Drifter Lifetimes by Manufacturer

Presenter:
Mayra Pazos

Collaborators:
Rick Lumpkin, Erik Valdes, Shaun Dolk

Drifter Data Assembly Center
(DAC)

NOAA/AOML/GDP

Miami, Florida

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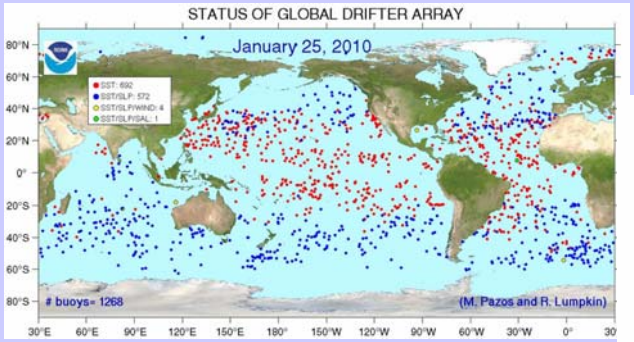
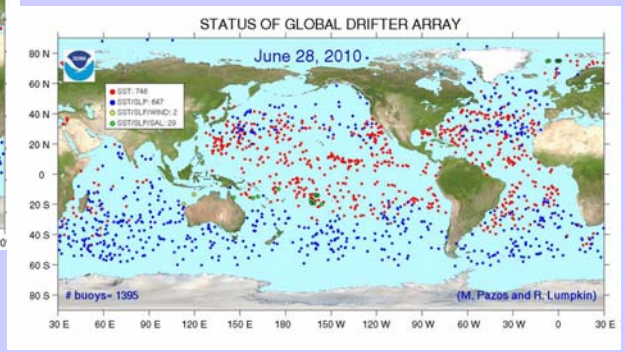
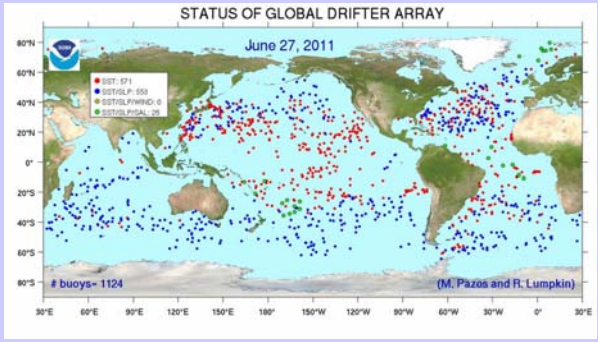
How has the array size evolved?



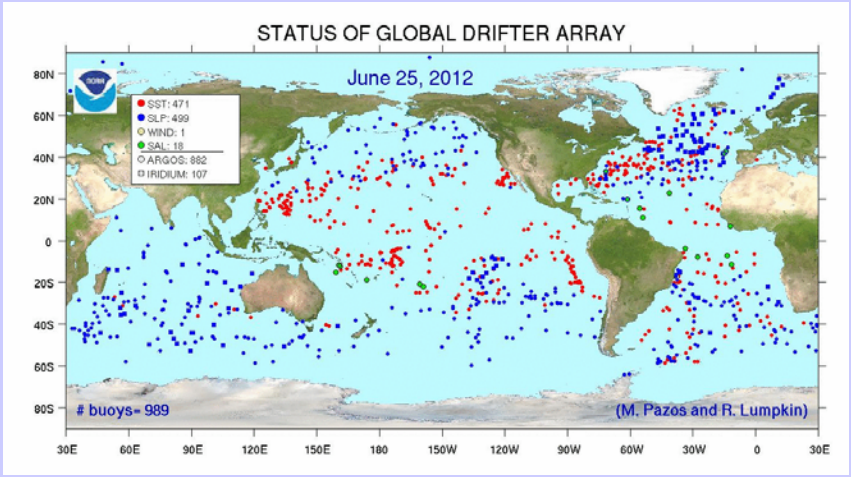
Jan 25, 2010
Drifters: 1268



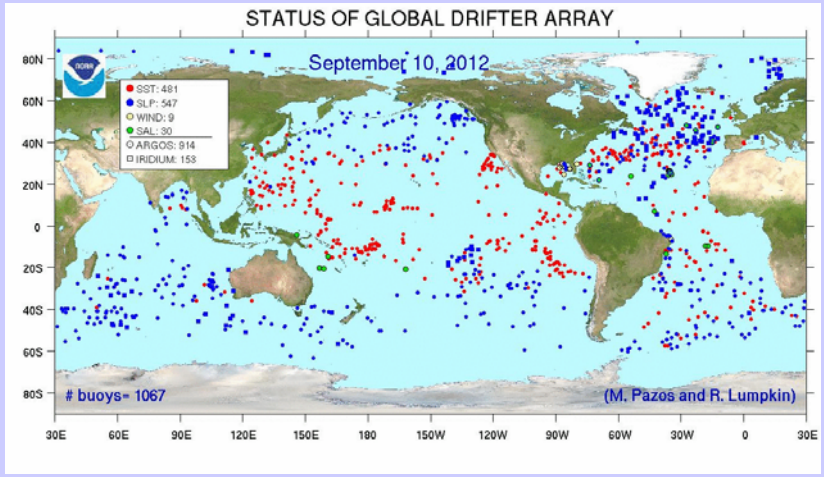
Jun 28, 2010
Drifters: 1395



Jun 27, 2011
Drifters: 1124



Jun 25, 2012
Drifters: 989



Sep 10, 2012
Drifters: 1067

A historical look at drifter deaths

Use directory file (QC data) for 1 Jan 2005—25 March 2012.
Use deployment log to include *Failed on Deployment* drifters.

For this analysis, there aren't (yet) enough DBi or SIO drifters to include.

Do not use "manufactured on" date: we only have this information for 21% of the drifters deployed since 2005

(2% of Clearwater, 73% of Technocean, 1% of Metocean, 1% of Pacific Gyre, 83% of DBi, 20% of SIO).

Instead use "deployed on" date or "died on" date.

Half-life calculations

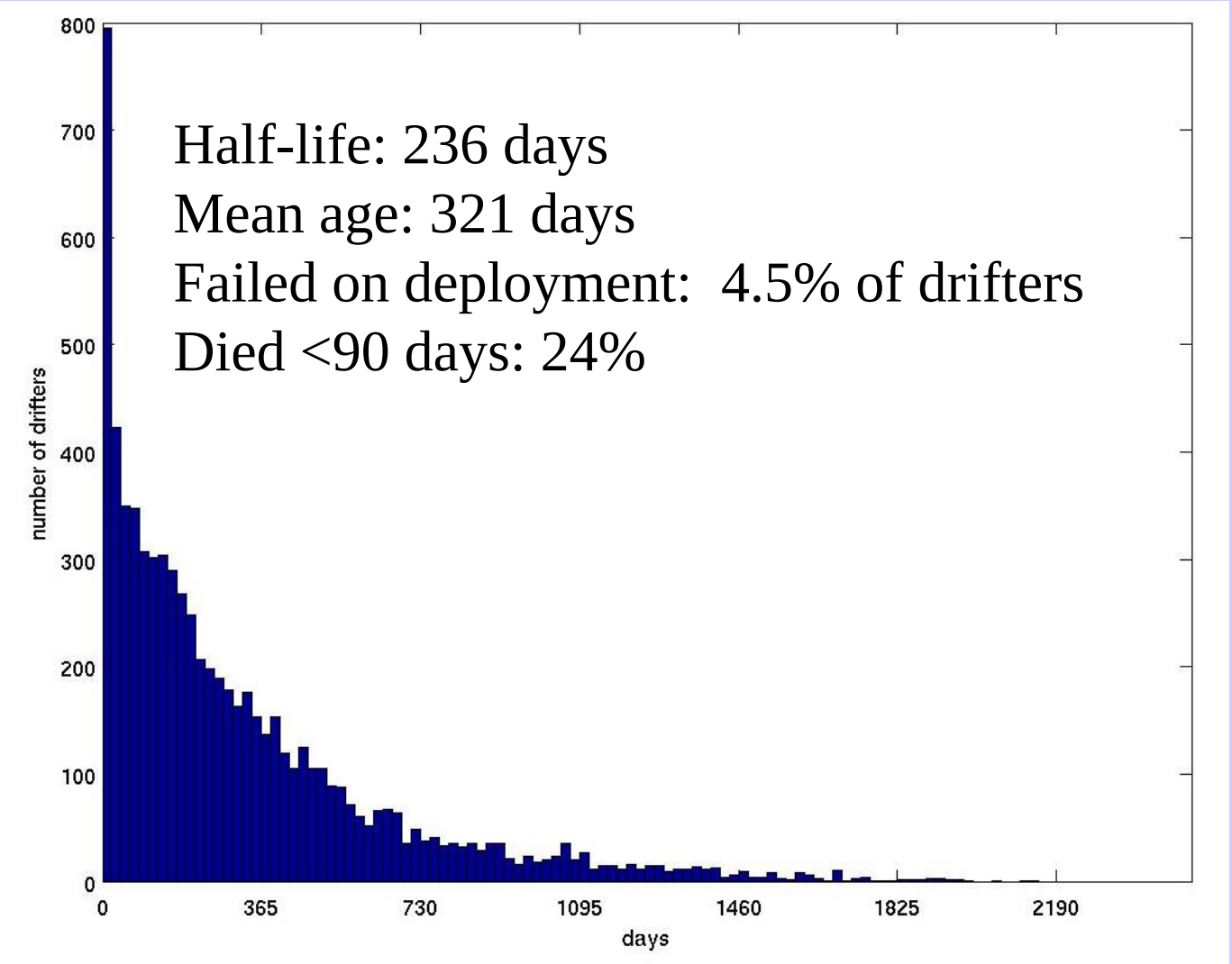
The half-life tells us how long it takes for 50% to die. Unlike mean lifetime, which can't be calculated until ALL are dead, we can calculate this once half are dead.

Simple example: 100 drifters are deployed, the half life is the number of days it takes 50 drifters to die

If more than half are still alive, we can calculate an "at least" half life:
1)For still alive drifters: use age (so far) instead of death age.
2)Calculate half-life using all ages.
3)Remove "still-alive" ages that are < half life.
4) Repeat 2, 3 until all "still-alive" ages are > half life.

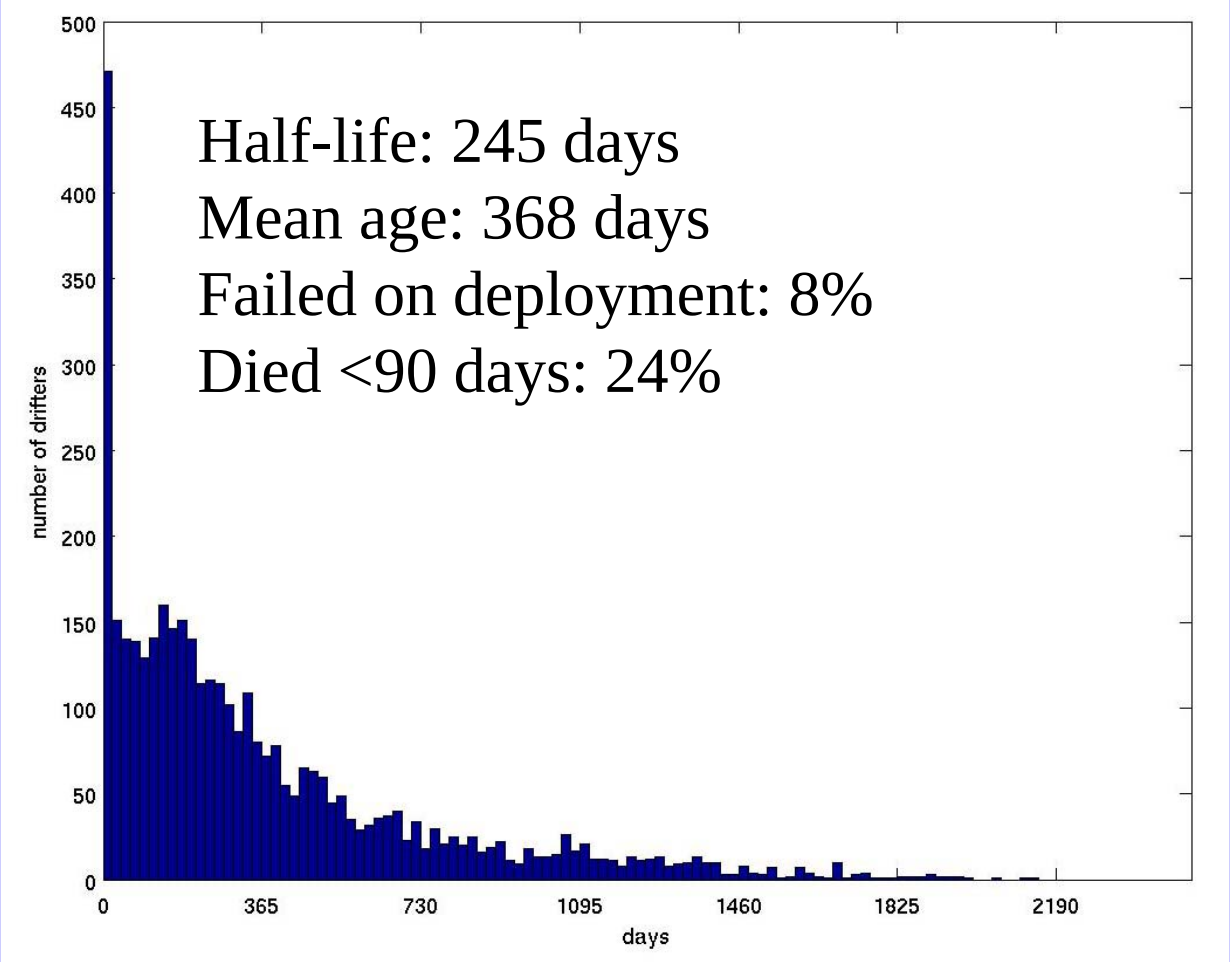
Age at death (all causes)

All drifters in study period. Includes quit, ran aground, picked up, and Failed on Deployment.

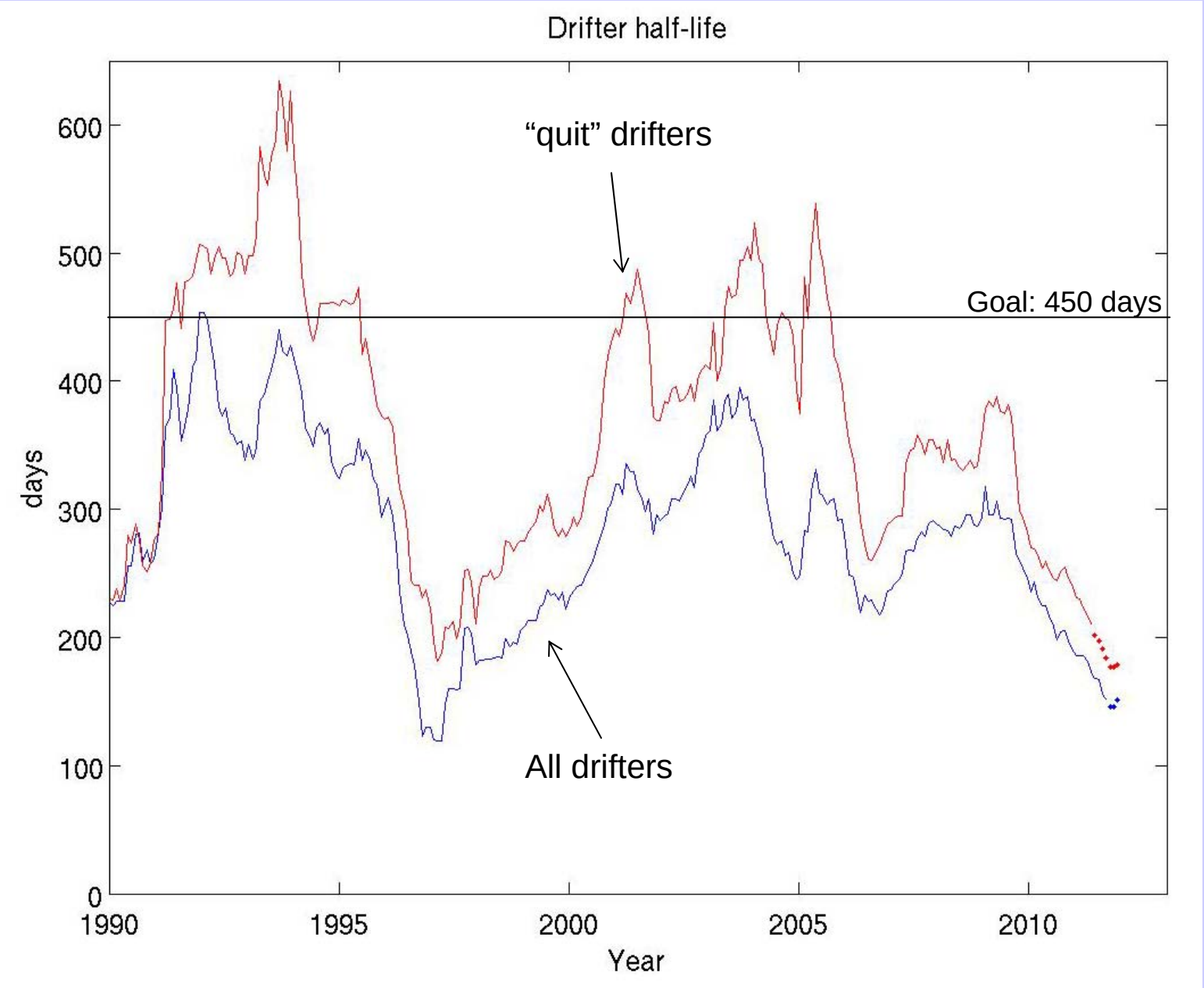


Age at death (“quit” drifters)

“Quit” means “quit transmitting”, with estimated chance of “ran aground” or “picked up” (Lumpkin, Maximenko and Pazos, 2012) less than 25%. Includes “failed on deployment”. Excludes all deaths poleward of 55°N/S (may have been caused by ice).



How has this half life changed over time?



Number of deployments

Number of drifters deployed each year, by manufacturer

2012: values through 25 March.

Manufacturer	***2005***	***2006***	***2007***	***2008***	***2009***	***2010***	***2011***	***2012***
Clearwater	331	431	469	390	355	445	259	88
Marlin-Yug	0	5	6	16	24	11	0	2
Metocean	102	68	224	149	223	202	219	41
Pacific Gyre	305	114	121	291	265	246	367	53
Technocean	456	286	274	175	279	394	253	4

From 2005-2010, the majority of the array was composed of Clearwater and Technocean drifters, with the number of Pacific Gyre increasing slowly after 2008

Number of deaths

How many drifters died each year, for all causes

(quit, ran aground, picked up). Includes Failed on Deployment

2012: values through 25 March. **Bold**: >1.5× more than number deployed that year

Manufacturer	***2005***	***2006***	***2007***	***2008***	***2009***	***2010***	***2011***	***2012***
Clearwater	253	380	543	487	391	458	361	97
Marlin-Yug	**14**	0	1	13	24	8	**7**	0
Metocean	81	62	107	187	156	240	258	47
Pacific Gyre	206	170	107	204	217	238	287	**84**
Technocean	278	358	278	268	260	345	**436**	**57**

How many drifters quit?

"quit transmitting", with estimated chance of "ran aground" or "picked up" (Lumpkin, Maximeko and Pazos, 2012) less than 25%. Includes "failed on deployment". Doesn't include deaths poleward of 55°N/S (possibly due to ice).

Percent: number that quit that year, divided by number deployed.

2012: values through 25 March. **Bold**: >50%

Manufacturer	***2005***	***2006***	***2007***	***2008***	***2009***	***2010***	***2011***	***2012***
Clearwater	29%	35%	**63%**	**78%**	**67%**	**71%**	**95%**	**57%**
Marlin-Yug	*	0%	17%	13%	8%	36%	*	0%
Metocean	**53%**	41%	28%	**83%**	38%	**69%**	**69%**	**73%**
Pacific Gyre	24%	**57%**	**53%**	36%	45%	**59%**	**51%**	**89%**
Technocean	24%	44%	39%	**69%**	43%	45%	**115%**	**1100%**

Half-life of drifters (days)

Number of days after which half are dead, as function of deployment year. Includes Failed on Deployment.

Values through 25 March 2012. **Bold**: less than **200 days** (**Large**: **<100 days)**

Manufacturer	***2005***	***2006***	***2007***	***2008***	***2009***	***2010***	***2011***	***2012***
				All drifters:				
Clearwater	379	210	206	253	217	**163**	**129**	>33
Marlin-Yug	*	752	577	**96**	**162**	466	*	>53
Metocean	332	353	379	381	373	207	**188**	>53
Pacific Gyre	**106**	**107**	**187**	206	283	268	>177	>69
Technocean	419	394	522	497	476	262	**146**	>48
				"Quit" drifters:				
Clearwater	909	232	251	217	213	**165**	**155**	>62
Marlin-Yug	*	849	635	>1229	634	>580	*	>53
Metocean	395	384	436	452	431	271	>206	>53
Pacific Gyre	244	**173**	**192**	424	346	335	>231	>70
Technocean	535	563	691	1032	726	296	**188**	>48

Percent which live <90 days

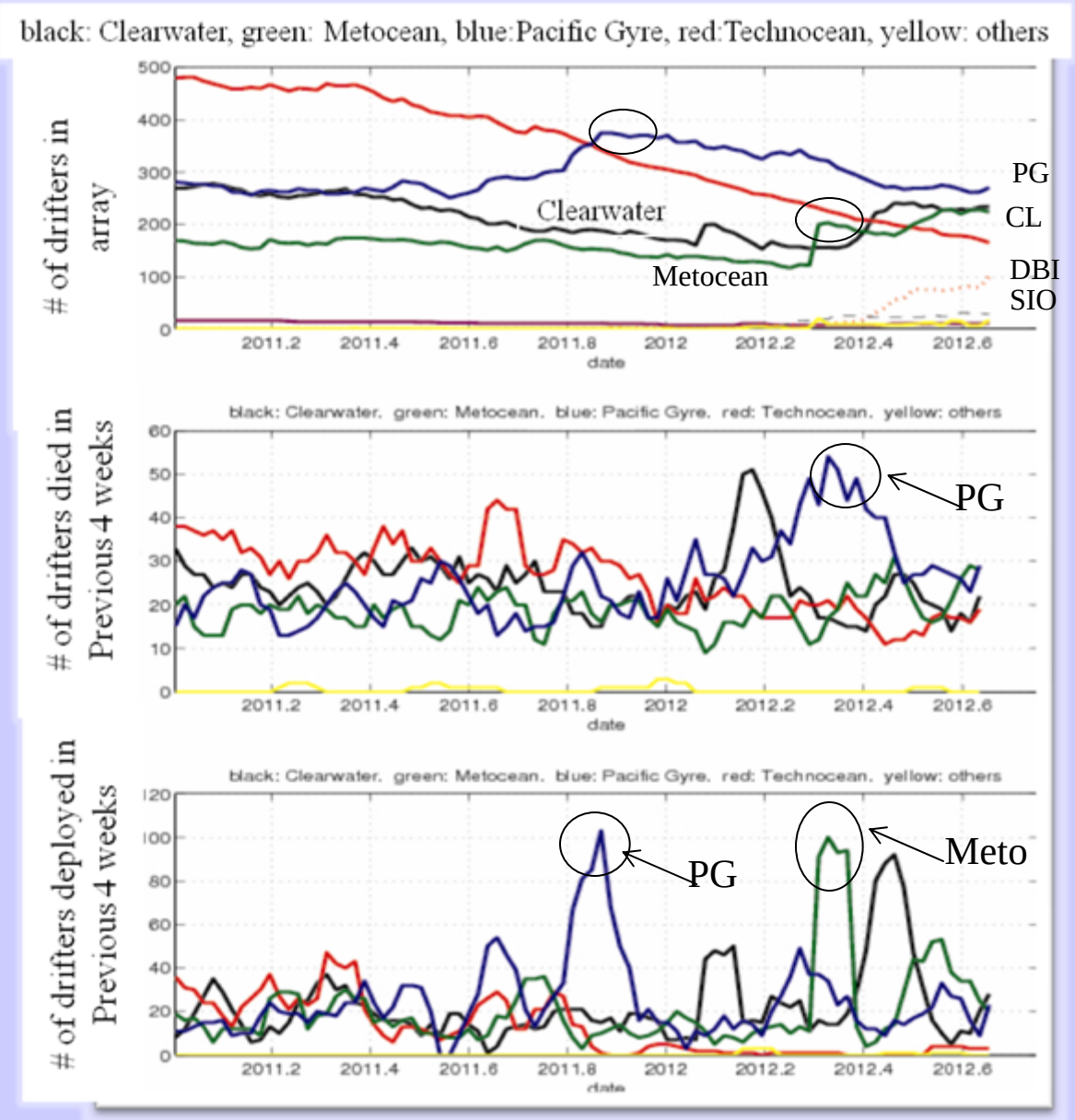
quit at <90d divided by # deployed that year. Includes Failed on Deployment

2012: values through 25 March. **Bold**: more than **10%**. **Large**: **>20%.**

Manufacturer	***2005***	***2006***	***2007***	***2008***	***2009***	***2010***	***2011***	***2012***
Clearwater	5%	8%	7%	**11%**	**11%**	**26%**	**27%**	**12%**
Marlin-Yug	*	0%	0%	0%	0%	**18%**	*	0%
Metocean	**12%**	6%	7%	5%	6%	5%	**11%**	**27%**
Pacific Gyre	**15%**	**20%**	**13%**	**13%**	**17%**	5%	5%	4%
Technocean	6%	**13%**	9%	8%	4%	**11%**	**32%**	***75%***

Recent changes

Through August 27, 2012



Steady decrease in # of **Technocean** drifters, accelerated towards end of 2011-2012.

Metocean maintained #, with big jump in April/May when Iridium (Joubeh, Meteo-France) were included in weekly maps. Second jump from Brazilian Navy deployments.

Clearwater #s decreased through 2011 and now has leveled out. Increased deployments to 314 from Jan-Aug 2012.

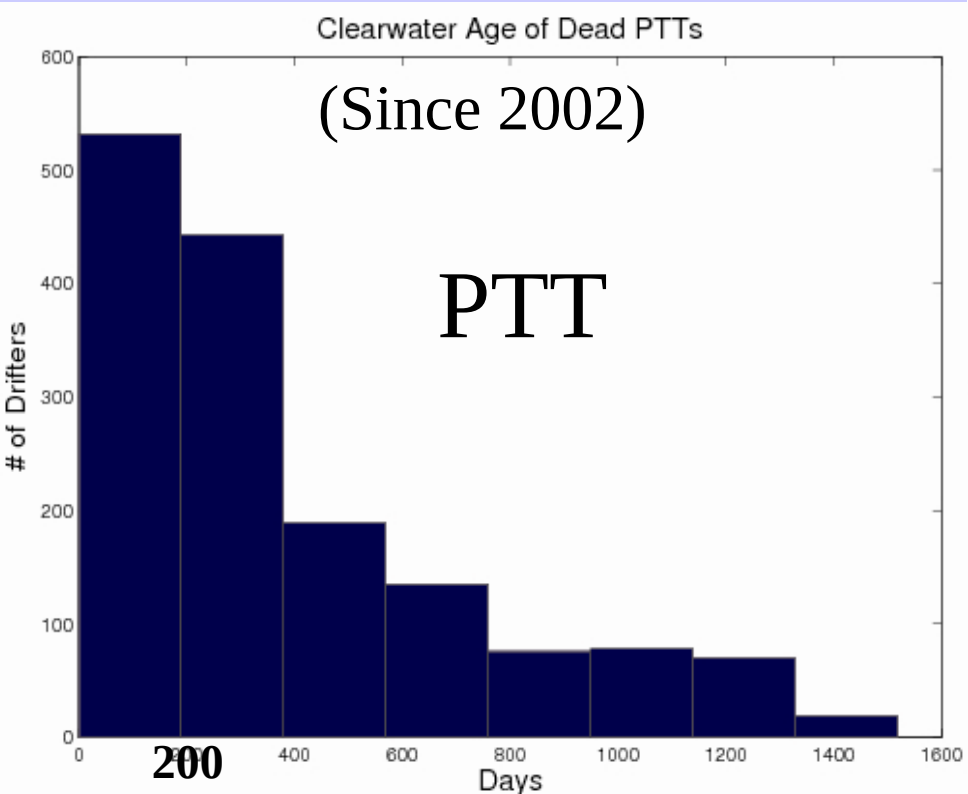
Pacific Gyre #s increased end 2011 with a big spike in deployments around Sep-Oct; steadily diminishing since March 2012

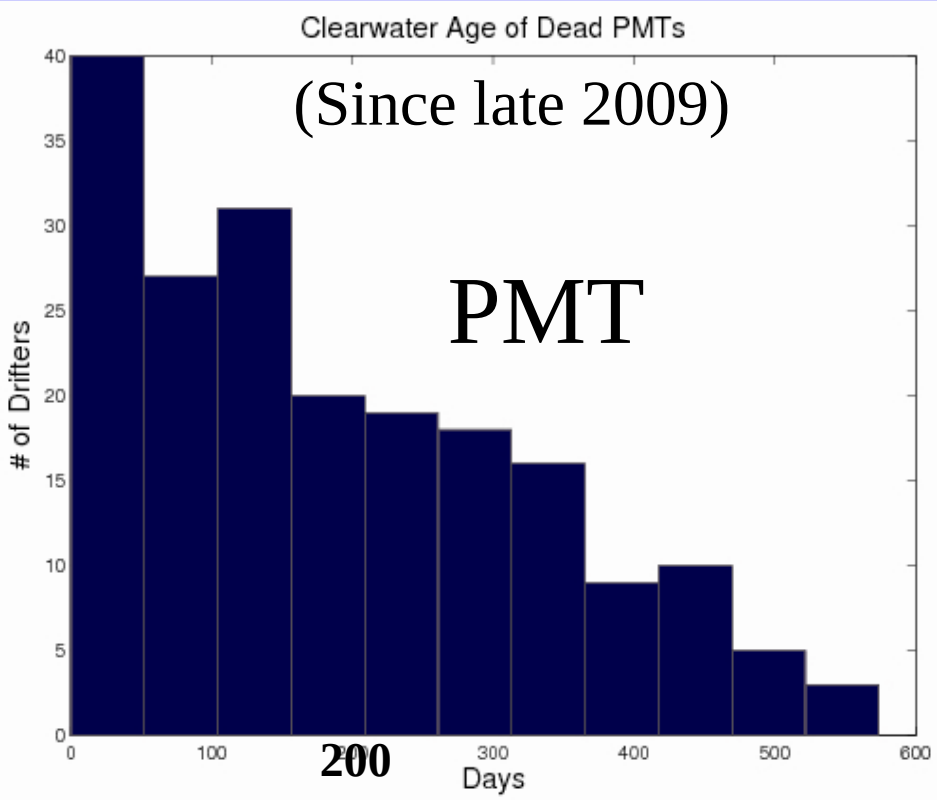
PTT vs. PMT Transmitters' Life Clearwater

"Quit" drifters, not picked up, not grounded and Lat at Death <= 50N/S
Life expectancy is ~ 450 Days

Half life (all buoys) = **280** days
Mean Life of quit buoys = **397** days
% quit less than 180 days= **32**%

Half life (all buoys) = **175** days
Mean Life of quit buoys = **191** days
% quit less than 180 days= **54%**



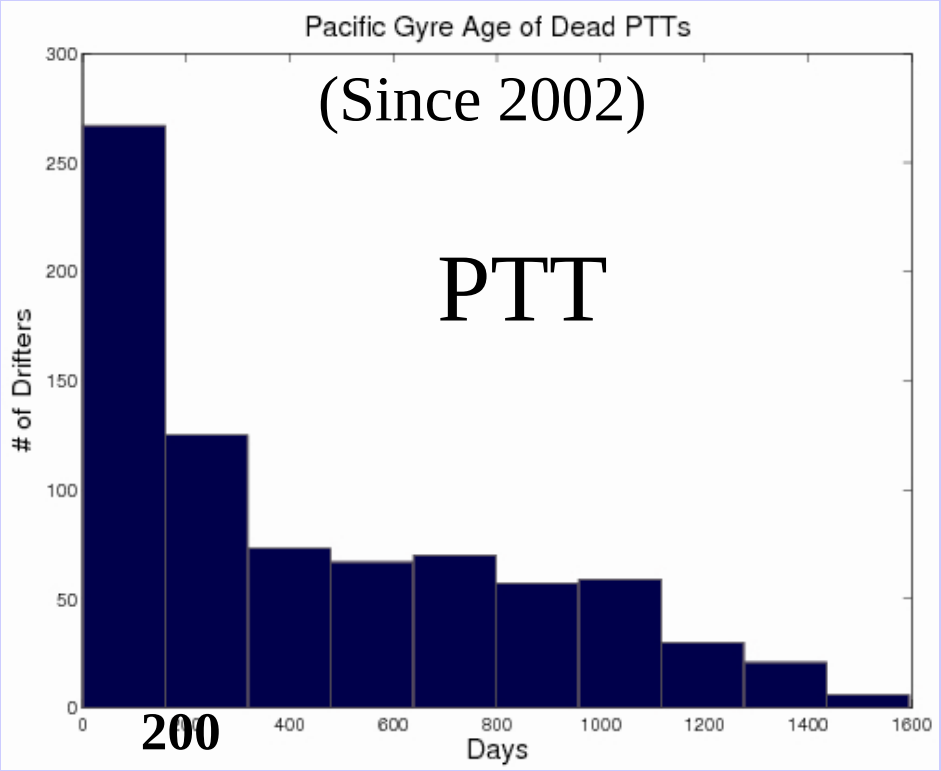


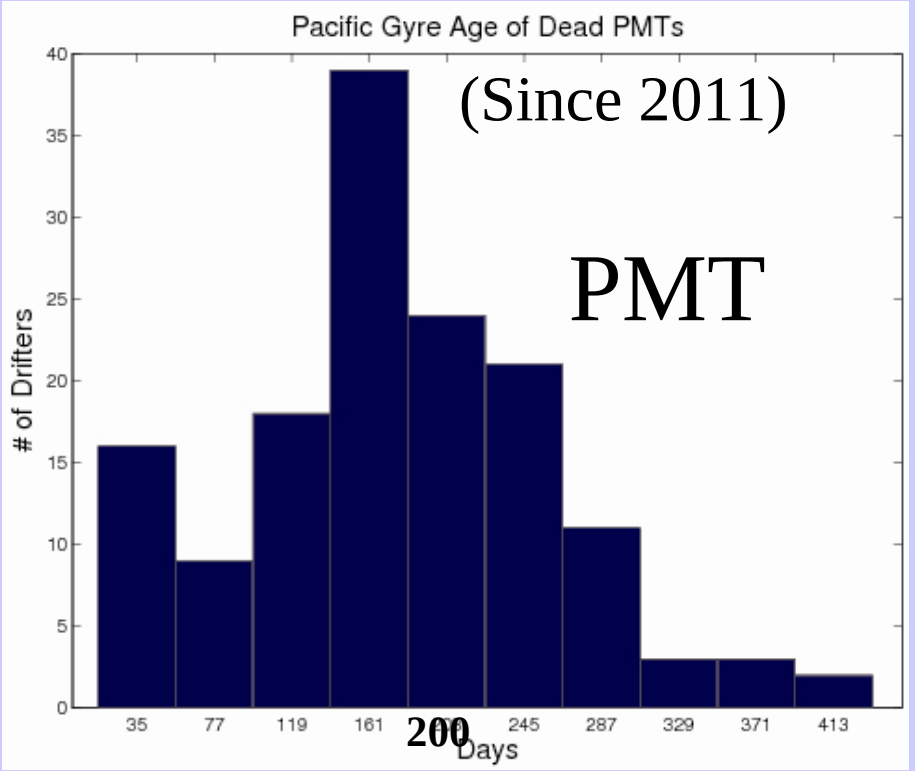
PTT vs. PMT Transmitters' Life
Pacific Gyre

"Quit" buoys, not picked up, not grounded and Lat at Death <= 50N/S
Life expectancy is ~ 450 Days

Half life (all buoys) = **385** days
Mean Life of quit buoys = **450** days
% died less than 180 days= **37**%

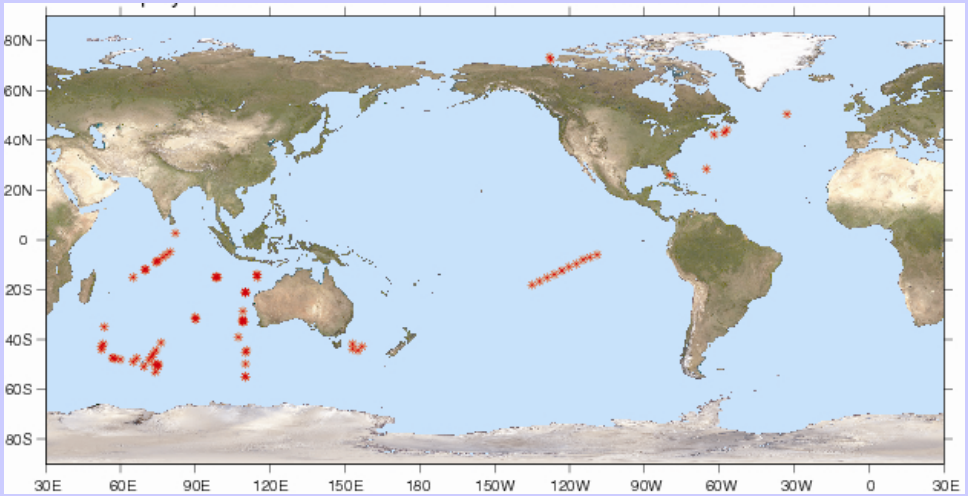
Half life (all buoys) = **196** days
Mean Life of quit buoys = **178** days
% died less than 180 days= **55%**





Iridium Drifters Transmitters' Life

Dead buoys, not picked up, not grounded



Deployment positions of Iridium drifters processed at Joubeh and in AOML database

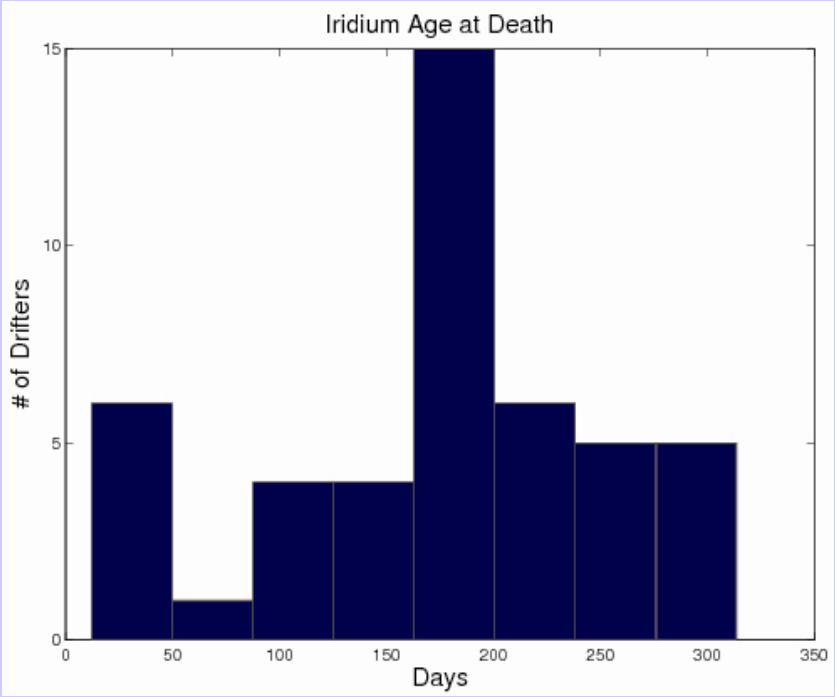
Total of 80 drifters
77 Metocean, 3 Pacific Gyre

Half Life = **190** days

Mean Life = **177** days

41% quit in less than 180 days

(Compared to Argos drifters since 1/1/2005: 237 days half life)



Summary

- The half-life of an average drifter is 236 days. If it does not run aground or gets picked up, the half-life increases to 245 days. Goal: 450 days.

- ***Clearwater***: half-life 200—250d during 2006—2009. Half life decreased to 130—160d in 2010—2011. <90d at death: increased from 5% in 2005 to 27% in 2011, fell to 13% in first three months 2012.
- ***Metocean:*** half-life 300—400d until 2010 when it fell to 270d ("quit" drifters). <90d at death: 5—10%, 27% in first three months 2012.
- ***Pacific Gyre***: generally increasing half-lives and decreasing % of short-lived drifters through study period. Half life now 200—300d, 4-5% die at <90d.
- ***Technocean*****:** half-life 400—700d until 2010. Fell below 200d in 2010, below 100d in 2011. <90d at death: ~10% until 2011, when it jumped to 32%; 75% in first three months of 2012.
- PTTs versus PMTs: mean and half lives of PMTs used as PTTs is considerably shorter than PTTs. More PMTs died <180 days (55% for PMT vs. 37% for PTTs).
- Iridium drifters: half life of 190 days, mean lifetime 177 days, 41% quit before 180 days. Performance not yet as good as Argos drifters, and far below 450 day goal.