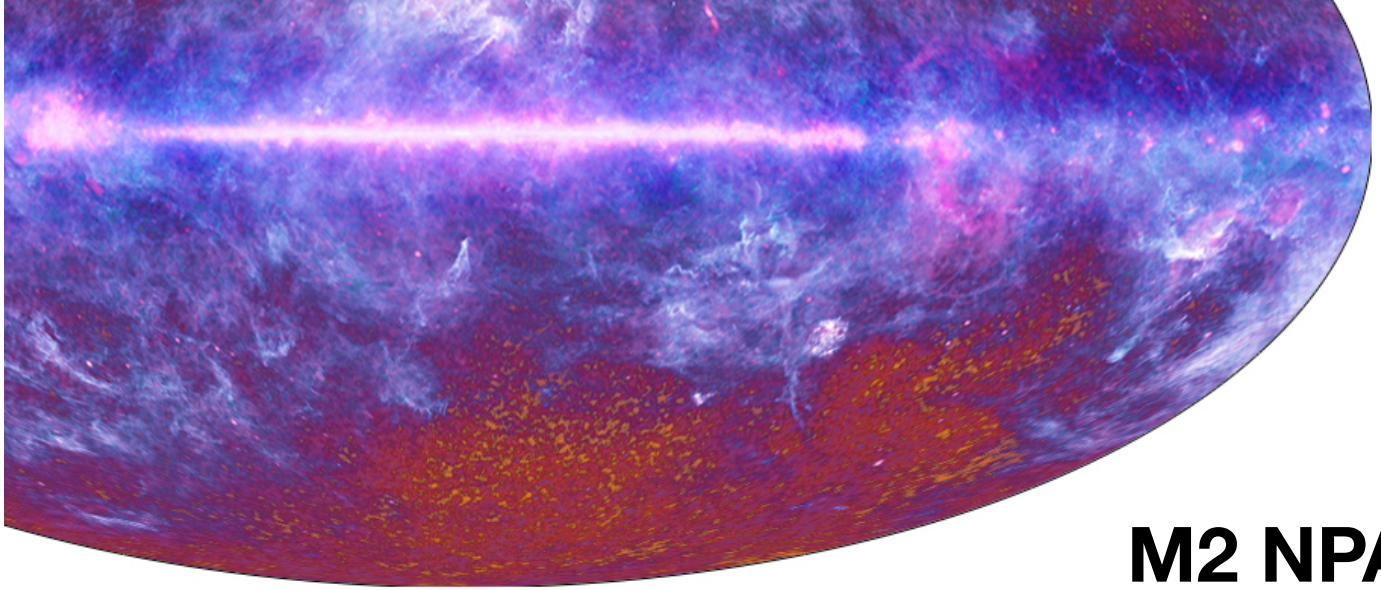


Planck

maps-sources

M2 NPAC
Projects: Data analysis and exploitation : the Millimeter Sky

Institut d'Astrophysique Spatiale – bât 121

Marian Douspis
Institut d'Astrophysique Spatiale, Orsay
Université Paris-Sud 11 et CNRS et université Paris-Saclay
http://www.ias.u-psud.fr/dole/m2.php

Objectives

Observation = B x Signal + Noise + syste + Sig2

Noise(t)
syste(t)
B(t)

Statistical Analysis & data combination

Outline

- 7 days of scientific projects in cosmology & astrophysics
- Build algorithms for data analysis and product creation
- Context: Planck mission: data released in 2018
- @ IAS, batiment 121 but unfortunately by zoom/collaborate

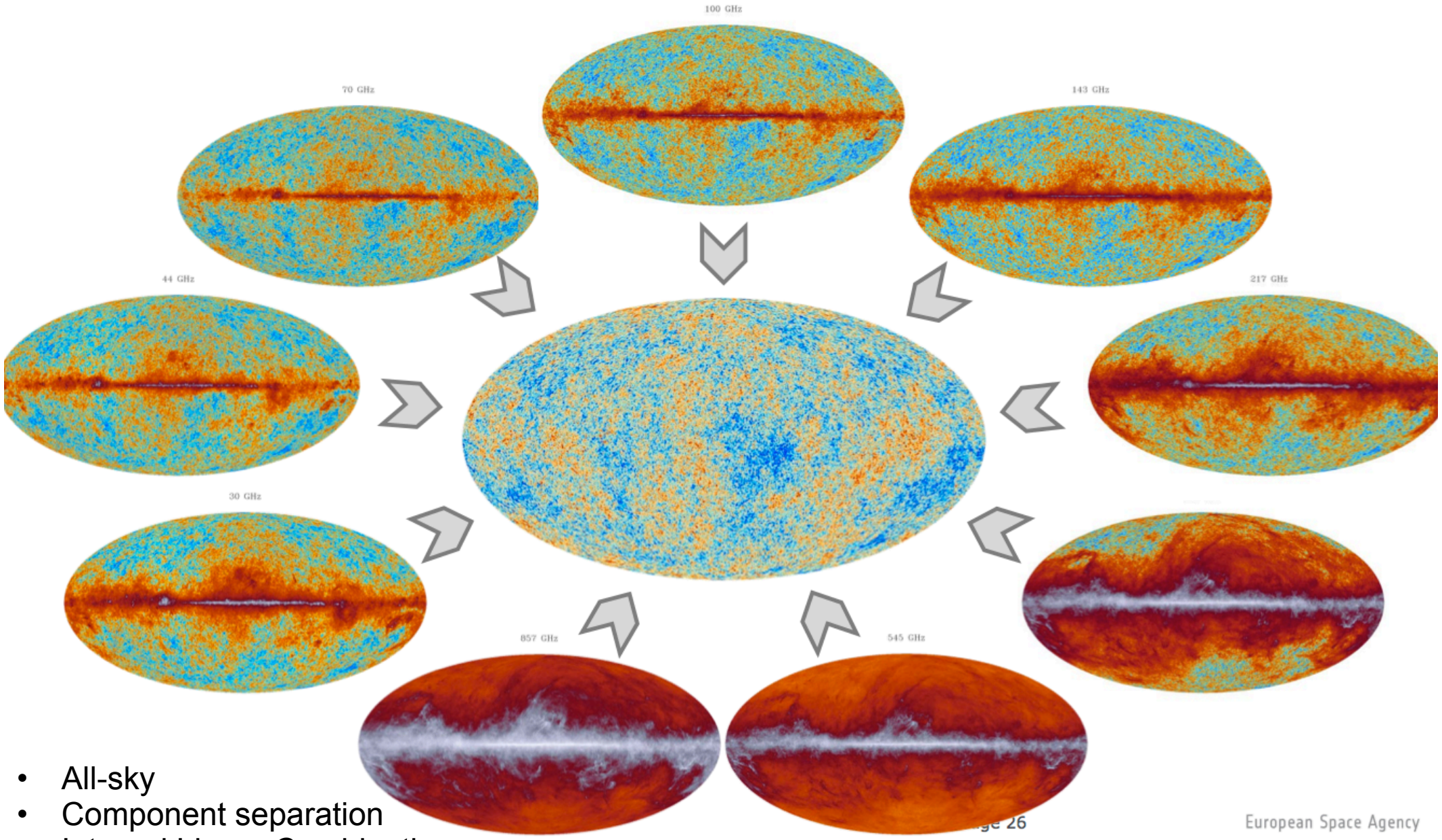
- binomes mandatory (3 max)
- 1 project per binome (with interactions)
- python / git

- Informal checkpoint after 3 days
- Small written report (~3 pages) for last day
- Final oral presentation (~15-20min/project)

4 projects using new 2018 Planck data

- project 1: CMB ILC: 1 binom
  - extract the Cosmic Microwave Background from Planck maps, then power spectrum then possibly cosmological parameters
- project 2: SZ ILC all-sky: 1 binom
  - extract the signature of galaxy clusters (with SZ effect) in Planck maps over the whole sky, detect clusters, measure flux
- project 3 : SZ ILC per patch and detection: 1 binom
  - separate SZ from dust and CMB, try to detect clusters
- project 4: stacking SZ: 1 binom
  - detecting new properties of SZ signature (e.g. relativistic effects in galaxy clusters) in Planck maps, and estimate contamination

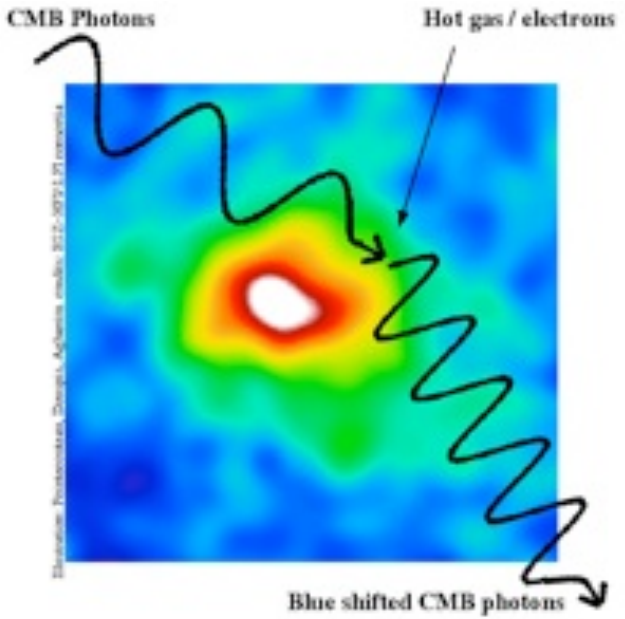
P1. CMB & component separation

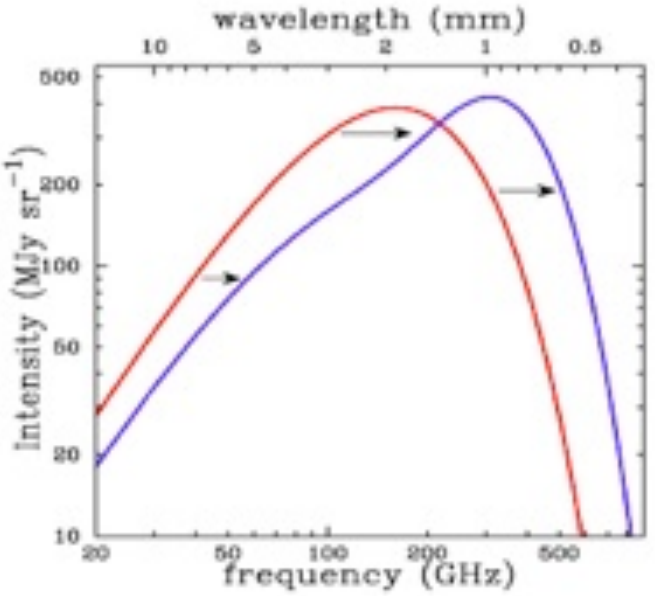


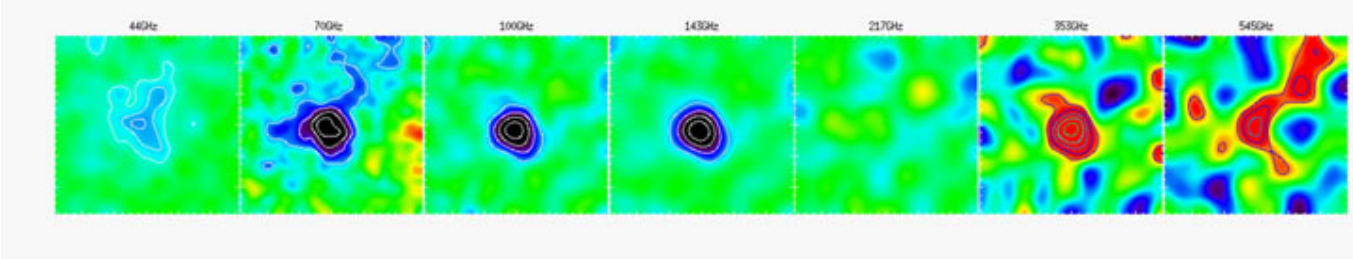
- All-sky
- Component separation
- Internal Linear Combination (ILC) method
- power spectrum estimation

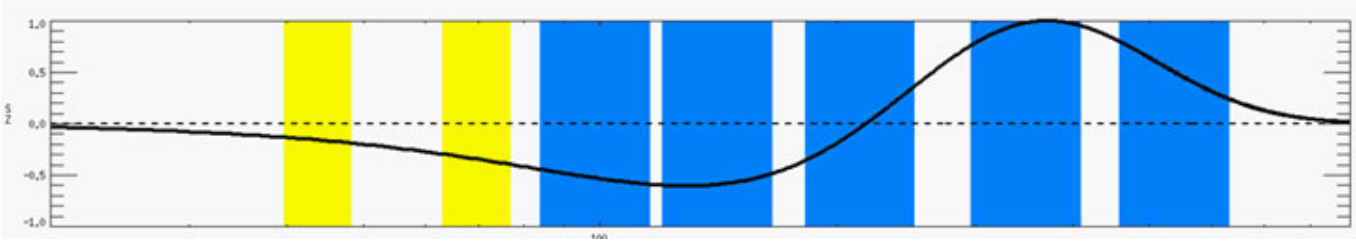
European Space Agency

P2 – P5: Sunyaev-Zeldovich (SZ) effect

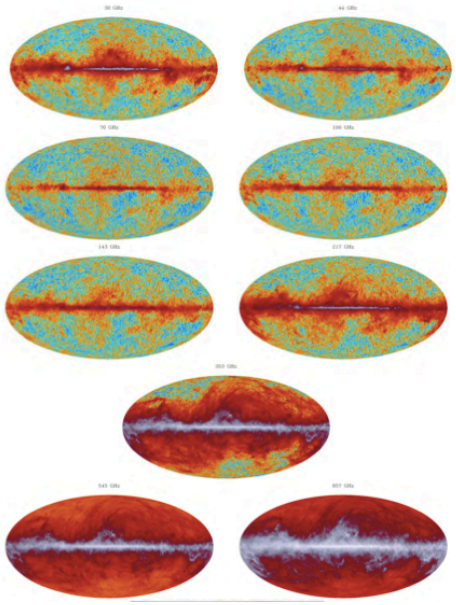


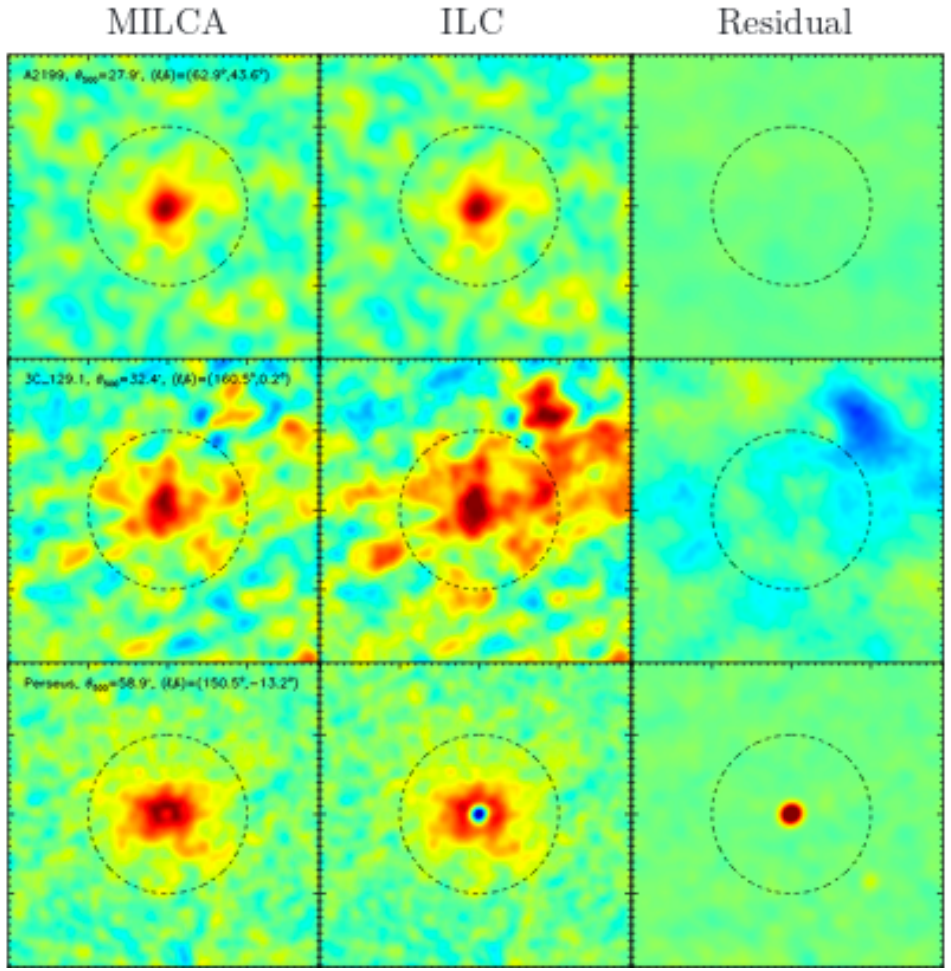






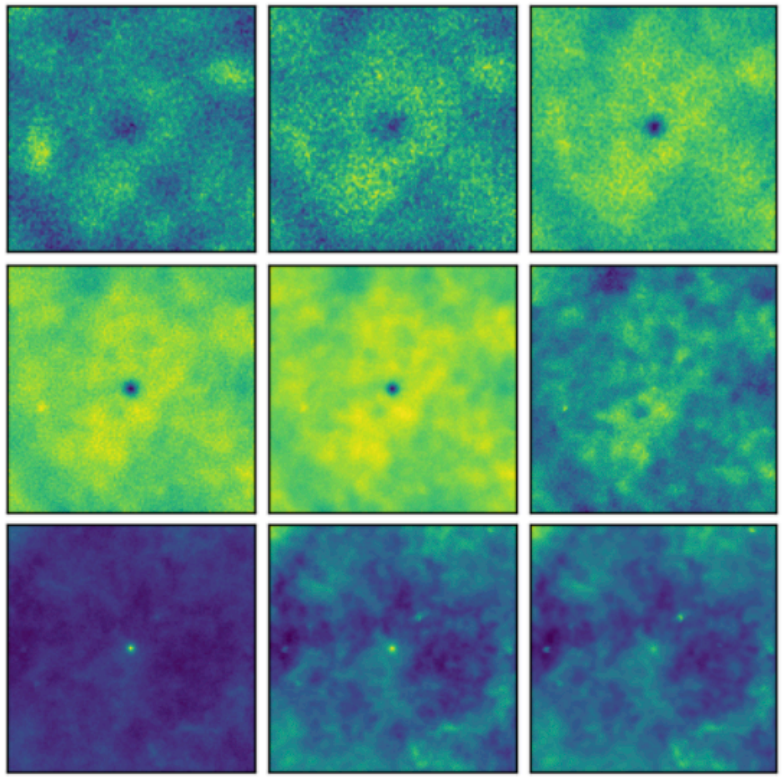
P2. All-sky SZ galaxy cluster signal

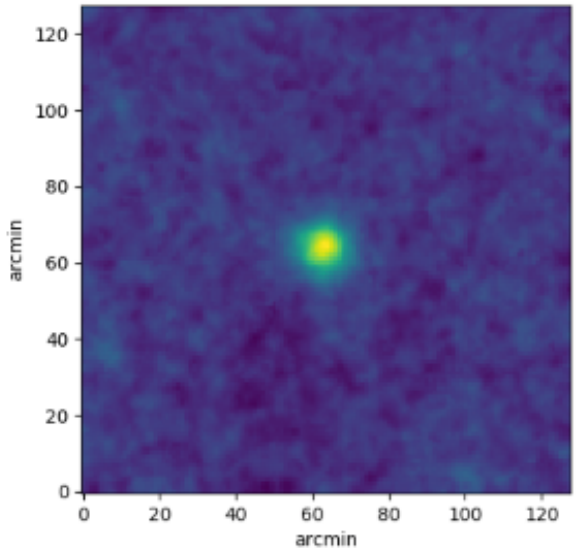




- all sky maps
- Component Separation
- ILC + wavelets
- power spectrum

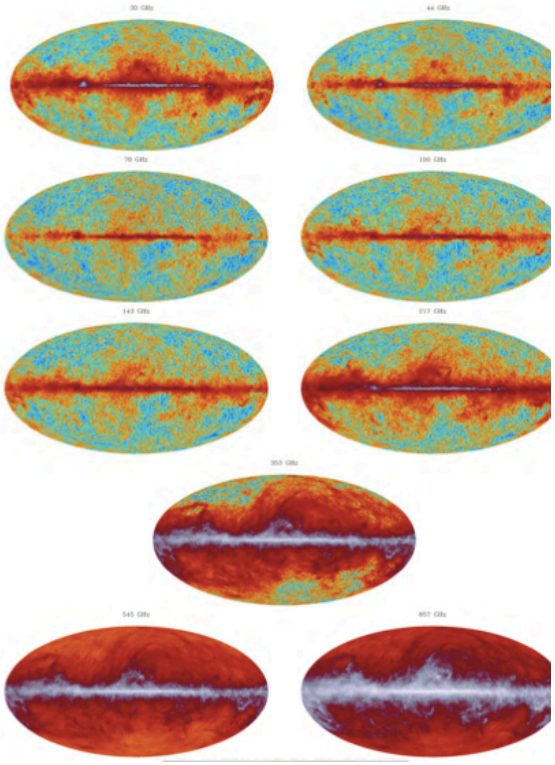
P3. SZ signal per patch

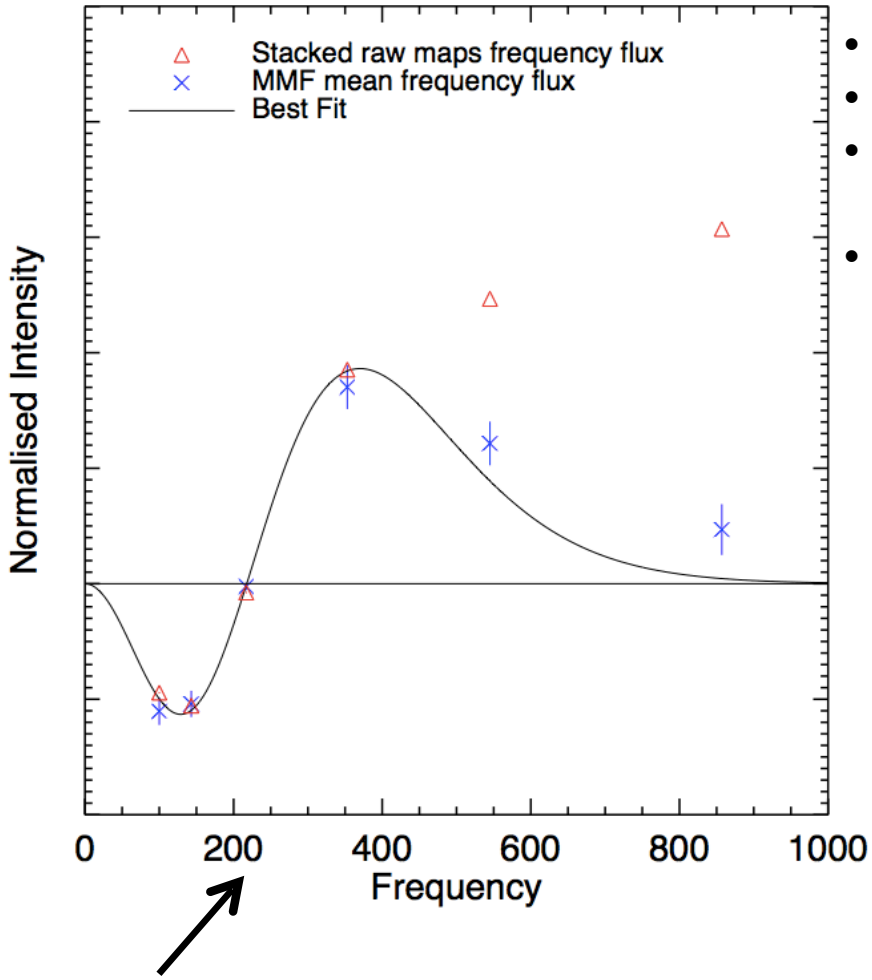
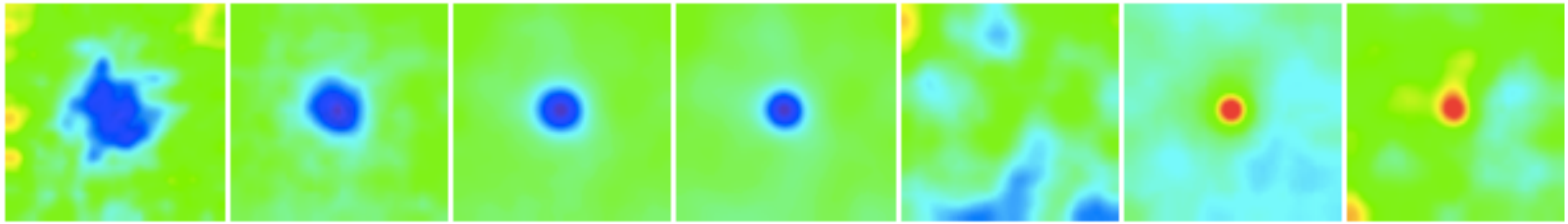




- all sky maps
- Component Separation
- ILC with multicomponents
- Detection of clusters

P4. Detecting galaxy clusters SZ by stacking





- Projection on small maps
- stacking
- Spectral energy distribution estimation
- Contamination estimation