

The background of the slide is a photograph of Earth taken from space. The Earth is a bright blue and white sphere, partially obscured by the dark curvature of the planet's surface in the foreground. The sun is visible as a bright white and yellow glow at the bottom left, creating a lens flare effect. The text 'IASI-NG Phase A Studies' is centered in a bold, green, sans-serif font.

IASI-NG Phase A Studies

M. SACCOCCIO, S. ROUSSEAU

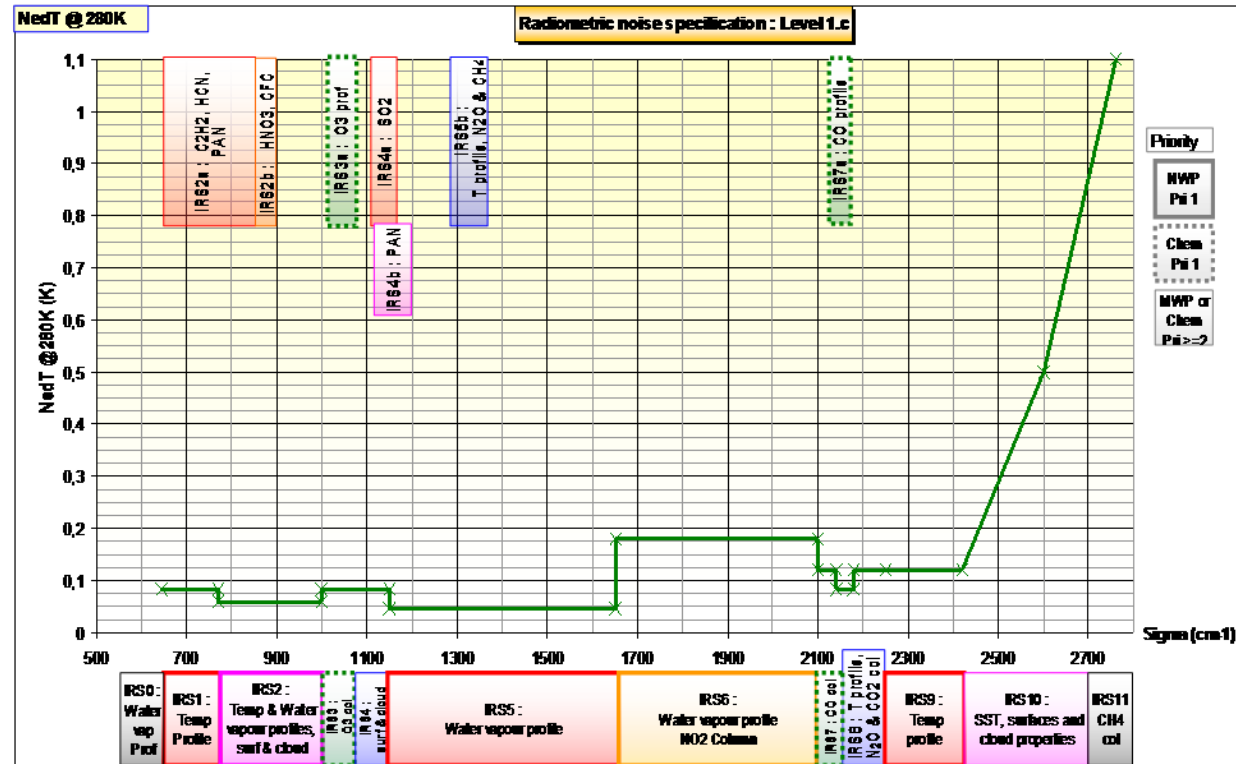
Overview

- IASI-NG requirements / EPS-SG MRD
- IASI-NG Phase A logic
- IASI-NG Performances and budgets status
- IASI-NG current status (feasibility and affordability)
- IASI-NG potential constraint relaxation
- Status on IRS1 scenario considered in Phase 0
- IASI-NG next steps

IASI-NG Phase A specification / MRD

■ IASI-NG goal is to improve the IASI demonstrated performances by a factor of 2 at level 1c

- ◆ Spectral sampling : 0.125 cm⁻¹
- ◆ Spectral resolution : 0.25 cm⁻¹
- ◆ Radiometric noise (see graph)
- ◆ Spatial sampling and resolution like IASI :
 - Pixel ~ 12 km diameter
 - Ground sampling 25km average



Goal : continuity with IASI, but with significantly enhanced performances

IASI-NG Phase A specification / MRD

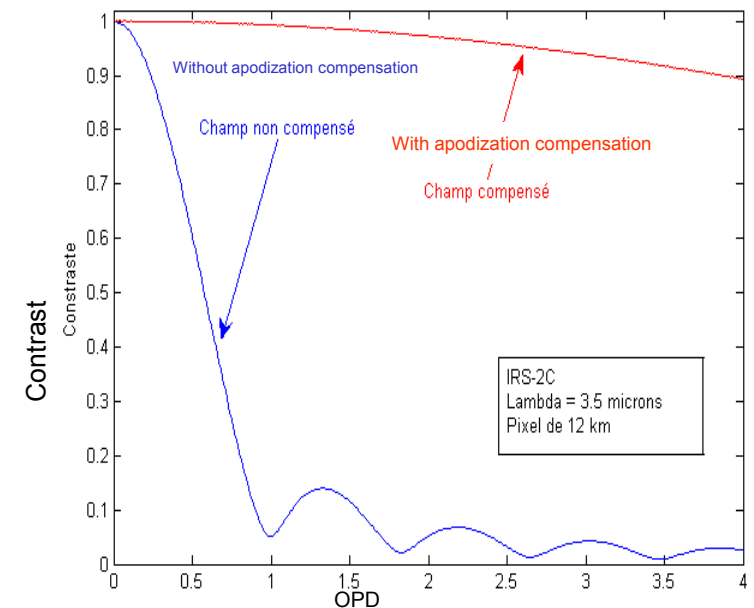
■ IASI-NG : Fourier transform spectrometer with optical path difference > 4 cm

■ Compared to IASI, it requires :

- ◆ Increased Input pupil
- ◆ Increased field of view
- ◆ Reduced detectors' temperature (active cryocooling)
- ◆ Corrected self apodization :
optical compensation or numerical processing



**Some technical challenges (self-apodization correction, metrology, calibration...),
but existing solutions and technical maturity higher than for IASI on certain items.**



IASI-NG Phase A studies in 2010

January 2010

Definition, analyses and preliminary comparison of 3 concepts
(performances, resources)

June 2010

Definition, analyses and deeper comparison
of the 2 most promising concepts
(including schedule, risks, costs)

December 2010

Selection and justification of industrial baselines
and back-up solutions, for deeper analyses,
+ preliminary ROM costs, schedule and risk analysis

IASI-NG Phase A studies in 2011

January 2011

**Design optimization, deeper feasibility studies,
refined instrument specifications
+ definition of main risk mitigation activities**
Start of METOP-SG Phase A studies => updated requirements

June 2011

Consolidation of feasibility and budgets
Refined equipment specifications
Risk mitigations activities
METOP-SG Phase A PCR => requirements TBC

September 2011

**Updated trade-off between industrial baselines
and back-up solutions**
Updated performances and budgets

End of IASI-NG Phase A studies

September 2011

Risk mitigation activities

+ updated ROM costs + schedule/cost drivers

+ updated development plan, schedule and risk analysis

**Later changes in interfaces & mission goals for IASI-NG
would impact requirements/definition/schedule**

December 2011

End of risk mitigation activities and impacts

Documentation finalization

End of Phase A Review preparation

March 2012

IASI-NG End of Phase A Review :

status on requirements and feasibility

Including interfaces with METOP-SG (End of Phase A)

If OK, launch of IASI-NG Phases B-C-D ITT

IASI-NG performances status / MRD

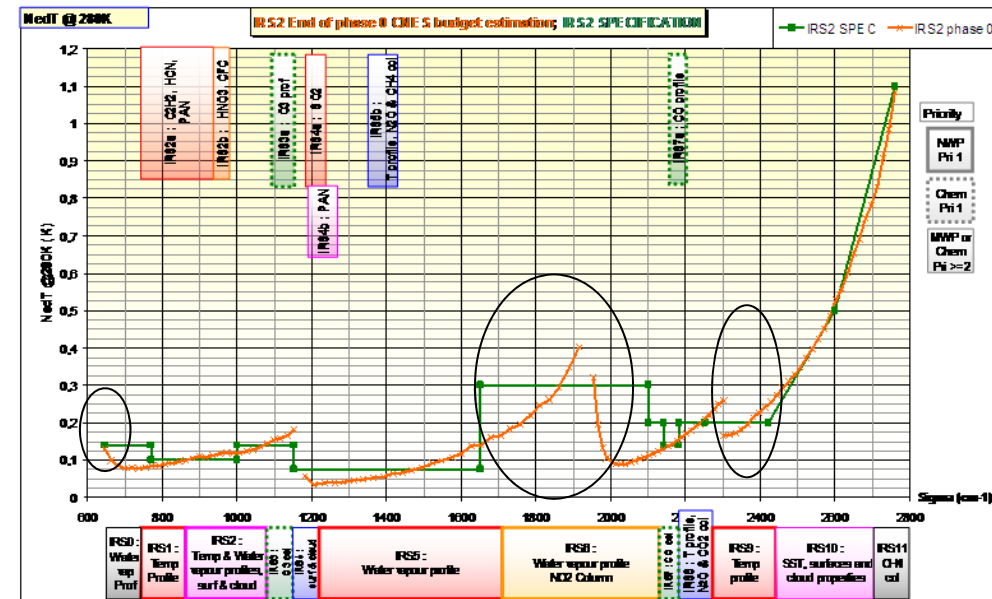
- **Performance goal (mostly breakthrough level) is reachable**
- Like on IASI, radiometric noise non compliant on the edges of the various bands (realistic shape of the noise versus flat shape of the requirement) :

- ◆ 4 bands are required to improve performances for high wavenumbers

- ◆ Remaining difficulties on the edges of the bands :

- [645-670] cm⁻¹
- [1900-2000] cm⁻¹
- [2200-2400] cm⁻¹

Some acceptable non-compliances



Typical radiometric performances

- The phase A competition imposes to compare the concepts at level 1c. The performance needs at level 1b have to be confirmed.

IASI-NG budgets status / IRD*

- **Mass : current allocation* : 360 kg**
 - ◆ **Compliant**
- **Power : current allocation* : 500 W EOL**
 - ◆ **Compliant** but an increase would relax some constraints
- **Volume : current allocation* : X=1,5 m, Y=1,5 m, Z=1,2 m**
 - ◆ **Compliant** but an increase would relax some constraints
- **Data Rate : current allocation* : 6 Mb/s mean, 7 Mb/s max**
 - ◆ **Compliant** but an increase would relax some constraint and increase performances
- **Reliability :**
 - ◆ **New requirement (0,85 - 8.5 years), injected during IASI-NG phase A studies => impacts on IASI-NG design/cost, compared to the previous (IASI/EPS) one.**

* Current baseline agreed with ESA and EUMETSAT

IASI-NG Phase A current status

- **IASI-NG will be an instrument with enhanced performances compared to IASI, which requires some innovations**
- **After CNES Phase 0 + Phase A studies (CNES + 2 industrial studies in parallel) :**
 - ◆ **no show stopper but a few technical challenges**
 - ◆ **a few acceptable non-compliances on the radiometric noise (edges of the bands)**
 - ◆ **2 nominal concepts + 2 back-up solutions***
(*higher performances but more risks, higher costs and later deliveries TBC).
 - ◆ **cost should be close to the IASI one**
even with a factor 2 on the 2 main performances (TBC)
 - ◆ **tight schedule (for a delivery first half of 2018 required by ESA)**

IASI-NG potential constraint relaxation

- **Some schedule and cost reductions could be obtained, if needed, by reducing some constraints**
- For example : reliability, number of development models, number of bands, ...
- This will have to be analyzed in case of severe budget constraints, requiring reduction of IASI-NG mission objectives
- **But potential impact on schedule** : more phase A studies (new instrument definition), later start of phase B-C-D...
- **Getting higher performances than the IASI ones seems feasible in any case**, but various possible solutions requiring studies if needed.

Status on IRS1 scenario considered in Phase 0

- **A new IASI instrument, with the same design, but updated, is not a low cost solution** due to technology evolutions :
some IASI technologies are no more manufactured
=> new and specific, thus expensive, developments
+ new interfaces, extended lifetime and increased reliability
- **A new IASI instrument, with the same design, but improved to maximize its performances, would give lower performances than IASI-NG expected ones.**
- **These solutions don't seem to be good compromises between performances and cost.**

IASI-NG Next steps (TBC)

- Call for tender for Phases B-C-D IASI-NG : **May 2012**
- Decision of CNES for Phases B-C-D : **December 2012**
- Contract approval for IASI-NG Phase B-C-D : **April 2013**
- Need date for the IASI-NG First Flight Model (over 3) :
Spring 2018