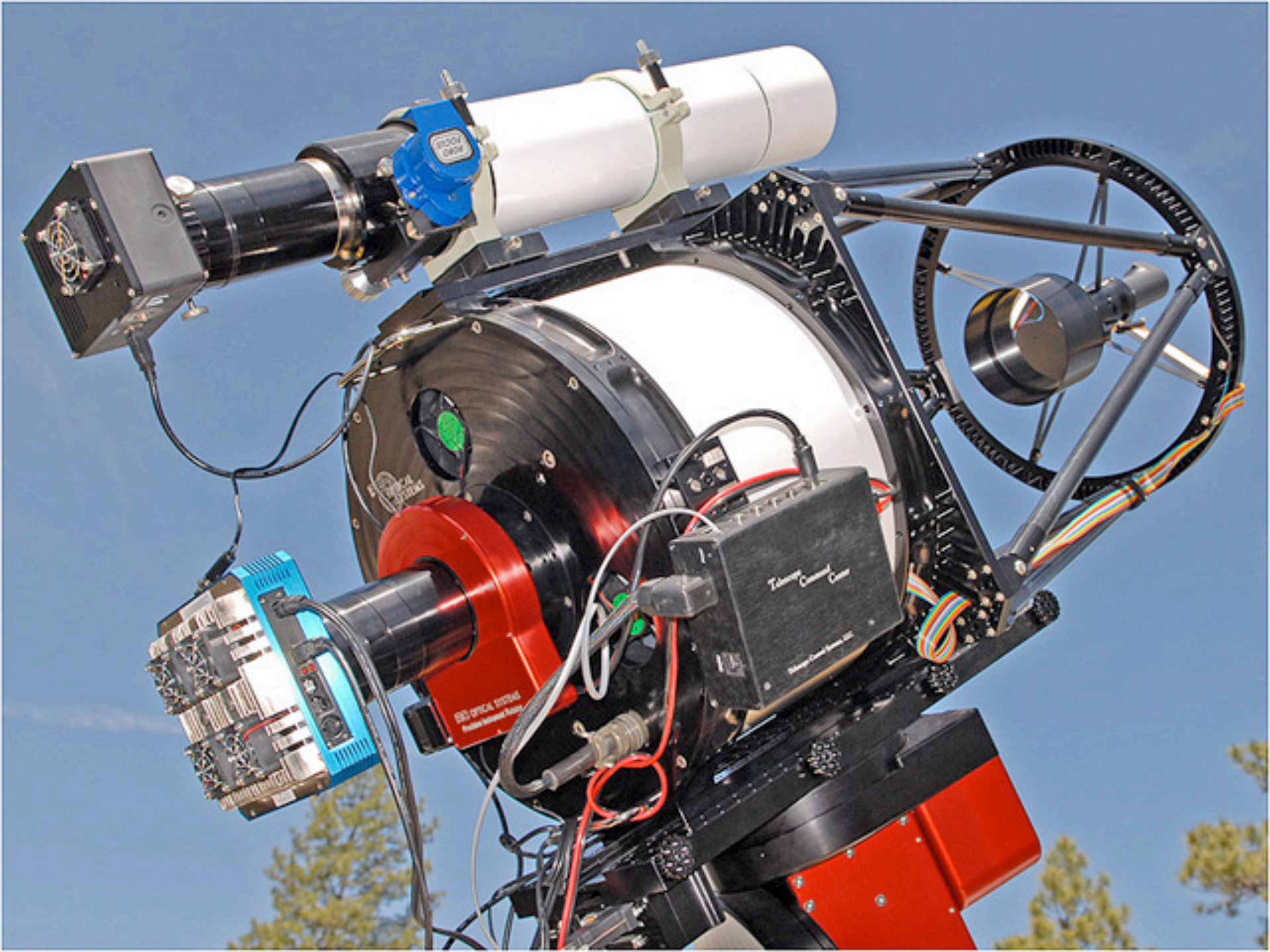




The Star of Bethlehem

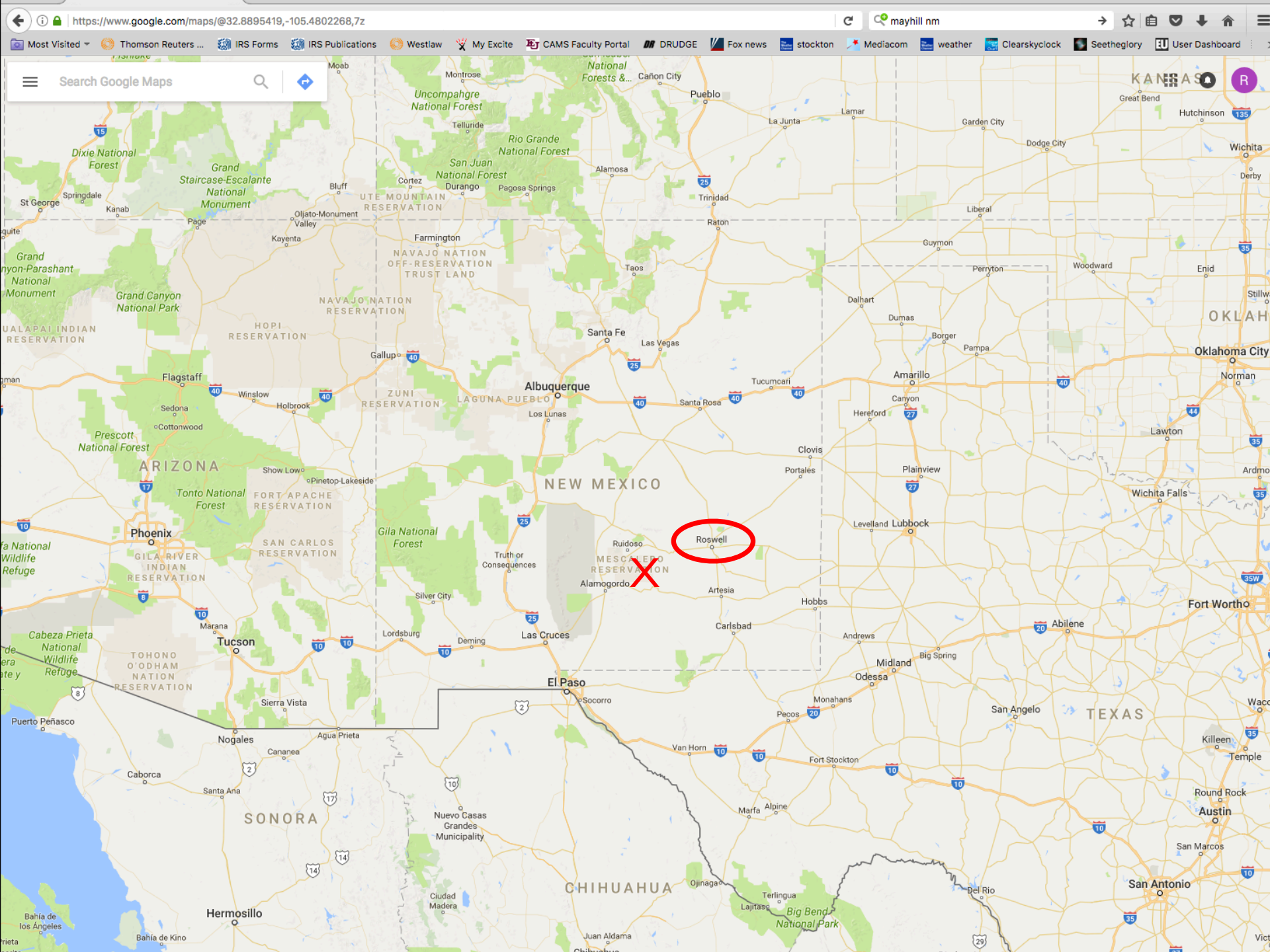
Introduction









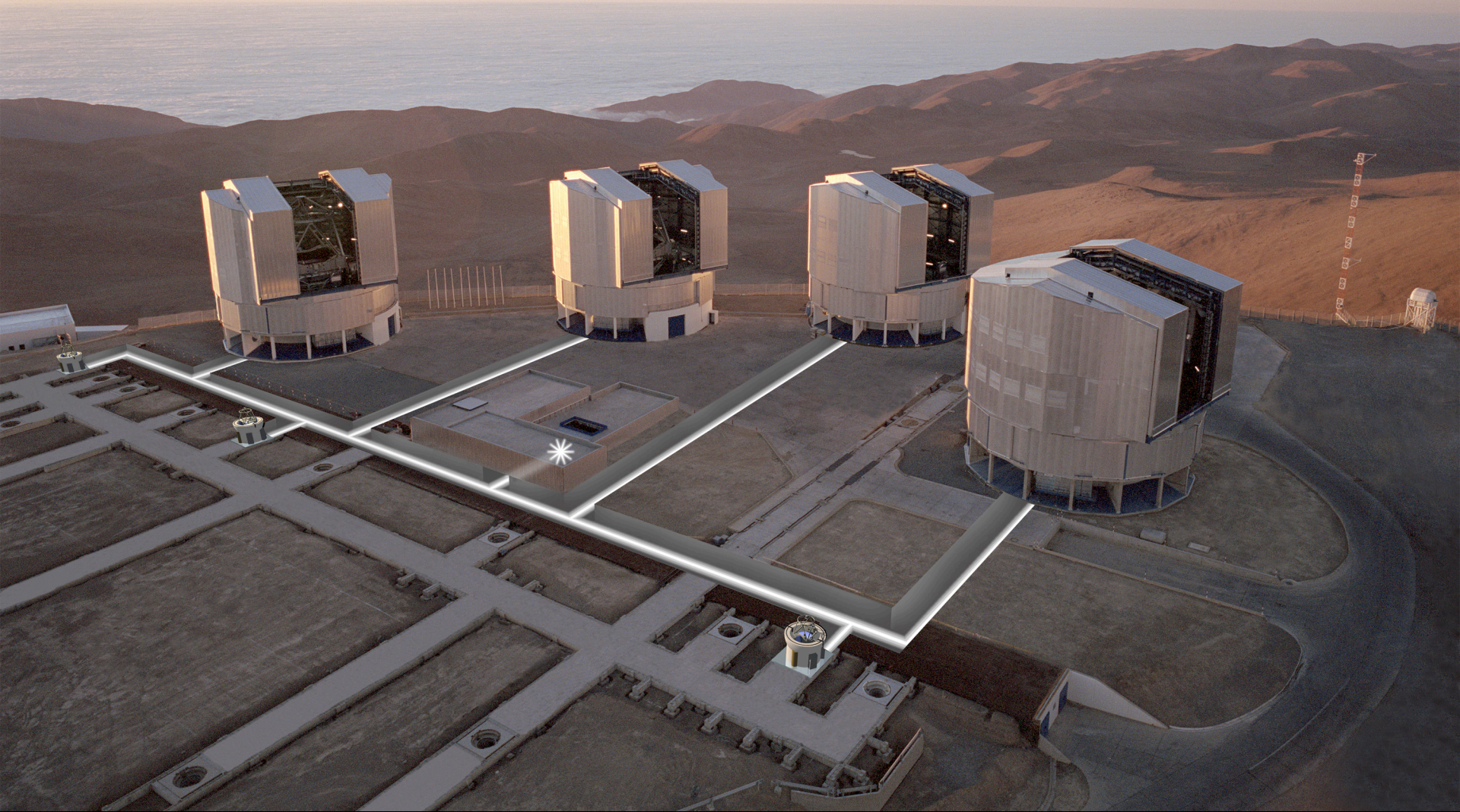






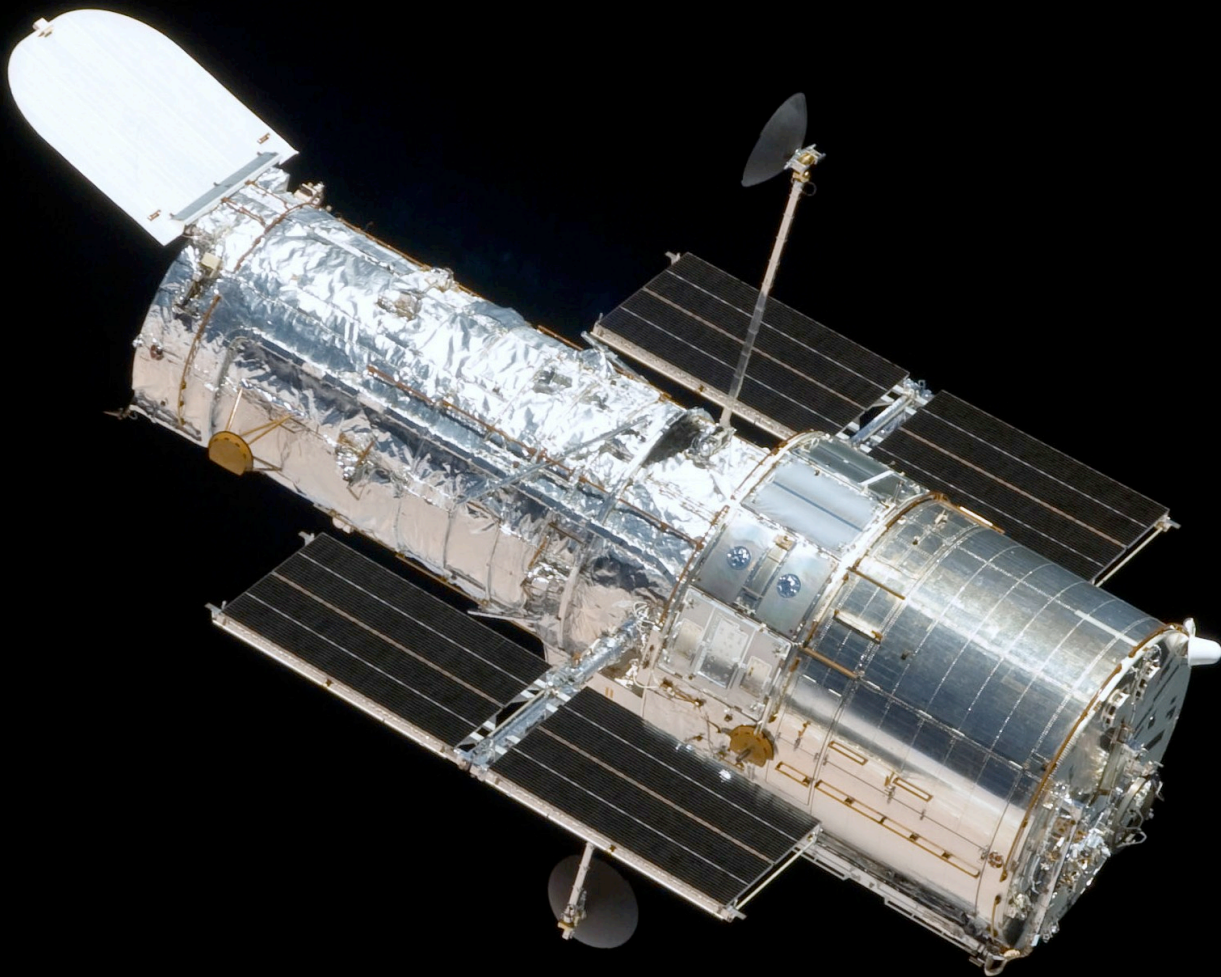


$A = 78,000''$ vs. $675''$























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THE TRIAL OF GALILEO

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4



THE STAR OF BETHLEHEM

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DEC



The Star of Bethlehem



3 Explanations ...

view	characteristics	what was the star?
secular science	<ul style="list-style-type: none"> • no God • scripture not inspired 	<ul style="list-style-type: none"> • myth • naturalistic explanation • i.e., comet, meteor, nova, planetary conjunction, etc.
Christian view #1	<ul style="list-style-type: none"> • God exists • scripture is reliable but no plenary inspiration • proof-texting/eisegesis allowed • can disregard some clues in scripture regarding the meaning of the star 	<ul style="list-style-type: none"> • comet, meteor, nova, planetary conjunction, etc.
Christian view #2	<ul style="list-style-type: none"> • God exists • plenary inspiration of scripture • no proof-texting/eisegesis • must consider ALL clues in scripture on the meaning of the star 	<ul style="list-style-type: none"> • no naturalistic explanation • only explanation is a miracle-- the Shekinah Glory of God (God's presence pointing to the one who would be called Emmanuel, "God with us")

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secular science	<ul style="list-style-type: none"> • no God • scripture not inspired 	<ul style="list-style-type: none"> • myth • naturalistic explanation • i.e., comet, meteor, nova, planetary conjunction, etc.
Christian view #1	<ul style="list-style-type: none"> • God exists • scripture is reliable but no plenary inspiration • proof-texting/eisegesis allowed • can disregard some clues in scripture regarding the meaning of the star 	<ul style="list-style-type: none"> • usually leads to a naturalistic explanation, i.e., comet, meteor, nova, planetary conjunction, etc.
Christian view #2	<ul style="list-style-type: none"> • God exists • plenary inspiration of scripture • no proof-texting/eisegesis • must consider ALL clues in scripture on the meaning of the star 	<ul style="list-style-type: none"> • no naturalistic explanation • only explanation is a miracle--the Shekinah Glory of God (God's presence pointing to the one who would be called Emmanuel, "God with us")

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relevant biblical and historical
evidence

Matthew 2: 1-2, 7-12

After Jesus was born in Bethlehem in Judea, during the time of King Herod, Magi from the east came to Jerusalem and asked, "Where is the one who has been born king of the Jews? We saw his star in the east and have come to worship him. When King Herod heard this he was disturbed

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#1 – a star (astera)

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2:1 Τοῦ δέ leesou genneethéntos en Beethléem teés loudaías en
 Τοῦ δὲ Ἰησοῦ γεννηθέντος ἐν Βηθλέεμ τῆς Ἰουδαίας ἐν
3588 1161 2424 1080 1722 965 3588 2449 1722
 Now Jesus when was born in Bethlehem of Judaea in

heemérais Heeroódou tou basiléous idou mágoi apó
 ἡμέραις Ἡρώδου τοῦ βασιλέως, ἰδοὺ μάγοι ἀπὸ
9999 2250 2264 3588 935 2400 3097 575 9999
 the days of Herod the king, behold, wise men from the

anatoloón paregénonto eis Hierosóluma
 ἀνατολῶν παρεγένοντο εἰς Ἱεροσόλυμα
395 3854 1519 2414
 east there came to Jerusalem,

2 légontes Pou estin ho techtheís basileús toón loudaíoon
 λέγοντες, Ποῦ ἐστὶν ὁ τεχθεὶς βασιλεὺς τῶν Ἰουδαίων;
3004 4226 2076 3588 5088 935 3588 2453
 Saying, Where is he that is born King of the Jews?

Eídomen gár autoú tón astéra en teé anatoleé kaí eélthomen
 εἶδομεν γὰρ αὐτοῦ τὸν ἀστέρα ἐν τῇ ἀνατολῇ καὶ ἦλθομεν
1492 1063 846 3588 702 1722 3588 395 2532 2064
 we have seen for his star in the east, and are come

proskuneésai autoó
 προσκυνῆσαι αὐτῷ.
4352 846
 to worship him.

<u>9999</u> with you,	afóboos ἀφόβως, <u>870</u> without fear:	heautoús ἐαυτοὺς <u>1438</u> themselves	poimainontes ποιμαίνοντες, <u>4165</u> feeding	nefélai νεφέλαι <u>3507</u> clouds	<u>9999</u> they are	ánudroi ἄνδρες <u>504</u> without water,	hupó ὑπὸ <u>5259</u> of
anémoon ἀνέμων <u>417</u> winds;	paraferómenai παραφερόμεναι, <u>3911</u> carried about	déndra δένδρα <u>1186</u> trees	fthinopooriná φθινοπωρινὰ <u>5352</u> whose fruit withereth,	ákarpa ἄκαρπα <u>175</u> without fruit,	dis δὶς <u>1364</u> twice	apothanónta ἀποθανόντα <u>599</u> dead,	
	ekrizoothénta ἐκριζωθέντα, <u>1610</u> plucked up by the roots;						

¹³ kúmata κύματα <u>2949</u> waves	ágria ἄγρια <u>66</u> Raging	thalássees θαλάσσης <u>2281</u> of the sea,	epafrizonta ἐπαφρίζοντα <u>1890</u> foaming out	tás τὰς <u>3588</u> their	heautoón ἐαυτῶν <u>1438</u> own	aischúnas αἰσχύνας, <u>152</u> shame;	
hoís οἷς <u>3739</u> to whom	ho ὁ <u>3588</u> the	zófos ζόφος <u>2217</u> blackness	toú τοῦ <u>3588</u> of	skótous σκότους <u>4655</u> darkness	eis εἰς <u>1519</u> for	aioóna αἰῶνα <u>165</u> ever.	teteéreetai τετήρηται. <u>5083</u> is reserved

astéres ἀστέρες <u>792</u> stars,	planeétai πλανῆται <u>4107</u> wandering
--	---

¹⁴ Proefeéteusen Προεφήτευσεν	dé δὲ	kaí καὶ	toútois τούτοις	hébdomos ἑβδομος	apó ἀπὸ	Adám Ἀδὰμ	Henoóch Ἐνώχ	légoon λέγων,
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English derivatives?



Matthew 2: 1-2, 7-12

After Jesus was born in Bethlehem in Judea, during the time of King Herod, **Magi from the east came to Jerusalem** and asked, "Where is the one who has been born king of the Jews? We saw his star in the east and have come to worship him. When King Herod heard this he was disturbed

#2 -- magi to Jerusalem

Then Herod called the Magi secretly and found out from them the exact time the star had appeared. He sent them to Bethlehem and said, "Go and make a careful search for the child. As soon as you find him, report to me, so that I too may go and worship him."

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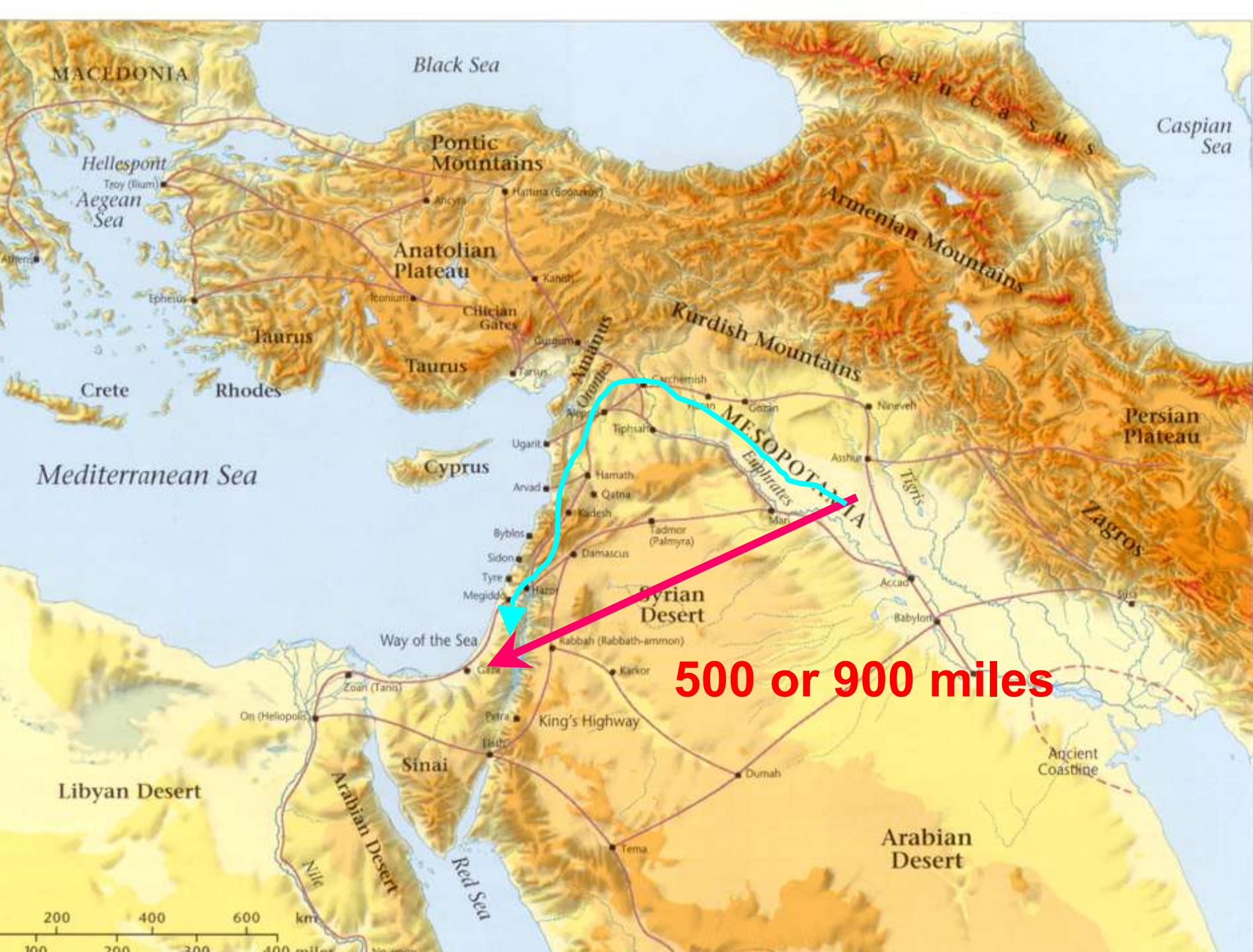






2 important points

#1 -- a long journey



#2 – why Jerusalem?

Expectation of a King in Judea

secular historians

Seutonius: Percrebuerat Oriente toto, vetus et constans opinio, esse in fati, ut eo tempore Judea profecti rerum potirentur.

An ancient and settled persuasion prevailed throughout the east, that the fates had decreed someone to proceed from Judea, who should attain universal empire.

Tacitus: Pluribus persuasio inerat, antiquis sacerdotum literis contineri, eo ipso tempore fore, ut valesceret Oriens, profectique Judaea rerum potirentur. Tacitus

It was contained in the ancient books of their priests, that at that time the east should prevail: and that someone should proceed from Judea and possess dominion.

[Annals stops abruptly]

Old Testament accounts of a ruler coming from Judea

1. Numbers 24:17-18 (the “Star Prophecy”): “A star will come out of Jacob; a scepter will rise out of Israel.”

[Origen: “But with respect to the appearance of a star at the birth of Jesus there is a prophecy of Balaam recorded by Moses to this effect: There shall arise a star out of Jacob, and a man shall rise up out of Israel.”]

2. Daniel 9:25: “Know and understand this: From the issuing of the decree to restore and rebuild Jerusalem until the Anointed One, the ruler, comes, there will be seven sevens, and sixty-two sevens.”

Conclusions:

- an expectation of a new king among the Jews
- and among the Assyrians and Babylonians due to the diaspora, and Abraham’s descendants (Ur of the Chaldees)
- explains why the magi came to Judea

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#3 -- birth of Messiah

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#4 -- star seen in the east

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#5 --star appears suddenly

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#6 -- Herod did not see it

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#7 -- long periods with gaps

After they had heard the king, they went on their way, and the star they had seen in the east went ahead of them until it stopped over the place where the child was. When they saw the star, they were overjoyed. On coming to the house, they saw the child with his mother Mary, and they bowed down and worshiped him.

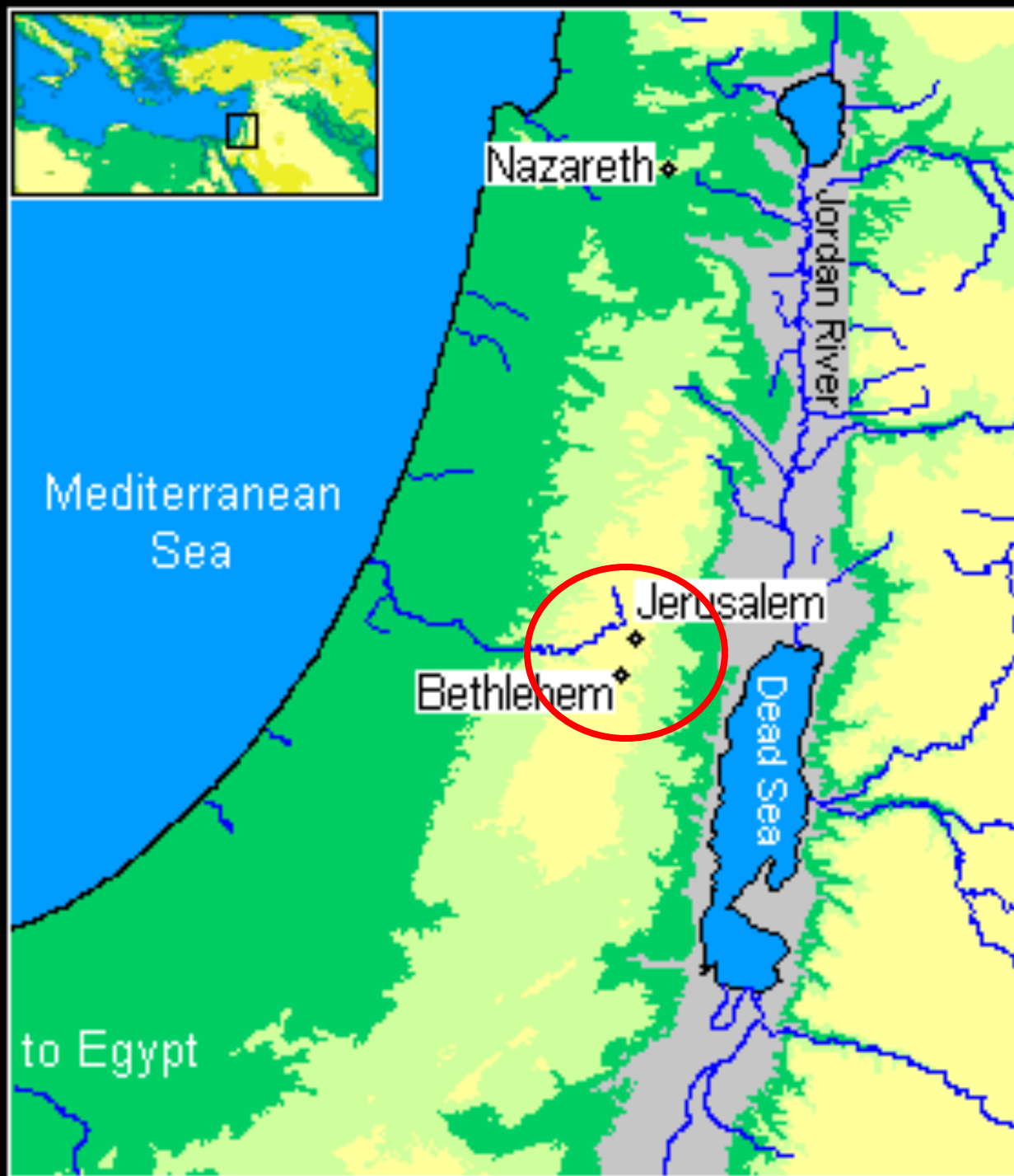
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#8 -- star preceded them south to Bethlehem



- the star they had seen in the east went ahead of them (from Jerusalem to Bethlehem)
- Bethlehem is 6 miles south of Jerusalem
- stars move east to west, not north to south

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#9 -- the star stops

one additional clue

- Luke 3:23. Now Jesus himself was about thirty years old when he began his ministry.
- John 2:19-20. Jesus answered them, "Destroy this temple, and I will raise it again in three days." The Jews replied, "It has taken forty-six years to build this temple, and you are going to raise it in three days?"

Note: (1) this incident occurred at the beginning of Jesus' ministry (when he was 30); (2) the temple was begun in 20 BC, so this incident (and the start of Jesus' ministry) occurred in 26 AD.

- if Jesus was 30 when he began his ministry, he was born c. 4 BC
- Luke 2:1-2. In those days Caesar Augustus issued a decree that a census should be taken of the entire Roman world. This was the first census that took place while Quirinius was governor of Syria.
- Quirinius was governor of Syria in 6-4 BC and 6-9 AD
- Herod died in 4 BC
- conclusion: Jesus was born ~ 4 BC



RES · GESTAE · DIVI · AVGVSTI · C

A COMPARAVI PER QVEM REM PVBLICAM
MINE · SENATVS · DECRETIS HONORIFICIS
NSVLAREM LOCVM SENTENTIAE DICENDAE
APERET · ME · PRO · PRAETORE · SIMVL · CVM
EM · CVM · CONSVL · VTERQVE · IN · BELLO
PARENTEM MEVM INTERFECERVNT · EOS
M · INFERENTIS REI PVBLICAE VICI · BIS ACIE
E · GESSI · VICTORQVE · OMNIBVS · VENIAM
IGNOSCI · POTVIT · CONSERVARE · QVAM
MEO · FVERVNT · CIRCITER · QVINGENTA
DIS · EMERITIS · MILLIA · ALIQVANTO · PLVRA
GVNIAM · PRO · PRAEMIS · MILITIAE
VAM · TRIREMES · FVERVNT · BIS · OVANS
S · ET · SEMEL · IMPERATOR · DECERNENTE
VRVM · DE · FASCIBVS · DEPOSVI · IN
OB · RES · A · ME · AVT · PER · LEGATOS
IS · ET · QVIQVIENS · DECREVIT · SENATVS
NATV · CONSVLTO · SVPPPLICATVM · EST
VM · MEVM · REGES · AVT · REGVM · LIBERI
RAM · SEPTIMVM · ET · TRIGENSIMVM
· DELATAM · ET · A · POPVLO · ET · A · SENATV
CATVS · IN · SVMMA · FRVMENTI · PENVRIA
COS · METV · ET · PERICLO · PRAESENTI
M · QVOQVE · TVM · ANNVVM · ET · PERPETVVM
ET · POSTEA · P · LENTVLO · ET · CN · LENTVLO
VE · ROMANO · CONSENTIENTIBVS · VT
ISTRATVM · NVLLVM · CONTRA · MOREM
VIT · PER · TRIBVNICIAM · POTESTATEM

PERFECI · CVIVS · POTESTATIS · CONLEGAM · ET · IPSE · VLTRO · QVINOVIENS MIHI · A ·
TRIVMVIRVM · REI · PVBLICAE · CONSTITVENDAE · FVI · PER · CONTINVO · ANNOS · DECEM
AD · EVM · DIEM · QVO · SCRIPSERAM · HAEC · PER · ANNOS · QVADRAGINTA · PONTIFEX · MAX
SACRIS · FACIVNDIS · SEPTENVIRVM · EPVLONVM · FRATER · ARVALIS · SODALIS · TITIVS
NVMERVM · AVXI · CONSVL · QVINTVM · IVSSV · POPVLI · ET · SENATVS · SENATVM
CENSVM · POPVLI · CONLEGA · M · AGRIPIA · EGI · LVSTRVM · POST · ANNVVM · ALTERVM · ET · QVADRAG
ROMANORVM · CENSA · SVNT · CAPITA · QVADRAGENS · OENTVM · MILLIA · ET · EXAGINTA · TRIAMILLIA · TV
LVSTRVM · SOLVS · FECI · C · CENSORINO · ET · C · ASINIO · COS · QVO · LVSTRO · CENSA · SVNT · CIVIVM
CENTVM · MILLIA · ET · DV · CENTA · TRIGINTA · TRIA · MILLIA · ET · TERTIVM · CONSVLARI · CVM · IME
FILIO · MEO · FECI · SEX · POMPEIO · ET · SEX · APPVLEIO · COS · QVO · LVSTRO · CENSA · SVNT
QVADRAGENS · CENTVM · MILLIA · ET · NONGENTA · TRIGINTA · ET · SEPTEN · MILLIA ·
EXEMPLA · MAIORVM · EXOLESCENTIA · IAM · EX · NOSTRO · SAECVLO · REDVXI · ET · IP
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TEMPVS · FVISSE · RECEPI · P · SVLPICIO · C · VALGIO · CONSVLIBVS · ARAM · F
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ET · VIRGINES · VESTALES · ANNIVERSARIVM · SACRIFICIVM · FACERE · IVSSIT · EO
ET · M · VINICIO · IN · VRBEM · EX · SYRIA · REDIERAM · ET · DIEM · AVGVSTALIA · EX
EX · SENATVS · AVCTORITATE · PARS · PRAETORVM · ET · TRIBVNORVM · PLEBI
PRINCIPIBVS · VIRIS · OBVIAM · MIHI · MISSA · EST · IN · CAMPANIAM · QVI · HONO
ME · EST · DECRETVS · CVM · EX · HISPANIA · GALLIAQVE · REBVS · IN · IIS · PRO

Luke 2:1

In those days Caesar Augustus issued a decree that that a census should be taken of the entire Roman world.

Recap

the “star” (10 clues)

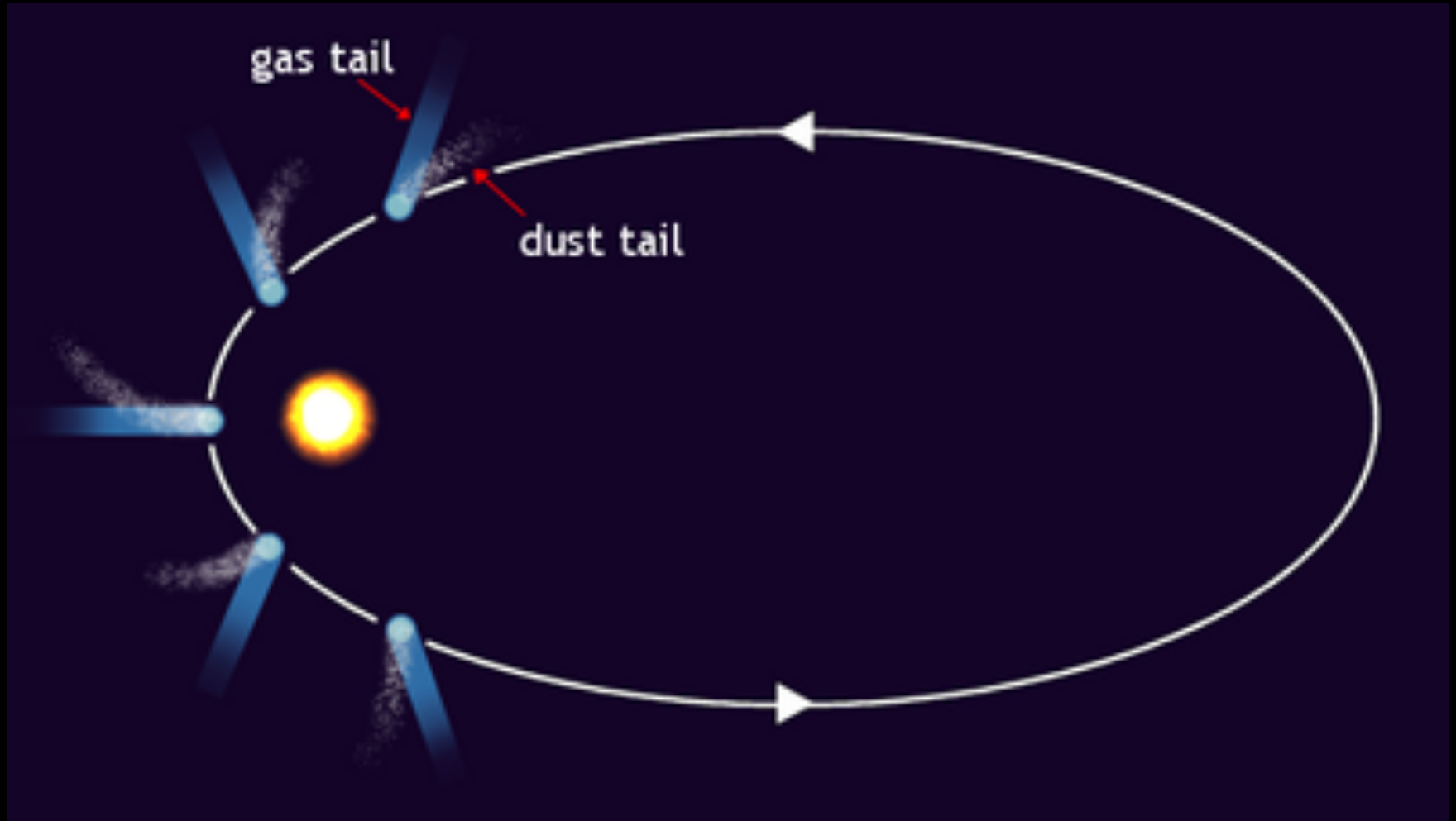
- 1) star (aster)
- 2) magi from the east went to Jerusalem
- 3) star signified birth of a king
- 4) magi saw the star in the east
- 5) star appeared suddenly
- 6) Herod did not see it
- 7) star was of long duration, but with gaps
- 8) the star led the magi south to Bethlehem
- 9) the star stopped at Bethlehem
- 10) ~ 4 BC

a “star” (astera)					
magi to Jerusalem					
birth of a king					
saw star in the east					
star appears suddenly					
Herod did not see it					
long duration with gaps					
star preceded them					
stopped at Bethlehem					
6-4 BC					

which explanation best fits
the biblical and historical
evidence?

| -- comet





dust tail – particles of dust

gas tail – vaporized ice







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ONLINE NOW

Podcasts: Bears, high school

Reporters Lyndal Scranton and Kyle Nedderrip discuss the final game of the MSU football season and the first tips for the basketball teams in the Bears Talk podcast at News-Leader.com/MSUBears. Reporters Allen Vaughan and Joe Cress talk about local high school football playoff action and get ready for winter sports in their podcast at News-Leader.com/blogs/highschoolHQ.

Send us your hunting photos

Did you bag a trophy buck this hunting season? You can post a photo of yourself with the trophy animal in our Hunters' Gallery online. Join us at News-Leader.com/photos/hunting.

YOUR COMMUNITY



Missouri State's Dale Lamberth

Three burning questions

Missouri State University opens its basketball season on Saturday with seven veterans and four newcomers on the Bears' line. Hopes are high that they'll make it to NCAA, but three burning questions must be answered first. Sports, **1D**

United Way exceeds its goal

The city of Ozarks learned Thursday morning that it has exceeded its fundraising campaign goal — good news for affiliates such as the National Alliance for the Mentally III in Springfield. **7A**

Will Battlefield get its first bar?

The city of Battlefield is threatened with having its first "liquor-by-the-drink" establishment — a bar — because a Springfield bar owner has affiliated with a veterans group and wants to open one there. Will it happen? Sarah Overstreet, **1B**

Dedication honors 'Flower Lady'

SPRINGFIELD NEWS-LEADER

NEWS-LEADER.COM • OZARKSMOBILE.COM SPRINGFIELD, MISSOURI • FRIDAY, NOVEMBER 9, 2007 • 50C

Complaint: Schools unfair to girls

Filing alleges lack of softball fields is discriminatory.

By Cory de Vera

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Baseball fields for boys are located on campus at four of Springfield's public high schools, but all the girls' softball teams must play on off-campus city-

owned fields.

In August, someone filed a Title IX complaint alleging that the situation is discriminatory to female students. Title IX is the part of federal law banning gender discrimination in public schools. Since 1972 it has been credited with expanding athletic opportunities for women and girls around the nation.

The complaint came as a



Web resources: Follow the link with this story to get more information about Title IX.

surprise to athletic director Mark Fisher.

"From my understanding our coaches and community are pleased with the fields they play on at (city-owned) Meador and Coop-

er" parks, said Fisher.

This week, two investigators from the U.S. Department of Education's Office of Civil Rights came to town to tour facilities, district leaders said. Though the complaint concerned softball, they checked out other athletic facilities at the five high schools, as well.

"I would have to say there does seem to be gender dis-

crimination," said Joanne Levy, the mother of a Kickapoo junior who played softball last year. "The girls work hard, we have an excellent team. It doesn't seem fair that they can't have a field to call their own."

Levy said she is glad the school district will have to review the issue.

See Complaint, Page 5A

Comet Holmes captured

A local attorney's photo of the erupting comet, taken with a telescope camera, will appear in Astronomy Magazine.

Comet Holmes, between the orbits of Mars and Jupiter, brightens in the nighttime sky on Oct. 24.



Richard Hammar explains how he used his state-of-the-art Ritchey-Chretien telescope to capture an image of Comet Holmes.

Celestial object increased a million times in brightness.

By Wes Johnson

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In the far reaches of the solar system, 150 million miles from Earth, a tiny black object suddenly sprang to luminous view on Oct. 24.

And local attorney Richard Hammar caught the erupting comet with his telescope camera from the driveway of his Highland Springs home.

"In a matter of a few hours this object increased a million times in brightness," Hammar said.

"This thing is out between Mars and Jupiter," he said. "It's the opportunity of a lifetime."

Hammar's remarkably crisp photograph of Comet Holmes will be featured in the April edition of Astronomy Magazine, which should hit the

For Hammar, watching the two-mile-wide comet turn from a tiny speck to a "big fuzzy star" was awe-inspiring.

During the day, Hammar is an attorney for the Assembly of God headquarters in Springfield.

But at night — when the sky is clear — Hammar likely will be found in his driveway peering through an 18-inch optical telescope or taking pictures with his state-of-the-art Ritchey-Chretien computerized telescope.

The Ritchey-Chretien adjusts for the rotation of the Earth so camera images aren't blurry.

Its 15-inch mirror was polished to near perfection with a stream of argon gas atoms in the Soviet Union.

"It took me five years of constant







Halley's Comet

- 1P/-239 K1 (25 May 240 BC)
- 1P/-163 U1 (12 November 164 BC)
- 1P/-86 Q1 (6 August 87 BC)
- 1P/-11 Q1 (10 October 12 BC)
- 1P/66 B1 (25 January 66 AD)
- 1P/141 F1 (22 March 141)
- 1P/218 H1 (17 May 218)
- 1P/295 J1 (20 April 295)
- 1P/374 E1 (16 February 374)
- 1P/451 L1 (28 June 451)
- 1P/530 Q1 (27 September 530)
- 1P/607 H1 (15 March 607)
- 1P/684 R1 (2 October 684)
- 1P/760 K1 (20 May 760)
- 1P/837 F1 (28 February 837)
- 1P/912 J1 (18 July 912)
- 1P/989 N1 (5 September 989)
- 1P/1066 G1 (20 March 1066)
- 1P/1145 G1 (18 April 1145)
- 1P/1222 R1 (28 September 1222)
- 1P/1301 R1 (25 October 1301)
- 1P/1378 S1 (10 November 1378)
- 1P/1456 K1 (9 June 1456)
- 1P/1531 P1 (26 August 1531)
- 1P/1607 S1 (27 October 1607)
- 1P/1682 Q1 (15 September 1682)
- 1P/1758 Y1, 1759 I (13 March 1759)
- 1P/1835 P1, 1835 III (16 November 1835)
- 1P/1909 R1, 1910 II, 1909c (20 April 1910)
- 1P/1982 U1, 1986 III, 1982i (9 February 1986)
- Next perihelion predicted 28 July 2061

Note that perihelion dates 1607 and later are in the [Gregorian calendar](#), whilst perihelion dates of 1531 and earlier are in the

	comet				
a “star” (astera)					
magi to Jerusalem					
birth of a king					
saw star in the east					
star appears suddenly					
Herod did not see it					
long duration with gaps					
star preceded them					
stopped at Bethlehem					
6-4 BC					

	comet				
a “star” (astera)	no				
magi to Jerusalem	yes?				
birth of a king	yes?				
saw star in the east	yes				
star appears suddenly	yes				
Herod did not see it	no				
long duration with gaps	no				
star preceded them	yes?				
stopped at Bethlehem	no				
6-4 BC	yes				

	comet				
a "star" (astera)	no				
magi to Jerusalem	yes?				
birth of a king	yes?				
saw star in the east	yes				
star appears suddenly	yes				
Herod did not see it	no				
long duration with gaps	no				
star preceded them	yes?				
stopped at Bethlehem	no				
6-4 BC	yes				

#2 -- meteor

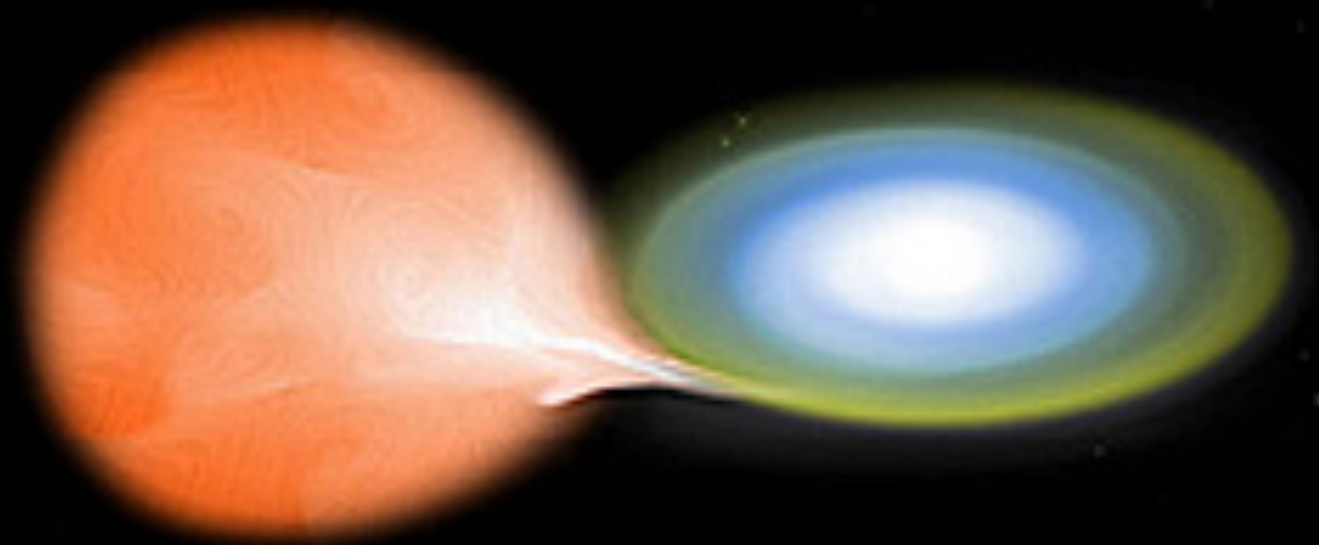


	comet	meteor			
a “star” (astera)					
magi to Jerusalem					
birth of a king					
saw star in the east					
star appears suddenly					
Herod did not see it					
long duration with gaps					
star preceded them					
stopped at Bethlehem					
6-4 BC					

	comet	meteor			
a “star” (astera)		no			
magi to Jerusalem		no			
birth of a king		no			
saw star in the east		yes			
star appears suddenly		yes			
Herod did not see it		yes			
long duration with gaps		no			
star preceded them		no			
stopped at Bethlehem		no			
6-4 BC		yes			

	comet	meteor			
a "star" (astera)		no			
magi to Jerusalem		no			
birth of a king		no			
saw star in the east		yes			
star appears suddenly		yes			
Herod did not see it		yes			
long duration with gaps		no			
star preceded them		no			
stopped at Bethlehem		no			
6-4 BC		yes			

#3 -- nova





The quiescence optical light curve of Nova Scorpii 1994 (=GRO J1655–40)*

F. van der Hooft¹, M.H.M. Heemskerk¹, F. Alberts¹, and J. van Paradijs^{1,2}

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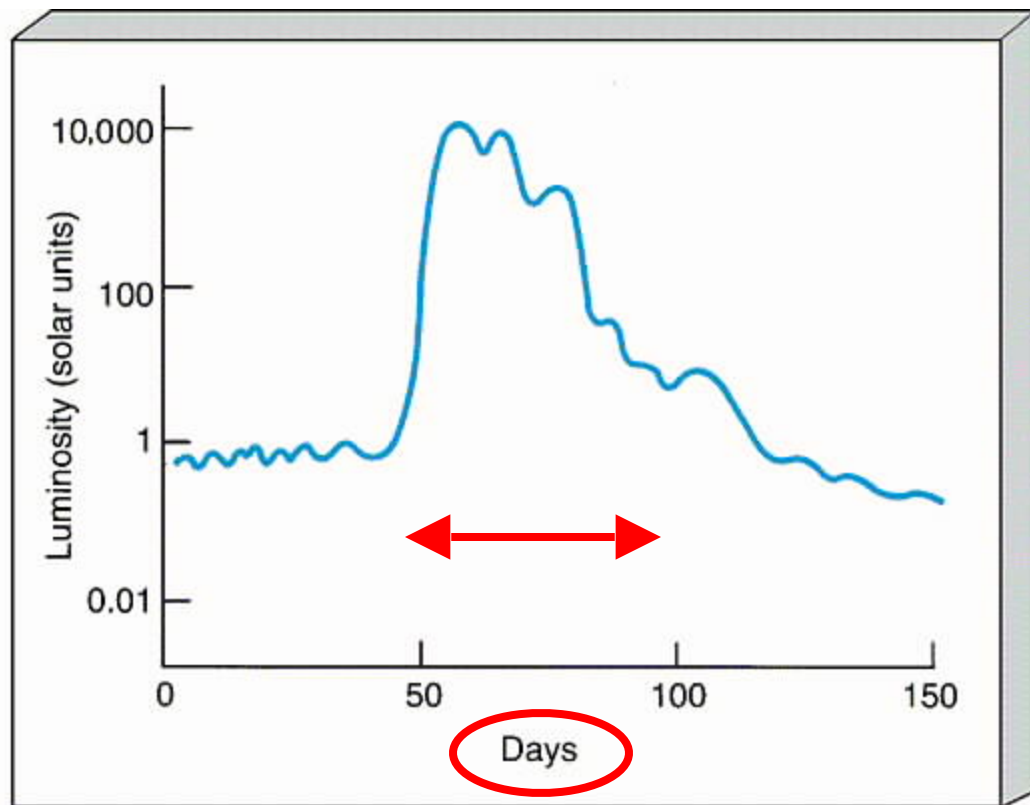
Abstract. We report on extensive *V*, *R*, and *i* band photometry of the black-hole candidate Nova Sco 1994 (GRO J1655–40) obtained during March 1996, when the source was close to its quiescent pre-outburst optical brightness ($V=17.3$). From our observations and data taken from the literature we derive a refined ephemeris for inferior conjunction of the secondary star: $\text{HJD } 244\,9838.4198(52) + 2.62168(14) \times N$. We have modeled the *V*, *R*, and *i* band light curves in terms of a Roche lobe filling secondary and an accretion disk around the compact star, the latter described as a flat cylinder with a radial temperature distribution. From the shape of the light curve we constrain the binary inclination and mass of the secondary star to lie in the ranges $63^\circ.7\text{--}70^\circ.7$ and $1.60\text{--}3.10\,M_\odot$, respectively. This limits the mass of the black-hole to the range $6.29\text{--}7.60\,M_\odot$. The mass range we obtained for the secondary star is supported by the results of stellar evolution calculations.

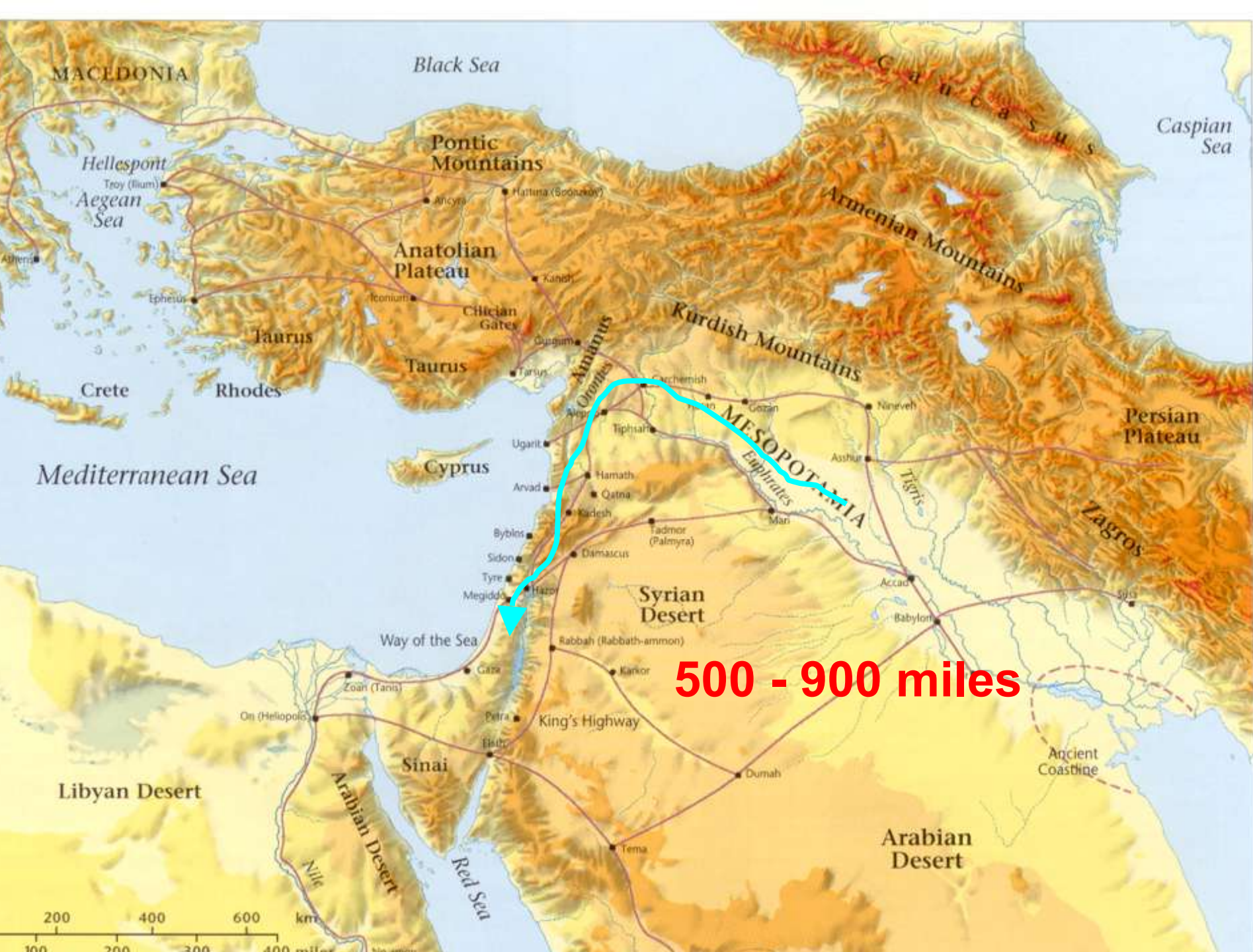
Key words: stars: binaries: close – individual: Nova Sco 1994 (GRO J1655–40) – X-rays: stars

by the luminosity of the secondary star (see Verbunt et al. 1994, Van Paradijs & McClintock 1995 and Narayan, McClintock & Yi 1996 for reviews of the quiescence X-ray and optical properties of SXTs). Therefore, the properties of the secondary star can be studied during the quiescent episode.

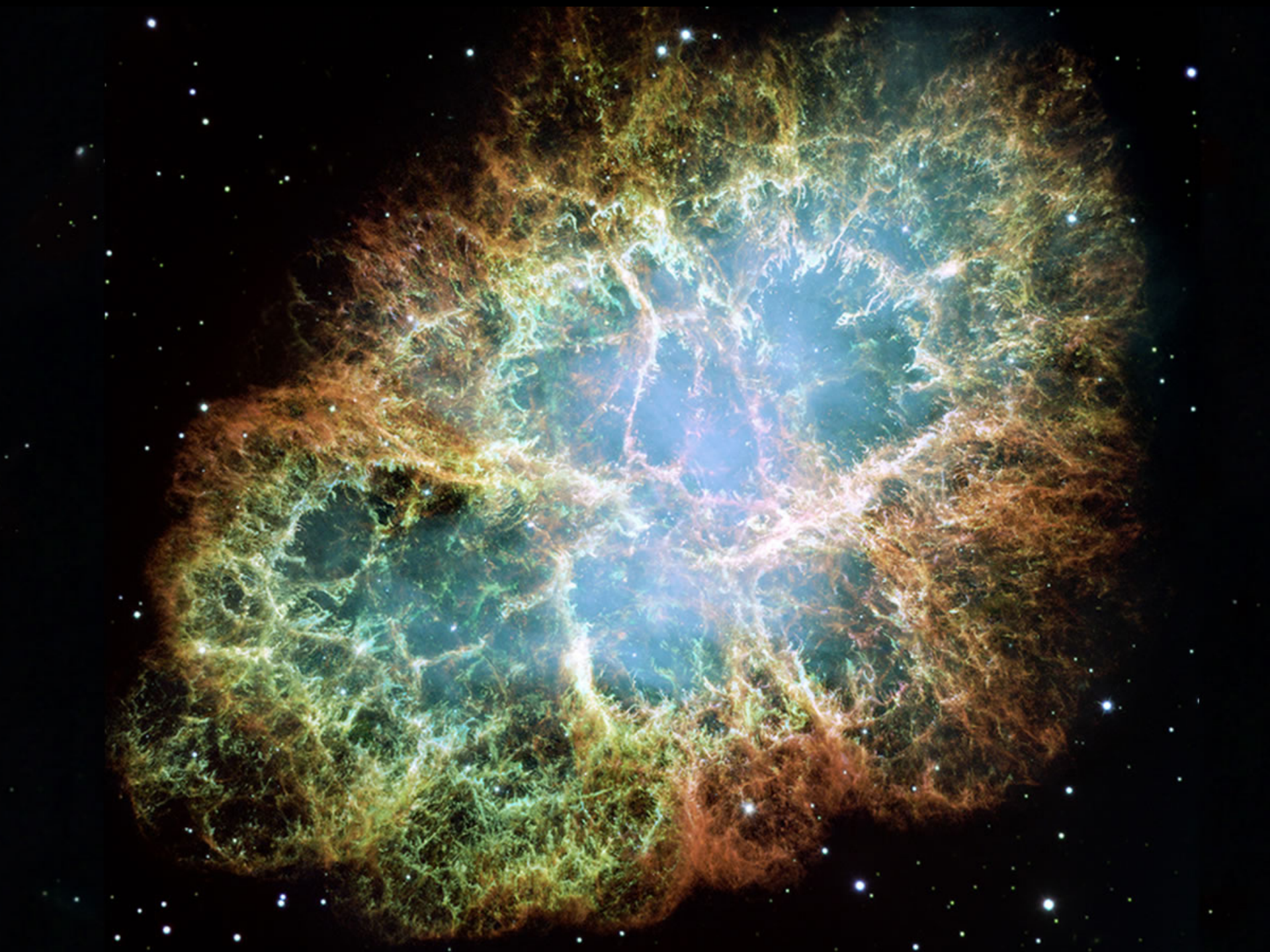
The SXT Nova Sco 1994 (GRO J1655–40), discovered on 1994 July 27 with BATSE (20–100 keV) on board the Compton Gamma Ray Observatory (Zhang et al. 1994), has been studied extensively during the past two years in X-rays and at optical and radio wavelengths (Tingay et al. 1995, Bailyn et al. 1995a, Harmon et al. 1995b, Hjellming & Rupen 1995, Zhang et al. 1995, Bailyn et al. 1995b, Paciesas et al. 1996, Van der Hooft et al. 1997). CCD photometry of Nova Sco 1994 revealed a double-waved modulation of the optical light at a period of 2.6 days (Bailyn et al. 1995b, Van der Hooft et al. 1997). Strong evidence that the compact object in Nova Sco 1994 is a black hole was presented by Bailyn et al. (1995b) who established a spectroscopic period of 2.601 ± 0.027 days and a mass function $f(M) = 3.16 \pm 0.15\,M_\odot$. The secondary was classified as an F3-F6 IV type star (Orosz & Bailyn 1997).

As an SXT, Nova Sco 1994 is remarkable, due to the fast





#4 -- supernova



Known Supernovae

(in our galaxy since 1000 AD)

1006

- location unconfirmed (probably in Lupus)
- 100x luminosity of Venus (clearly visible in daylight)

1054

- Crab nebula in Taurus
- a daytime object for 23 days

1572

- Tycho's Star (Tycho Brahe) in Cassiopeia
- not visible in daylight
- as bright as Venus at night

1604

- Kepler's Supernova in Ophiuchus
- not a daytime object, but as bright as Jupiter at night
- during a conjunction of Jupiter, Saturn and Mars



Supernova 1987A in the LMC

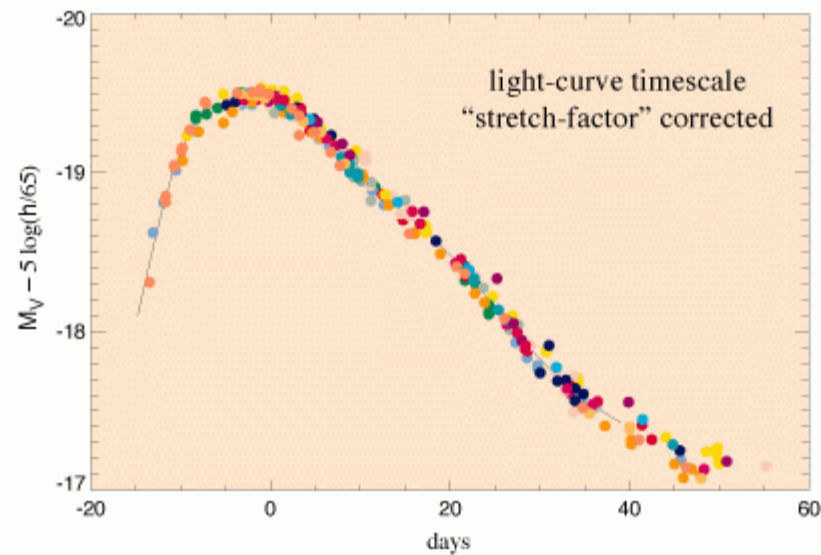
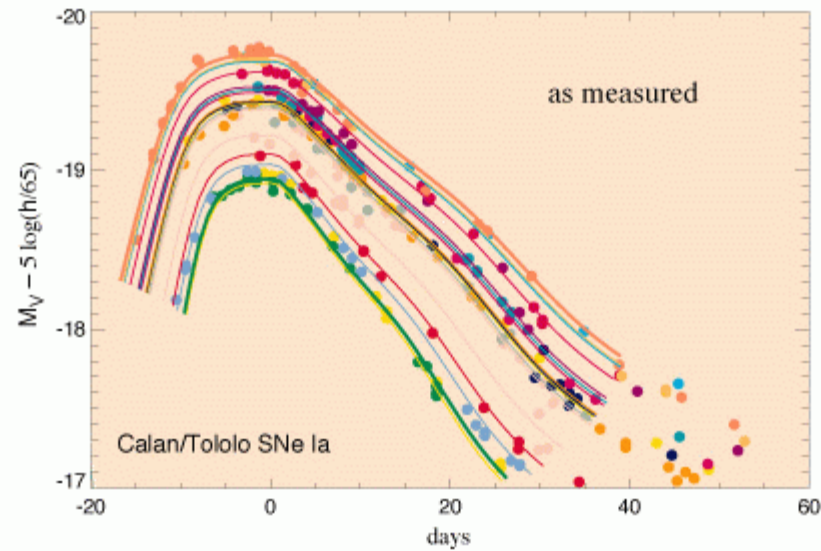


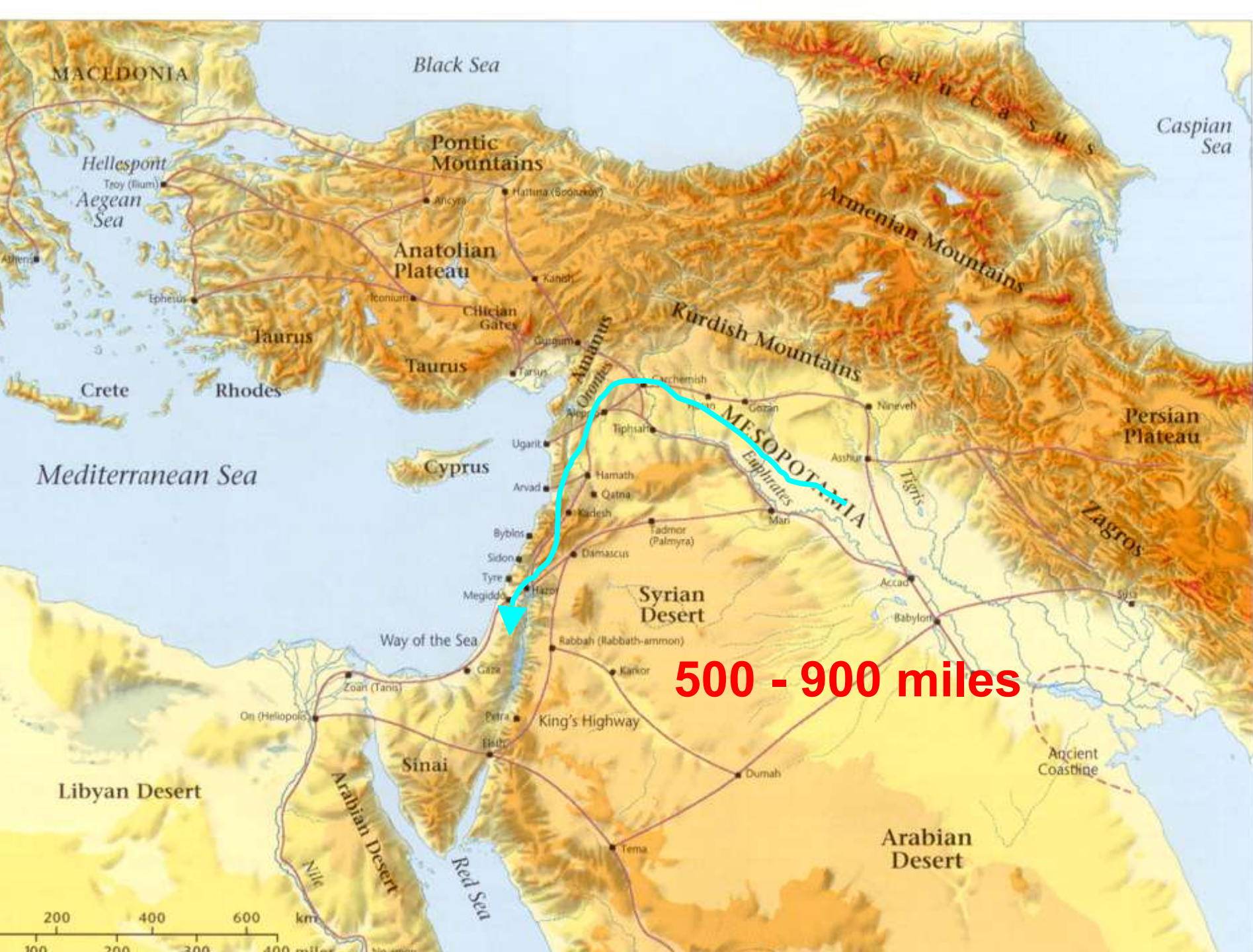
Supernova 1987A in the LMC



Low Redshift Type Ia Template Lightcurves

V Band





	comet	meteor	nova supernova		
a “star” (astera)					
magi to Jerusalem					
birth of a king					
saw star in the east					
star appears suddenly					
Herod did not see it					
long duration with gaps					
star led them S to Beth.					
stopped at Bethlehem					
6-4 BC					

	comet	meteor	nova supernova		
a “star” (astera)			yes		
magi to Jerusalem			yes		
birth of a king			yes		
saw star in the east			yes		
star appears suddenly			yes		
Herod did not see it			no?		
long duration with gaps			no		
star led them S to Beth.			no		
stopped at Bethlehem			no		
6-4 BC			yes 5 BC		

	comet	meteor	nova supernova		
a “star” (astera)			yes		
magi to Jerusalem			yes		
birth of a king			yes		
saw star in the east			yes		
star appears suddenly			yes		
Herod did not see it			no?		
long duration with gaps			no		
star led them S to Beth.			no		
stopped at Bethlehem			no		
6-4 BC			yes 5 BC		

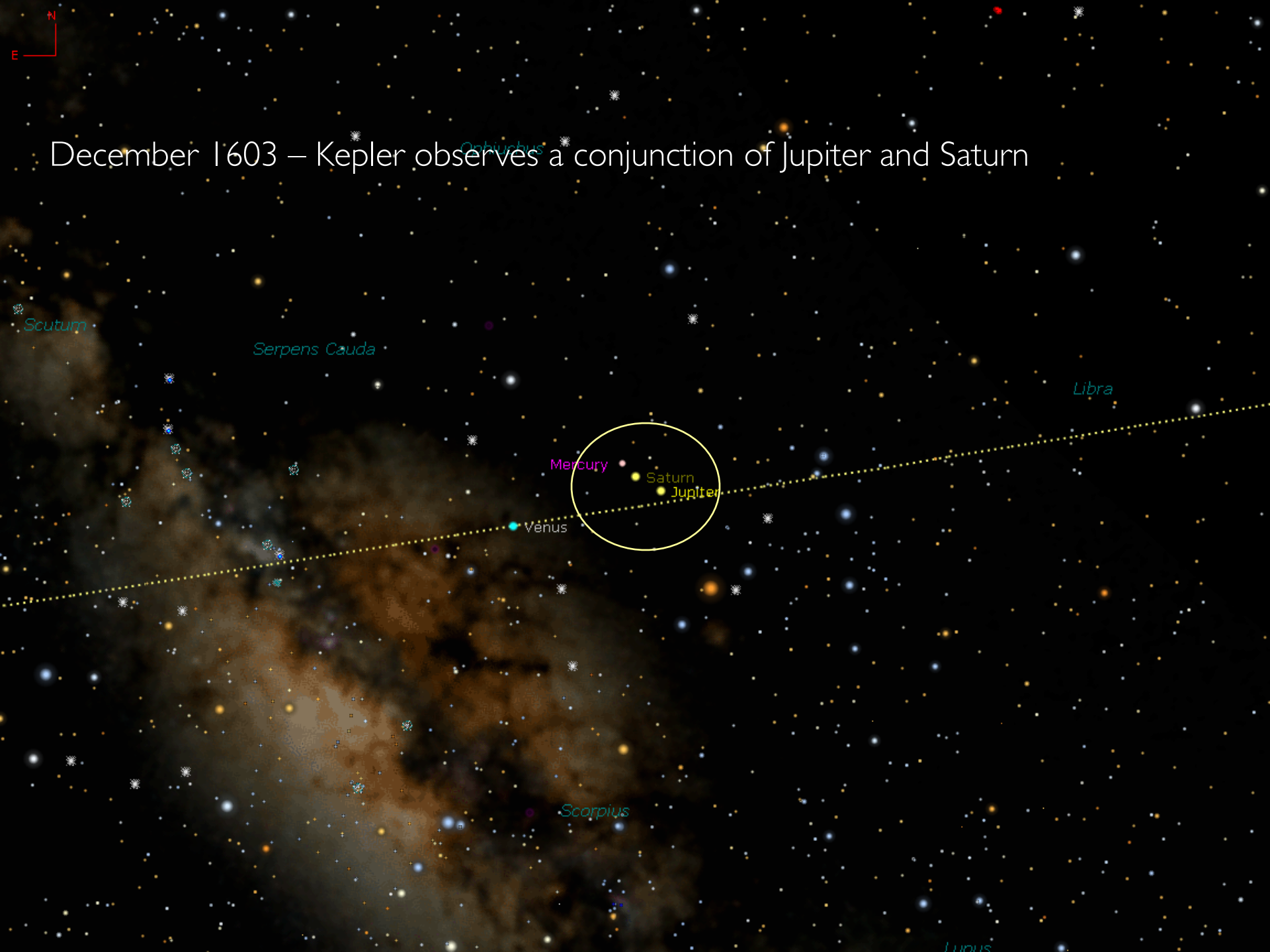
#5 -- planetary
conjunction

2 “superior” planets (Mars, Jupiter,
Saturn) coming into close proximity
in the sky

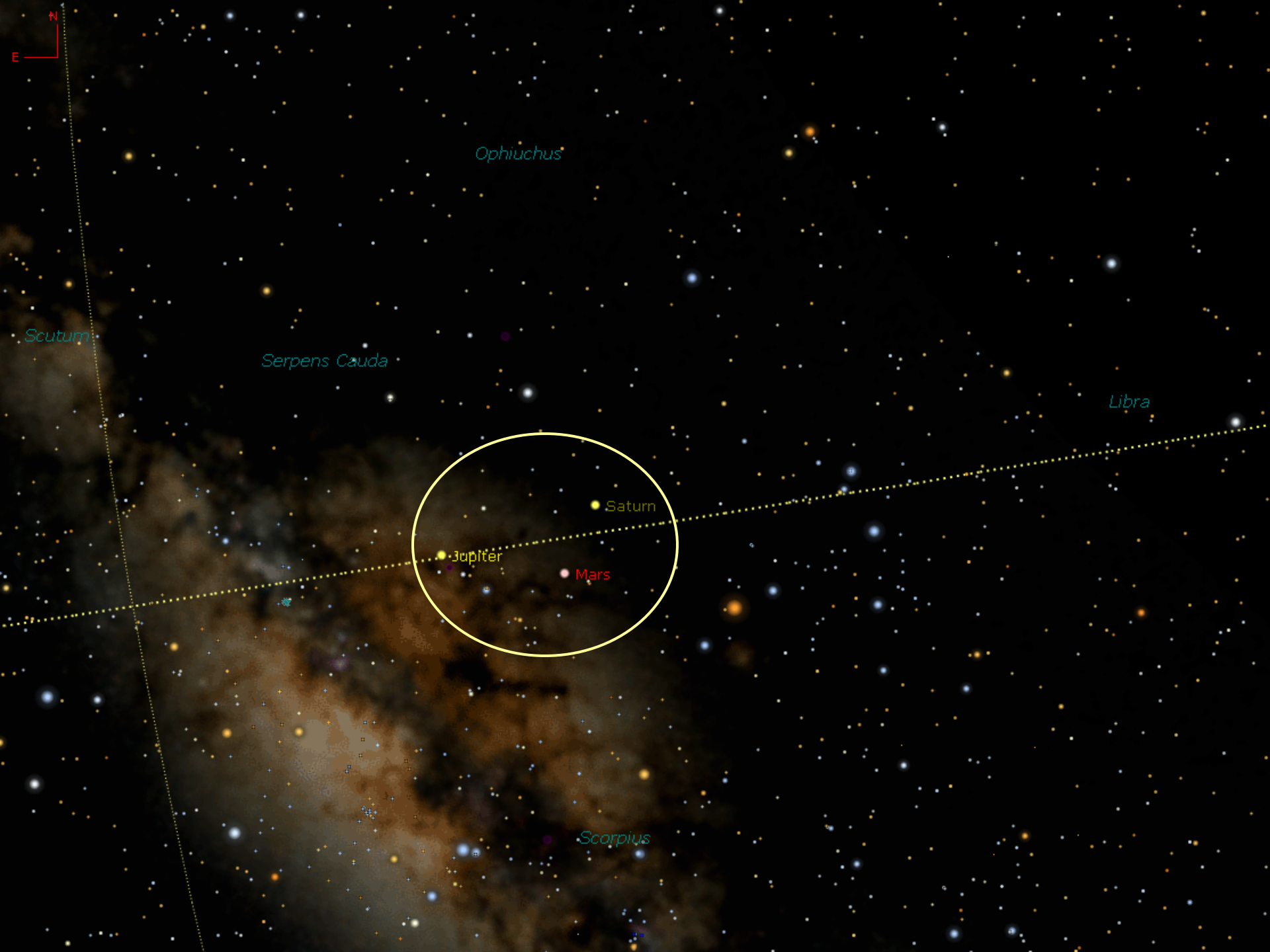
Johannes Kepler (1571-1630)



December 1603 – Kepler observes a conjunction of Jupiter and Saturn



followed by a “massing” of Jupiter-Saturn-Mars ten months later in October 9, 1604



Ophiuchus

Scutum

Serpens Cauda

Libra

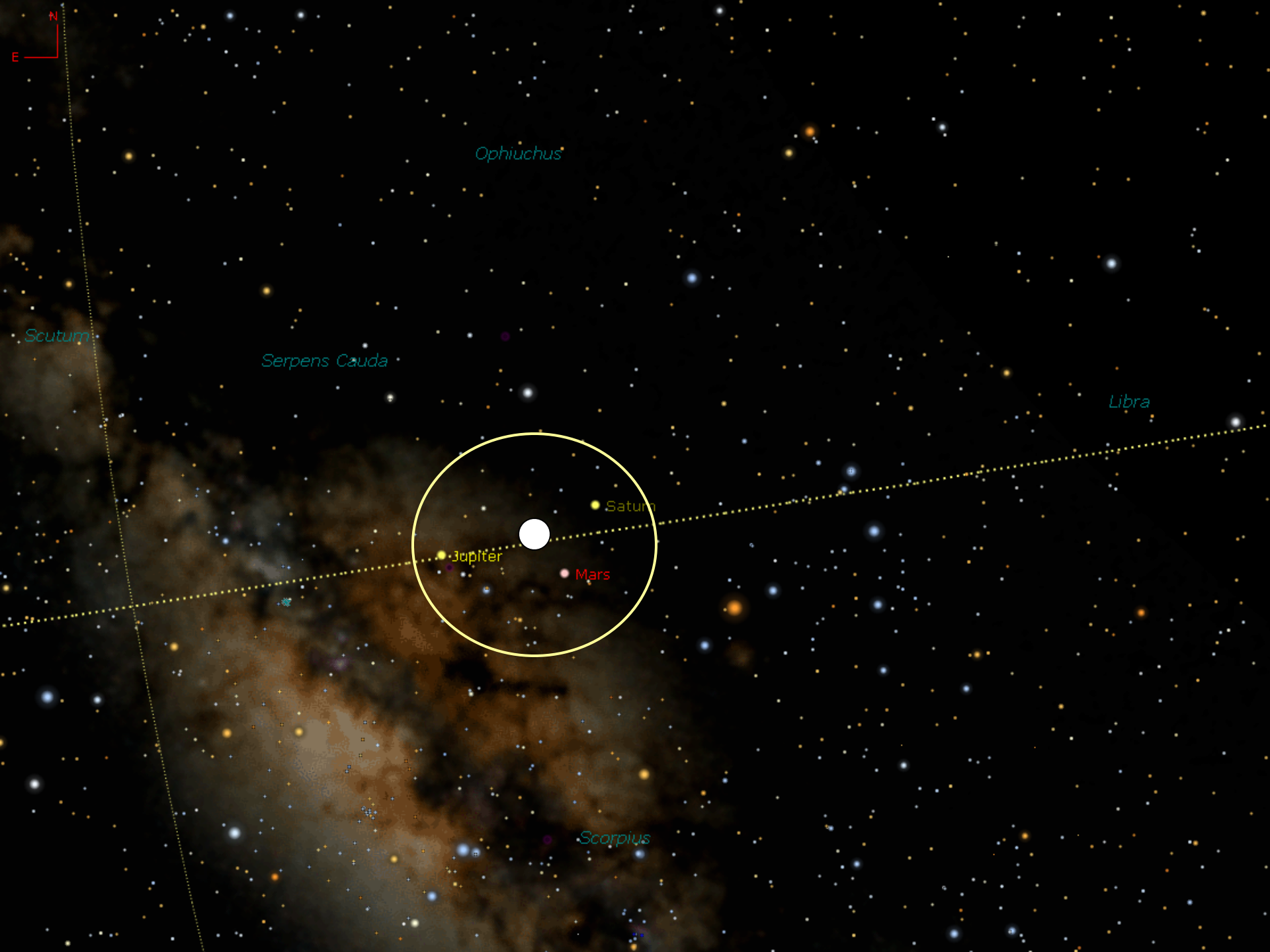
Saturn

Jupiter

Mars

Scorpius

followed, the next day, October 10, 1604,
by



Ophiuchus

Scutum

Serpens Cauda

Libra

Saturn

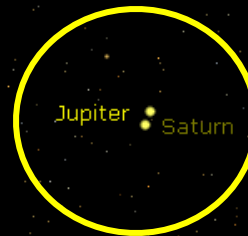
Jupiter

Mars

Scorpius

- Kepler deduces that a Jupiter-Saturn conjunction followed by a massing of Jupiter-Saturn-Mars produced a new star
- he is able to calculate that a conjunction of Jupiter and Saturn occurred in 7 BC, followed by a massing of Jupiter-Saturn-Mars in 6 BC

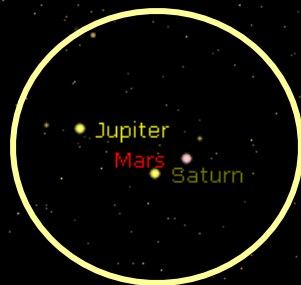
Dec. 4 -- 7 BC



• Uranus

followed by a planetary
“massing”

Feb. 6 BC



• Uranus

• Mercury

in Pisces

- Kepler concludes that this triple conjunction and massing produced a new star in 6 BC, just as the conjunction and massing in 1603-1604 produced a new star
- the new star formed in 6 BC was the Star of Bethlehem!
- Kepler begins a cottage industry of explaining the Christmas Star!
- but was he correct?

	comet	meteor	nova supernova	planetary conjunct.	
a “star” (astera)					
magi to Jerusalem					
birth of a king					
saw star in the east					
star appears suddenly					
Herod did not see it					
long duration with gaps					
star led them S to Beth.					
stopped at Bethlehem					
6-4 BC					

	comet	meteor	nova supernova	planetary conjunct.	
a “star” (astera)				no	
magi to Jerusalem				yes?	
birth of a king				yes?	
saw star in the east				yes	
star appears suddenly				no	
Herod did not see it				no?	
long duration with gaps				no	
star led them S to Beth.				no	
stopped at Bethlehem				no	
6-4 BC				yes 6 BC	

	comet	meteor	nova supernova	planetary conjunct.	
a “star” (astera)				no	
magi to Jerusalem				yes?	
birth of a king				yes?	
saw star in the east				yes	
star appears suddenly				no	
Herod did not see it				no?	
long duration with gaps				no	
star led them S to Beth.				no	
stopped at Bethlehem				no	
6-4 BC				yes 6 BC	

planetary conjunction also ruled out by use of term astera (singular)

2	légonτες λέγοντες, <u>3004</u> Saying,	Poù Ποῦ <u>4226</u> Where	estin ἐστίν <u>2076</u> is	ho ὁ <u>3588</u>	techtheís τεχθεῖς <u>5088</u> he that is born	basileús βασιλεὺς <u>935</u> King	toón τῶν <u>3588</u> of the	loudaíoon Ἰουδαίων; <u>2453</u> Jews?		
	Eídomen εἶδομεν <u>1492</u> we have seen	gár γὰρ <u>1063</u> for	autoú αὐτοῦ <u>846</u> his	tón τὸν <u>3588</u> star	astéra ἀστέρα <u>792</u>	en ἐν <u>1722</u> in	teé τῇ <u>3588</u> the	anatoleé ἀνατολῇ <u>395</u> east,	kaí καὶ <u>2532</u> and	eélthomen ἦλθομεν <u>2064</u> are come

astera ~ a star: (1) singular (one star); (2) fixed, not moving

#6 -- a miracle



- Saint John Chrysostom of Antioch
- ~ 400 AD
- believed the Star was miraculous
- "How then, tell me, did the star point out a spot so confined, just the space of a manger and shed, unless it left that height and came down, and stood over the very head of the young child? And at this the evangelist was hinting when he said, *Lo, the star went before them, till it came and stood over where the young Child was.*"

	comet	meteor	nova supernova	planetary conjunct.	miracle
a “star” (astera)					
magi to Jerusalem					
birth of a king					
saw star in the east					
star appears suddenly					
Herod did not see it					
long duration with gaps					
star led them S to Beth.					
stopped at Bethlehem					
6-4 BC					

	comet	meteor	nova supernova	planetary conjunct.	miracle
a “star” (astera)					YES
magi to Jerusalem					YES
birth of a king					YES
saw star in the east					YES
star appears suddenly					YES
Herod did not see it					YES
long duration with gaps					YES
star led them S to Beth.					YES
stopped at Bethlehem					YES
6-4 BC					YES

	comet	meteor	nova supernova	planetary conjunct.	miracle
a “star” (astera)					YES
magi to Jerusalem					YES
birth of a king					YES
saw star in the east					YES
star appears suddenly					YES
Herod did not see it					YES
long duration with gaps					YES
star led them S to Beth.					YES
stopped at Bethlehem					YES
6-4 BC					YES

a miraculous light ...
visible only to a few

Shekinah Glory

Exodus 40:34-35: “Then the cloud covered the tabernacle of meeting, and the glory of the LORD filled the tabernacle. And Moses was not able to enter the tabernacle of meeting, because . . . the glory of the LORD filled the tabernacle.”



Star of Bethlehem	Shekinah Glory
<p>“...and the star they had seen in the east <u>went ahead of them</u> until it <u>stopped</u> over the place where the child was.” Matthew 2:9</p>	

Star of Bethlehem	Shekinah Glory
<p>“...and the star they had seen in the east <u>went ahead of them</u> until it <u>stopped</u> over the place where the child was.” Matthew 2:9</p>	<ul style="list-style-type: none">• By day the pillar of cloud did not cease to guide them on their path, <u>nor the pillar of fire by night to shine on the way they were to take.</u> <i>Nehemiah 9:19-20</i>• Then the LORD appeared at the Tent in a pillar of cloud, <u>and the cloud stood over the entrance to the Tent.</u> <i>Deut. 31:15</i>• Then the Egyptians will know that I am the LORD, when I am honored through Pharaoh, through his chariots and his horsemen." And the angel of God, who had been going before the camp of Israel, moved and went behind them; <u>and the pillar of cloud moved from before them and stood behind them.</u> <i>Exodus 14:18-20</i>

Luke 2:9

And there were shepherds living out in the fields nearby, keeping watch over their flocks at night . . . and the glory of the Lord shone around them

Luke 2:9

And there were shepherds living out in the fields nearby, keeping watch over their flocks at night . . . and the glory of the Lord shone around them



view	characteristics	what was the star?
secular science	<ul style="list-style-type: none"> no God scripture not inspired 	<ul style="list-style-type: none"> myth naturalistic explanation i.e., comet, meteor, nova, planetary conjunction, etc.
Christian view #1	<ul style="list-style-type: none"> God exists scripture is reliable but no plenary inspiration proof-texting/eisegesis allowed can disregard some clues in scripture regarding the meaning of the star 	<ul style="list-style-type: none"> comet, meteor, nova, planetary conjunction, etc.
Christian view #2	<ul style="list-style-type: none"> God exists plenary inspiration of scripture no proof-texting/eisegesis must consider ALL clues in scripture on the meaning of the star 	<ul style="list-style-type: none"> no naturalistic explanation only explanation is a miracle-- the Shekinah Glory of God (God's presence pointing to the one who would be called Emmanuel, "God with us")



The Star of Bethlehem