

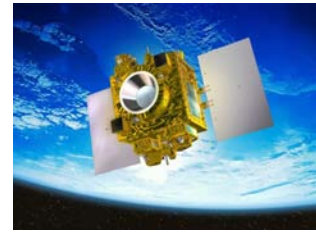
Appendix D

GAETAN V5: a Global Analysis Environment for Thermal Analysis Network

Hélène Pasquier
(CNES, France)

GAETAN V5 :

A Global Analysis Environment for Thermal Analysis Network



PASQUIER H el ene, *Thermal Engineer, CNES*



21th European Workshop on Thermal and ECLS Software, 30-31 October 2007, ESA/ESTEC

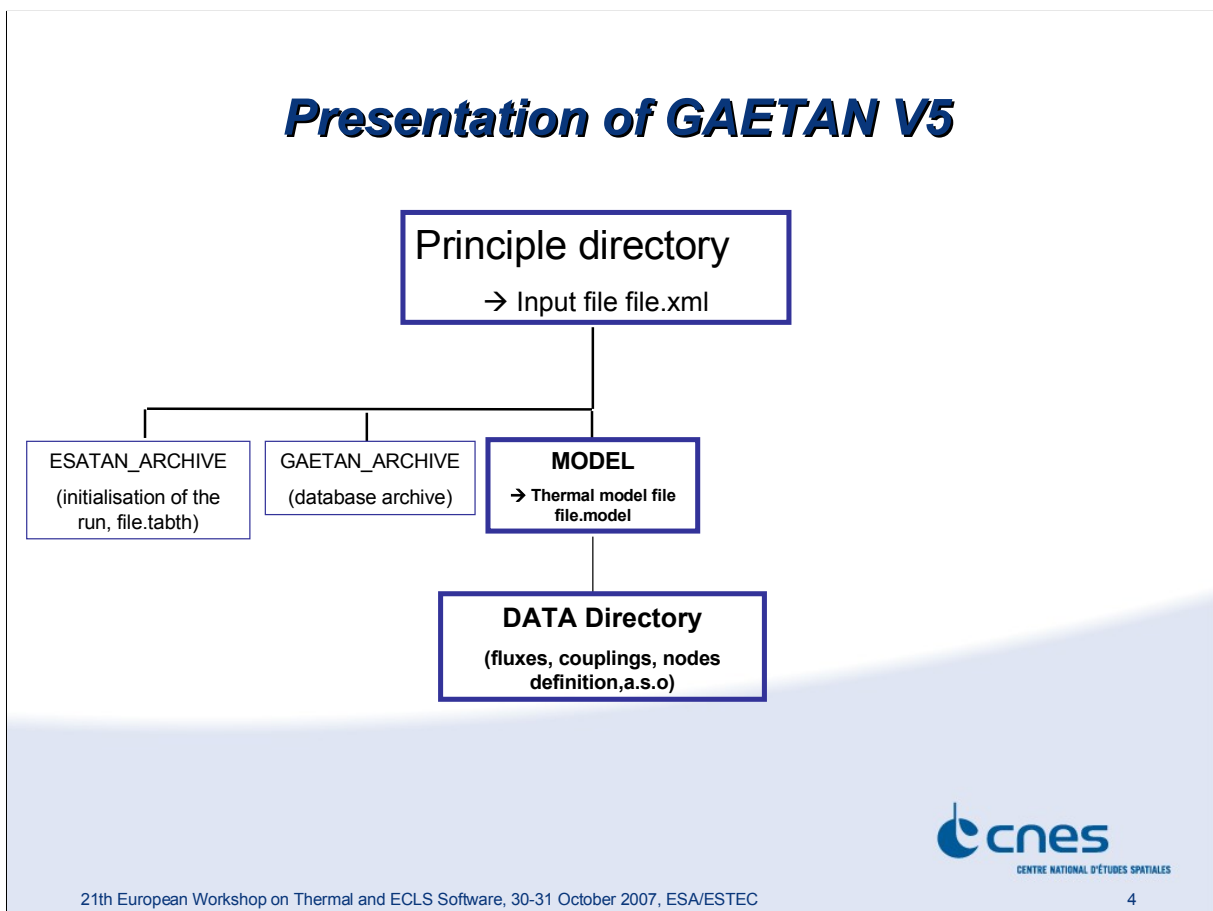
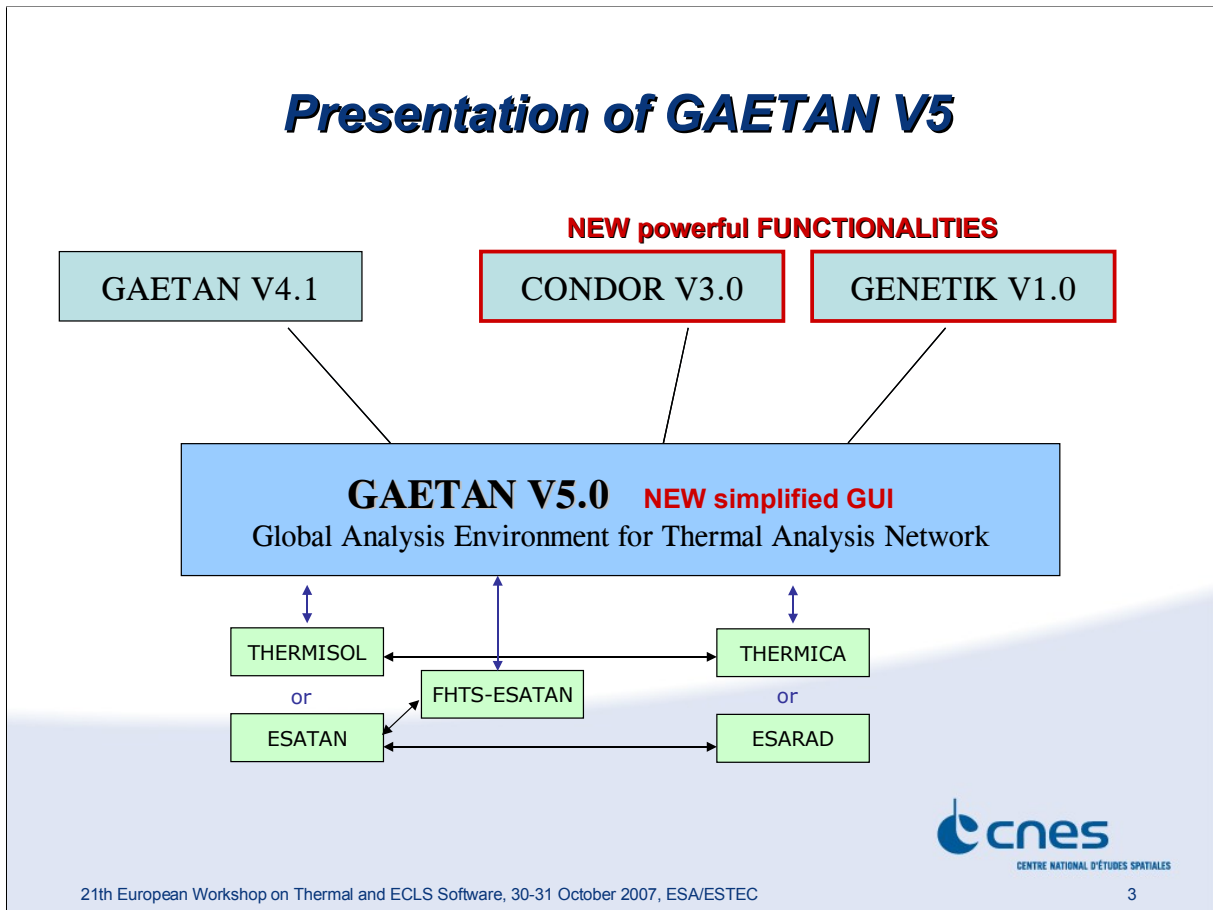
Agenda

- **Presentation of GAETAN V5**
- **Demonstration of the new friendly interface**
- **Focus on dimensioning case research modules**

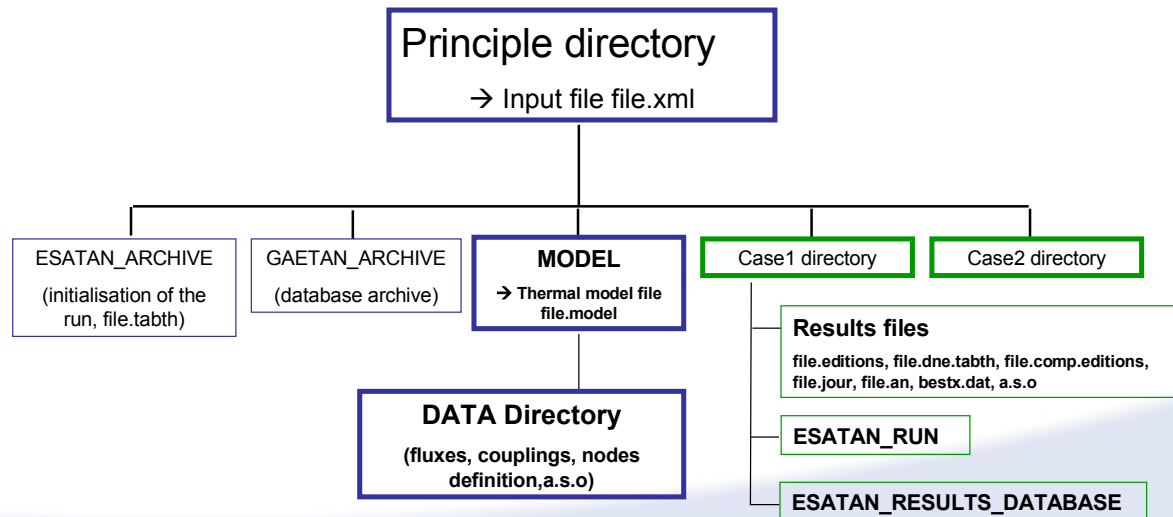


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Presentation of GAETAN V5



Presentation of GAETAN V5 - Main functionalities of GAETAN -

→ PRE PROCESSING FUNCTIONS

- Thermal model configuration and studies management
- Practical use of names for calculation cases, heat load cases, groups of nodes, heat balance, calculation times, a.s.o.
- Complementary entities helpful for thermal study management (i.e. : groups of nodes, condensed nodes, boundary fluxes, instantaneous thermal slopes, a.s.o.)
- Thermal coupling and sensitivity cases analyses

Presentation of GAETAN V5

- Main functionalities of GAETAN -

→ POST PROCESSING FUNCTIONS

- Heat balance analysis : detailed exchanged heat flows diagnostic and extrema
- Radiator / Heat sink analysis (Sink temperature, heat rejection, heat power on simulated heat sink during thermal test ...)
 - Useful for thermal balance test engineering
- Automatic results comparison
 - With specification, with test results, between several calculation cases
 - Between nodes, groups of nodes
 - Using mapping table



Presentation of GAETAN V5

- Main functionalities of GAETAN -

→ MIXTE FUNCTIONS

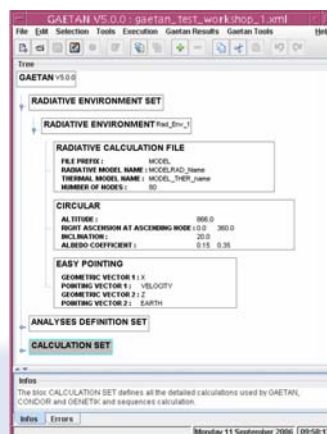
- Help for model reduction (energetic approach)
- Data archived : for later initialization (ESATAN_ARCHIVE), for later post processing (ESATAN_RESULTS_DATABASE) or for comparison (GAETAN_ARCHIVE)
- Dimensioning case research with the CONDOR and the GENETIK modules



Presentation of GAETAN V5 - Main functionalities of GAETAN -

The aim of the new GUI is to make the software easier to use.

➔ DEMONSTRATION



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Focus on dimensioning case research modules - CONDOR Module -

- Why CONDOR ?
 - New project → complex orbit and many possible attitude (random attitude for example)
 - ➔ More complicated to determine the dimensioning case for thermal analysis
- What is CONDOR ?
 - This aim of the module is the evaluation of external orbital conditions for simple geometries, classical orbits and attitude conditions
 - Condor can also be used with Thermica/Esarad – GAETAN – Thermisol/Esatan to obtain data (fluxes, temperature, a.s.o) for many complex geometries, orbital and attitude conditions



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Focus on dimensioning case research modules - GENETIK Module -

■ Why GENETIK ?

- **More exhaustive research with GENETIK (variation of many parameters can be tested) – optimized research (Genetic Algorithm → Darwin theory)**

	CONDOR	GENETIK
<i>Geometry</i>	fixed by user (simple or complex)	
<i>Orbit</i>	Parameters fixed by user Ex. : albedo = 0.25 / altitude = 800 km	Discrete variation or range defined by user Ex. : albedo ∈ [0.25,0.35] / altitude = 800 km or 900 km
<i>Attitude</i>	Parameters fixed by user Ex. : X_{SAT} = Earth direction	Discrete variation or range defined by user Ex. : X_{SAT} = Earth direction or Azimut = 100° / Zenith = 20°
<i>Day of the year</i>	Between 0 and 365 with a fixed time step	Between 0 and 365
<i>Results</i>	Worth day (hot or cold) of the year	Worth case (ex. : albedo = 0.22 - altitude = 900 km - Azimut = 100° / Zenith = 20° - day 272)



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GAETAN V5 – Future Activities

- Improvements on the software are in course today
- First semester of 2008 → operational use of GAETAN V5 in CNES and TAS Toulouse
- Second semester of 2008 → implementation of the users back and finale validation of the tool
- **End of 2008 – beginning of 2009 : tool available for the European community**



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