

Operational Meteorology for ATTREX

L. Pfister

Whereby are described some of the weather conditions under which the Global Hawk cannot operate, and how these constraints might affect our ability to land and take off from proposed bases, and fly in proposed areas.

Outline

- Brief statement of GH TOL constraints, and in-flight constraints
- TOL wx conditions at Guam, Darwin, and Dryden
- Addressing in-flight weather constraints (convection and turbulence)

Flight rules

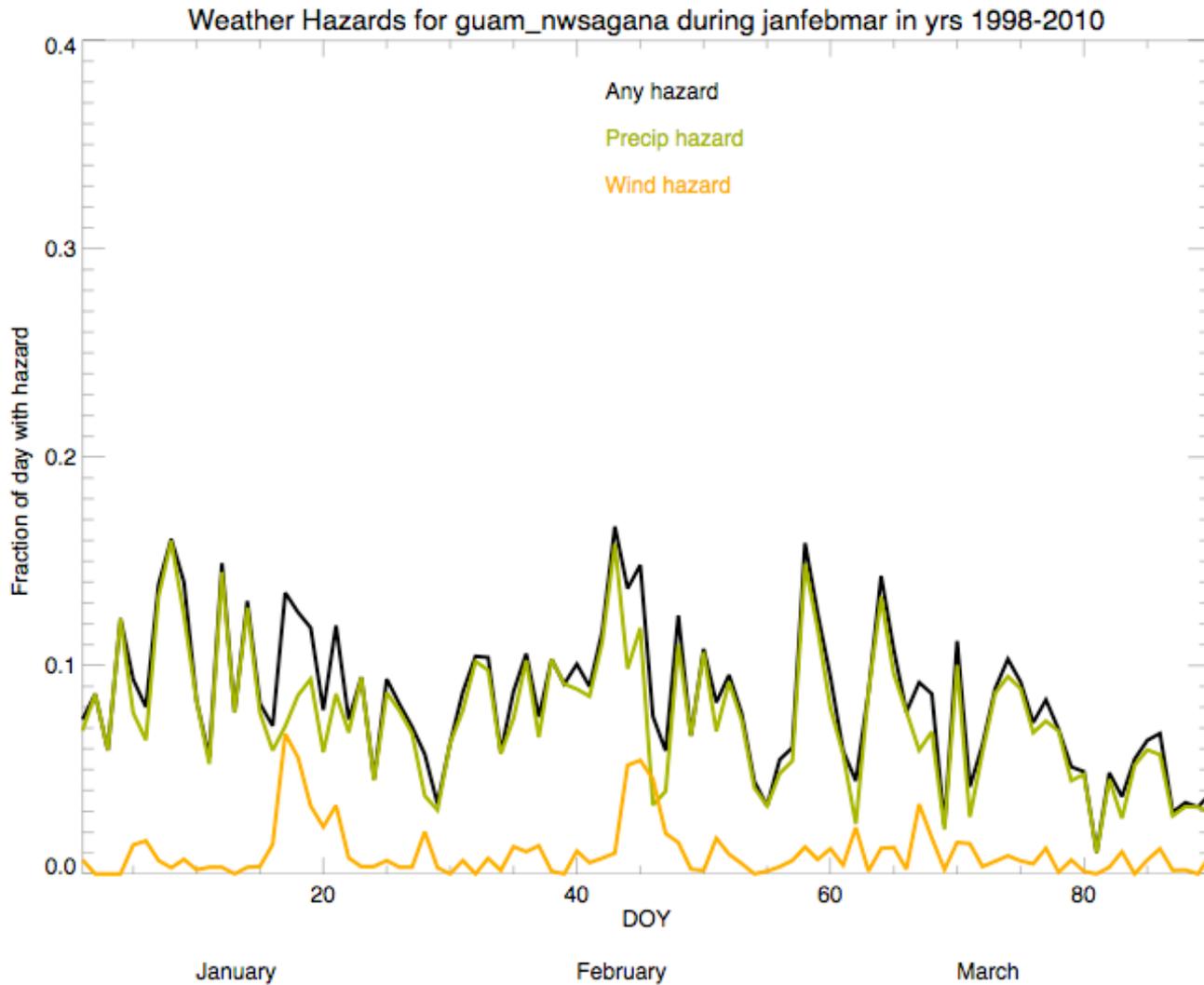
- Cross winds < 15 knots at Take-Off and Landing (TOL)
- Total winds < 30 knots at TOL
- No moderate turbulence (only light)
- No standing water on runway
- Visibility must be greater than .1 miles
- Ceiling must be greater than 500 feet
- No TOL during T-storms
- No icing conditions
- No flights within 25 nautical miles of T-storms.
- No flights over convection exceeding 50Kft in altitude.

Evaluating TOL conditions

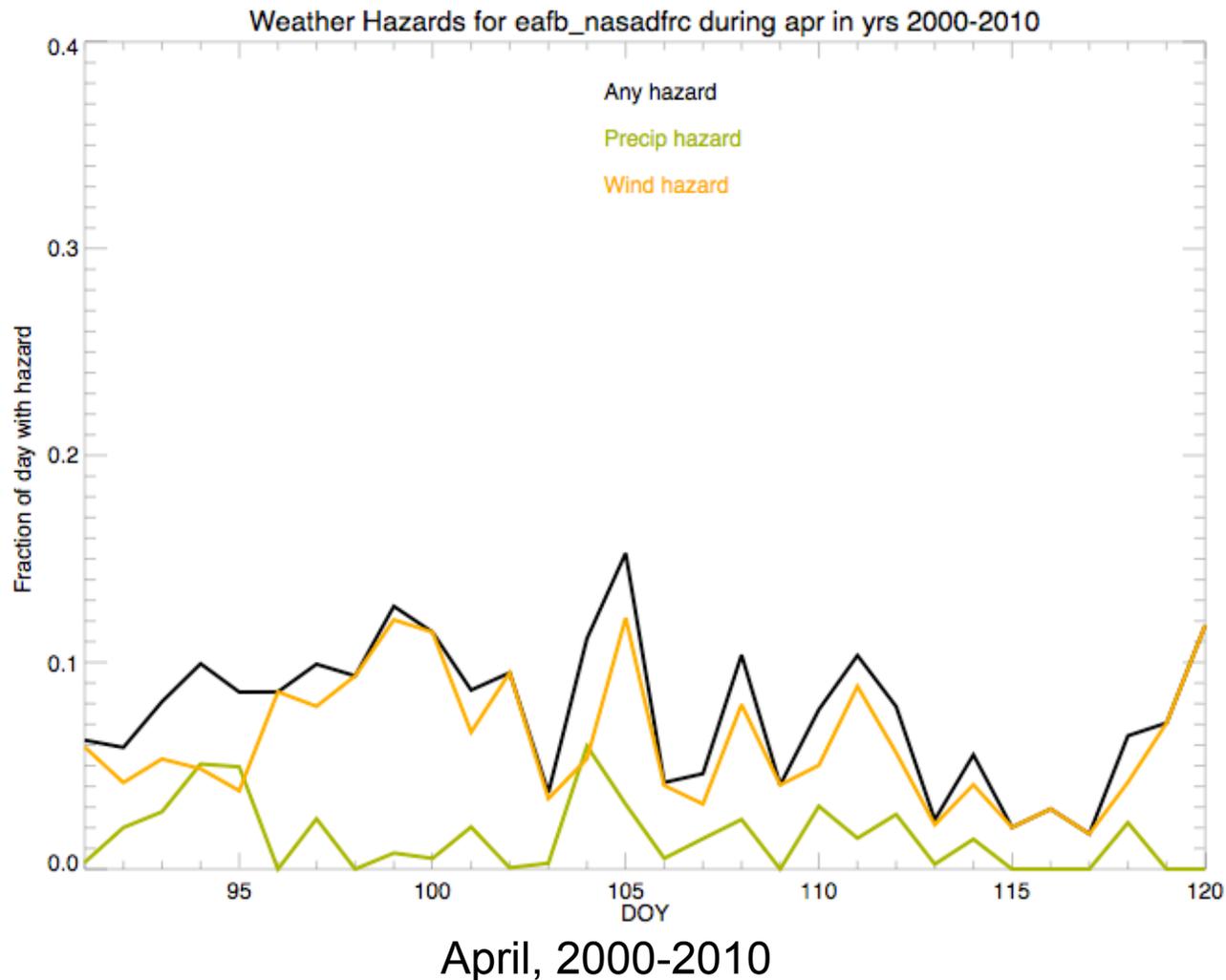
- Use ~12 years of surface observations (more often than once per hour in many cases).
- An observation either presents a hazard for the GH (winds, rain, low ceiling, fog, low visibility, tstorm) or not.
- Examine fraction of day that presents a hazard, and compare with other stations we have operated from. (e.g., Dryden)
- Examine diurnal cycle – compare with other stations.
- If that is not a workable method, come up with a fraction of days in a given month (climatologically) that we consider flyable based on reasonably conservative criteria.
- Can we forecast the days when we can't fly (can we see trouble coming)?

Wx conditions at Darwin (July) and Dryden (October)

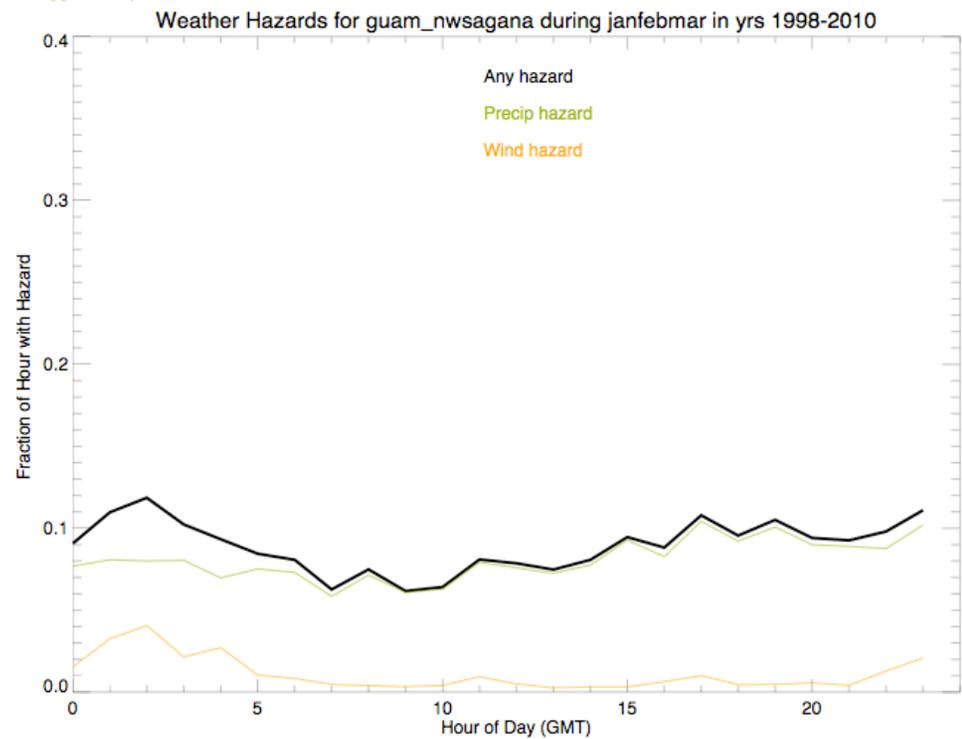
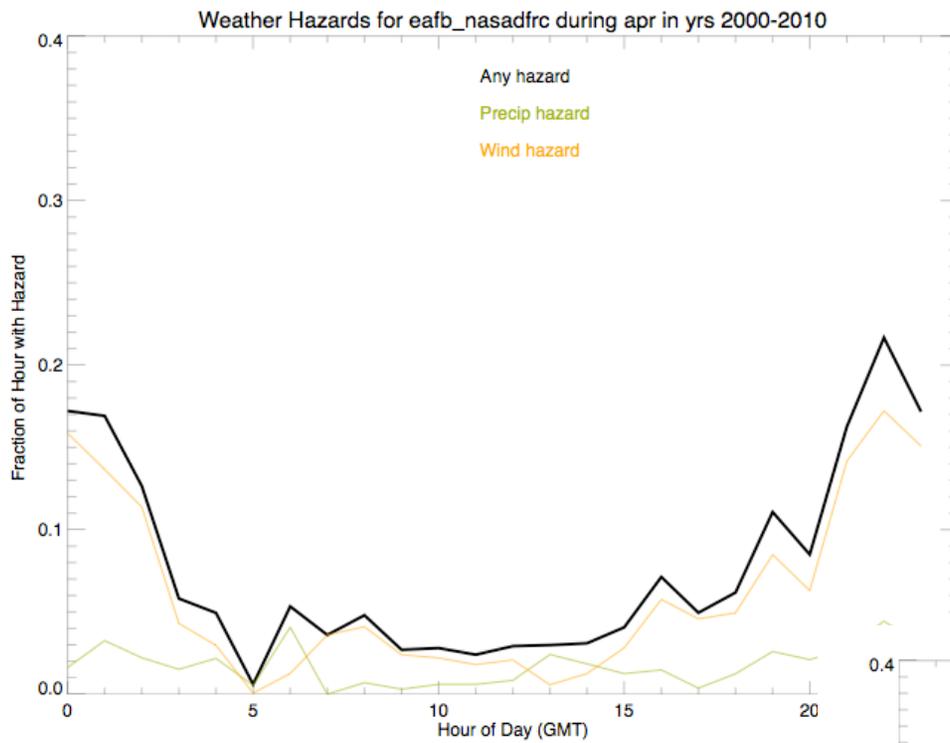
- Dryden: Winds are the major issue. October has the lowest incidence of high winds of the year, April the highest. We operated in April (with some weather issues). We conclude that operating at Dryden in October will not be a problem
- Darwin: During July, weather conditions out of limits (either rain or winds) are unusual. The fraction of observations out of limits is zero for almost all days. We conclude that operating at Darwin in July will not be a problem.



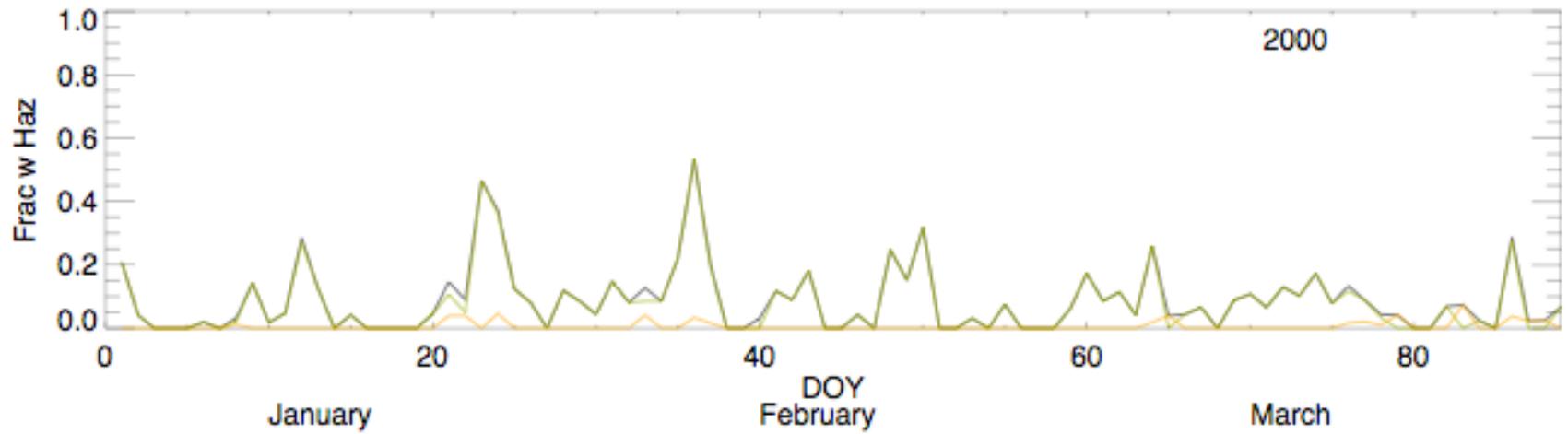
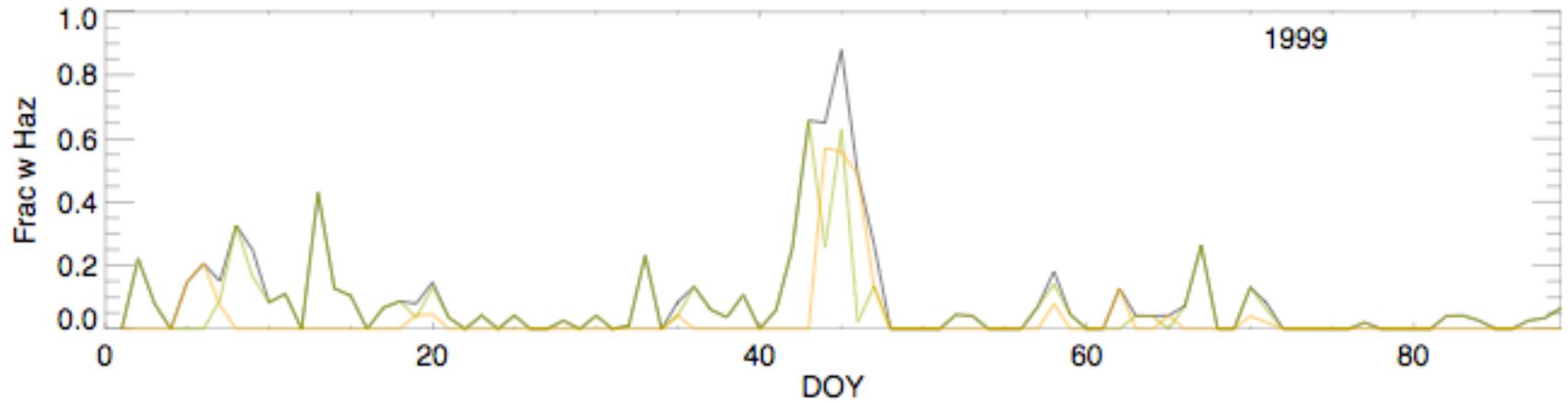
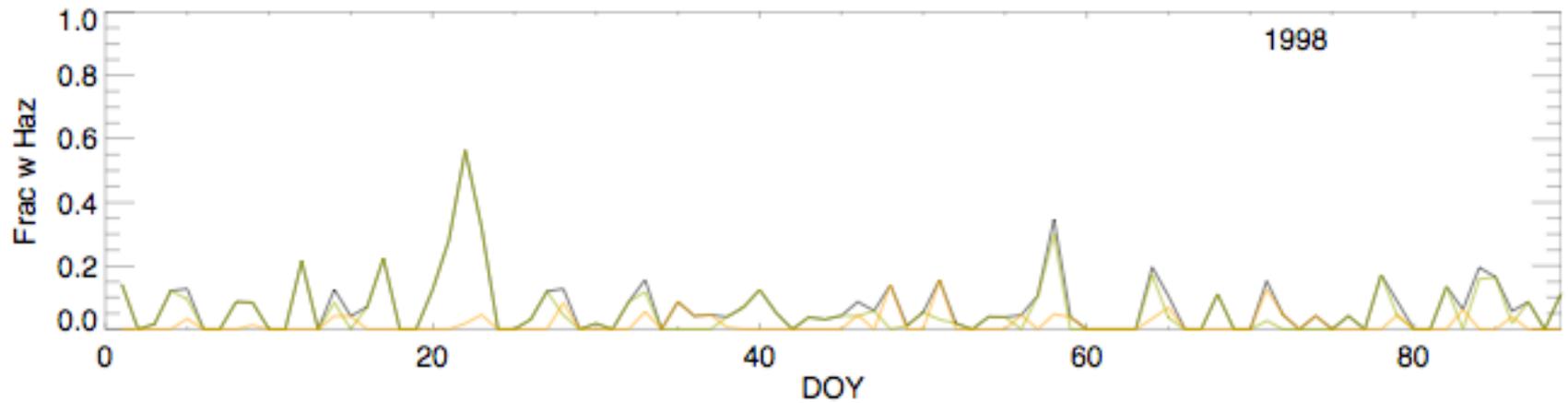
Primary weather hazard is precip (we used ANY rain at all)
Last half of March is definitely "better"

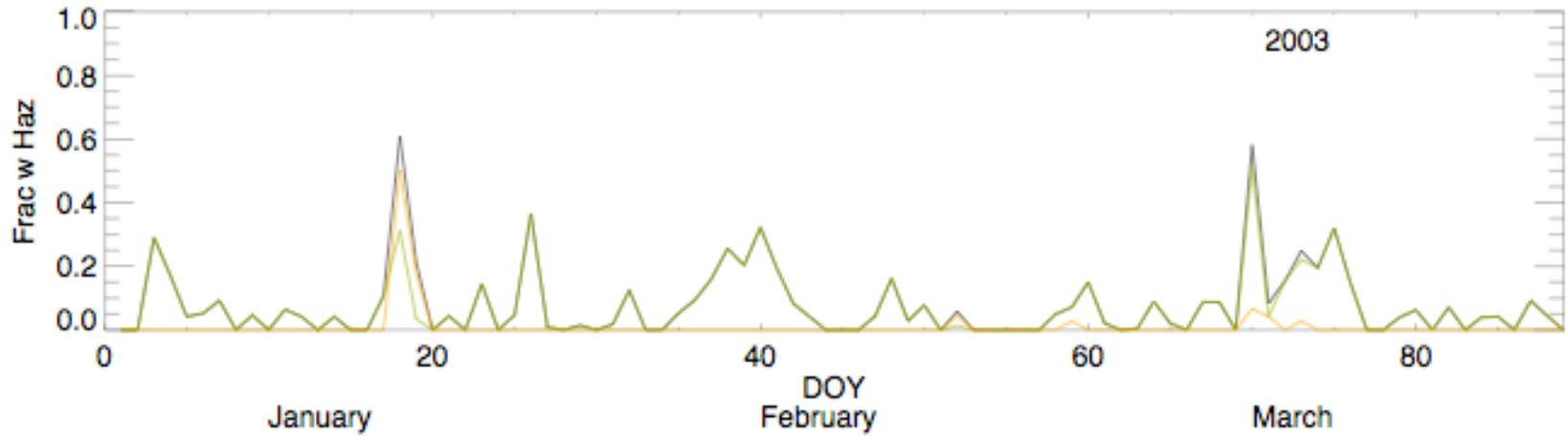
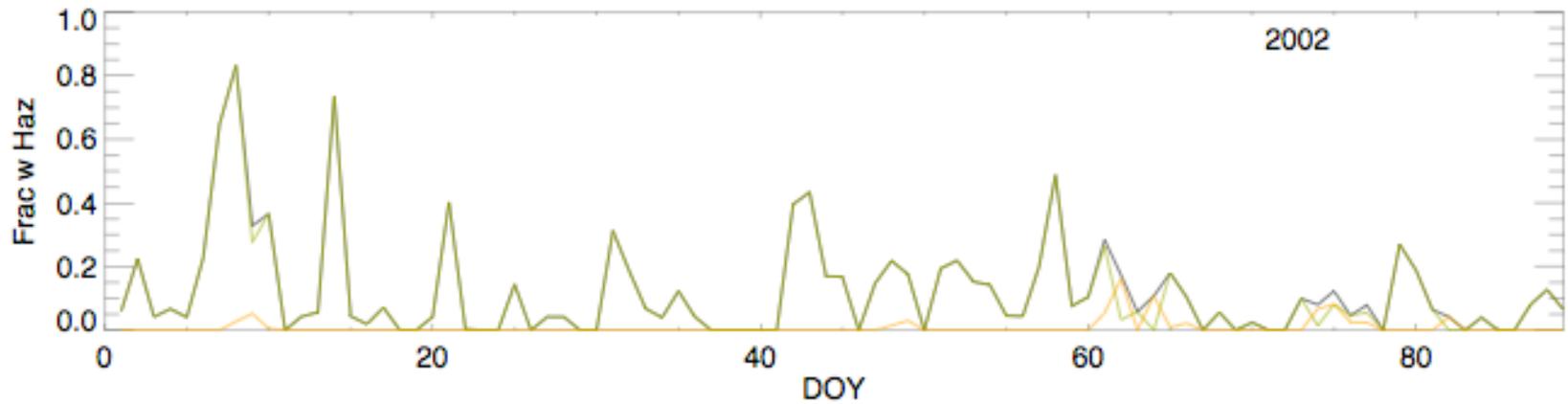
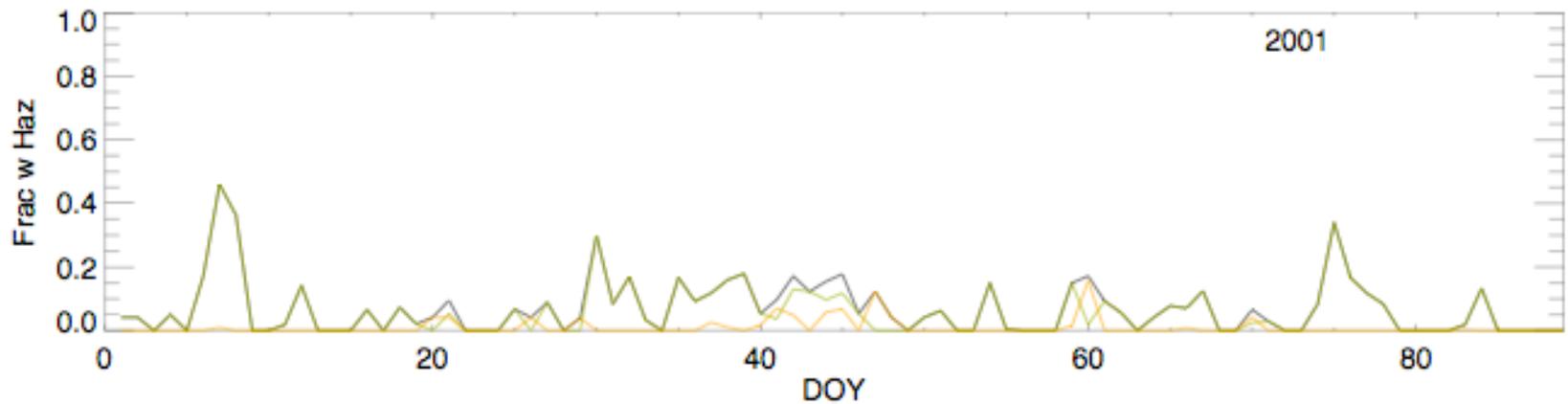


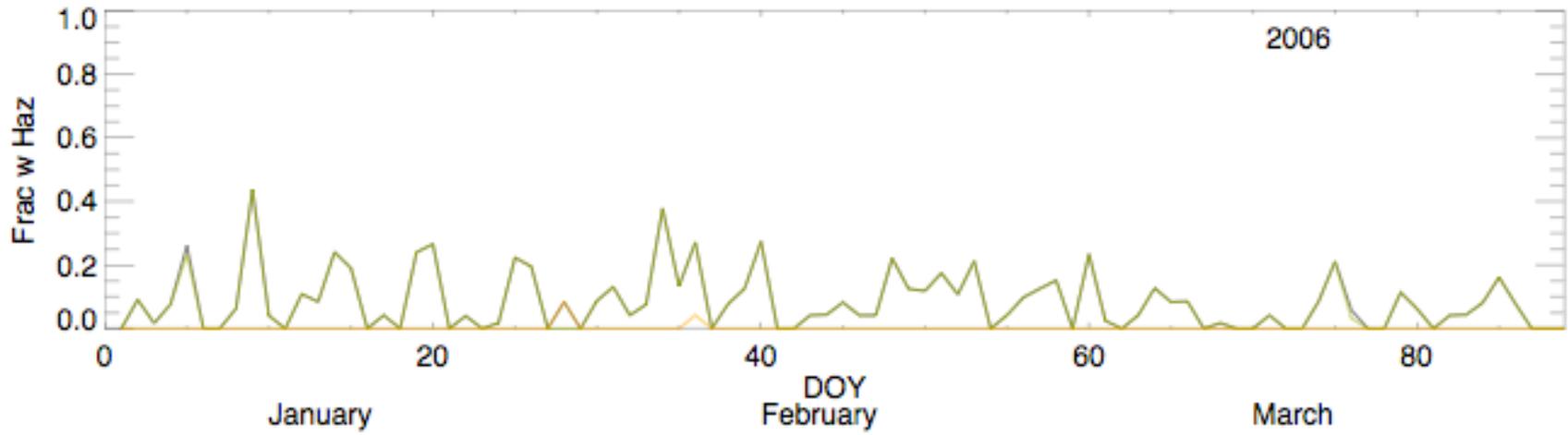
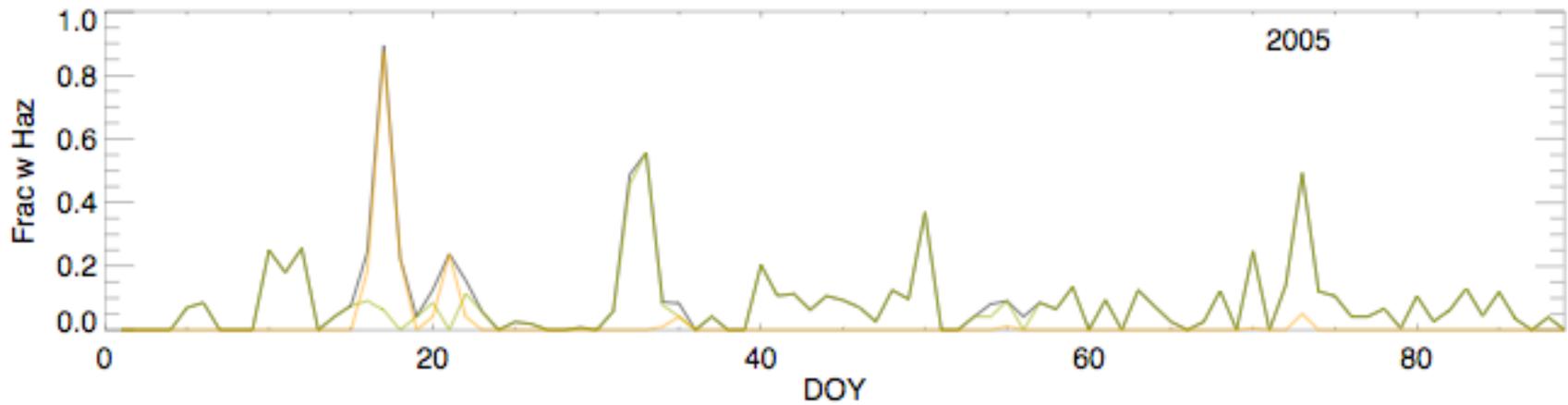
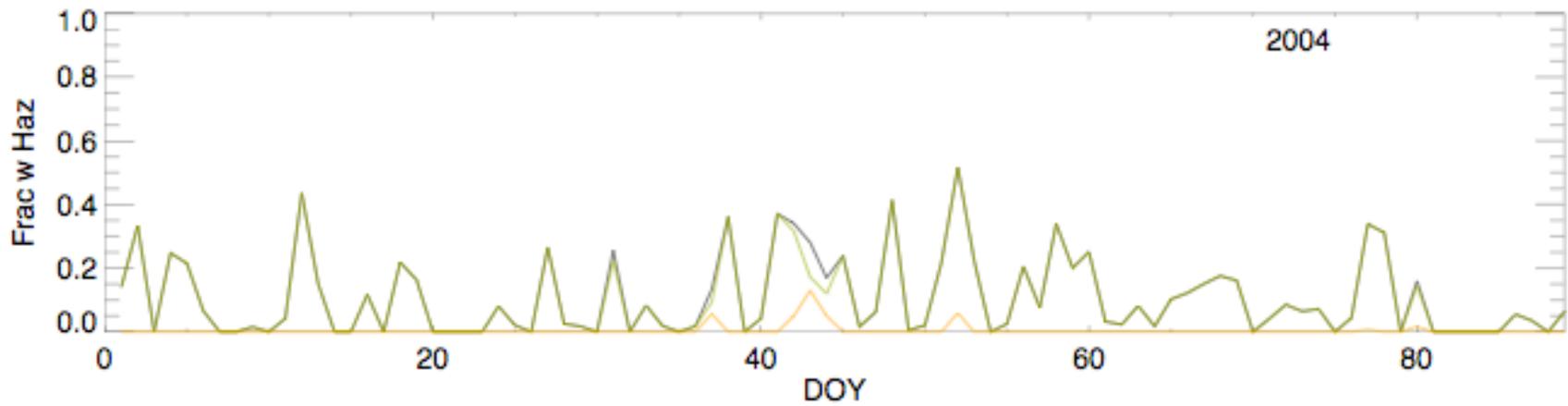
Similar plot for April at Dryden. Overall levels are similar, though the source of the hazard is wind, not precip. Operating at Dryden was a moderate weather challenge (we scrubbed more than once due to weather). 2010 was a better than average April.

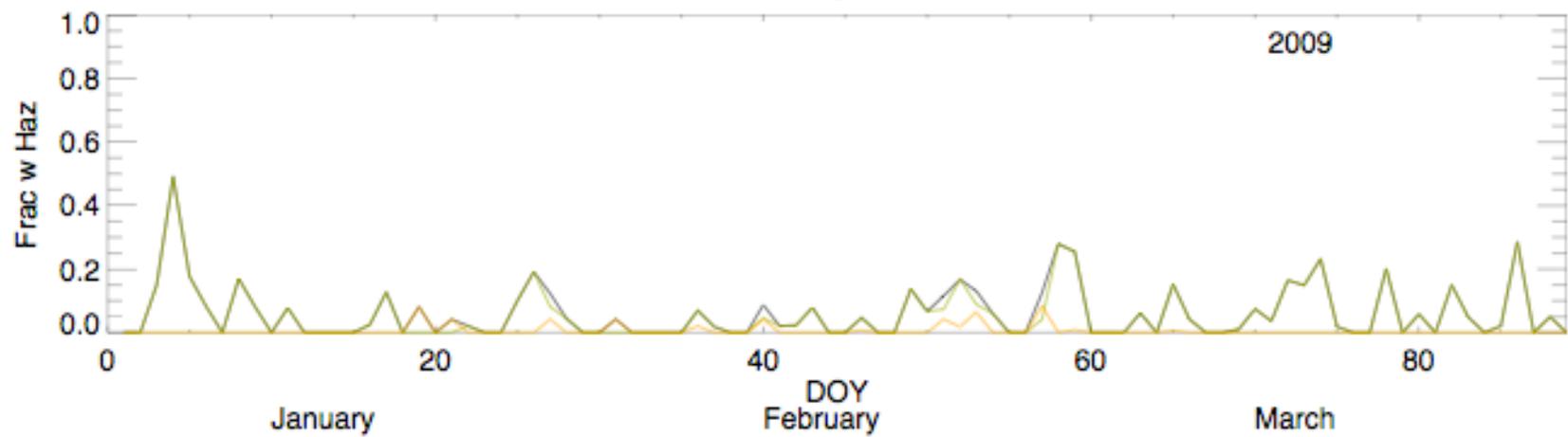
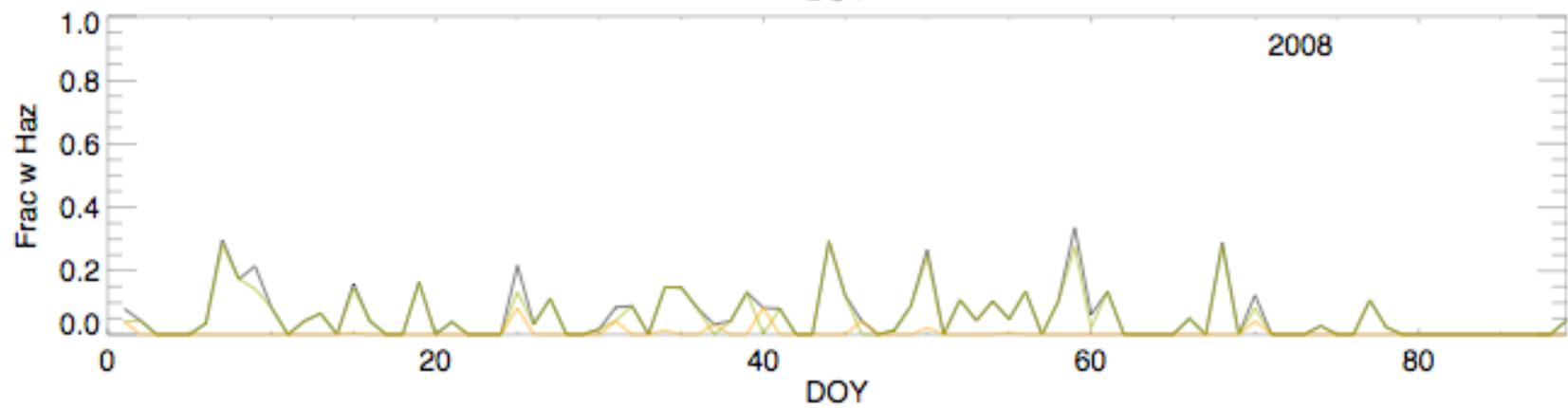
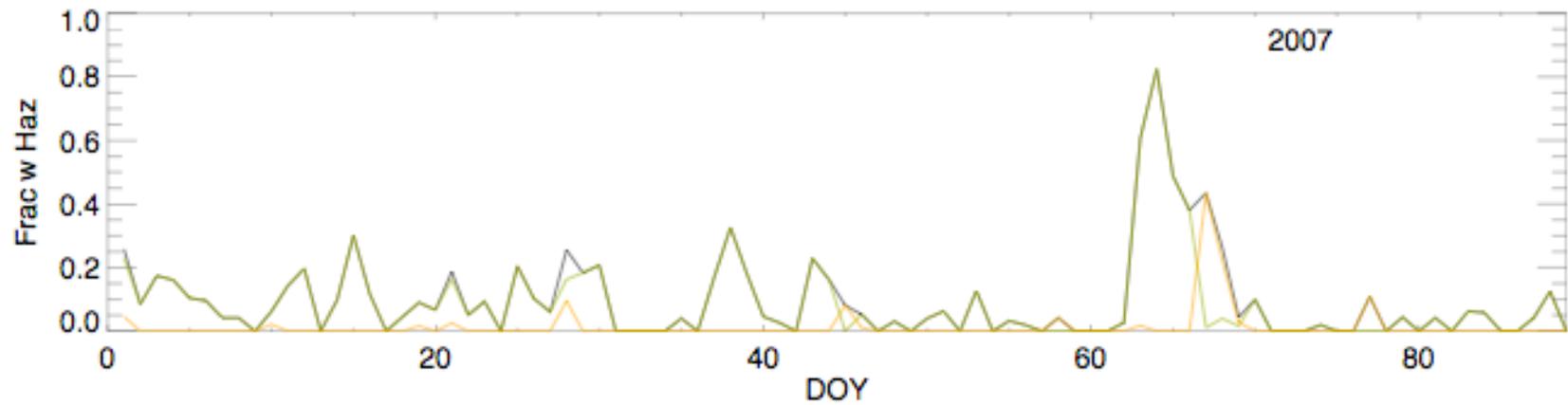


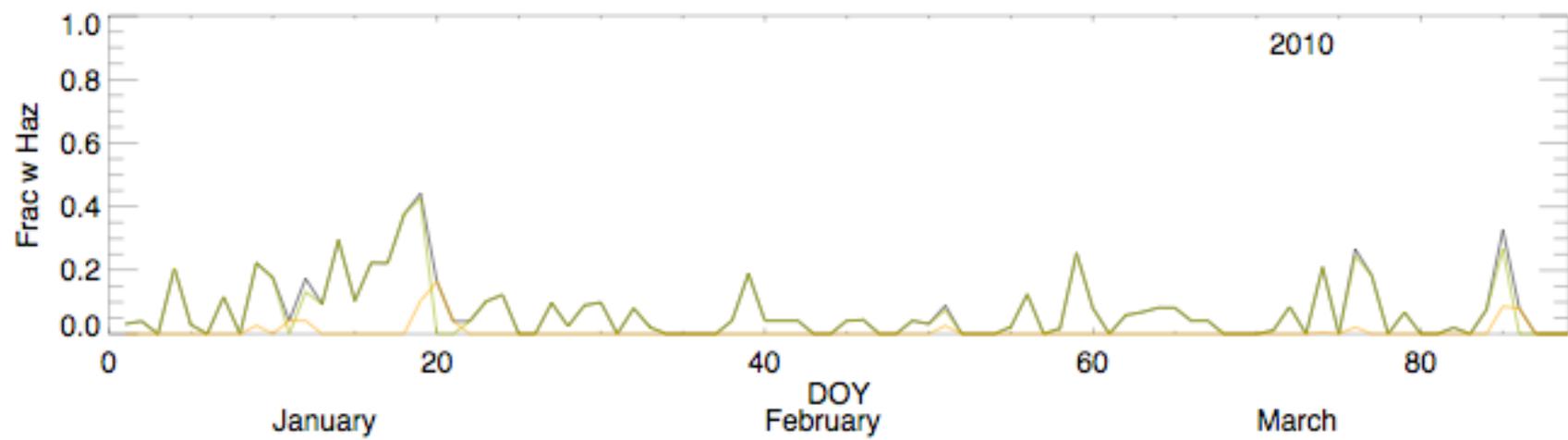
Comparable magnitudes overall,
 But diurnal variation is strong
 At DFRC, not at Guam







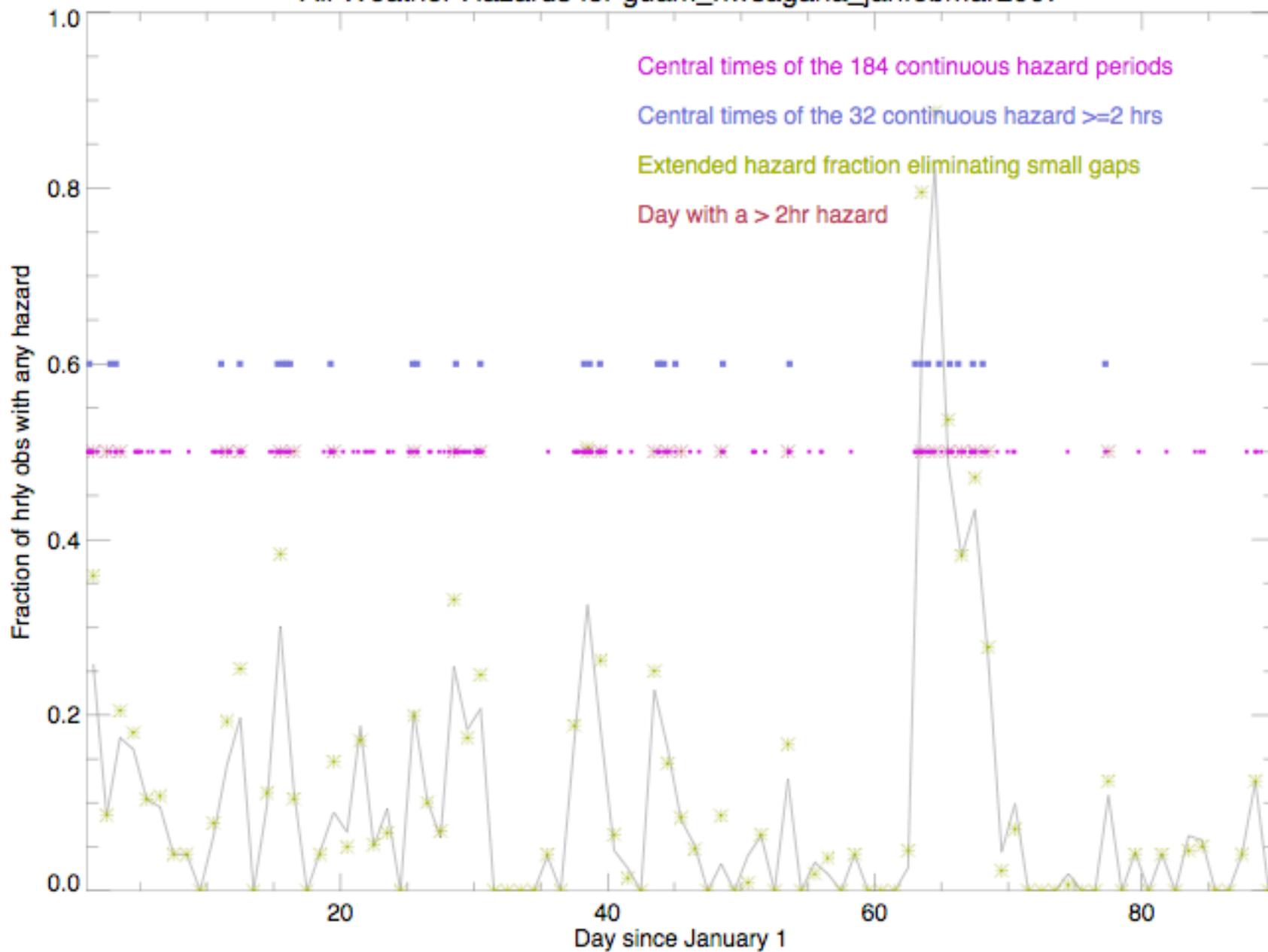




Assessment so far

- Comparison with Dryden does not, so far, tell us the answer to the question: “Can we operate from Guam?”
- USAF lands at Guam, but operating for a month, landing and taking off may be different from what USAF does
- Need another approach to answering question

All Weather Hazards for guam_nwsagana_janfebmar2007



“Absolute” criteria

- As opposed to “relative” (e.g., compare with another familiar location)
- We look for days with NO occurrences of hazards lasting more than 2 hours consecutively. We figure aircraft can loiter for that long without horribly damaging the science (come back with more fuel)
- Evaluate fraction of such days for each month over 13 years.

Results of this analysis

- January: .737 of days “flyable” (SD=.07)
- February: .750 (SD=.12)
- March: .804 (SD=.09)
- Worst January is .61, Worst February is .52, worst, March is .71

Basically, what is going on is that a lot of rain events appear to be very light and short. Is there standing water on the runway afterwards? Have not considered icing. Need to look at soundings.

Movie time

- Show a movie – 3 hourly satellite imagery for a month – January 2007.
- Purpose is to assess if the significant hazards (more than 2 hours) are forecastable in a crude sense
- Another purpose is to get a sense of what our obstacles might be in flight.

In-flight hazards

- Major hazard is turbulence
- Flying in “thick cloud” a hazard
- Basically, we cannot fly over convection that is higher than 50Kft. Probably want to avoid budding convection also, since we have about
10 minute latency on satellite imagery.
- Colors green and yellow and red are probably 50kft, with higher turrets possible.
- Flight planning discussion has some flight plans relative to convection.