

SDD: DA and preprocessor

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ECS run types for SDD

ECS run Type	Purpose	Configuration	# Events
STANDALONE	Detector tests		
PEDESTAL	Measure baselines and noise	Zero supp = OFF Baseline eq. = OFF	50
PULSER	Measure gain	Zero supp = OFF Baseline eq. = OFF Test pulse = ON	50
INJECTOR	Measure Drift speed	Zero supp = ON Baseline eq. = ON Prepulse = ON	50
PHYSICS		Zero supp = ON Baseline eq. = ON	

ECS run types and DAs for SDD

ECS run Type	DA	DA type	Code on svn	Used online	Notes
STANDALONE	Not needed				
PEDESTAL	ITSSDDBASda	LDC			OK
PULSER	ITSSDDGAINda	LDC			OK
INJECTOR	ITSSDDINJda	LDC			Code OK, but parameters to be tuned
PHYSICS	Not needed (for now)	MON			Will be implemented if injector triggers will be collected during PHYSICS runs

ECS run types and preprocessor for SDD

ECS run Type	Preprocessor operation	Code on svn	Used online	Foreseen developments
STANDALONE	Do nothing			
PEDESTAL	Do nothing			
PULSER	Store baselines, noise and gain Store DCS DP			
INJECTOR	Store drift speed Store DCS DP			Store calculated values for modules with bad injectors
PHYSICS	Store DCS DP			Enable drift speed storage when injector triggers will be taken

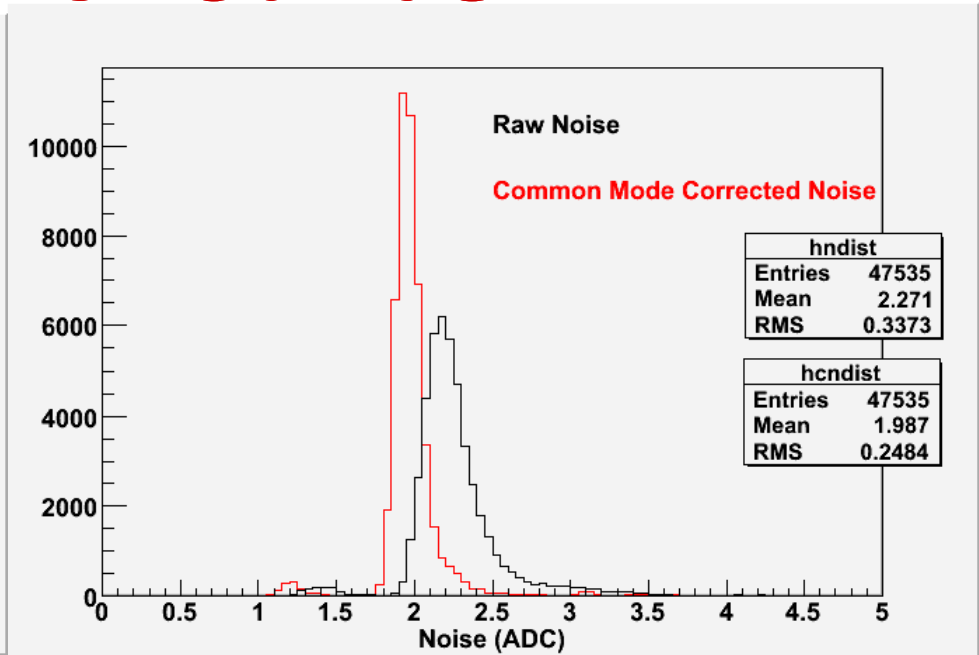
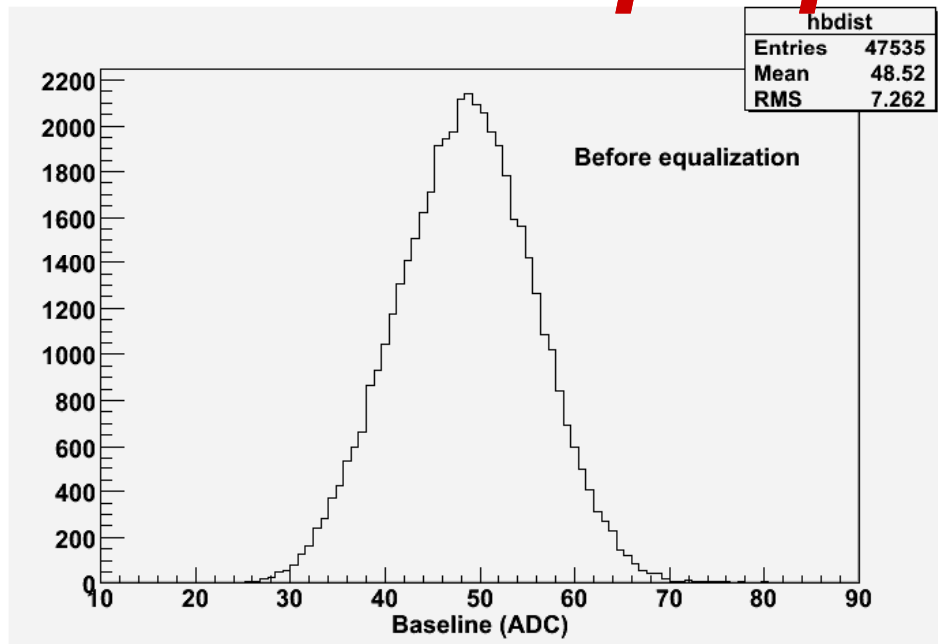
ECS run types and OCDB

ECS run Type	Preprocessor operation	OCDB directory
STANDALONE	Do nothing	
PEDESTAL	Do nothing	
PULSER	Store baselines, noise and gain	OCDB/ITS/Calib/CalibSDD
	Store DCS DP	Reference/ITS/DCS/DataSDD
INJECTOR	Store drift speed	OCDB/ITS/Calib/DriftSpeedSDD
	Store DCS DP	Reference/ITS/DCS/DataSDD
PHYSICS	Store DCS DP	Reference/ITS/DCS/DataSDD

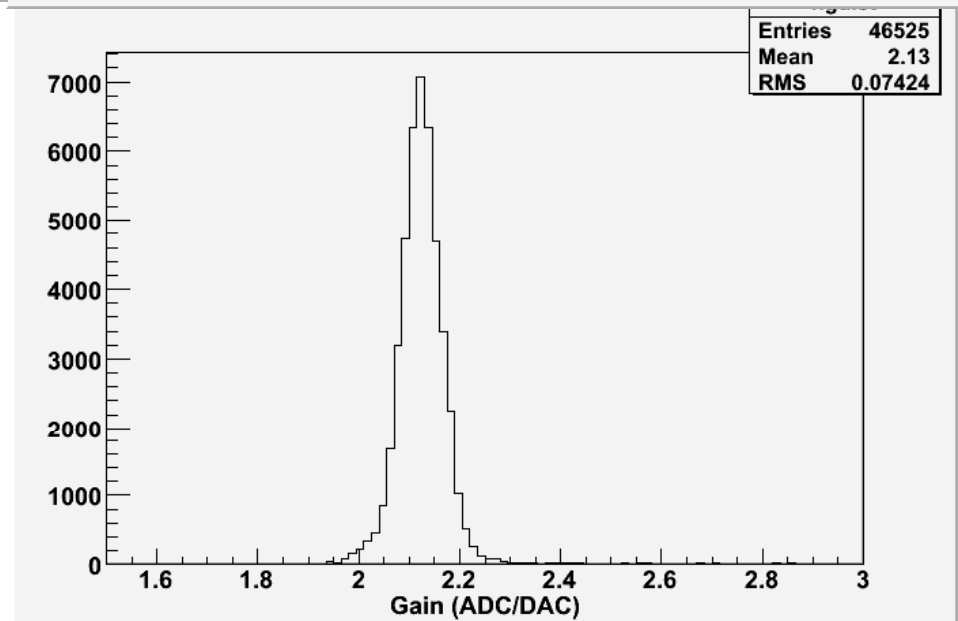
Operation during cosmic run

- PULSER and INJECTOR runs (with DA automatically starting at EOR) implemented and correctly working starting from March 5th
 - ⇒ Previous calibration runs (taken as STANDALONE) being analyzed offline
- Good CalibSDD files in OCDB starting from run 25410
 - ⇒ Results checked offline for few runs and are ok
- Problems with DriftSpeedSDD files due to:
 - ⇒ Modules with injectors not working
 - ⇒ Threshold for injector cluster finding (optimized for non zero suppressed data)
- Solution (OK for first reco pass):
 - ⇒ DriftSpeedSDD object produced offline by analyzing run 25411 and put in the OCDB with validity from run 25000 to run 999999
 - ⇒ Drift speed for modules with bad injectors set to the average value of the modules with good injectors

Example plots: CalibSDD

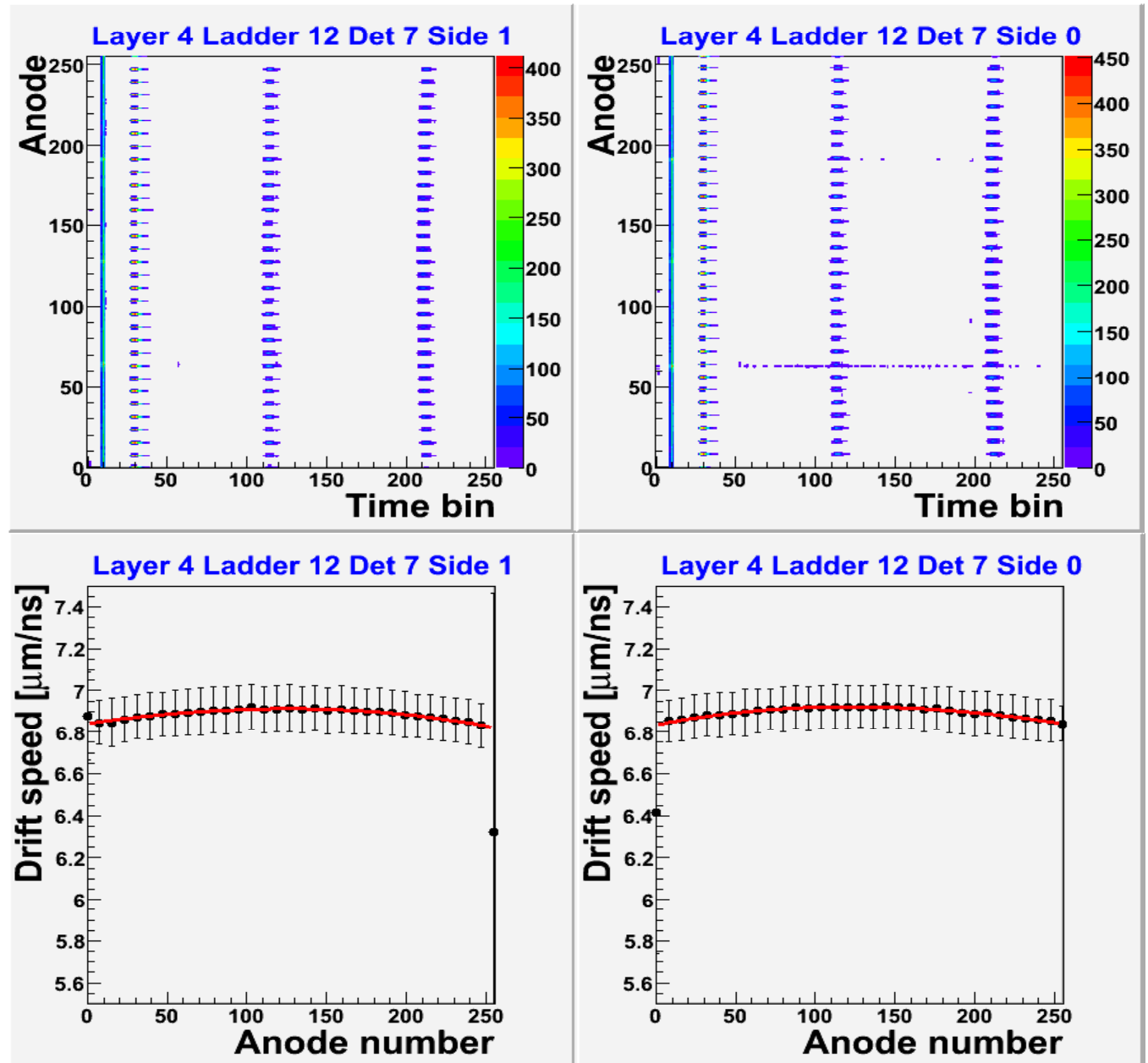


- Baseline and noise distribution for good anodes from pedestal run 23665
- Gain distribution from pulser run 23668



Example plots: DriftSpeedSDD

- 33 (1 each 8 anodes) x 3 injectors on each half module
- Drift speed depends on anode number
 - ⇒ Drift speed depends on temperature
 - ⇒ $v_{\text{drift}} = \mu_e E$ with $\mu_e \propto T^{-2.4}$
 - ⇒ Heat sources on detector edges
- Fit with 3rd order polynomial
 - ⇒ Fit parameters stored in OCDB



DCS data during cosmic run

- Several problems in the retrieval of DCS data points by the SHUTTLE during the cosmic run
 - ⇒ Option for data points smoothing not properly set in PVSS
 - ⇒ Few DP aliases were not properly saved in the ORACLE db
- Problems solved on March 4th (thanks to several interactions among Jiri Kral, Svetozar and Chiara)
 - ⇒ The DPs not properly saved have been removed from SHUTTLE configuration
- However, the preprocessor was designed to skip modules with missing DP aliases
 - ⇒ If a DP alias is missing the module is considered as not connected
 - ⇒ No data saved in Reference/ITS/DCS/DataSDD
 - ⇒ Preprocessor code fixed, but out of time for aliroot tag
 - ✓ *Should work properly in next run*

Summary and outlook

- DA and preprocessor successfully used for PEDESTAL and PULSER runs in cosmic run
- Ongoing offline re-analysis of INJECTOR runs to have a more precise calibration of drift speed
- Problems with DCS data (only for reference) have been fixed
 - ⇒ Should be OK for next run
- To-do list and schedule for next data-taking:
 - ⇒ Re-tune parameters in DA for INJECTOR runs to have a better estimation of drift speed (expected due date = April 15th)
 - ⇒ Implement in the preprocessor a proper treatment of the (very few) modules with bad injectors (expected due date = April 30th)
 - ⇒ Implement (if needed) a DA to treat injector triggers collected with "prepulse" during a PHSYICS run
 - ✓ *For the moment not foreseen by the SDD DAQ experts*

Other calibration parameters (not treated by DAs)

- DDL Map

- ⇒ Correspondence between hardware numbering scheme (DDL/Carlos) and module ID in AliRoot
- ⇒ For last cosmic run has been put by hand by Raffaele in OCDB
- ⇒ Strategy (based on the use of the DAQdetDB) being developed together with Sylvain

- Time offset

- ⇒ Conversion from measured drift time to drift distance (accounts for trigger and electronics delays)
- ⇒ To be tuned from the residual between track reconstructed from SPD (and SSD) and cluster position
- ⇒ Will be tuned using the ITS alignment tools?

- ADC to keV charge conversion constant

- ⇒ Tuned from the charge distribution of reconstructed clusters
- ⇒ Calibration algorithm working on ITS.RecPoints (+ tracking?)

Backup

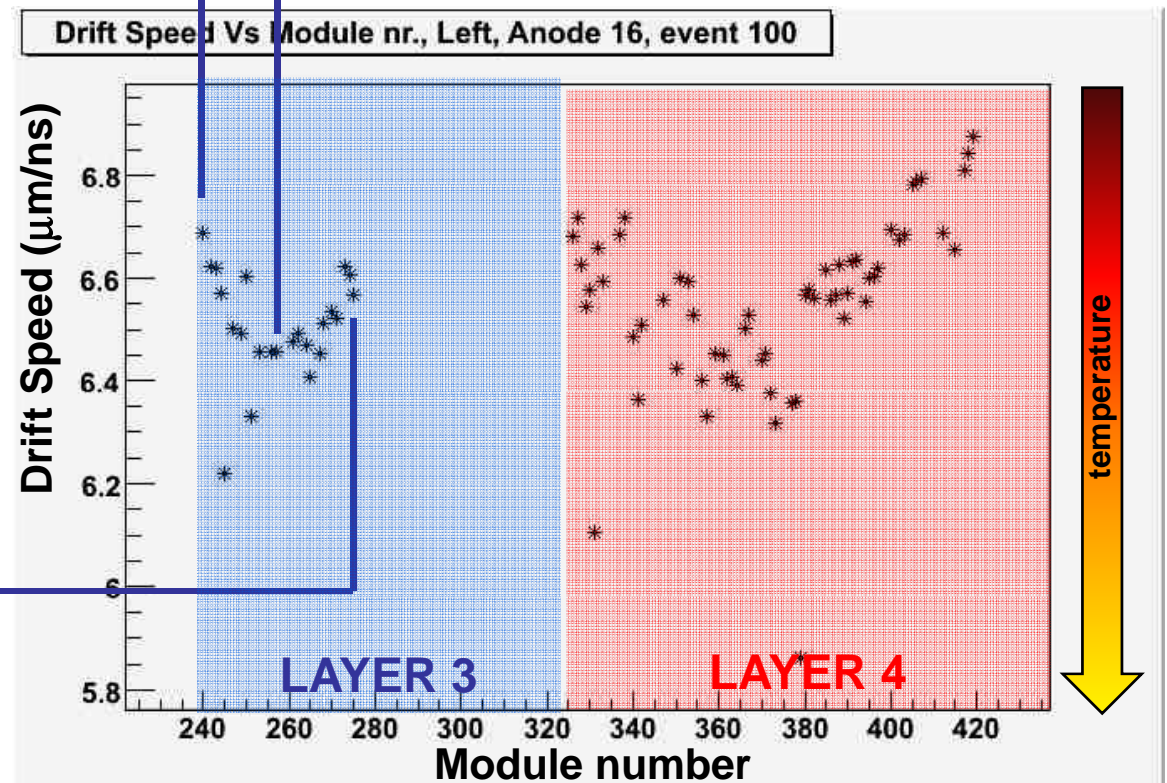
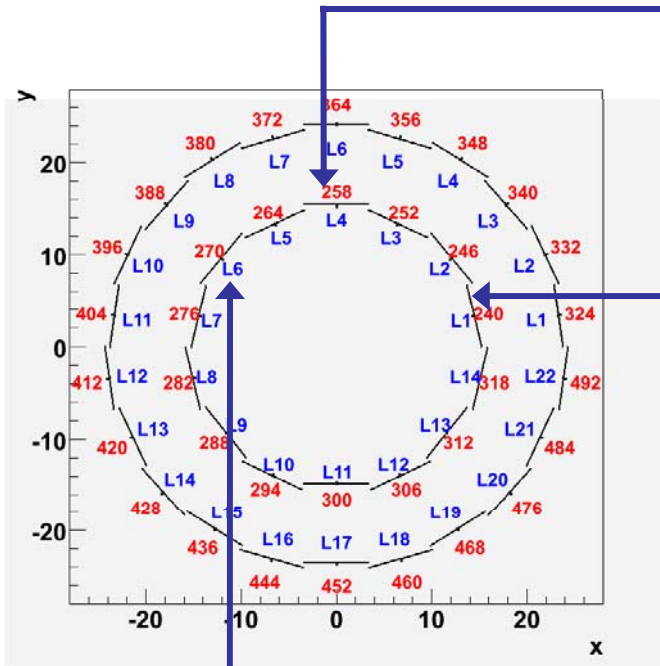
Example plots: DriftSpeedSDD

- Drift speed depends on temperature

$$\Rightarrow v_{\text{drift}} = \mu_e E \text{ with } \mu_e \propto T^{-2.4}$$

- Heat goes up

\Rightarrow Top ladders: higher T , lower drift speed



RespSDD

- One AliITSresponseSDD object with common calibration parameters of all the 260 SDD detectors
- Contains:
 - ⇒ time offset, jitter error, charge loss, conversion $\text{ADC} \rightarrow \text{keV}$
- Values presently in OCDB:
 - ⇒ Time offset and $\text{ADC} \rightarrow \text{keV}$ tuned on MC data, should be then tuned from the analysis of cosmic events
 - ⇒ Charge loss set to zero on the basis of preliminary measurements on the laser test setup in Torino
- Update in OCDB:
 - ⇒ Values not extracted from DAs and not updated by preprocessor

DDLMapSDD

- One AliITSDDLModuleMapSDD object with the DDL map
 - ⇒ December data have been collected with non standard connection scheme for SDD
 - ⇒ Same situation will happen in February
- Contains:
 - ⇒ conversion from DDL/Carlos (hardware) numbers to aliroot module number
- Values presently in OCDB:
 - ⇒ Default DDL map on SVN repository, files exist for December DDL maps
- Update in OCDB:
 - ⇒ DDL maps to be put in the DaqDetDB by the SDD shifter immediately after a change in the connection scheme
 - ⇒ Functionality of putting this file on FXS to be implemented by DAQ team, afterwards preprocessor to be modified to put this file in the OCDB

CalibSDD

- One AliITSCalibrationSDD object for each of the 260 SDD detectors
- Contains:
 - ⇒ Flag for bad module
 - ⇒ Bad channels, baselines, noise and gain for each anode
 - ⇒ TO BE ADDED: flag for dead chips
- Values presently in OCDB:
 - ⇒ Reasonable values extracted from detector testing in Torino
 - ⇒ On-going analysis on December data to obtain real values for the ≈ 80 modules that were on
- Update in OCDB:
 - ⇒ At each PEDESTAL+PULSER sequence of run collected at every LHC fill period
 - ⇒ DAs (ITSSDDBASda.cxx and ITSSDDGAINda.cxx) code ready and tested locally on December data

DriftSpeedSDD

- One AliITSDriftSpeedArraySDD object for each side of the 260 SDD detectors (total 520 objects)
- Contains:
 - ⇒ Drift speed (parametrized) vs. anode number
- Values presently in OCDB:
 - ⇒ Reasonable values extracted from detector testing in Torino
 - ⇒ On-going analysis on December data to obtain real values for the ≈ 80 modules that were on
- Update in OCDB:
 - ⇒ At each PHYSICS run using the INJECTOR triggers
 - ✓ *To be verified if will be available in February 08 run*
 - ⇒ DA (ITSSDDINJda.cxx) code ready and tested locally on December data
 - ⇒ Foresee the possibility to run on SDD standalone injector runs

MapsAnodeSDD, MapsTimeSDD

- One AliITSDriftSpeedArraySDD object for each side of the 260 SDD detectors (total 520 objects)
- Contains:
 - ⇒ Correction maps for anode and drift coordinates to account for dopant concentration and drift field inhomogeneties
- Values presently in OCDB:
 - ⇒ Dummy maps with no correction and just a smear equal to the expected residual error
 - ⇒ In the next months: analysis of the maps measured in Turin with laser on all the SDD detectors
- Update in OCDB:
 - ⇒ Never updated
- To be done:
 - ⇒ Implement a flag in AliITSCalibrationSDD (i.e. at the module level) to exclude the application of this correction

DCS data points

- SDD data points (only for reference)
 - ⇒ 260 HV values → 1 per module
 - ⇒ 260 MV values → 1 per module
 - ⇒ 520 temperature values → 1 per hybrid
 - ⇒ + Status values
 - Update frequency
 - ⇒ FIXED: every 1-2 minutes
 - ⇒ + each time the value exits from confidence band around last stored value
 - File size 55 B/sec → about 5 MB/day in oracle
 - Data size reduction done by the preprocessor
 - ⇒ Store values only when out of a tunable confidence band around last stored value
 - ⇒ Need DCS data from February08 run to estimate file size in the OCDB
- Calculate drift field } backup estimation of drift speed