# Science Plan for MTG-IRS

Some general ideas (TBA)….

1. Emphasis should be on science that showcases the unique combination of hyperspectral measurements with high GEO time and spatial sampling

2. It should be a relatively short, ambitious and exciting roadmap - containing only enough detail to demonstrate that the ideas are credible.

3. It should **not** be a *stream of consciousness*, but should be focussed on achievable, high impact outcomes

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# Outline (high level) structure for MTG-IRS Science Plan

| Title | Lead coordinators | Contributors |
|---|---|---|
| **Chapter 1**: The rationale for MTG-IRS and system description | Dorothée | |
| **Chapter 2**: Cross cutting challenges | Johannes | |
| **Chapter 3**: Support for operational meteorology | Christina | |
| **Chapter 4**: Support for AC monitoring and forecasting | Pierre | |
| **Chapter 5**: Support for future climate science | Claude | |
| **Chapter 6**: Scientific process studies | Tony | |

# Chapter 1: The rationale for MTG-IRS and system description

- Combining two technologies GEO and HSRIR
- Benefits of GEO – high temporal resolution
- Benefits of HSRIR – high vertical resolution information on Met variables and information atmospheric composition (AC)
- Description of MTG
- Description of IRS
- Key aspects of data delivery strategy and archiving
- Supporting **real time operational** applications
- Supporting **scientific process studies** (with potential massive impacts for operational applications)

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Chapter Lead(s) :
Contributors :

# Chapter 2: Cross cutting challenges

Pre-requisites for MTG-IRS to deliver the science plan….

- Instrument calibration (radiometric / spectral) and validation
  - Mostly overview, but we can refer to existing CAL/VAL plan ?

- Radiative transfer capability
  - Spectroscopy
  - Line-by-line models
  - Fast models

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# Chapter 3: Support for operational meteorology

- High speed NRT generation of L2 Met products for forecasters that are complementary to the model output they have available
  - Instability / CAPE / winds / temperature / humidity

- High speed NRT generation of L2 Met products suitable for operational data assimilation
  - Transformed retrievals or retrievals with full error covariances / averaging kernels
  - 3D winds

- High speed NRT generation of L1 data for operational data assimilation
  - Radiances
  - PCA products
  - Meta-data on scene heterogeneity

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Chapter Lead(s) :
Contributors :

# Chapter 4: Support for AC monitoring and forecasting

- High speed NRT generation of L2 AC products for forecasters that are complementary to the model output they have available
  - Air quality, aerosol…
- High speed NRT generation of L2 AC products suitable for operational data assimilation
  - Retrievals with full covariances / averaging kernels
- High speed NRT generation of L1 data for operational assimilation
  - Radiances
  - PCA products
  - Meta-data on scene heterogeneity

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Contributors :

# Chapter 5: Support for future climate science

- Generation and archiving of L1 datasets with traceable calibration
  - Radiances
  - Meta-data

- Generation and archiving of L2 / L3 datasets with traceable calibration
  - Met / AC variables
  - Meta-data

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Chapter Lead(s) :
Contributors :

# Chapter 6: Scientific process studies

(*some place holder ideas based on* exploiting time/space sampling and hyperspectral facility of IRS)

| Science Topic | Meteorology | Atmospheric Composition | Climate |
|---|---|---|---|
| Instrument CAL / VAL and L1 data (plus meta data) generation | ● | ● | ● |
| L2 product generation for assimilation and non-assimilation use | ● | ● | ● |
| Improving understanding diurnal properties of the land and ocean (Skin T / emis) | ● | ● | ● |
| Diurnal cycle of clouds, hydrological cycle and deep convection | ● | ● | ● |
| Monitoring and forecasting severe weather / AC events | ● | ● | ● |
| Improved RT of clouds, aerosols, solar radiation and the surface | ● | ● | ● |
| Genesis and forecasting of Atlantic Tropical cyclones | ● | ● | ● |
| Aerosol trajectory, extracting wind information and diurnal cycle of aerosols | ● | ● | ● |
| Convection role in AC processes (including aerosol) | | ● | ● |
| Diurnal cycle and rapid evolution of AC | ● | ● | ● |
| ..more… | | | |

# Possible template for Chapter 6 contributions:

**Topic X:**

We could solicit proposals (MAG and beyond) submitted using the above template for inclusion in the science plan ?

1. What is it …generally improving our understanding of X?
2. Why does it matter …current shortcomings of knowledge?
3. How will IRS be used ?
4. Who will actually do the work …should we / can we guide this ?
5. What are the expected outcomes and who / what will benefit ?

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Contributors :

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# Possible Chapter X: Supporting community science (?)

MTG-IRS (in combination with MTG-I and EPS-SG) will make the 0 degree GEO region the most comprehensively observed atmosphere / surface and ocean from space that has ever been known…

- Data accessibility and visualization for a wide range of (WWW) users
  - Formats
  - Tools
  - exposure

- Training and education
  - Online guides
  - Visualization / application tools
  - Conferences / courses

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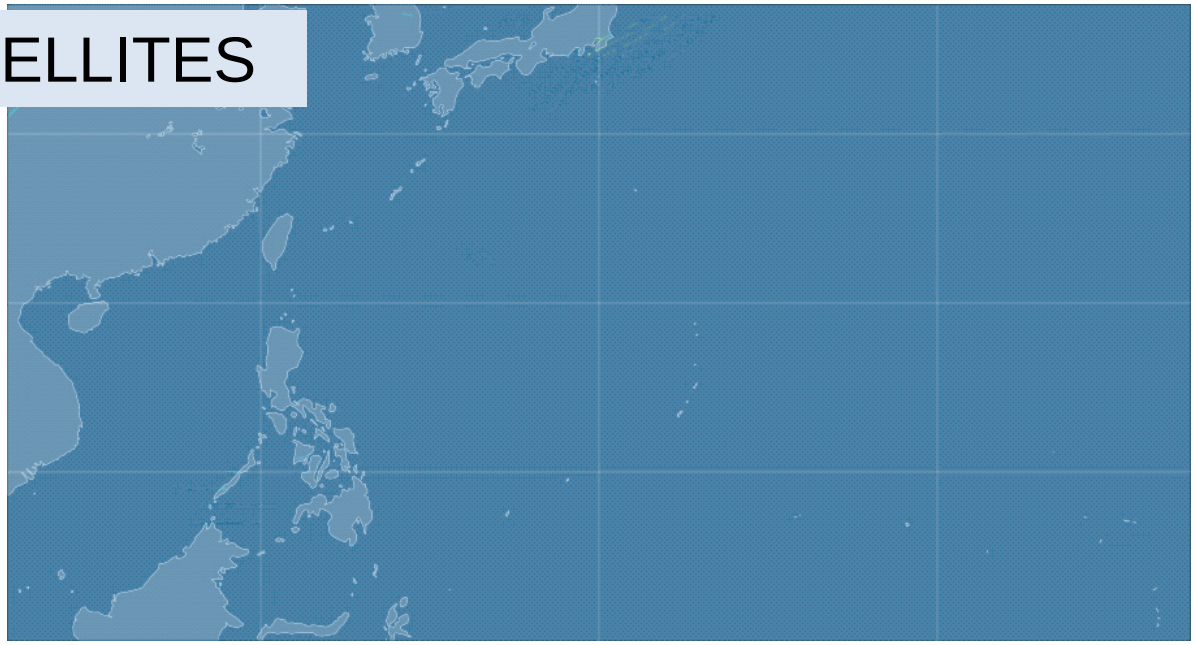
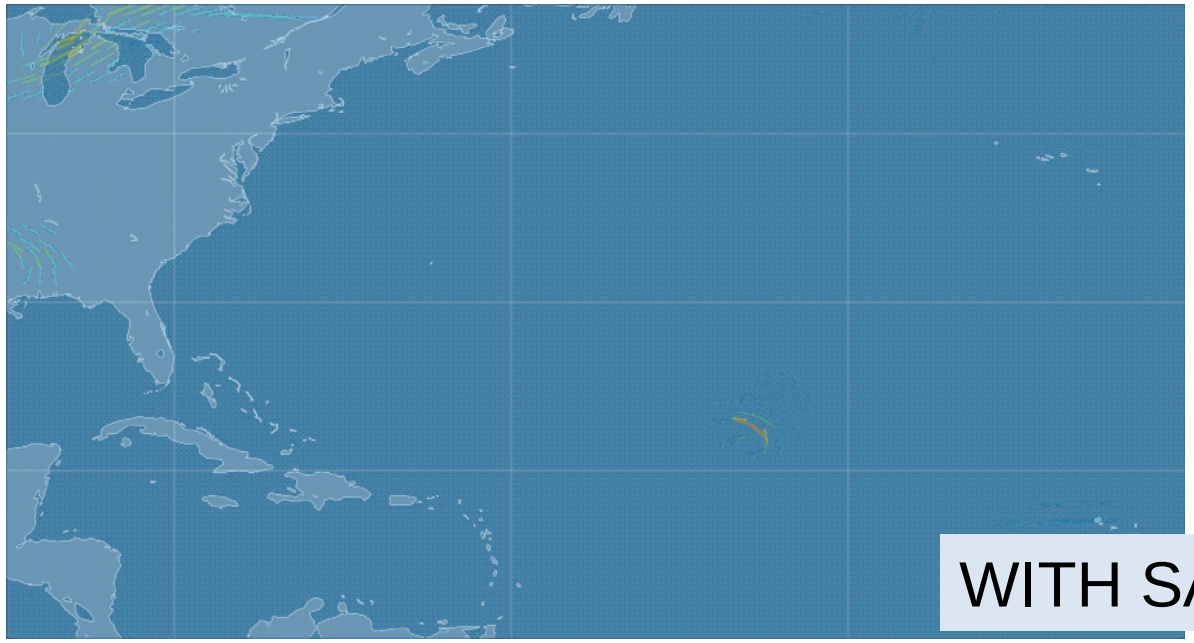
WITHOUT SATELLITES



ECMWF 10 DAY FORECAST (FLORENCE / MANGKHUT) FROM 2018-08-31@12UTC



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