



Flight Planning Strategies for Key Projects and for the Extended Mission

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What is a Key Project?



- A Key Project (KP) should address an important scientific issue in a comprehensive manner
- In general, it should be a large program that may not otherwise be proposed by individual GOs
- It should have a high archival value to allow subsequent data mining from the community
- No proprietary period for data taken
- It should have a dedicated science team to produce enhanced data products/tools that are easily accessible to the community





Why introduce SOFIA Key Projects?



- In the past, the SOFIA Call for Proposals has solicited for large (>99 hours) “impact proposals” (US queue) and “joint impact proposals (US + German queues at 80:20 ratio)
- Very few large proposals have been submitted and the few successful ones have been difficult to observe (e.g. Orion C+ map by Tielens, et al and M51 C+ map by Pineda/Stutzki)
- Funding for impact science teams has been too low
- SOFIA Program has guaranteed one year proprietary period, which only starts after the last data has been taken
- The DDT program “Horsehead Nebula in C+” did provide data to the community immediately, but there was no associated science team to work with the data.
- There was no expectation for enhanced data products





What should a SOFIA KP look like?



- Two year program spanning Cycles 6 and 7
- **Large** program that address (an) important scientific issue(s) in a comprehensive manner
- Encourage innovative investigations with high archival value
- Solicit for associated science teams and fund US members immediately after their selection; we expect enhanced data products
- No proprietary period for data taken
- Flexible operation model (e.g. “suitcase deployments” if necessary)
- KP should not significantly affect Cycle 6 Priority 1 and Priority 2 GO programs (~430 hours)





SOFIA KP Constraints



- Cycle 6 Priority 1 & 2 programs have already defined the cadence of instrument availability in Cycle 6
- After ~430h have been granted to Priority 1 & 2 GOs, the remaining ~150h are in areas of the sky less popular
- GREAT team (Rolf Güsten, Jürgen Stutzki, et al) is already at limit of what they can provide (38 flights!) in Cycle 6
 - GREAT immensely popular among GOs; more than 75% of GREAT capacity has been allocated to GOs and taken by GTO observations
 - There is little wiggle room for additional KP capacity for GREAT
- After HAWC+ improvements (stability, sensitivity, holding time and reduction of overhead) more KP capacity is available
- Nevertheless, we need additional flights to open up larger areas of the sky to KP





SOFIA KP Options



- Option 1: convert all 27 contingency days into flights for an additional ~200 hours
 - This would significantly affect Cycle 6 completion of programs
- Option 2: Fly 4 days/week with 1 day contingency
 - Crew rest rules for flight personnel would require hiring of additional personnel – i.e. not easily implementable and hard to fit into budget
- Option 3: Fly 4 days/week but dedicate the fourth day to KP and use this flight as a sacrificable contingency for the previous 3 flights
- Option 4: Do instrument swaps on weekends
 - Some cost impact, but implementable
- An internal team is weighing options, balancing completion statistics of approved GO programs, cost, and gain for KP hours.
Result: We should be able to gain ~20 flights with minimal impact to GO and GTO programs in Cycle 6 with contingency robustness





Implementing a SOFIA KP



- For Cycle 6, SMO will develop updated “sky availability” charts that show where additional targets are needed to complement flight plans with known Cycle 6 targets; together with additional KP flights this will give us flexibility for KP
- Essentially, defined KP programs should be treated as Priority 2.5 for Cycle 6, but Priority 1.5 for Cycle 7.
- For the Cycle 7 CfP, we will develop updated “sky availability” charts that show where additional targets are needed to complement flight plans that have KP targets
- To define a KP, there should be close collaboration with the SMO for optimal use of SOFIA with all its constraints
- My suggestion:
 - Establish a committee (KPSC) with external and SMO experts to define potential Key Projects and types of enhanced products
 - Once defined, solicit membership on science teams from community
 - Adequately fund science team members to kick-off KP programs





Open questions



- To what extent will Germany participate in Key Project program?
 - GSSWG/DLR could decide to use the additional observing time differently than the US
 - Even if the GSSWG/DLR plan to participate, how do we address the 80%/20% question?
- Potential participation of PI-led instruments in KP program needs to be negotiated with revision of or augmentation to MOUs
- How do we define KP programs?
 - Ans: SMO suggestion on previous slide
- How do we select KP science teams?

