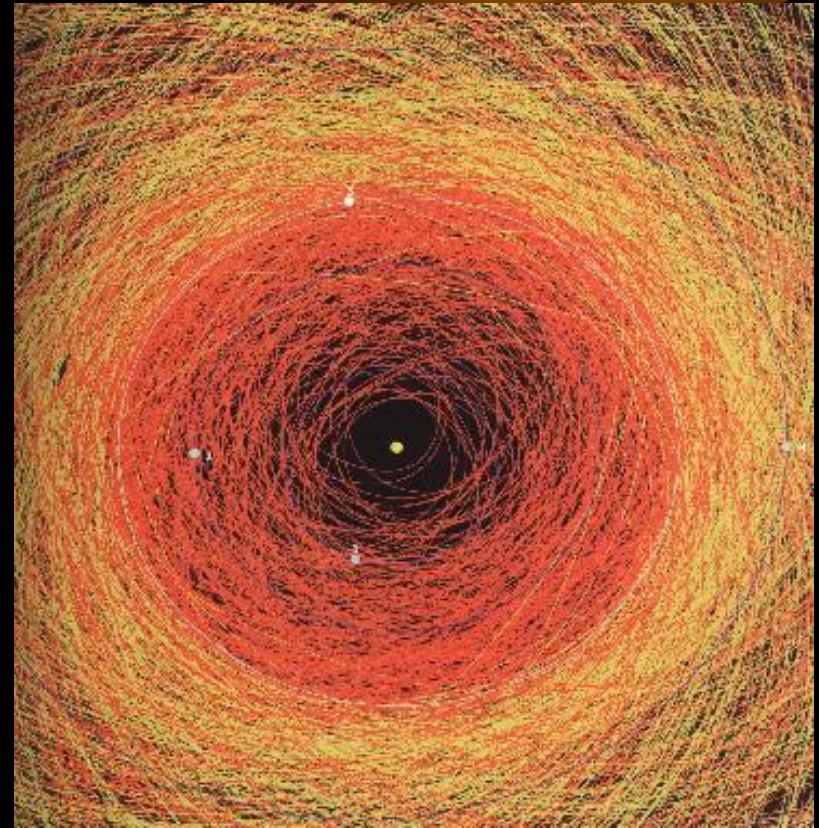


What's the problem?

- The problem is that a large Earth Orbit crossing asteroid or micro-planet could hit this planet with such devastating force *it would end life on Earth, as we know it.*
- It needn't be more than a kilometer wide. It could be much smaller and still cause widespread damage to our fragile global economy. It could do this through direct impact on a populated area, or by creating a “nuclear” winter effect, or more likely by giving rise to *Tsunami*.

Earth Crossing Asteroids (NEO's)

- The orbits of the inner planets (Earth # 3) superimposed with Earth orbit crossing asteroids (**Red orbits**) known at the start of the year 2000. **The problem is obvious.**



Think the idea is amusing?

It's not a question of
if this is going to
happen ... but *when*.

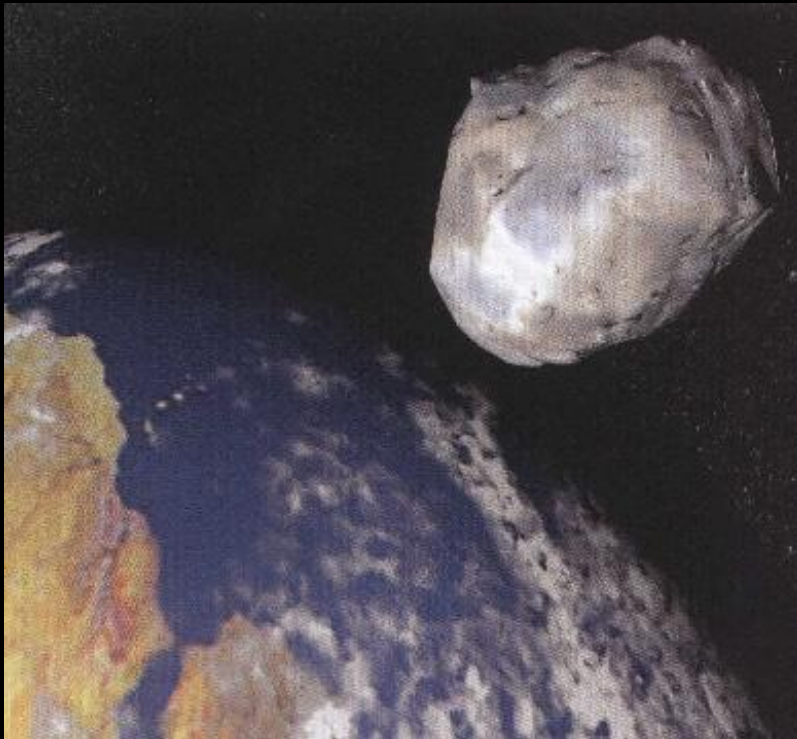


Do we go the way of the dinosaurs?

- Or do we use our unique gifts to do something about it.
- As Carl Sagan said, “The reason the dinosaurs became extinct was because they did not have a space program.”



Will the next one slip quietly by?

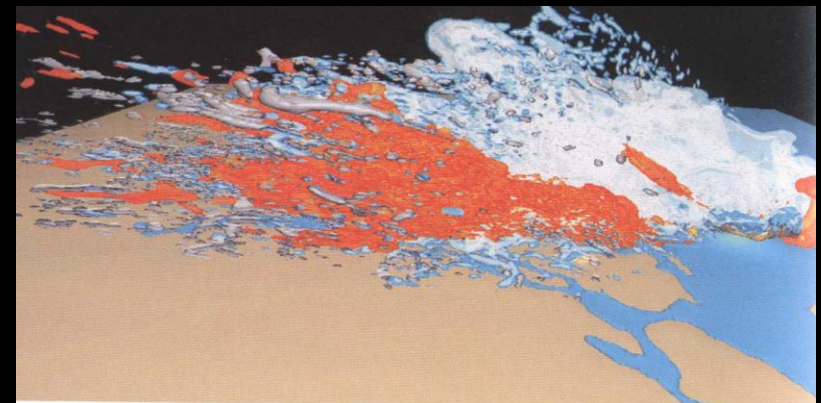


*The worst thing is that
we don't know.*

Finding out one way
or the other is an
insurance policy we as
a species ignore at our
peril.

What is the likely cost of an impact?

This computer model shows the results of an impact by a 0.9 mile wide asteroid into the Atlantic Ocean just off Long Island. NYC is quickly engulfed by rock and water followed soon after by a huge mass of material that penetrates deep inland. All life in the region is devastated, global atmospheric disturbances result from the ferocity of the explosion.



What is Being Done?

- Currently, **NASA** and the **USAF** are running **LINEAR**, a discovery program based in New Mexico.
- **JPL** is running **NEAT** from Hawaii.
- SpaceWatch is running a discovery and follow-up program from Kitt Peak, Arizona.

New Discoveries Abound



The **LINEAR** program being run by Dr. Grant Stokes in the NM desert is dumping huge amounts of new data into an overtaxed system. Shown is a 1 Metre aperture camera used by **LINEAR**

Near Earth Asteroid Tracking



- **NEAT** is headed by Dr. Eleanor Helin (Glo) a long time specialist in NEO discovery and follow-up. **NEAT** is a dept. of JPL and desperately needs extra funding.

What Needs To Be Done?

The Discovery work is being achieved at an ever increasing pace. What is desperately needed is for the follow-up work to these new discoveries to be completed. Follow-up includes historic photometry, orbital calculations, period, inclination etc. *In effect, we need to know where this chunk of space rock is headed!*

Follow-up is absolutely vital!

- This task is, in effect, being ignored by Governments.
- **The Watch** supports astronomers, around the globe to help to accomplish this necessary task. In addition, we offer financial support to those individuals who have proven that they can provide quality work to the **MPC**.

What is the MPC?

The *Minor Planet Center* in Massachusetts tracks all minor planets, asteroids and comets.

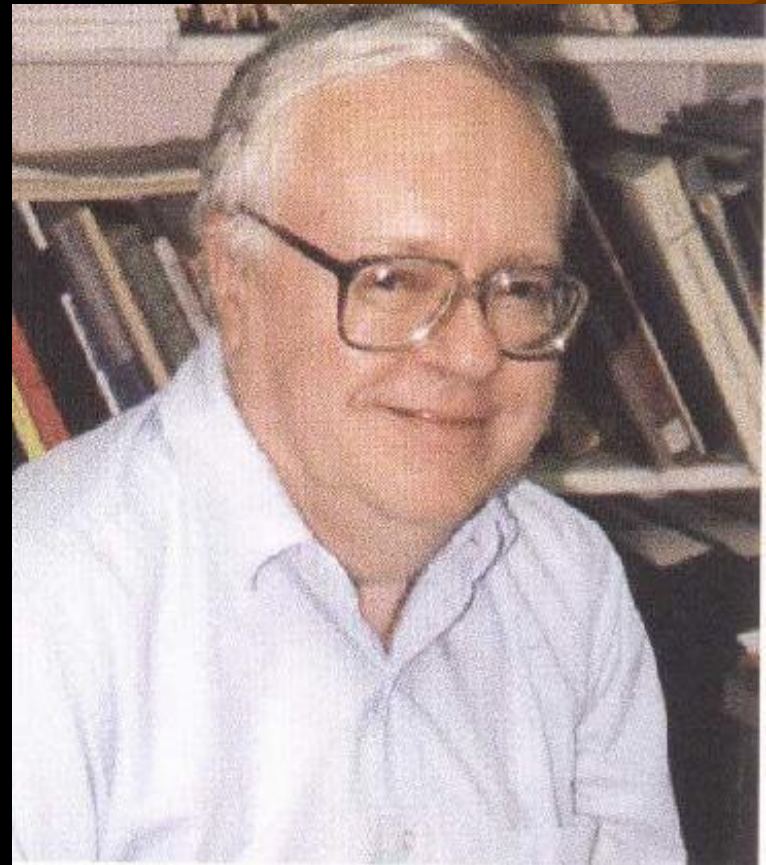
The Watch has assisted with financial resources to further automate this process.

The center is undermanned for the flood of new data that is being “dumped” into their system from the Air Force LINEAR program.

They desperately need further financial aid.

The Minor Planet Center

- The MPC is manned by two people, Dr. Brian Marsden (right) and Gareth Williams. They are the only two people who keep track of all NEO's. *They are swamped and need extra manpower.*



Why is Follow-up so important?

- Photographing an object is only part of the job. We need to know where that object has been and where it is going.
- An objects orbit can be perturbed by other bodies in space and its orbit needs to be constantly monitored.
- The more lead time we have to avoid an impact, the more likely we are to succeed in achieving this difficult task.

We also have a hole in the sky!



- What we mean by this is that we have reasonable coverage of the skies in the Northern Hemisphere, but almost no coverage in the Southern skies. A large impact in the South Pacific is just as likely to cause global effects as anywhere else on the planet.

We need observations in the Southern Hemisphere ASAP



Astronomers in Australia need our support urgently. An NEO is just as likely to approach from the southern skies as from the North. Here we see amateur astronomer Gordon Garradd in the outback.

What can financial aid achieve?

- Upgrade software and staffing levels at the MPC.
- Keep as many follow-up astronomers fed and clothed as possible. Acquiring aid will be dependent upon the quality of previous work.
- Help to bring online new observing equipment.
- Educate both the public and the governments about the dangers in a non-sensational manner, through a public awareness and outreach program.
- Get schoolchildren and students involved for the future. The more qualified observers the better.

How do we decide who to help financially?

- The Watch council has been formed to perform this duty; it is comprised of several of the most notable researchers in the field. Requests are based upon both merit and necessity.
- Previous quality of work sent to the MPC will aid in being a determining factor.
- Determined by the urgency of work needed as well as geographical and seasonal determinations.
- How much “**Bang for the buck**” do we get?

Without new finances, both government and private, the insurance premiums to maintain these necessary programs will not be paid. At that point we might just deserve to go the way of the Dinosaurs!