ADPS Science Software Development

Bryan Franz
NASA Ocean Biology Processing Group

Aquarius Processing Programs

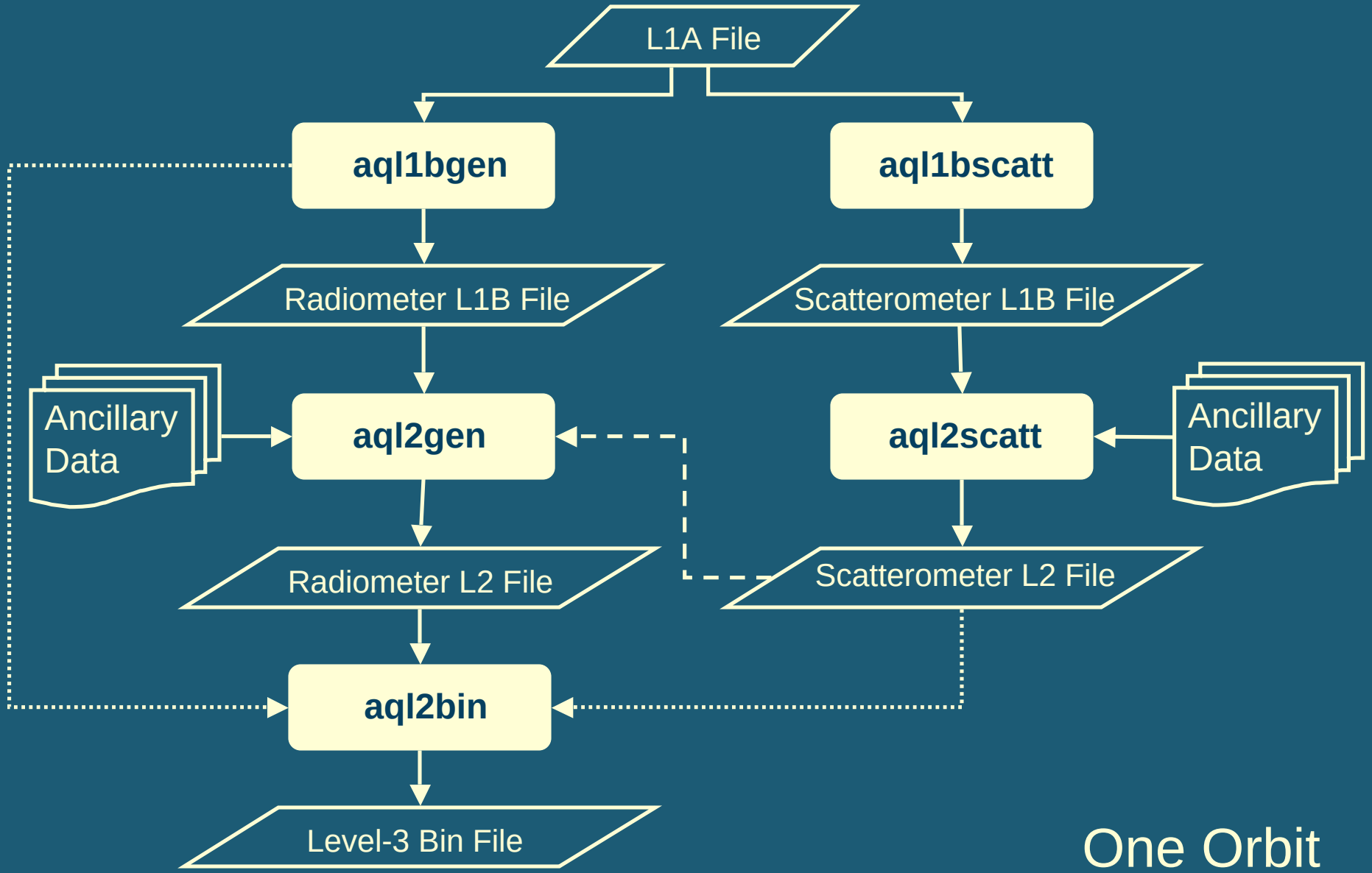
- aql0gen - L0 generation from downlink
- aql1agen - L0 to per orbit L1A
- aql1amerge - L1A duplicate orbit reduction

- aql1bgen - radiometer L1A to L1B (T_A)
- aql2gen - radiometer L1B to L2 (SSS)

- aql1bscat - scatterometer L1A to L1B (T_A)
- aql2scat - scatterometer L1B to L2 (SSR)

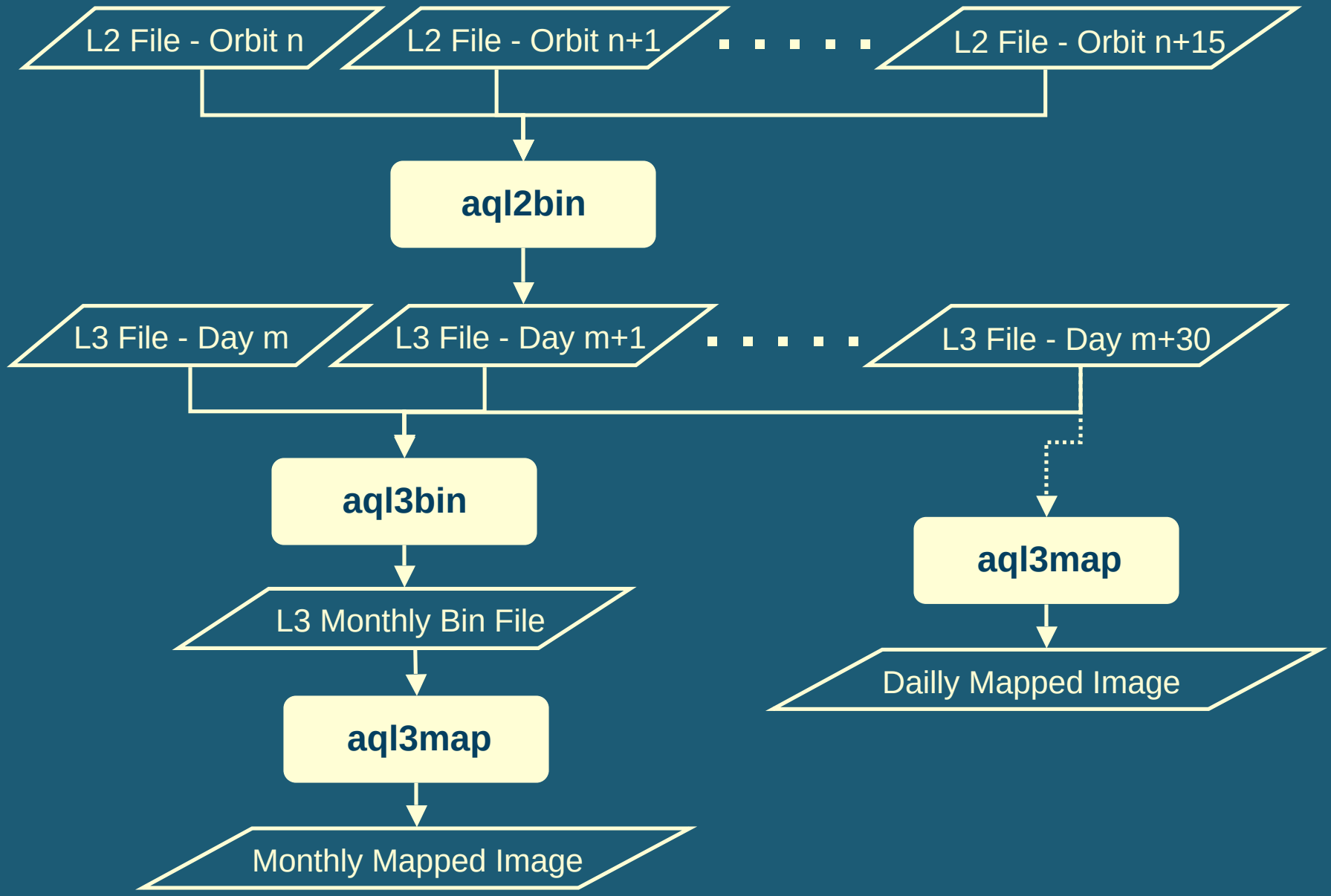
- aql2bin - daily space binning
- aql3bin - temporal averaging
- aql3map - projected images

Science Processing Flow



One Orbit

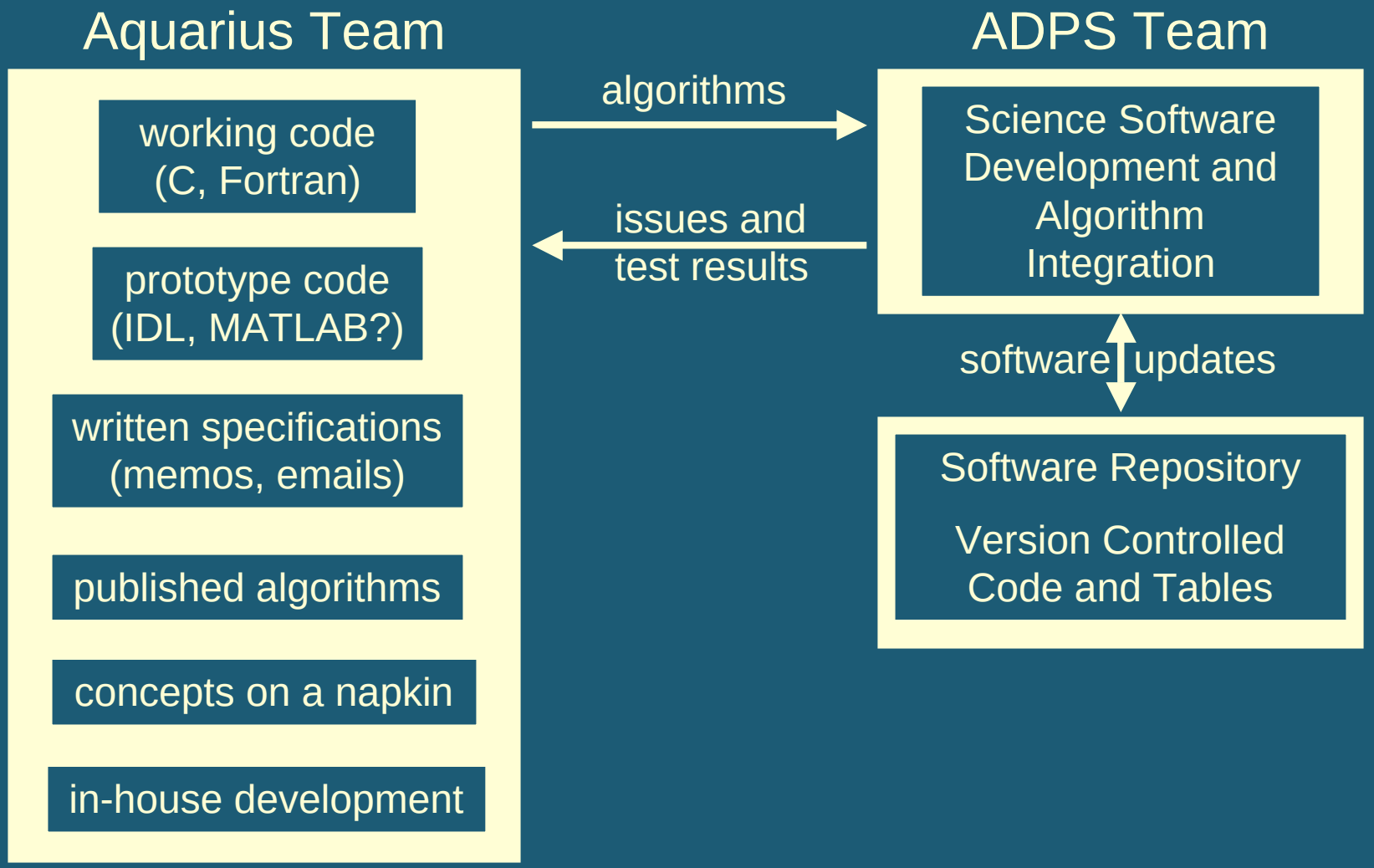
Science Processing Flow Cont.



Programs and Primary Contributors

• aql0gen	- L0 generation from downlink	ADPS Team
• aql1agen	- L0 to per orbit L1A	
• aql1amerge	- L1A duplicate orbit reduction	
• aql1bgen	- radiometer L1A to L1B (T_A)	Wentz
• aql2gen	- radiometer L1B to L2 (SSS)	Levine, Wentz
• aql1bscat	- scatterometer L1A to L1B (T_A)	Yueh
• aql2scat	- scatterometer L1B to L2 (SSR)	
• aql2bin	- daily space binning	Lagerloef, Lilly, ADPS Team
• aql3bin	- temporal averaging	
• aql3map	- projected images	

Science Software Integration



Software Version Control

- SUBVERSION configuration control system

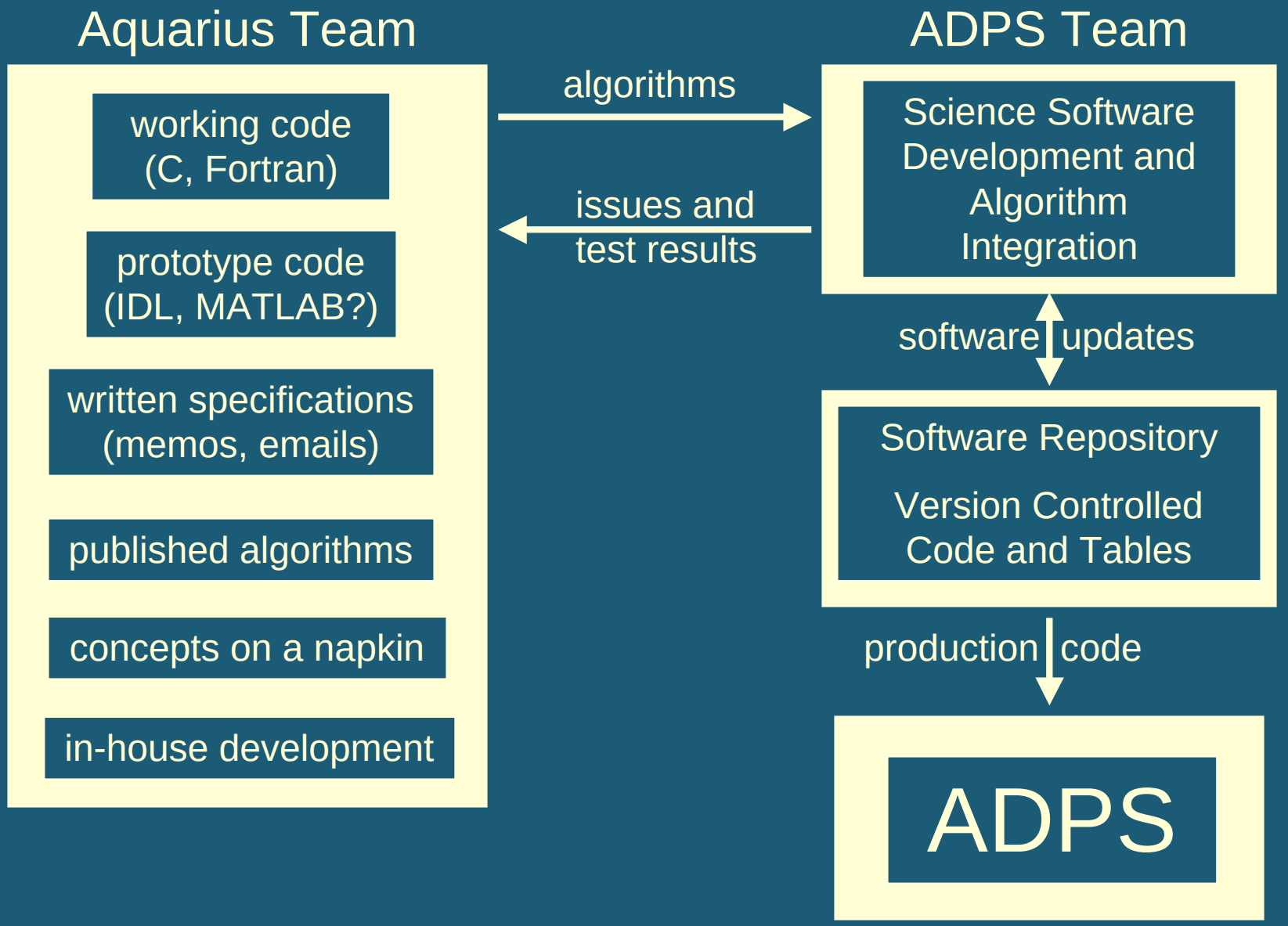
- trunk (*stable development version*)
  - src
    - aql1agen
    - aql1amerge
    - etc.
  - bin
  - lib
  - data (*static data and tables*)
  - test (*standard test files*)

the development tree can be made directly accessible to the Science Team or others

e.g., the ocean color software is exported nightly to public ftp

- tags (*snapshots of trunk, tested and approved for production*)
  - version 1
  - version 2
  - etc.

Science Software Integration



Common Software Attributes

- Processing inputs and controls are best handled through a parameter file with a list of parameter=*value* pairs, e.g.:

% aql2gen par=parameter-file

parameter-file:
ifile=l1b-filename
ofile=l2-filename
proc_opt=3
etc.

the level-2 code for ocean color and SST supports over 100 parameters to specify various ancillary input files, alternative algorithm switches, flag thresholds, and the list of **products to be included in output**.

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the level-2 code for ocean color and SST supports over 100 parameters to specify various ancillary input files, alternative algorithm switches, flag thresholds, and the list of **products to be included in output**.

- Default values (standard production settings) for each input parameter are defined within the static data tables.
- Programs easily executed from unix commandline
  - no elaborate environments or GUIs required
- Given no inputs, programs provide version information and usage

  l3bin 2.17 (Feb 16 2007 23:00:05)
- Programs return exit status (e.g., 0=success, 1=failure)

ADPS Responsibilities

- The ADPS Team will work closely with the Aquarius algorithm developers to implement all processing codes into the production system.
- This will include support for testing changes at the granule (orbit) level as well as facilitating global, life-of-mission analyses prior to adoption.
- It is anticipated that the ADPS team will develop the driver code for some or all processing levels (e.g., aql2gen)
  - the driver will read the input files, pass arguments to the processing function(s), and write the output files in HDF5 format
- It is also understood that the ADPS Team will have primary development responsibilities for L0 through L1A as well as implementing L3 binning & mapping (with detailed requirement input from the Science Team).
- Finally, it is expected that the ADPS team will develop procedures to acquire, archive, and interface with ancillary data sources (sst, winds, etc.)

Level-2 Format and Processing Options

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NASA Ocean Biology Processing Group

Level-2 Format

- Separate files for radiometer and scatterometer.
- Formatted using HDF5
- Product-level metadata similar to Level-1A, Level-1B.
- Temporal resolution per subcycle (120 or 180ms) or common multiple (360, 720, 1440ms).
- Geolocation (lon/lat) per time and per beam.
- Retrieved geophysical parameters (SSS or SSR) and associated quality flags (l2_flags), per time per beam.
- Additional products TBD.

Flexibility of Output Products

- code and formats (HDF5) can be developed to allow for run-time specification of the output content.

aql2gen l2prod="SSS,l2_flags"

- software would then have the ability to produce alternate product suites for specialized studies, diagnostic analyses, and algorithm development.

aql2gen l2prod="SSS,TA_meas,TA_space,TA_earth,l2_flags"

- consider defining a minimal set of derived products to be included in the "standard" Level 2 file (e.g., SSS, l2_flags).

- then, consider what additional products may be useful as optional output (e.g., brightness temperatures, correction terms, co-located ancillary, intermediate computations).

- code should be developed to allow the standard product suite and optional product list to grow and evolve.

Flexibility in Sample Rejection

Flagging and Masking

- flags are additional bits of information carried along with each measurement that may be used at a later stage for masking.
- masks are conditions for which particular measurements are excluded from subsequent processing (e.g., flag i was set).
- masking is generally applied during spatial or temporal aggregation (e.g., suspect retrievals flagged at L2 and masked at L3).

Possible Radiometer L2 Flags and Masking Scenario

16-bit integer per L2 sample (e.g., per horn, per sub-cycle)

Bit	Name	Description	L2 Mask	L3 Mask
1	TAFAIL	Ant. Temperature Not Available	■	■
2	TAWARN	Ant. Temperature Suspect		■
3	RFIHI	RFI Contamination High		■
4	RFIMD	RFI Contamination Moderate		■
5	RFILO	RFI Contamination Low		
6	LANDHI	Land Contamination High	■	■
7	LANDMD	Land Contamination Moderate		■
8	LANDLO	Land Contamination Low		
9	RAINHI	Rain Contamination High		■
10	RAINMD	Rain Contamination Moderate		■
11	RAINLO	Rain Contamination Low		
12	WINDHI	High Wind Speeds		■
13	SFLARE	Solar Flare Predicted		
14				
15				
16				

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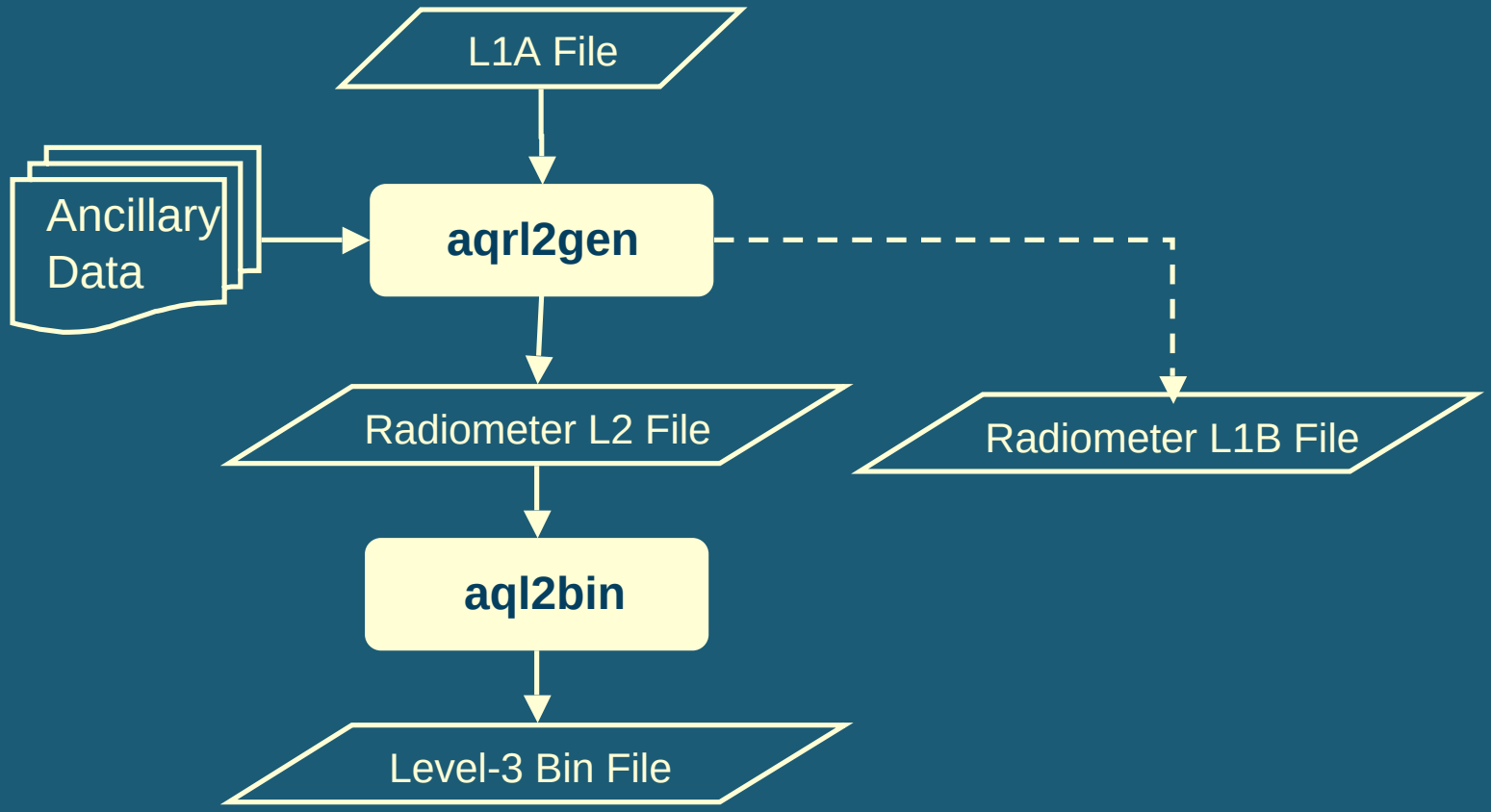
- masking is generally applied during spatial or temporal aggregation (e.g., suspect retrievals flagged at L2 and masked at L3).
- aggregation and associated masking is best applied within a new processing level
  - e.g., any temporal averaging between L1B and L2 is done in aql2gen
  - allows same input file to be processed with multiple rejection criteria
  - facilitates diagnostic analysis of retrieved geophysical parameters and associated quality flags via standard output files

Back-up Slides

Science Processing Flow



L1B = 0.10 sec

L2 = 5.76 sec

L2GEN

read parameters

read L1A

compute L1B

if (want L1B)

write L1B

endif

per radiometer step or scatterometer subcycle

if (want L2)

read ancillary

compute L2

write L2

endif

per frame (5.76 sec)

Questions

- reading entire orbit into memory?
- binning swath to monthly or daily to monthly?
- faraday rotation: radiometer feeding scatterometer processing?