HERschel Inventory of The Agents of Galaxy Evolution (HERITAGE) in the Magellanic Clouds

Margaret Meixner (STScI)
And HERITAGE team
Thank You to the Herschel Mission Observatory Staff & Instrument teams

- Merci
- Gracias
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- Dank u
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- For all their hard work to provide us with the opportunity for the longest wavelengths
HERITAGE Team members: sage.stsci.edu

PI: Margaret Meixner, STScI
Suzanne Madden, Service d' Astronomie of CEA
Sacha Hony, Service d' Astronomie of CEA
Alexander Tielens, Leiden University
Karl Gordon, STScI
Alberto Bolatto, University of Maryland
Charles Engelbracht, University of Arizona
Edward Churchwell, University of Wisconsin
Julia Duval, STScI
Brian Babler, University of Wisconsin
Tracy Beck, STScI
Jean-Philippe Bernard, CESR
Caroline Bot, Observatoire de Strasbourg
Francois Boulanger, Institut d' Astronomie de l' Universite de Paris
Steve Bracker, University of Wisconsin
Geoffrey Clayton, Louisiana State University
Martin Cohen, UC, Berkeley
Kazuhito Dobashi, Tokyo Gakugei University
Yasuo Fukui, Nagoya University
Maude Galametz, Service d' Astronomie of CEA
Frederic Galliano, Service d' Astronomie of CEA
Joseph Hora, Harvard-Smithsonian/CfA
Annie Hughes, Swinburne University
Remy Indebetouw, University of Virginia
Frank Israel, Leiden University
Akiko Kawamura, Nagoya University
Sungeun Kim, Sejong University
Aigen Li, University of Missouri
Knox Long, STScI
Massimo Marengo, University of Iowa
Ciska Markwick-Kemper, University of Manchester
Mikako Matsuura, University College, London
Marilyn Meade, University of Wisconsin
Karl Misselt, University of Arizona
Erik Muller, Australia Telescope National Facility
Antonella Nota, STScI/ESA
Sally Oey, University of Michigan
Koryo Okumura, Service d' Astronomie of CEA
Joana Oliveira, Keele University
Toshikazu Onishi, Nagoya University
Masaaki Otsuka, STScI
Pasquale Panuzzo, Service d' Astronomie of CEA
Deborah Paradis, Caltech/IPAC
Albrecht Poglitsch, MPE-Garching
William Reach, Caltech/IPAC
Thomas Robitaille, Harvard-Smithsonian CfA
Monica Rubio, Universidad de Chile
Marc Sauvage, Service d' Astronomie of CEA
Marta Sewilo, STScI/Joshua Simon, Caltech
Ramin Skibba, University of Arizona
Linda Smith, STScI/ESA
Sundar Srinivasan, IAP
Snezana Stanimirovic, University of Wisconsin
Jacco van Loon, Keele University
Barbara Whitney, Space Science Institute
Mark Wolfire, University of Maryland
Kevin Xu, NHSC support

18 December 2009 Herschel SDP Initial Results
Meixner & HERITAGE team
HERITAGE/SAGE Team members: sage.stsci.edu
Goals of HERITAGE

• HERITAGE is a 238 hour Herschel Open Time Key Program.
• Study of Galaxy Evolution by studying the processes that cause it: Interstellar medium, star formation and stellar feedback. Follow onto Spitzer SAGE surveys.
• Mass census of all (esp. coldest) ISM dust
• Probe the most massive embedded young stellar objects
• Quantify the dust return from most massive evolved stars
• How? SPIRE and PACs parallel mapping of Large Magellanic Cloud and Small Magellanic Cloud
• Provides critical long wavelengths missed by Spitzer SAGE surveys of LMC and SMC.
  – PACS 100 and 160 microns
  – SPIRE: 250, 350 and 500 microns
HERITAGE: Tracing the Lifecycle of Baryonic Matter:
Intermediate mass stars
High mass stars

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credit: http://hea-www.cfa.harvard.edu/CHAMP/EDUCATION/PUBLIC/ICONS/
Context for HERITAGE

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Herschel provides critical wavelengths, completing picture started with Spitzer SAGE survey of LMC and SMC
SPIRE coverage on SAGE-LMC 160 micron image
SPIRE coverage on SAGE-SMC 160 micron image
HERITAGE will detect the circumstellar dust from the most massive stars at all stages of their evolution.
SDP for HERITAGE

- Nov. 23, 2009
- One slice through center of LMC.
- Changed one 18 hr AOR into two 9 hr AORs for new time limit on PACS.
- SPIRE & PACS parallel
- 100, 160, 250, 350 & 500 microns
Preliminary maps

SPIRE 500 µm

PACS 160 µm

Panuzzo & Misselt, Engelbracht

Sauvage & Duval, Gordon

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HERITAGE SDP strip

IRAC 4.5 micron stars

MIPS 24 micron Massive star formation

SPIRE 250 micron ISM dust

Panuzzo & Hony
PAH (8 micron) to 250 microns: Do dust grain populations vary?
PAH/BG vs. 2MASS (contours) Paradis et al. (2009)
Dust & Gas

- Better dust mass estimate and Dust-to-gas mass ratio estimate
- Search for cold dust, in CO clouds?

Bolatto, Gordon, Kawamura
Massive YSOs: N44, SPIRE 250 microns

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Sewilo, Carlson, Oliveira
YSO SED: importance of longer wavelengths

Carlson, SMC NGC 602
N49: Supernova Remnant

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Lessons Learned

• AORs must be < 9 hrs
• Calibration blocks are removed, all systems are go…
• PACS data processing, start at level 0, low surface brightness a challenge
• Observations looks very promising
• Potential papers on YSOs, ISM dust mass, SNRs and evolved stars from SDP
• Spectroscopic followup will be important
• More on HERITAGE at: sage.stsci.edu