

# Jason-1 Orbit change preparation

CNES



OSTST meeting - Nice

*Presented by G. Zaouche - CNES*

- **Jason-2 In-Flight assessment meeting : Sept 11, 2008**
  - Satellite and Ground System nominal - Verification phase in progress
- **CALVAL meeting : Sept 12, 2008**
  - discussions about the CALVAL phase duration
  - discussions about the phasing between Jason-1 and Jason-2 orbits
    - recall about the T/P and Jason-1 phasing :  $18^\circ$
    - introduction of a new phasing for discussion :  $162^\circ$
- **Further discussions and decision since then have been done on the OSTST email list (see presentation from N. Picot) and some will also be done in the current OSTST meeting**
- **At project level , action item to evaluate “what can be made” in term of :**
  - capability of the navigation system
  - duration of the transition phase
  - readiness of the Jason-1 ground system : maneuvers, products, ...
  - needed resources

**whatever the OSTST decision can be .....**

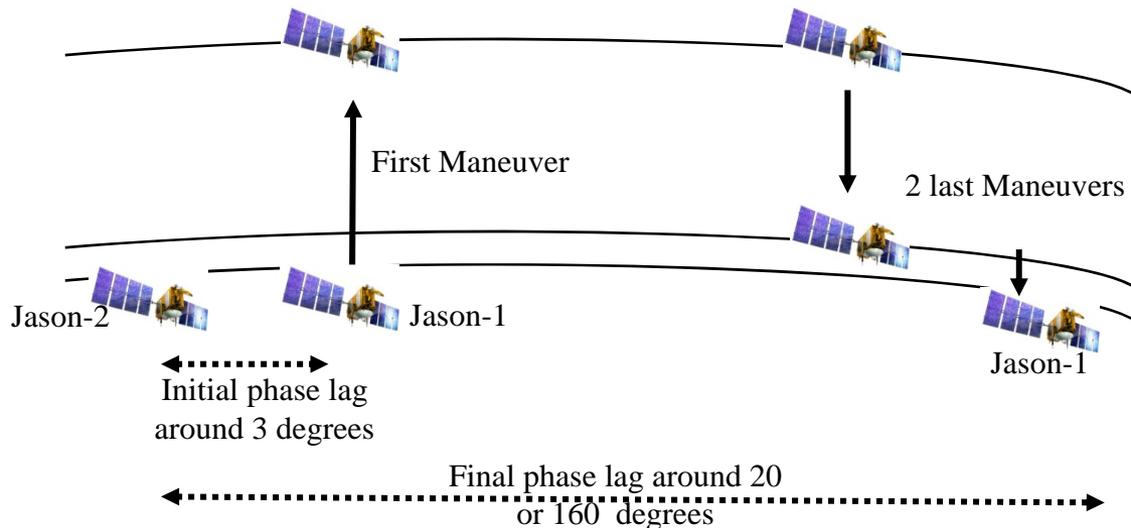


- **Orbit phasing - interleave orbit : 2 cases have been evaluated to date**
  - a shift at the interleaved at the closest position from Jason-2 ( $\pm 18$  degrees)
  - a shift at the interleaved at the furthest position from Jason-2 ( $\pm 162$  degrees)
- **General principle**
  - in order to move Jason-1 at the interleaved, it is then necessary to modify its in-orbit position. This is done with several semi-major axis maneuvers.
  - general constraints on the maneuvers due to satellite and operations are :
    - Maximum amplitude of each boost of 2.5 m/s
    - In order to perform maneuvers with a good accuracy, it is necessary to have a waiting period of at least 2 days between them. This constraint may be relaxed if the needed precision for the maneuver is low.
    - Moreover, in order to minimize the dispersion on the last maneuver (that enable to position Jason-1 at its final operational position), it is preferable to have a low amplitude for this last RV maneuver.



- **Jason-1 Station acquisition :**

- if the targeted phase-lag is  $\pm 18$  degrees, then the RV will be performed with 3 semi-major axis maneuvers (one to raise or lower Jason-1 altitude depending on the sense of the drift, and two to come back on the operational orbit at the targeted position, the last one being of low amplitude (at most 1 km))
- if the targeted phase-lag is  $\pm 162$  degrees, then the RV will be performed with 3 or 5 semi-major axis maneuvers depending on the maximal expected duration for the operations



- Several cases have been studied with different Da maneuvers (2 examples are given below) :
  - case 18° with Da of 4 km

Da Man 1	Day Man 1	DV man 1	Da Man 2	Day Man 2	DV man 2	Da Man 3	Day Man 3	DV man 3	Total Duration	Total Consumption
4 km	1	1.84 m/s	3 km	5	1.36 m/s	1 km	8	0.46 m/s	8 days	3.66 m/s

- case 162° with Da of 20 km

Da 1	Day 1	DV 1	Da 2	Day 2	DV 2	Da 3	Day 3	DV 3	Da 4	Day 4	DV 4	Da 5	Day 5	DV 5	Total Dur.	Total Cons.
10 km	1	4.66 m/s	10 km	2	4.66 m/s	10 km	9	4.66 m/s	9 km	11	4.2 m/s	1 km	13	0.46 m/s	13 days	18.64 m/s

- Orbit change synthesis
  - Depending on the targeted phase lag and maximum wanted duration for the operations, the global duration of the station acquisition goes from 8 to 21 days, with a global cost from 3.66 m/s to 18.64 m/s (4% to 20% of current hydrazine mass)
  - The RV maneuvers are performed with 4 thrusters. If needed, eccentricity may be corrected with these maneuvers (dispersions on the different RV maneuvers)



- **Satellite :**
  - 4 thrusters are OK - usual constraints for maneuvers
- **Instruments :**
  - DORIS, AMR and GPSP : no constraints
  - Poseidon2 constraints for large Da maneuvers
    - POS2 will be put in WAIT mode
    - new “PRI” (altimeter repetition frequency) value to be uploaded when satellite altitude change  $> \pm 1$  km
    - POS2 in WAIT mode when Jason-1 nadir is above Jason-2
- **Mission centers :**
  - impact about products in transition phase : evaluation in progress (but products will not be disseminated to the users)
- **Station keeping maneuvers :**
  - planned , as for Jason-2 , in one thrust over earth (no more orbit 127)
  - eccentricity will be checked
- **Operations :**
  - tests resources in operational conditions with the satellite simulator : about 2 weeks
  - orbit change duration : from 8 to 21 days
  - human resources needed for the whole period : evaluation in progress
  - **Need of a formal OSTST decision to guarantee the change date**



- No showstopper at Jason-1 system level
- Earliest decision from OSTST **needed** to organize operations

Don't forget that ..... in less than ONE month (Dec 7, 2008) .....  
Happy Birthday ... **old** ... Jason-1 !!!!!!

