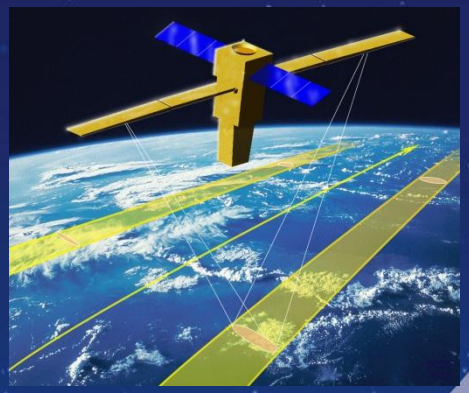
(Wavemill : Ocean Current Radar)

The Wavemill radar will obtain high quality ocean surface data from four beam footprints on two swaths, each of 100 km width.
This data includes : -
Ocean & coastal surface current speed and direction
Geostrophic (gravity effect) currents & eddies
Sea surface height and slope
Swell products
This information is of critical importance to the study of climate change and rising sea levels.

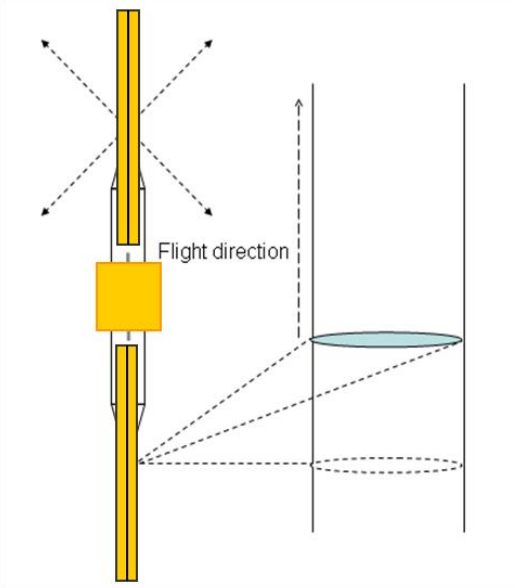


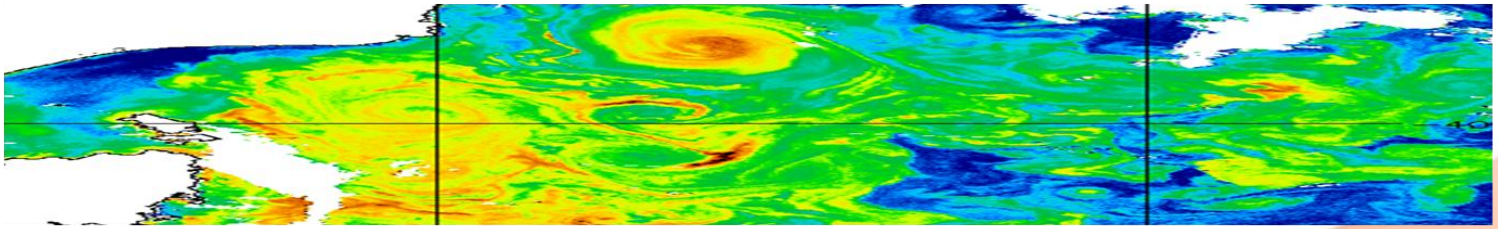
Byron Richards

29th July 2013

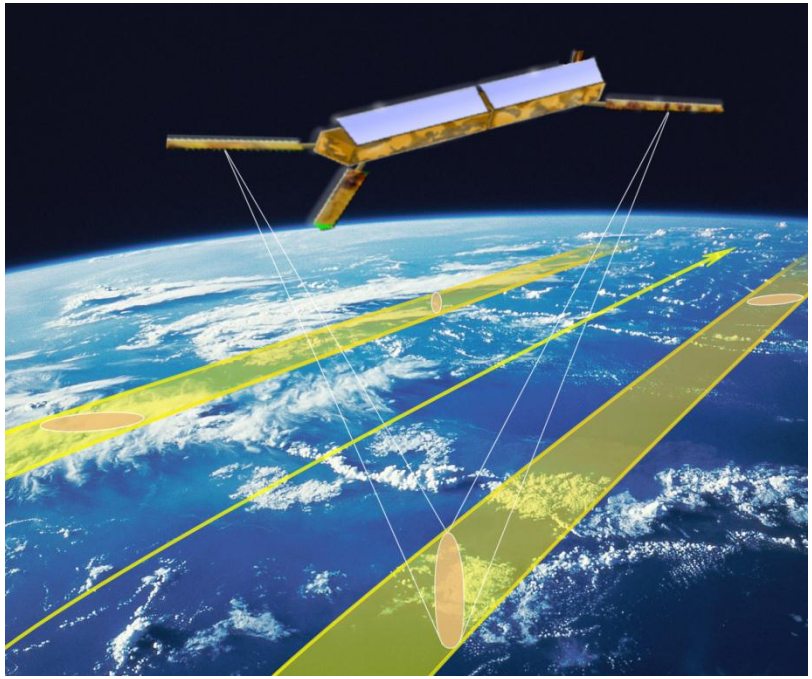
Wavemill Concept

- Wavemill is a mission/instrument concept for a space-borne **interferometric synthetic aperture radar**
- Across track (XTI) and along track (ATI) interferometry in a single instrument and pass to measure:
  - Sea surface currents
  - Sea surface winds
  - Sea surface height (secondary)
- Fulfils strong scientific and user-needs for open ocean and coastal regions

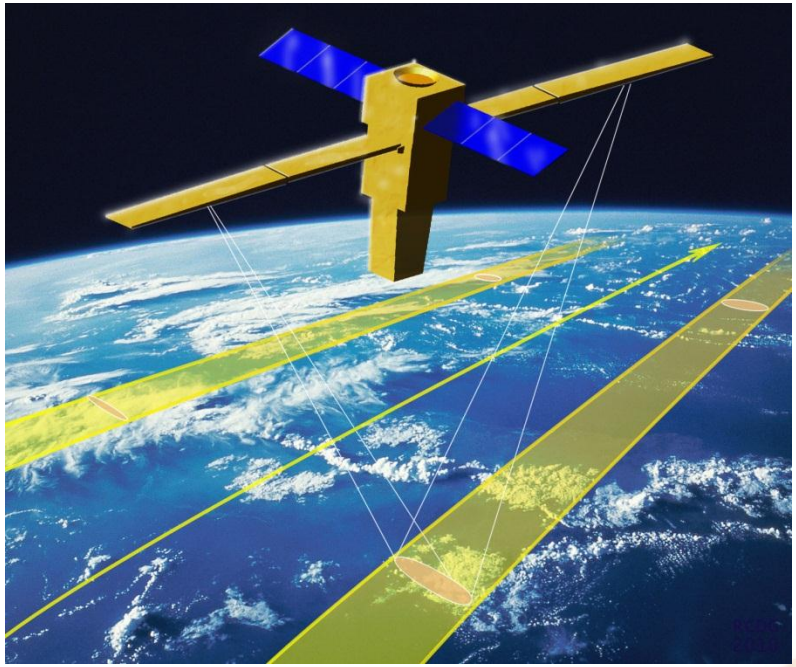




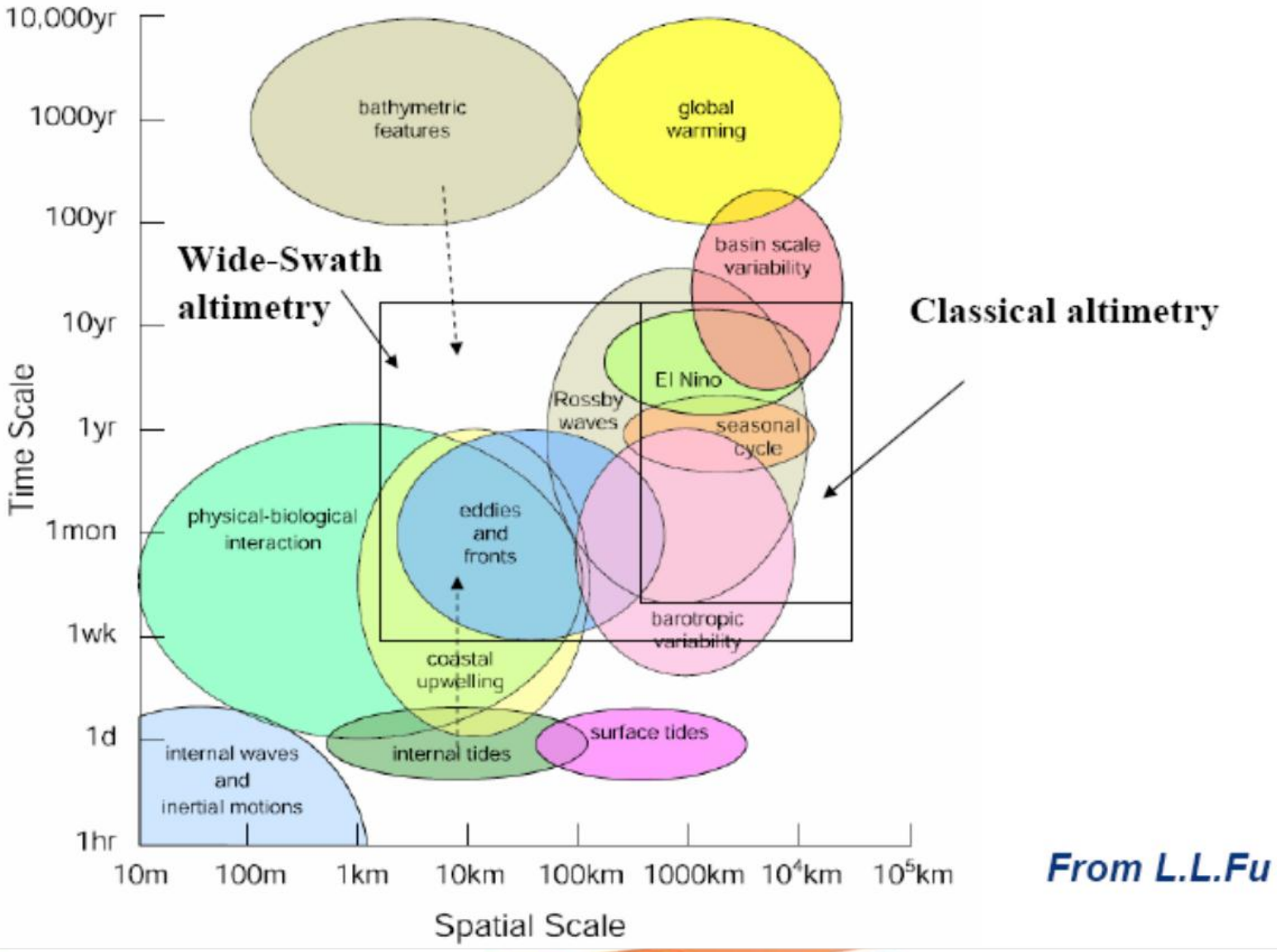
Wavemill Ocean Current Radar



Original Four Antenna Concept

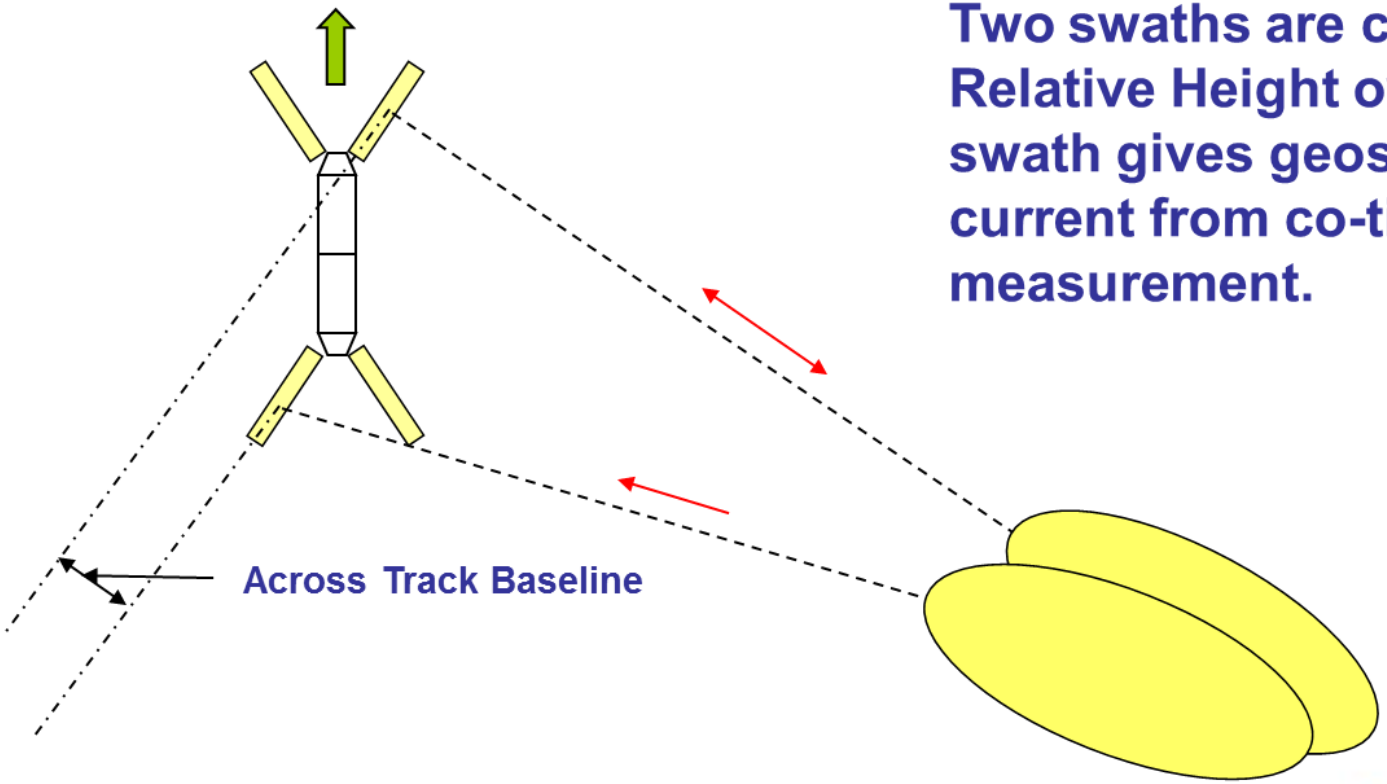


Two Phase Centre 'Javelin' Concept



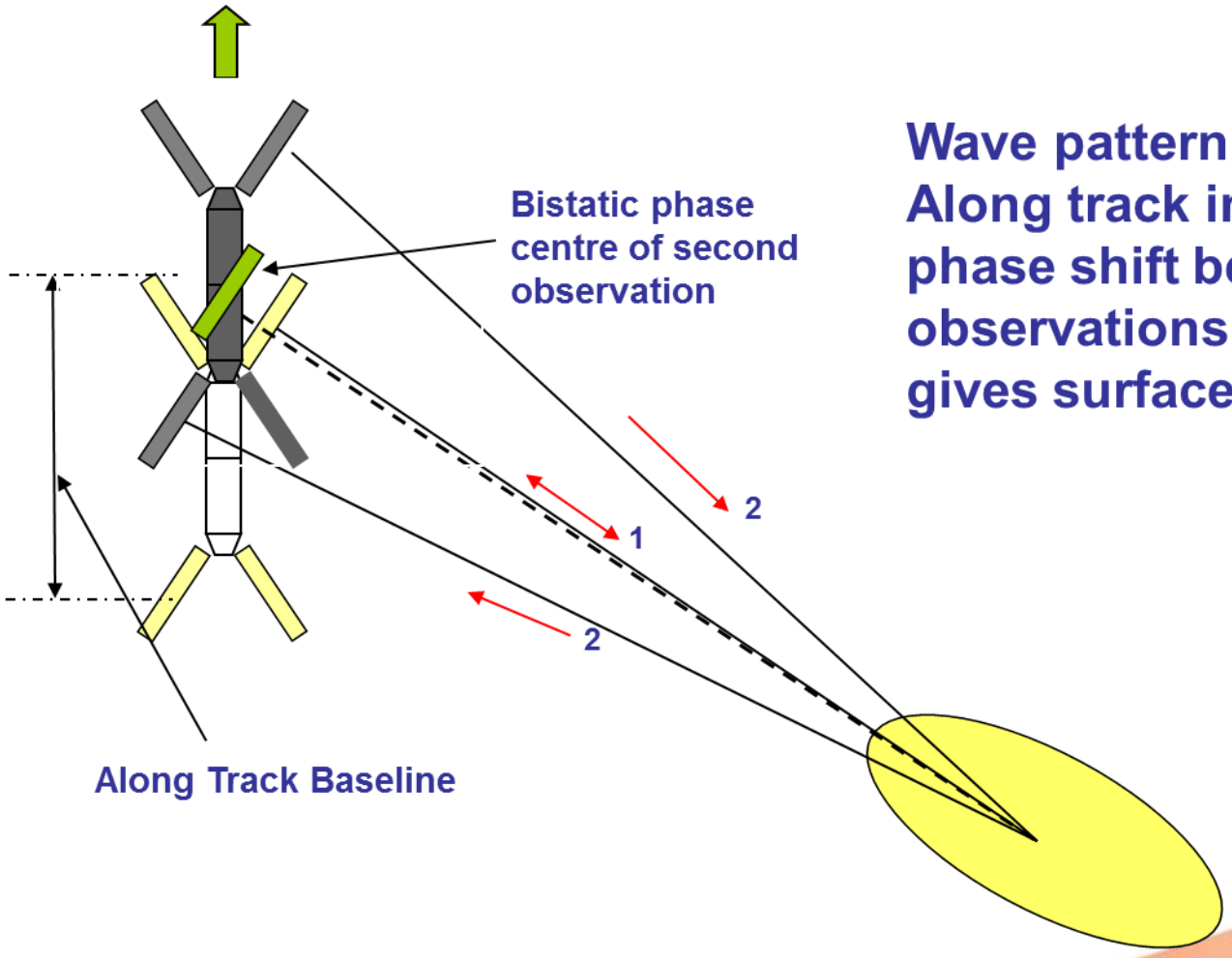
From L.L.Fu

Measurement of Sea Surface Height



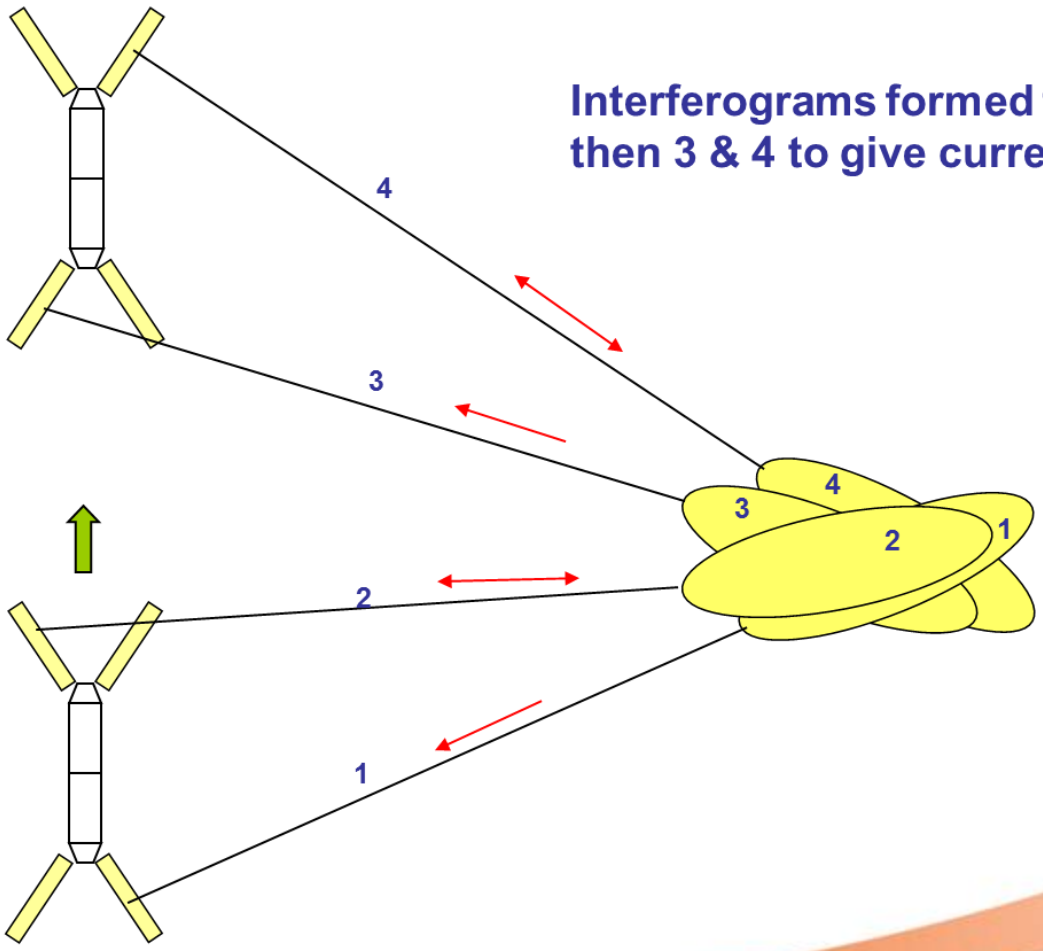
Two swaths are co-time. Relative Height over entire swath gives geostrophic current from co-time measurement.

Measurement of Current Velocity

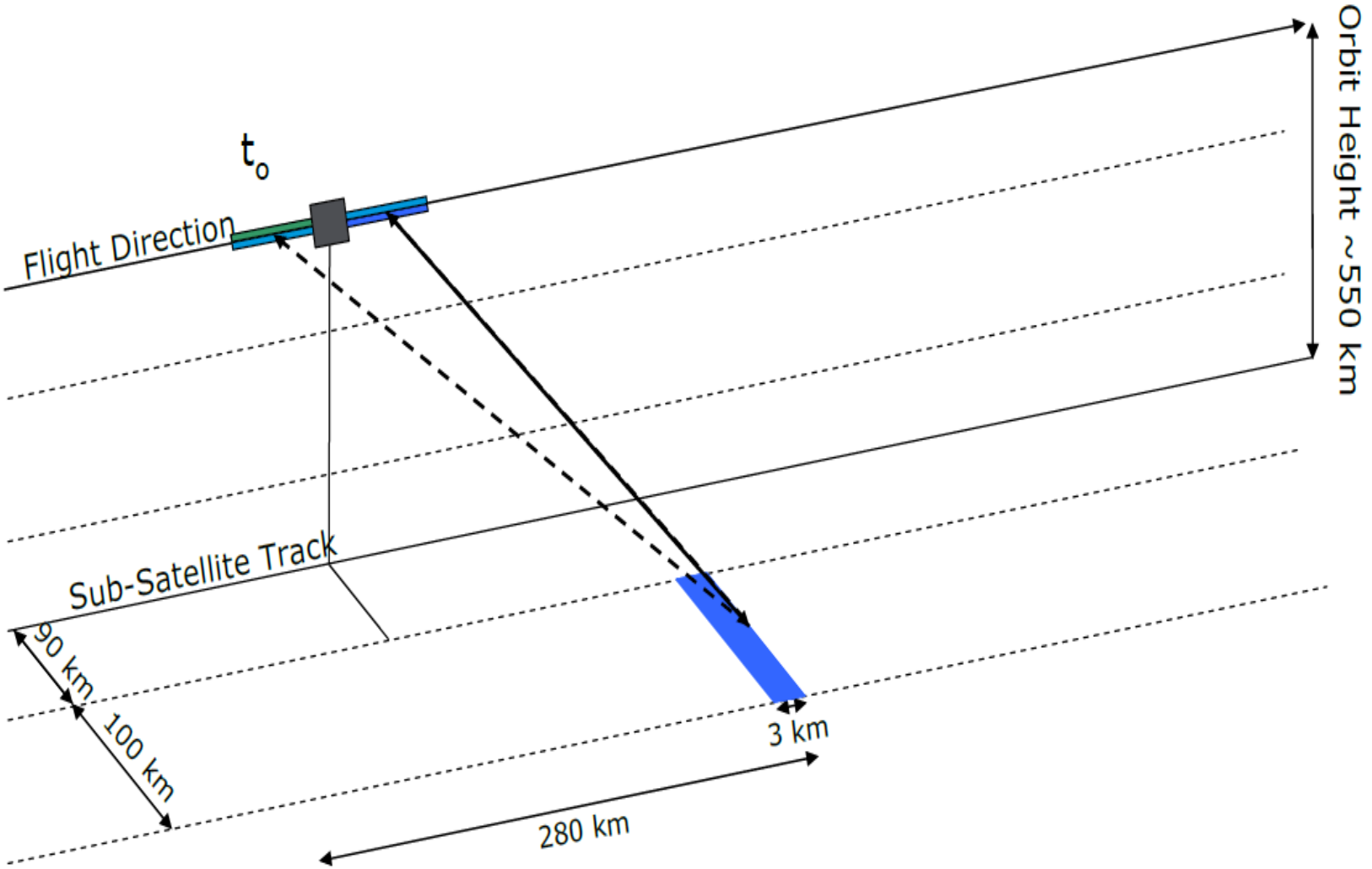


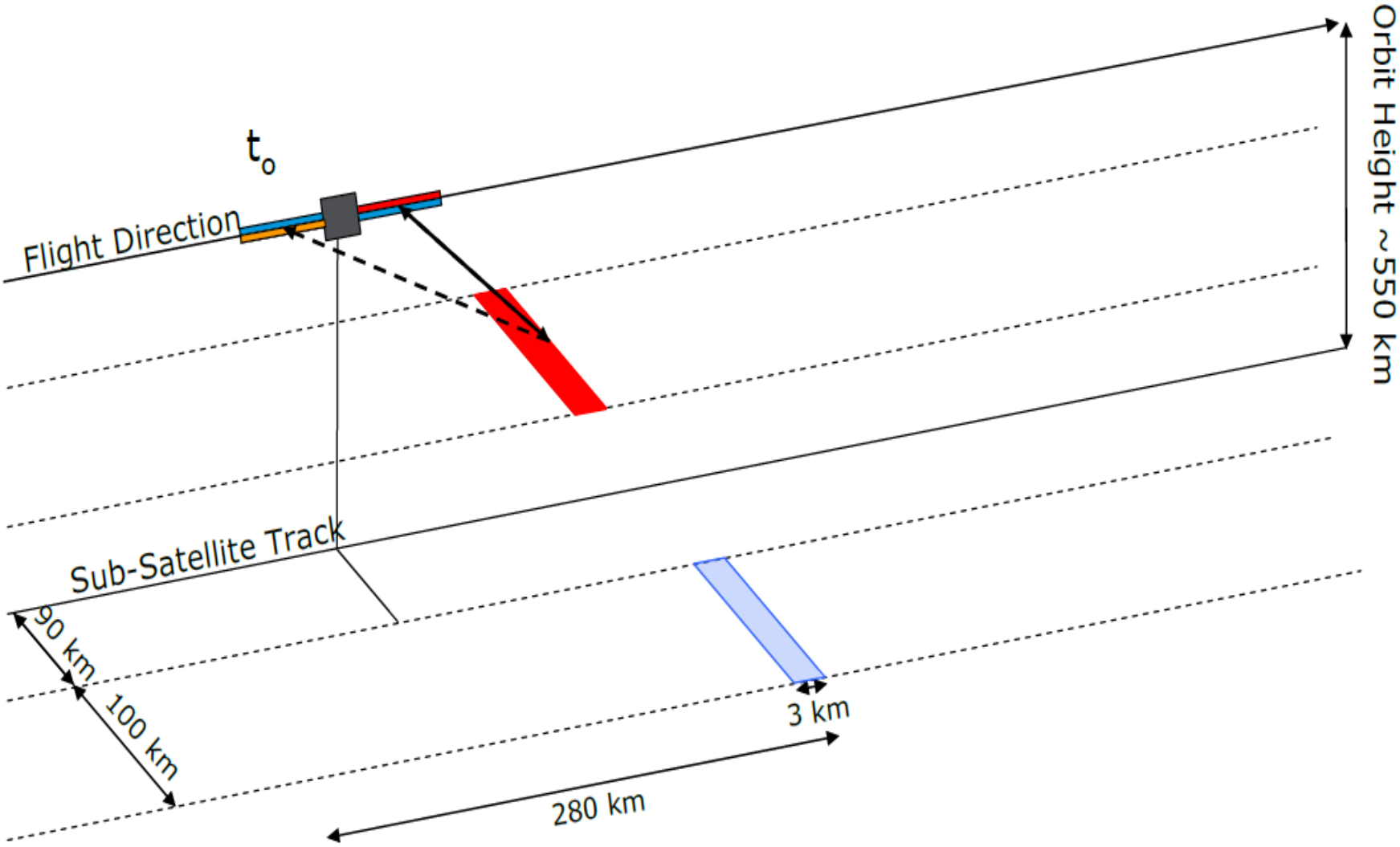
Wave pattern is still coherent
Along track interferometry from phase shift between observations due to motion gives surface current.

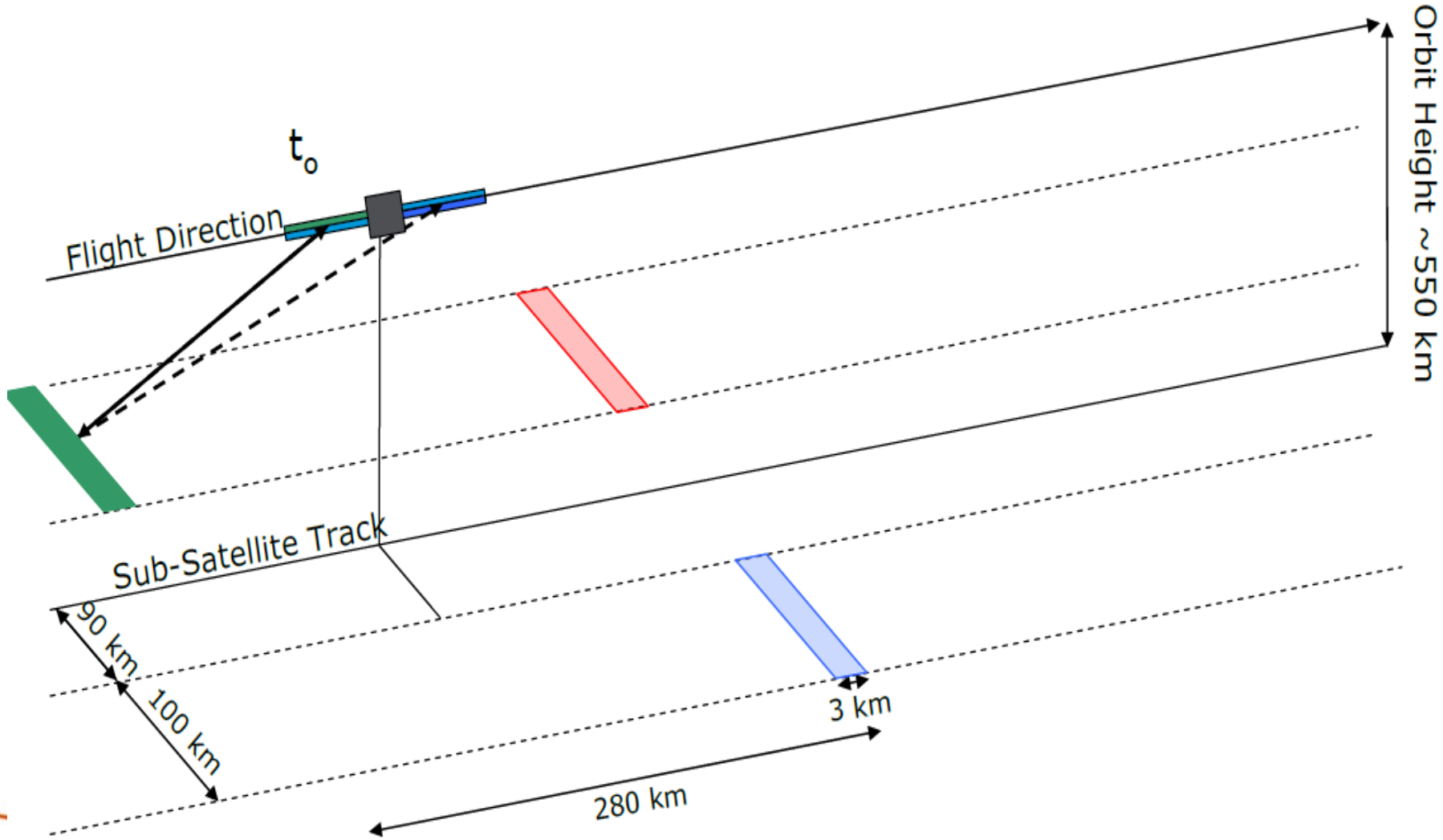
Measurement of Current Direction

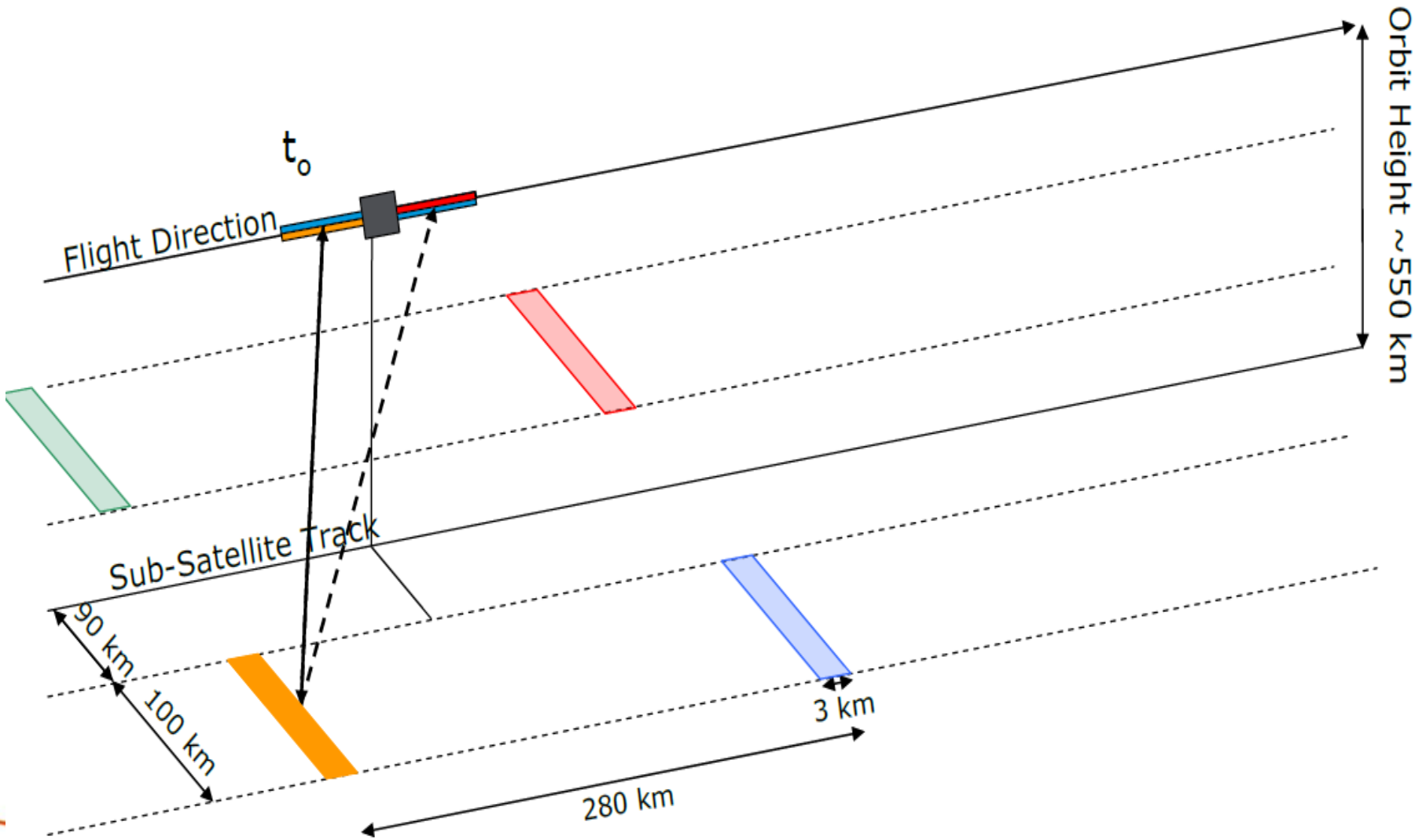


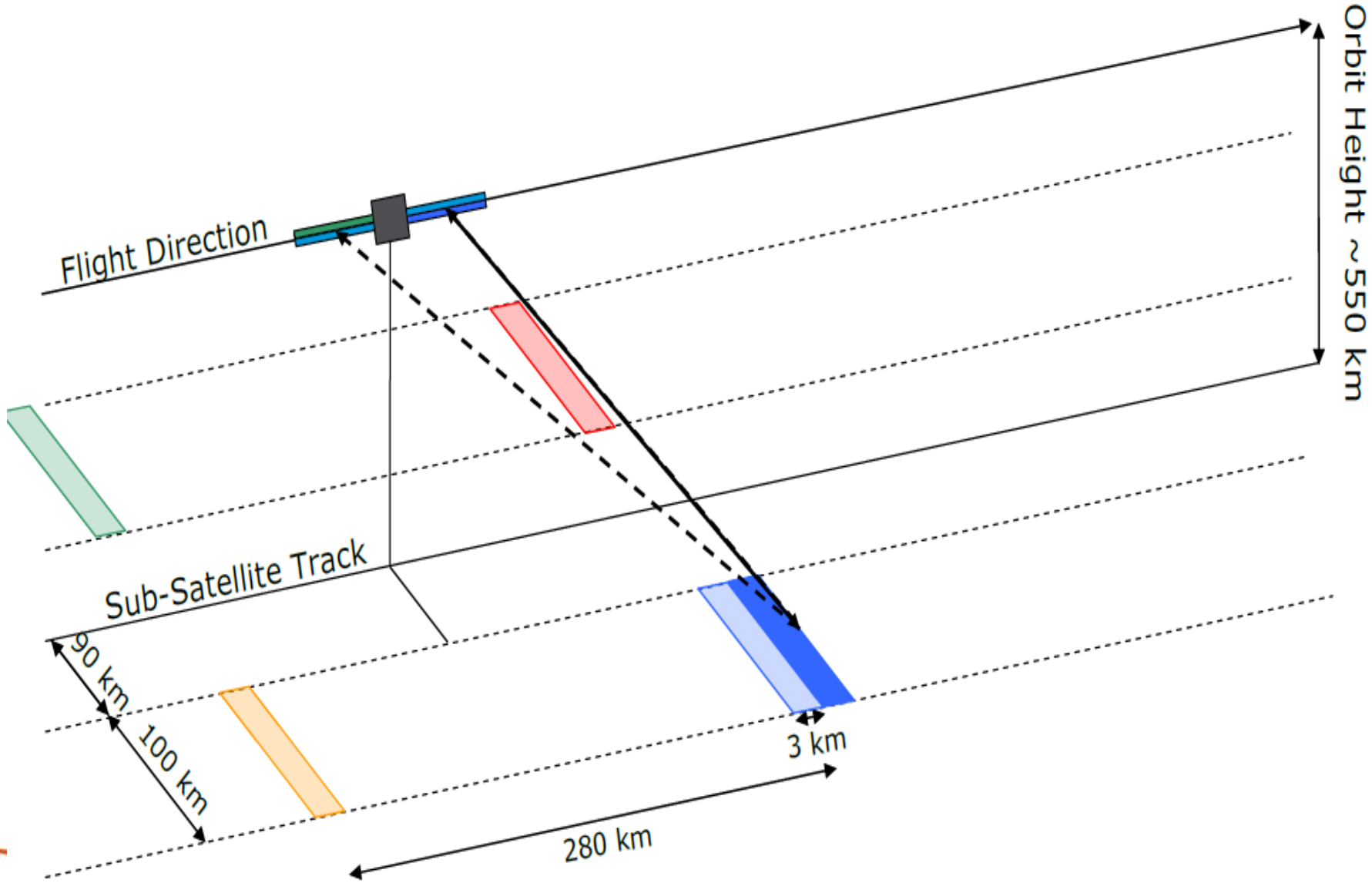
Interferograms formed from 1 & 2 and then 3 & 4 to give current direction

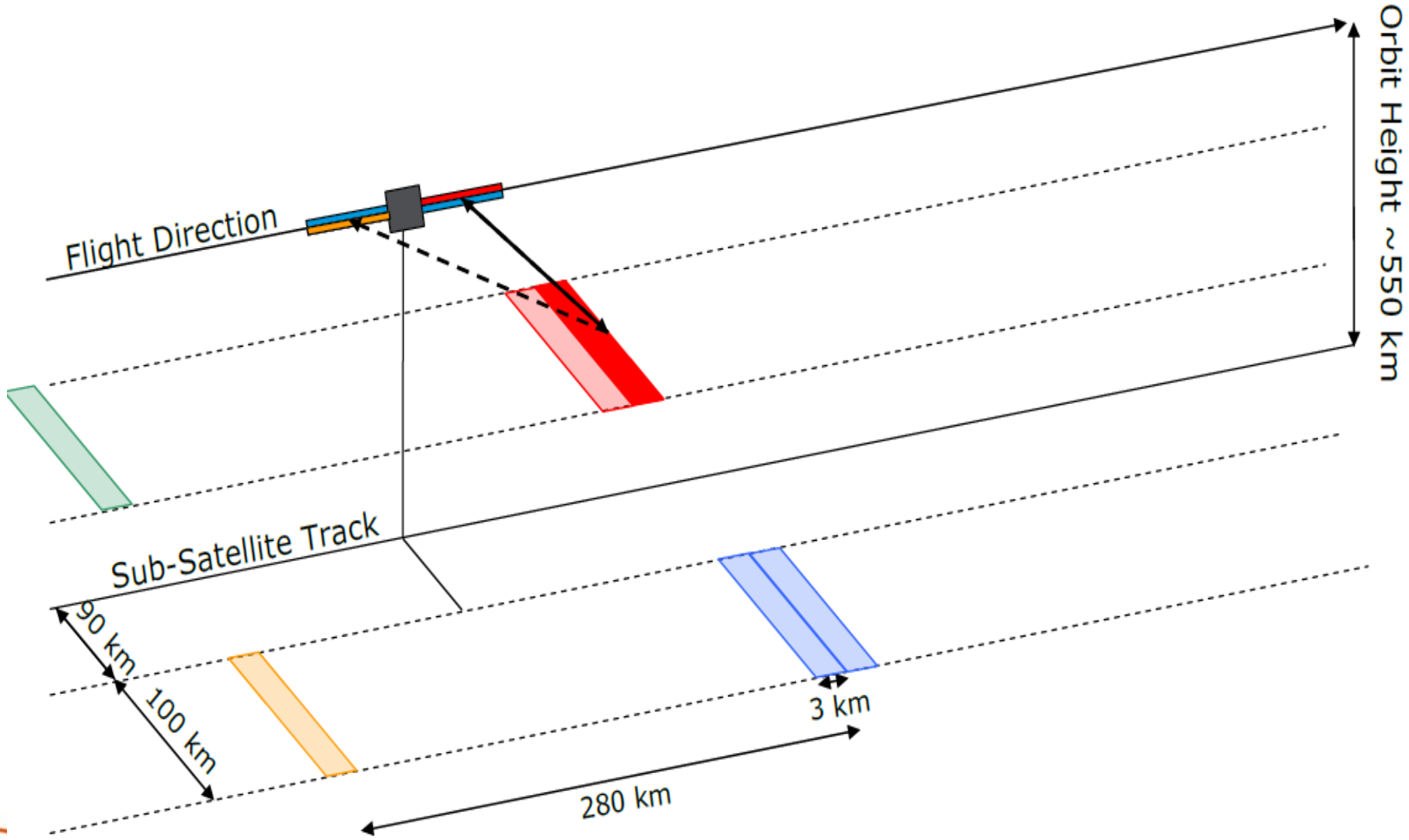


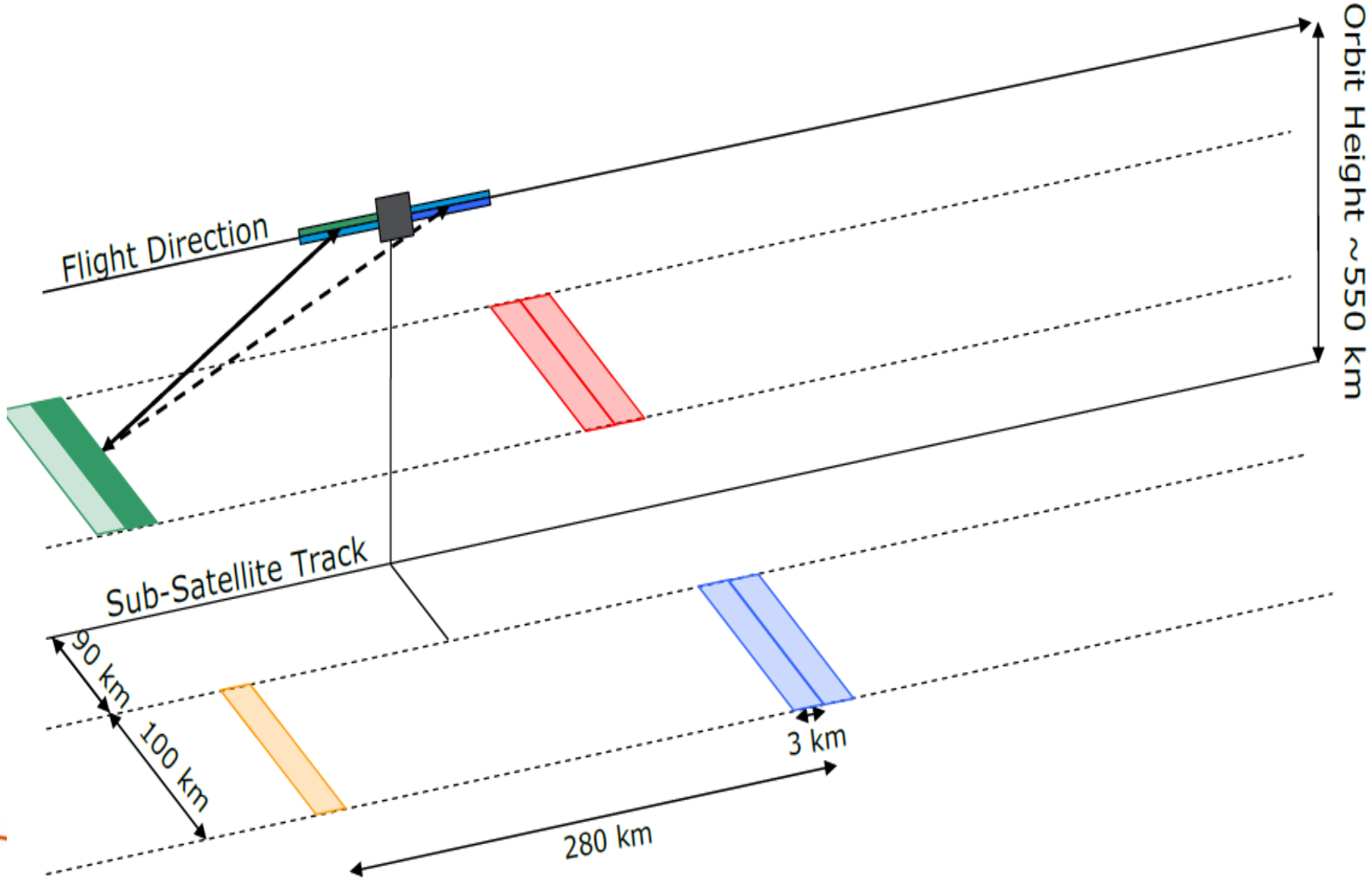


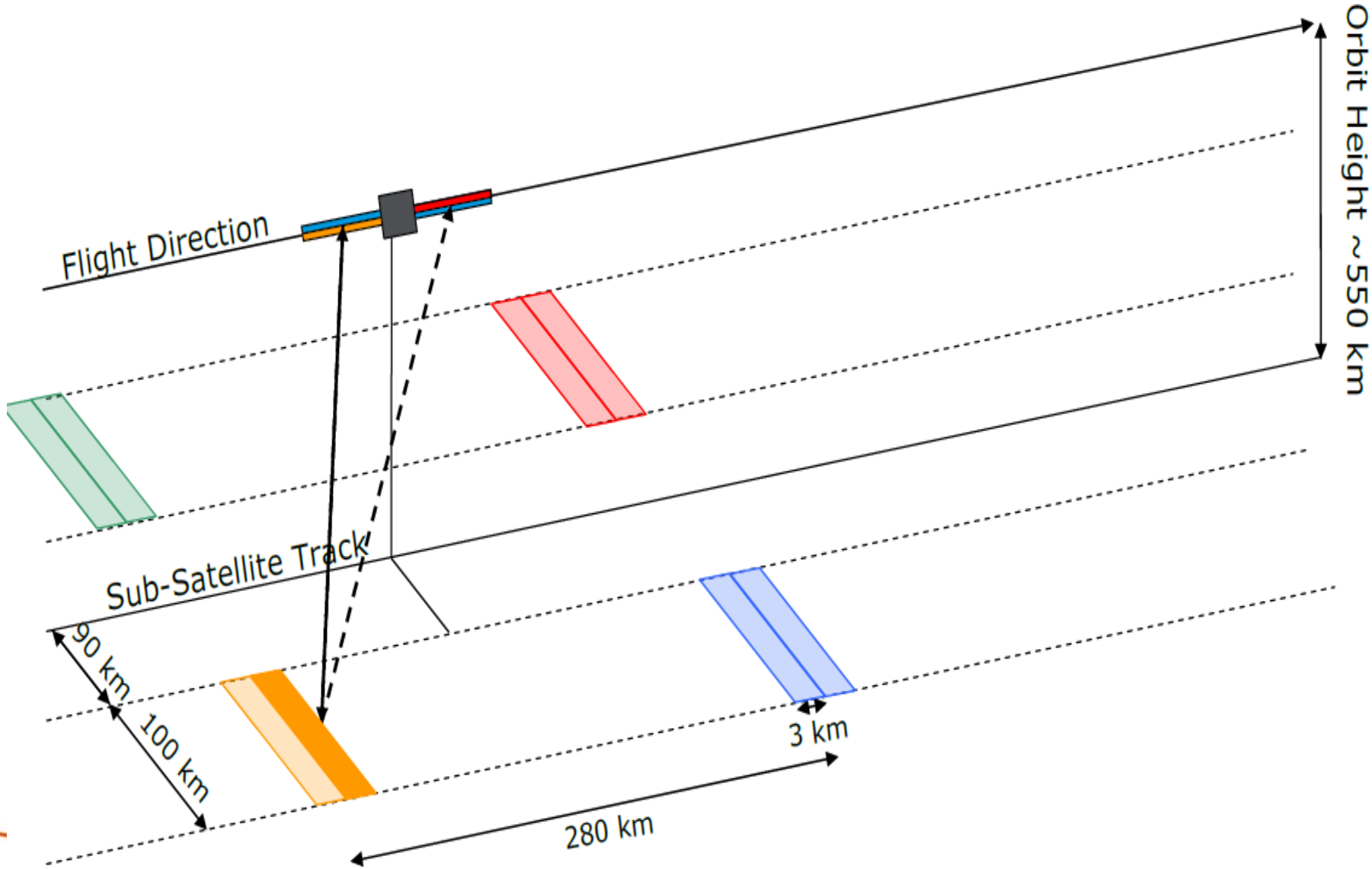


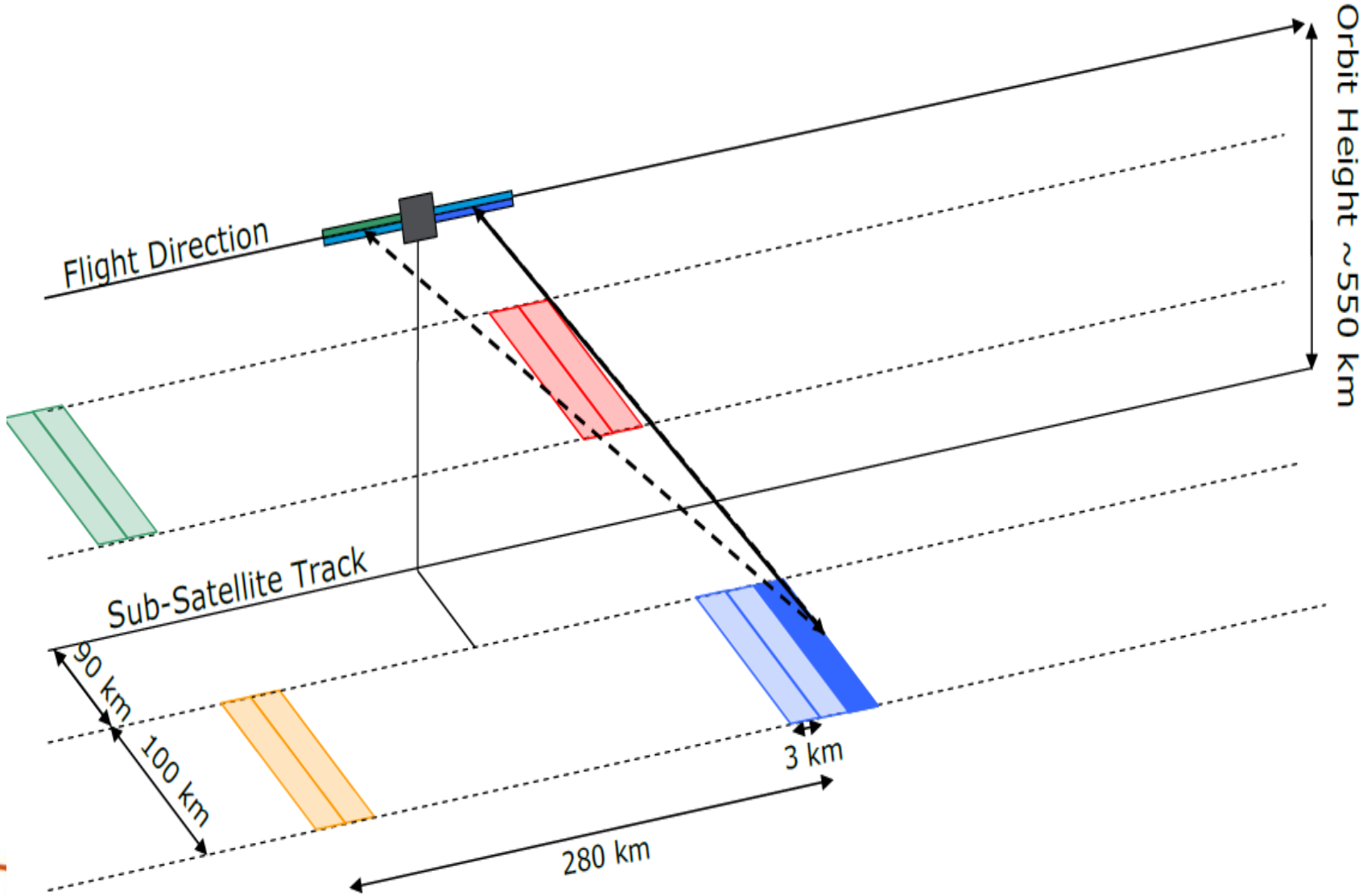


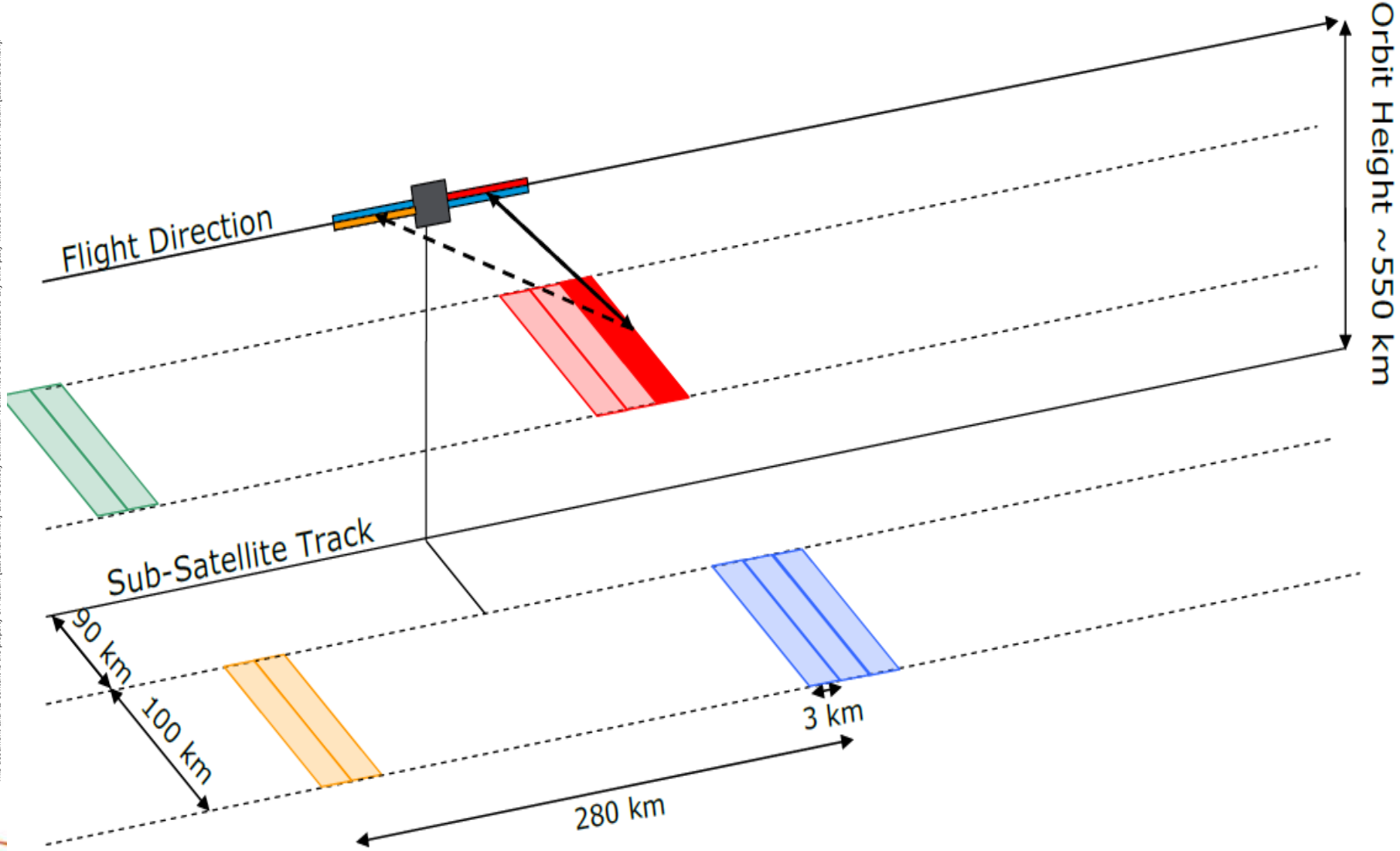


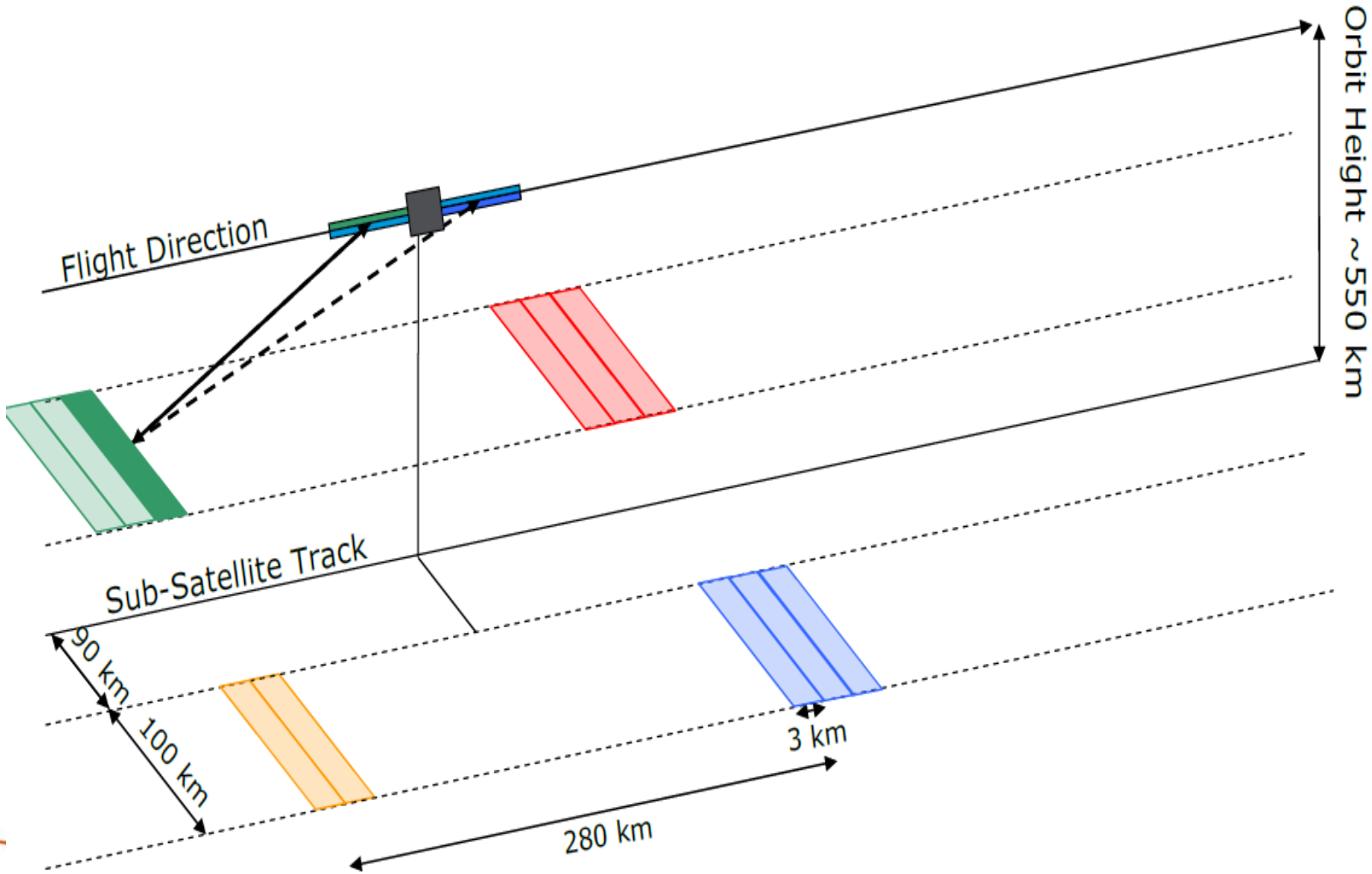


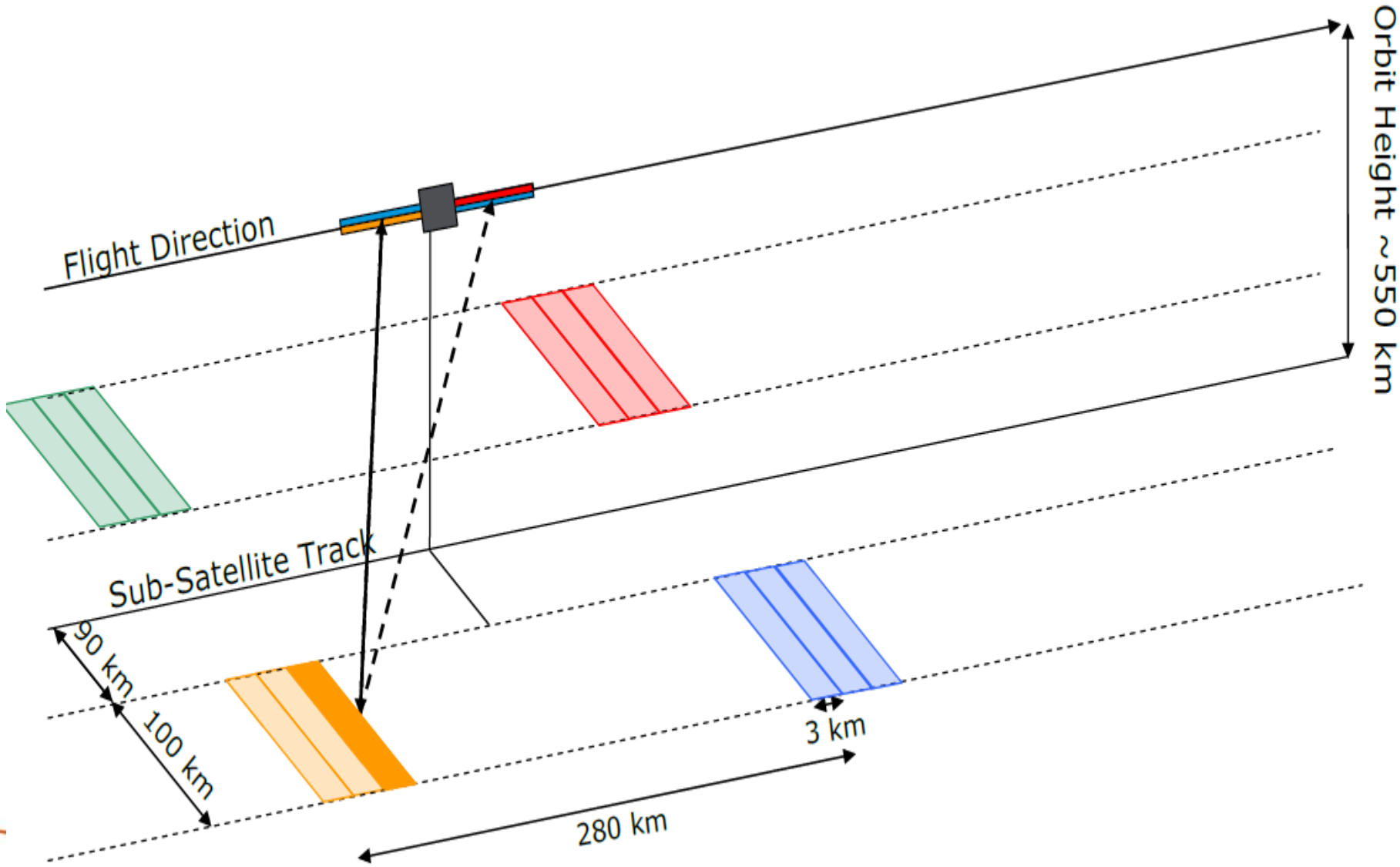


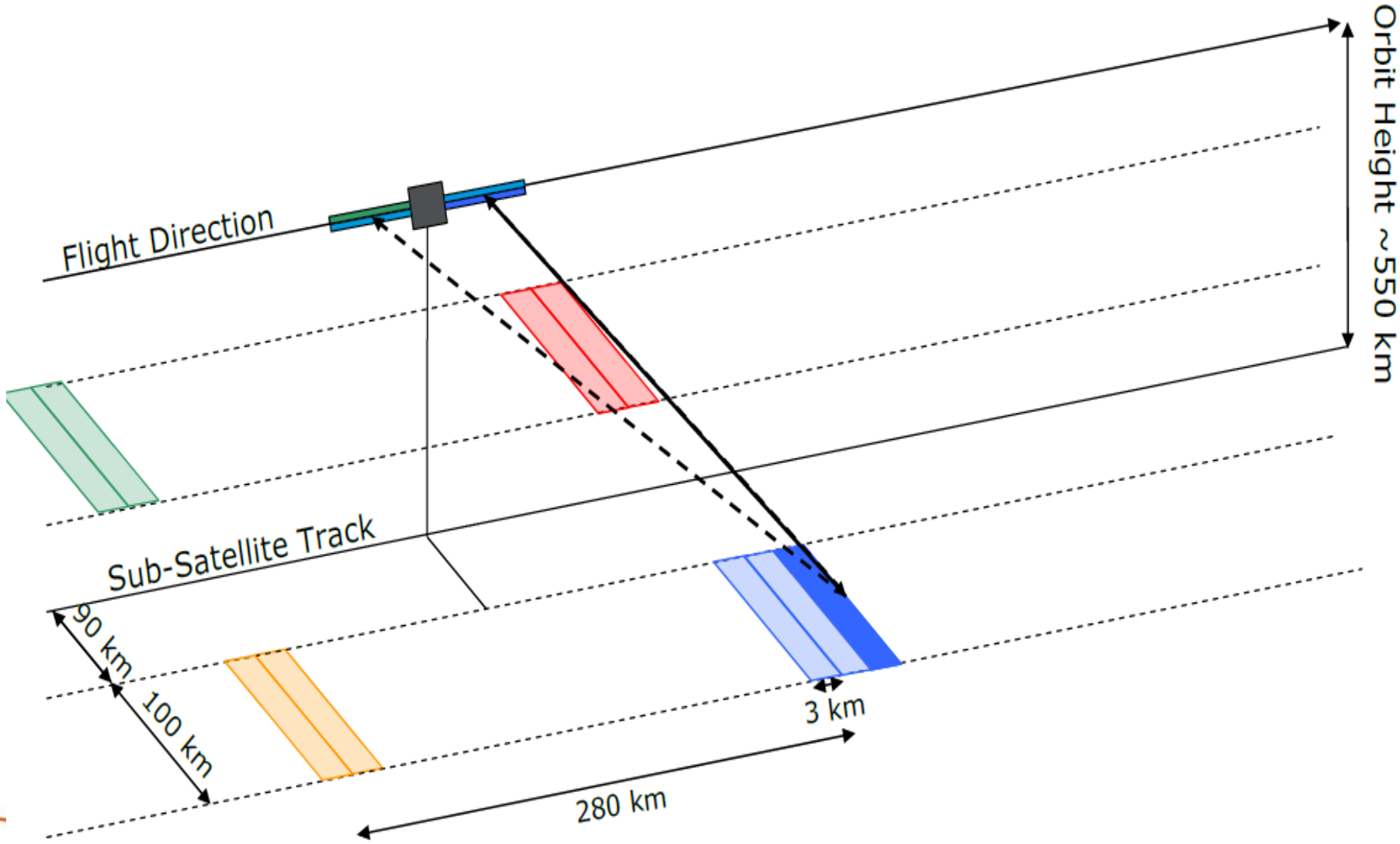


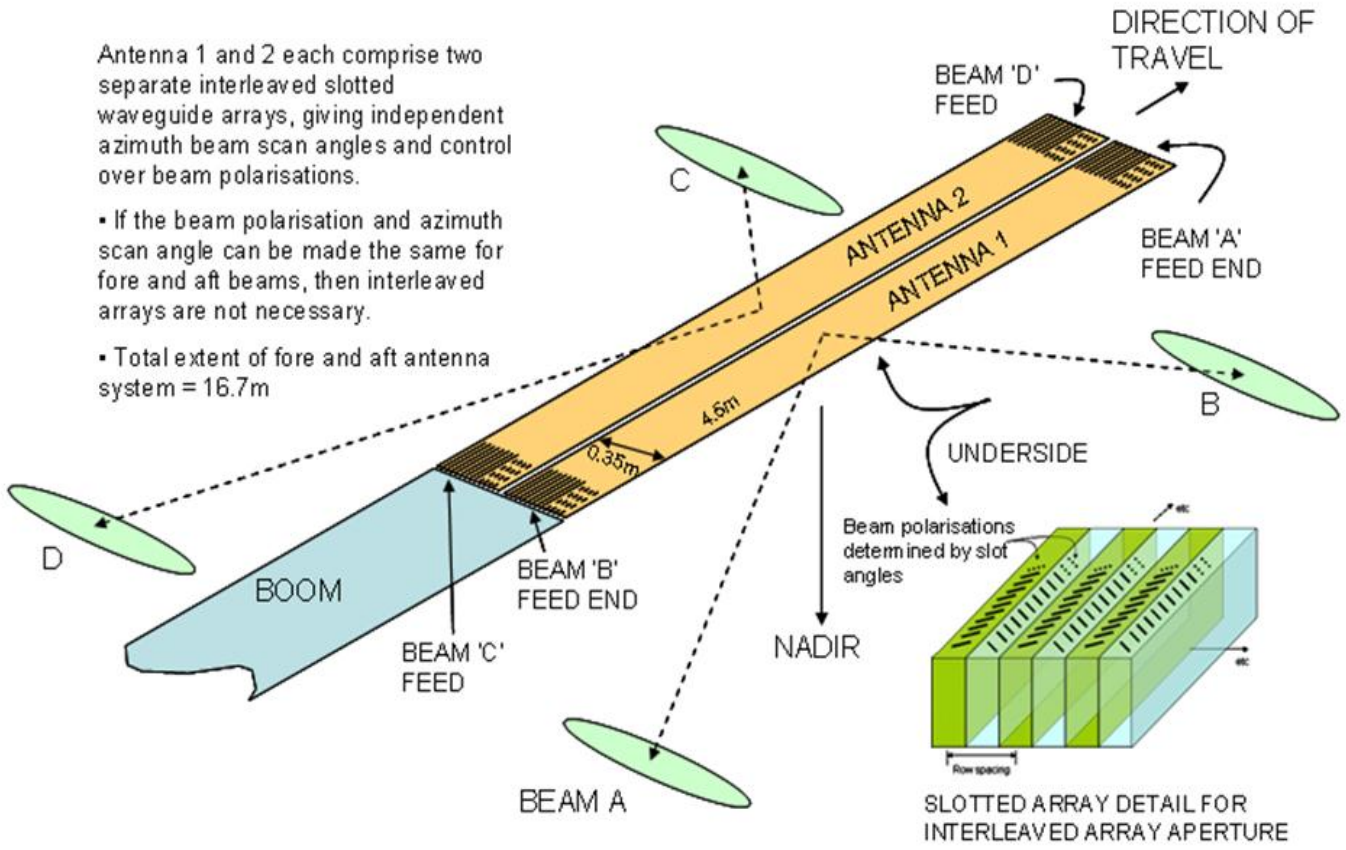








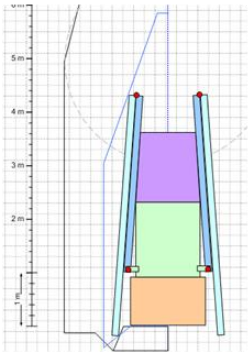


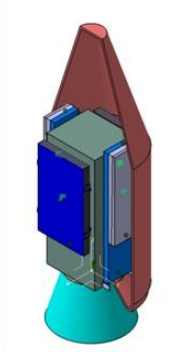


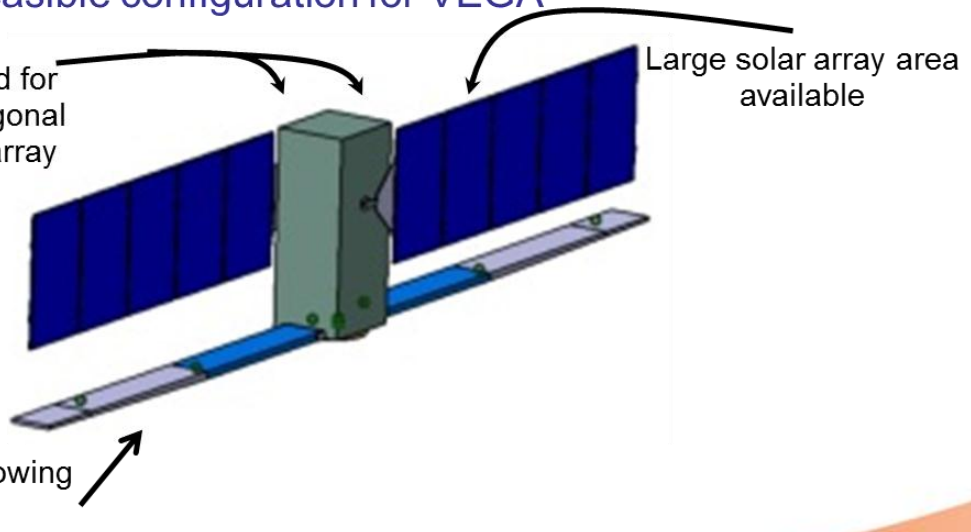
Planar Interleaved Antennas for Independent Beam and Polarisation Control

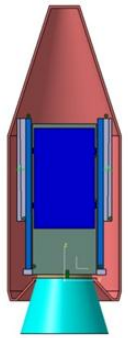
Platform Design

- Can now fit within the VEGA fairing
- Folding antenna design improved packaging efficiency considerably
- Power available from solar array area is now *more* than that required by platform/payload
- Limiting factor is free structure area for radiators (but we have some ideas!)
- Overall, a feasible configuration for VEGA

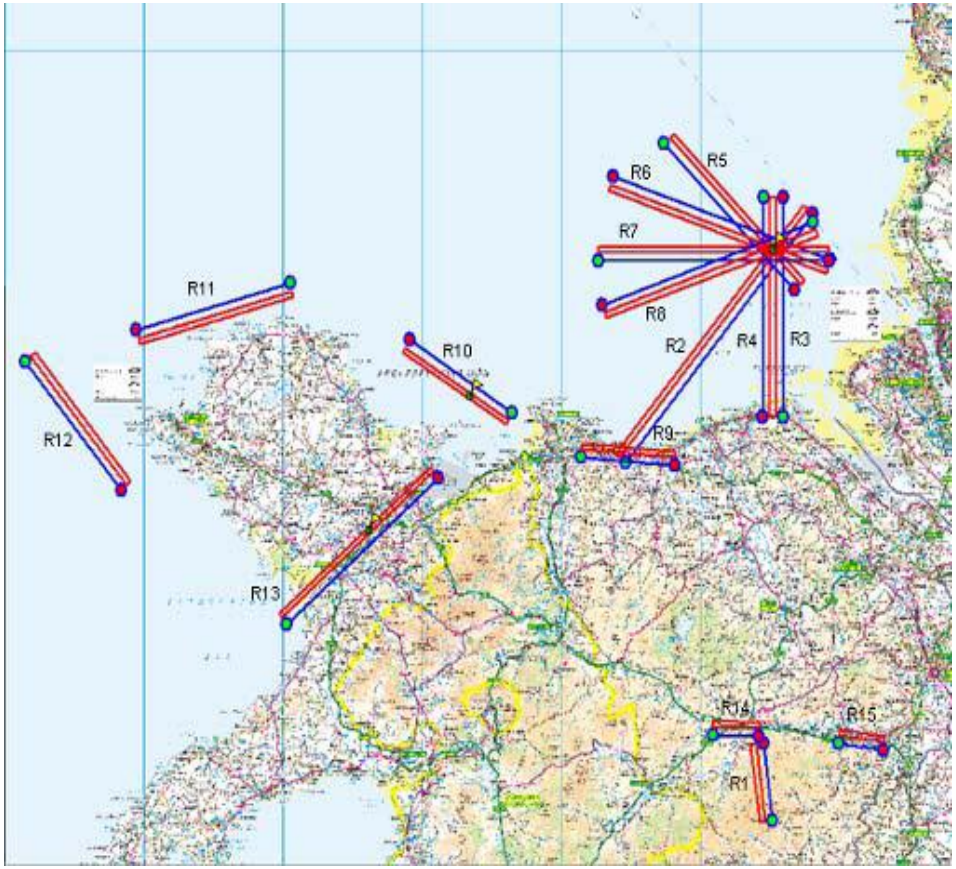






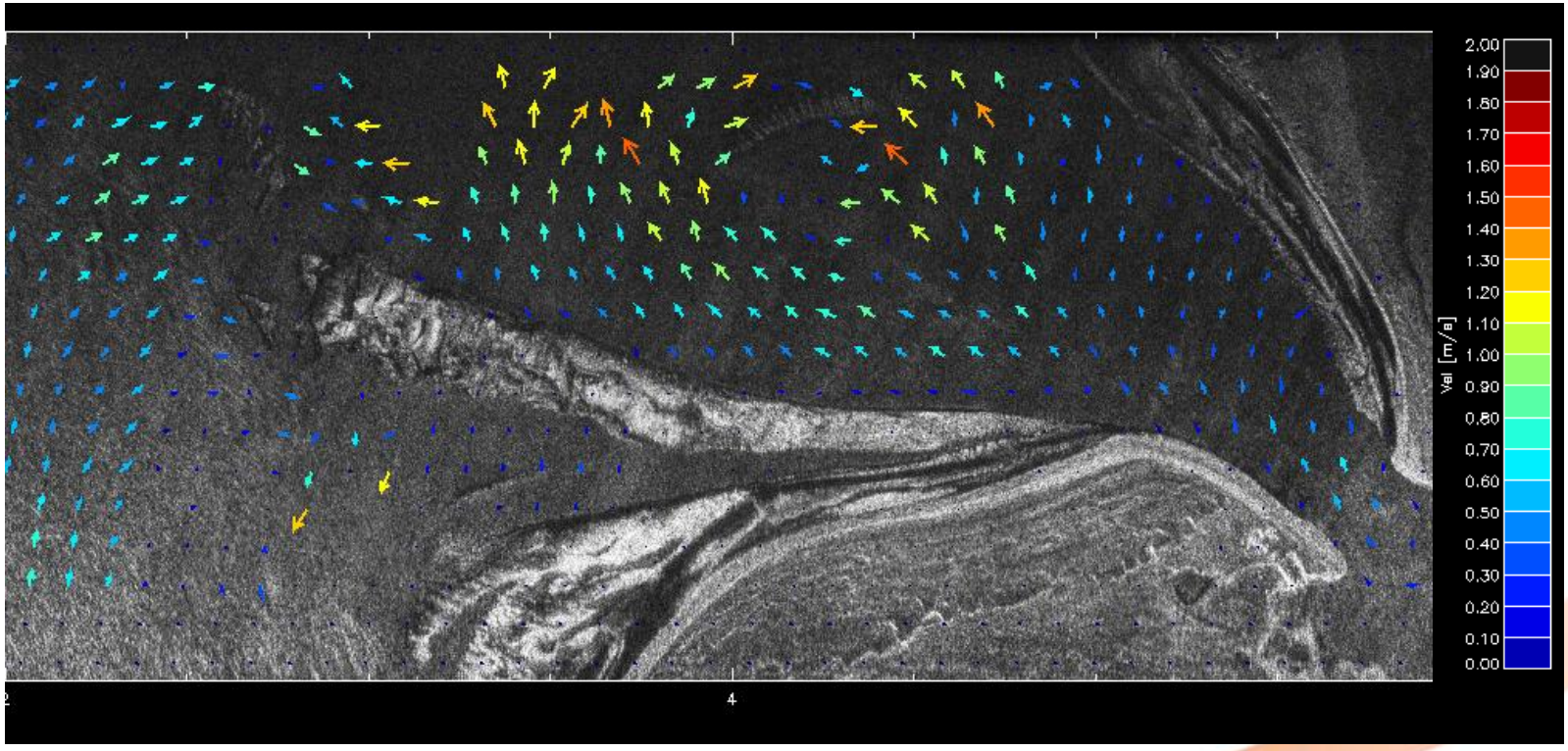


Proof of Concept Airborne Campaign



2D Surface Current Data

Menai Straits: Changing and Turbulent currents



Section of R13 (not correct orientation)

Whirlpool in the lee of the Skerries, Anglesey