

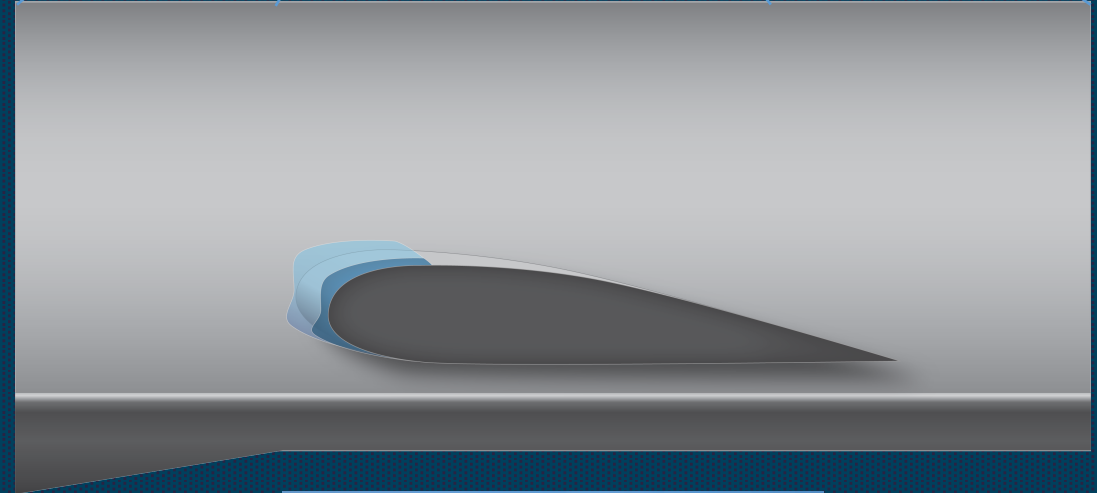
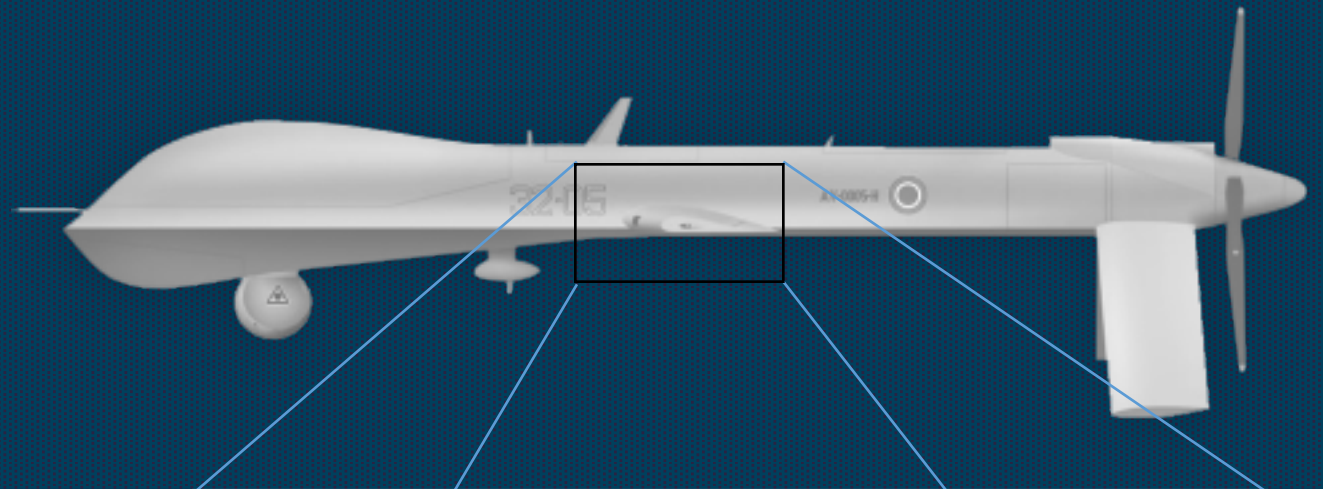


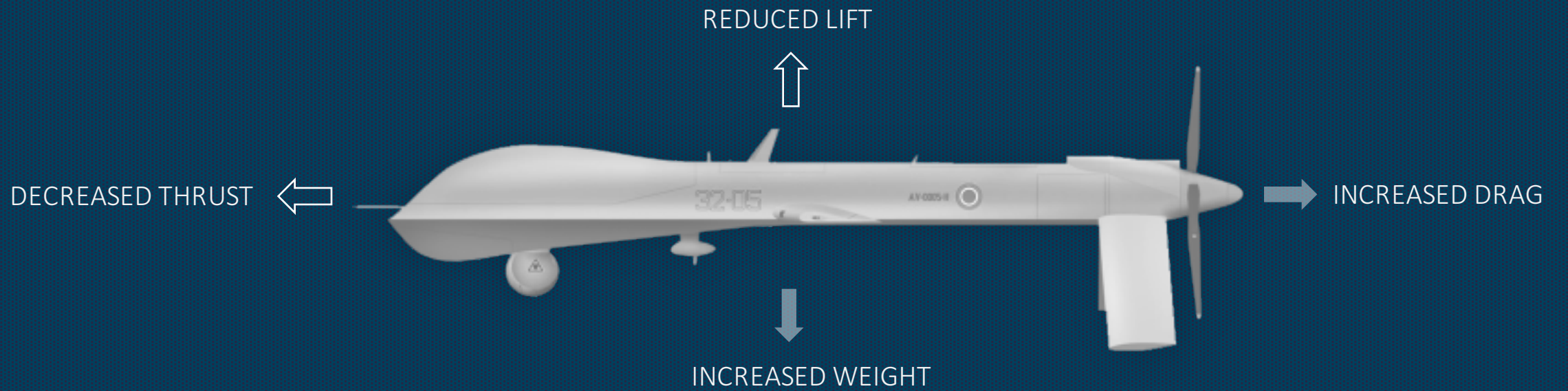
ICING CAN OCCUR ANYWHERE



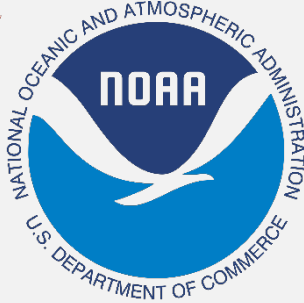
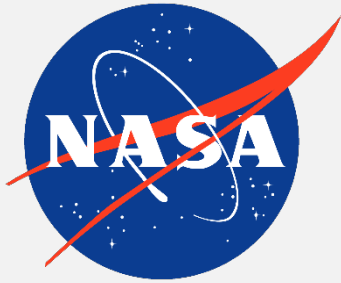
Icing can form on:

- Propellers
- Stabilisers
- Engine intakes
- Exposed sensors
- Leading edge of wings





SEVERE CONSEQUENCES OF ICING



\$10 000 000

/YEAR IN LOST EQUIPMENT



\$250 000

MANPOWER & FUEL /WEEK

\$250 000

UAV LOSSES /10 DAYS

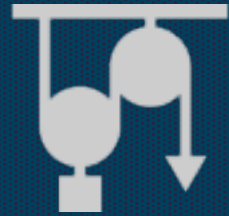


10 %

AFFECTED BY ICING

1 500 000

FLIGHT HOURS ON AV UAVS ALONE



MECHANICAL



ELECTRO-THERMAL

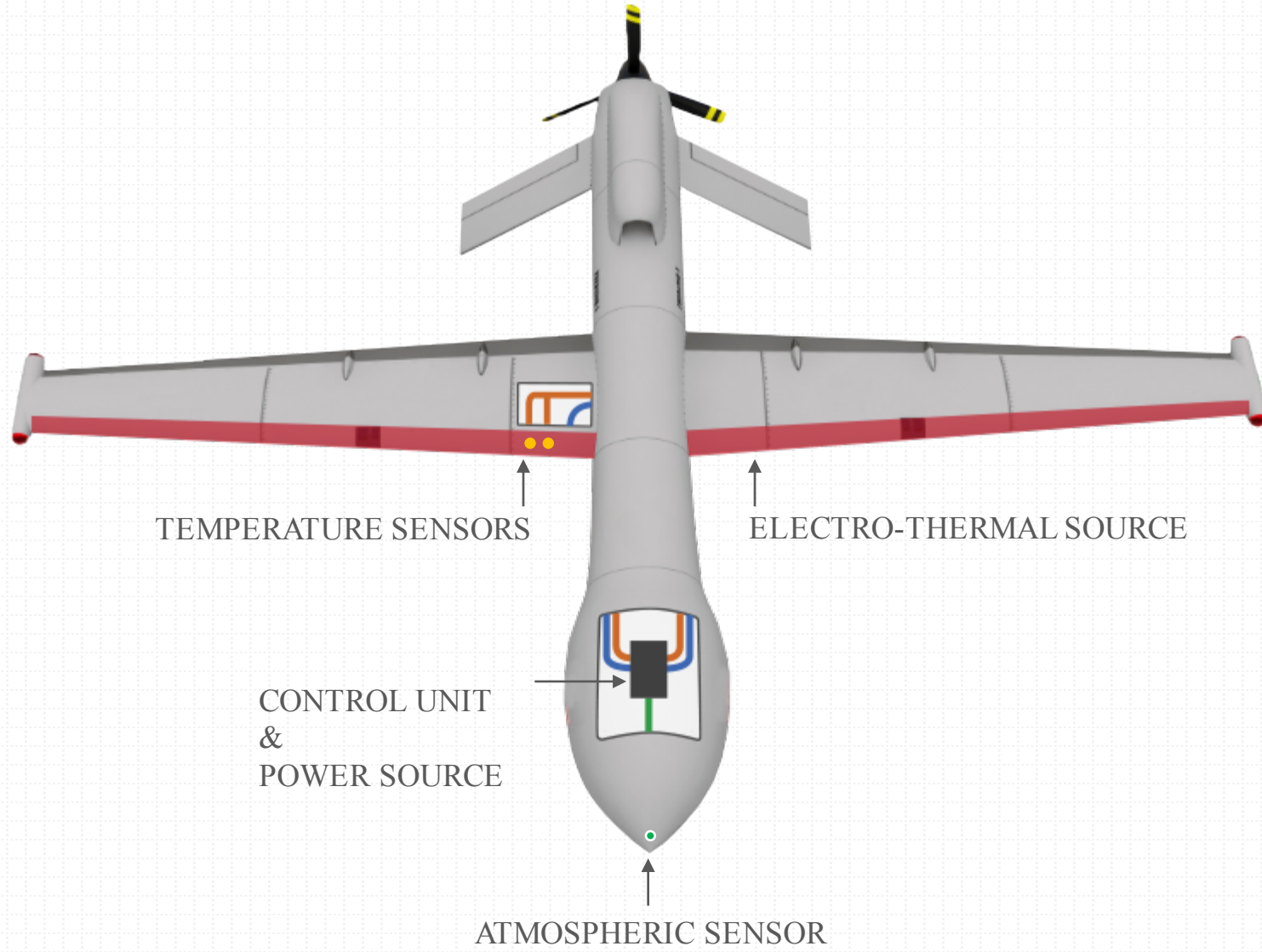


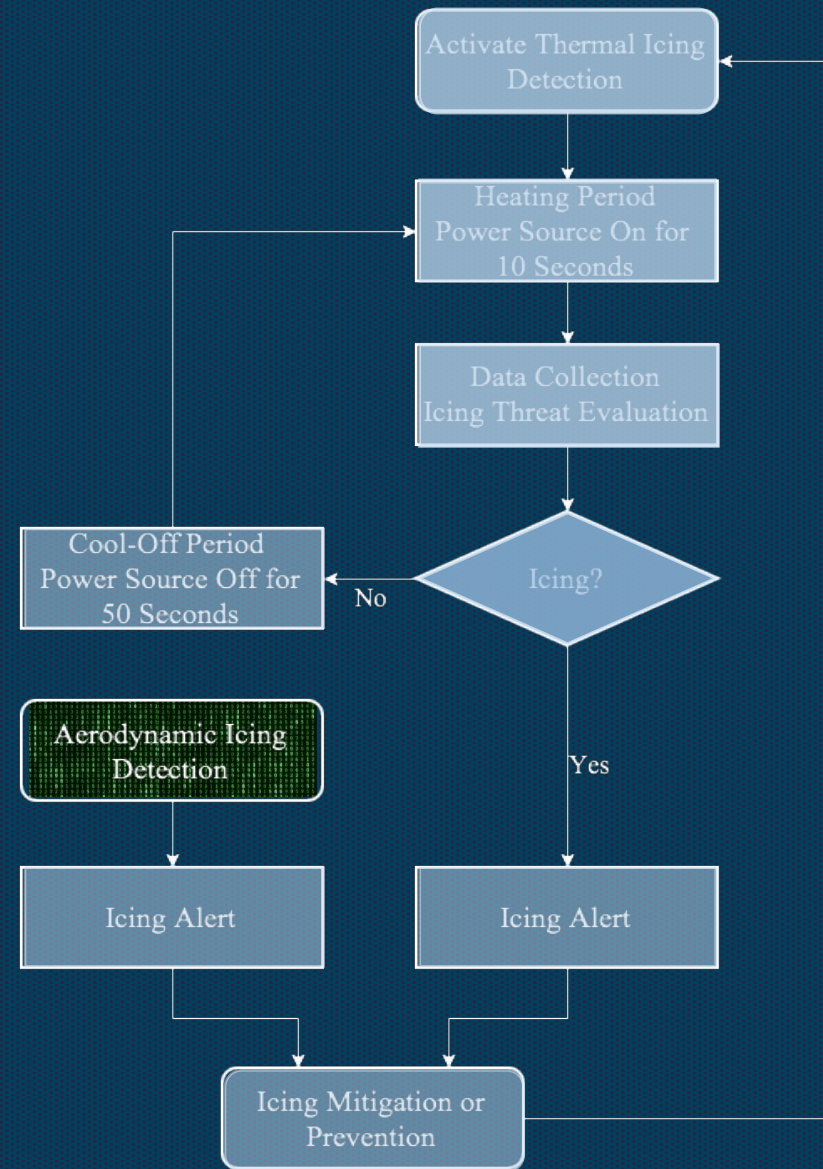
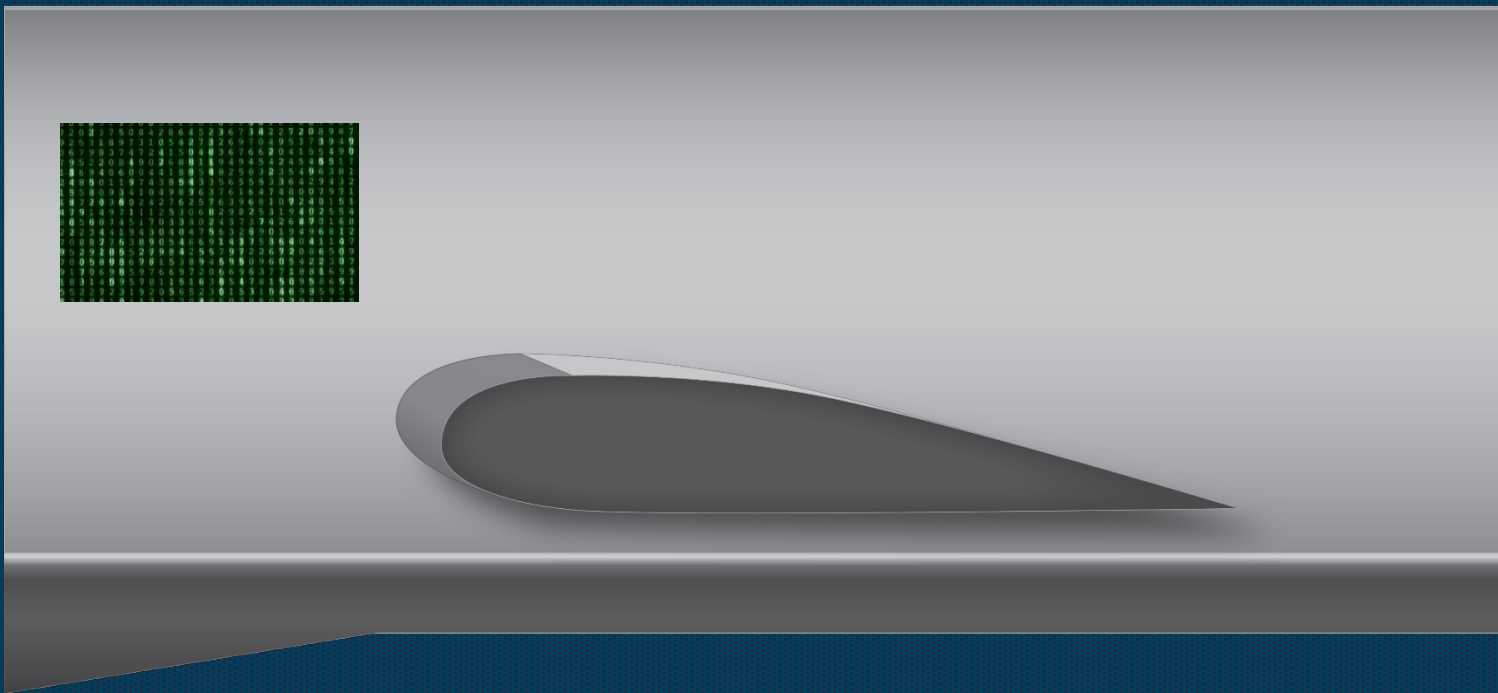
CHEMICAL

HEAVY
COMPLEX
INVASIVE

HAZARDOUS TO THE ENVIRONMENT

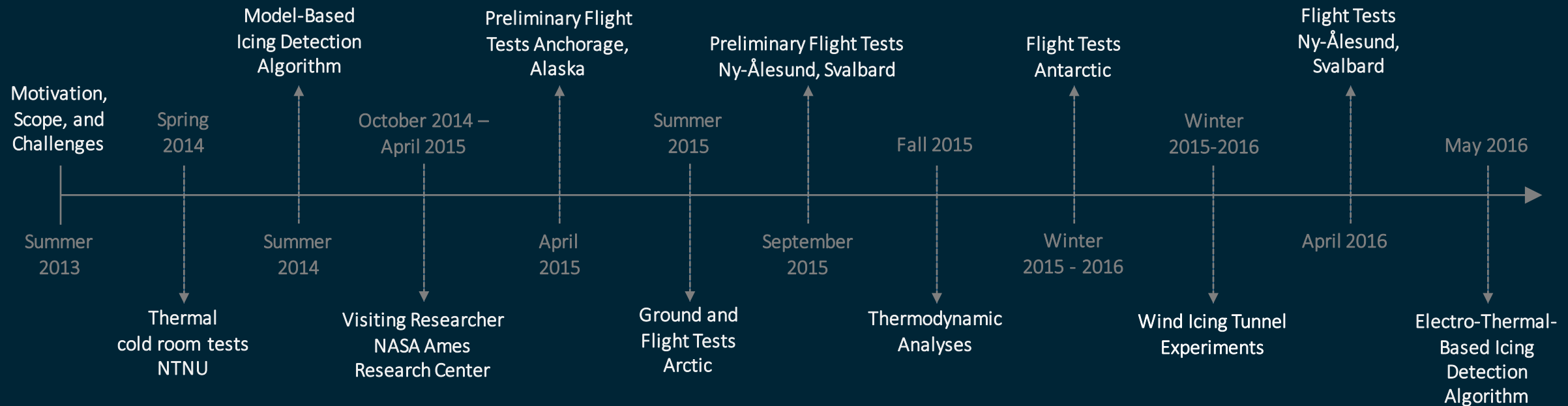
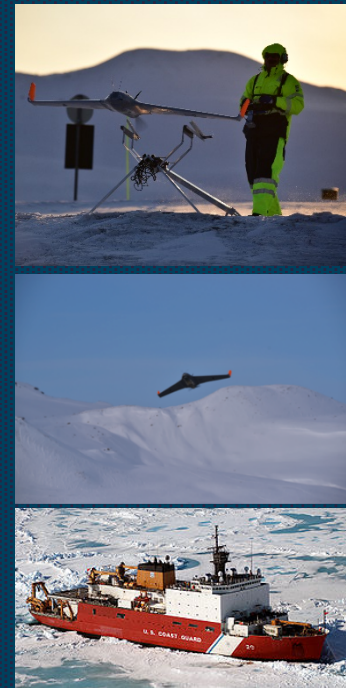
ALL ARE PILOT OPERATED





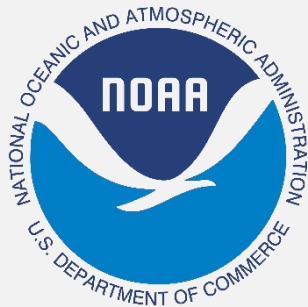
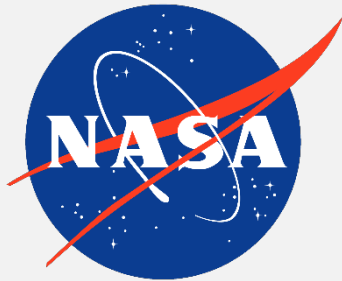
A UNIQUE SOLUTION TO A VAST PROBLEM

- Fully autonomous – First of its kind
- Patent pending – more in the pipeline
- Massive lab and on-site testing over past 3 years – Proof of concept



INTERNATIONAL COLLABORATION FROM DAY 1

INTERNATIONAL END USERS



INTERNATIONAL UAV MANUFACTURERS



NATIONAL COLLABORATORS



FUTURE WORK

Rotor UAVs

- No solutions today
- Our solution is transferable to rotary wings

Wind energy

- Ampyx power – UAV-based wind energy harvest
- Wind turbines


Conventional Aircraft

- Added value
 - Increased fuel efficiency
 - Less complexity
 - Fully autonomous and adaptive

Thank you for your attention



Icing Protection Solution for Unmanned Aircraft

 **NTNU AMOS**
Centre for Autonomous Marine
Operations and Systems



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